IPCC WGI SR15 Second Order Draft Review Comments And Responses - Summary for Policy Makers

Comment No	From Page	From Line	To Page	To Line	Comment	Response
2460					The SPM is very long and contains material not essential to the decisions facing policymakers. A shorter, more focused SPM probably would be more useful and more effective. The SPM does not need to cover every topic addressed in the underlying report. Consider limiting the SPM to statements relating to 1.5oC. If comparisons to 2oC are necessary, consider a blanket statement to the effect that except where specifically noted the impacts of 2oC are worse. [Erik Haites, Canada]	Partially taken into account: the revised draft has been shortened and the language clarified. Comparisons to 2°C is within the mandate of the special report and so is included.
4414					This is too long for policymakers to understand. Should focus on information policymakers must know in decision makings. [Mitsutsune Yamaguchi, Japan]	Noted - the revised SPM draft has been shortened and the language clarified.
4416					In most of figures, characters are so small and unable to read (ex. Figures SPM 2, 3, 5, 7), and so much information is included in one figure (ex. Figure SPM 2, 3, 4, 5, 7). I don't think policymakers understand all messages provided in a figure. Make them simple. [Mitsutsune Yamaguchi, Japan]	Taken into account - figures have been revised and simplified where possible
4418					Cost information is almost completely lacking except for Marginal Abatement Cost for only 2050 (p. 21, lines 22-23). In addition no absolute figures of MAC are shown in SPM (it says only MAC are 3 to 7 times higher compared to 2 degree in 2050). Whereas, in Table SPM.2 (p. 15) and Figure 6.21 (p. 450) in AR5/WG3, there are plenty of information on costs, including consumption and GDP losses and carbon prices in 2030, 2050 and 2100. Cost information is one of the critically important and policy relevant information for policymakers and one of the indexes to judge feasibility of targets and policies. From this persepective, current information on cost is quite poor and it will be impossible for policymakers to evaluate 1.5 degree target. Judging from Figure 6.21 of AR5/WG3, carbon price in 2050 for 2 degree is around $100 in 2030 and more than $1000 in 2100. Policymakers should make their decisions based on absolute figures of costs. Therefore costs of carbon price, as well as consumption and GDP losses in 2030, 2050 and 2100 both for 1.5 degree and 2 degree should definitely be shown in SPM. Of course, it will be necessary to add that the calculation of costs are based on uniform carbon tax, availability of all technologies and immediate participation of all countries, and therefore actual cost will be much higher. Or add caveat after cost description of SPM the same woeding as shown in p.70, lines 31-33 of Chapter 4, i.e. "--- most economic models assume least-cost planning, no market imperfections, no decision-making uncertainty and compensating transfers for the adverse distributional effects of higher energy prices. All of these assumptions are challenged in policymaking processes". [Mitsutsune Yamaguchi, Japan]	Taken into account - costs have been included in bullet points D2.1, D3.2, D5.1, C2.1, and pricing has been included in bullet D2.2
4420					No quantitative difference of impacts between 1.5 degree and 2 degree are shown. Though everybody knows it is very hard to show impact in monetary terms, any quantitative comparison, even if it is not monetized, is absolutely necessary for policymakers. Under current SPM, it will be almost impossible for policymakers to make decision with very few mitigation cost information and no quantitative information on damages. [Mitsutsune Yamaguchi, Japan]	Taken into account - text has been revised to compare between 1.5 and 2°C where possible. Bullets on costs have been expanded.
4422					Shortened edition os sentences in lines 12-15 in Chapter 1 should be inserted at the beginning of SPM. [Mitsutsune Yamaguchi, Japan]	Taken into account - stabilization and net-zero emissions has been included in the revised section A of the SPM
4424					There are many descriptions of overshoot. What matters for policymakers are the extent of temperature overshoot and the period of overshooting. Those information should be added in the text. Figure SPM.1 provide a few information on these points, but it should be clearly described in the text. And even though temporarily exceeding scenario is defined in Chapter 1 (pp.21-22), expression "allowing an exceeding duration of at most a few decades" are so vague and there is no description of the extent of overshooting temperature. [Mitsutsune Yamaguchi, Japan]	Partially taken into account - Descriptions of overshoot have been refined where possible, for example, differentiating between limited and high overshoot.
4426					In Figure SPM 2, explanation of what KR I, KR ii ----- mean is missing [Mitsutsune Yamaguchi, Japan]	Accepted - the figure has been revised
4428					Though there are many descriptions of equity, fairness and SD. Why there is no comments on competitiveness? [Mitsutsune Yamaguchi, Japan]	Taken into account - Competing demands has been added into BP C3.3
5886					The figures overall are far too complicated in current form to be accessible to the target audience. Significant efforts to simplify all graphics would greatly aid readability in the final draft. I'll make specific comments upon some of the graphics but feel it important to in addition flag this as being a general issue with the current SPM draft. [Peter Thorne, Ireland]	Taken into account - all figures have been substantially revised
5912					Many of the key findings are articulated without use of likelihood or confidence and are not at least obviously intended to be statements of fact. The lack of a confidence / likelihood based assessment potentially is problematic. Statements within the SPM should either be statements of fact or couched in confidence / likelihood language throughout to ensure a consistency in reader interpretation of your findings. [Peter Thorne, Ireland]	Noted. Due to the short timeline to revise the figures this was not possible before the next SPM draft but is TAI for the final government draft of the SPM
6010					the chapter repeats multiple times that the impact of a 2 degree global warming will be higher than the impact of 1.5 degree global warming, on all human and eco systems. Maybe this concept should be presented at the beginning of the chapter, together with the idea that the impact does not change linearly across temperatures (e.g. the difference between the impact of a 2.5 degree target and a 2 degree target is not the same as between a 2 degree target and a 1.5 degree target) [Sara Budinis, United Kingdom (of Great Britain and Northern Ireland)]	Noted
6966					The SPM should be as concise as possible and avoid any redundancy. [Klaus Radunsky, Austria]	Noted
6968					It is strongly recommended to use clear and simple language and not complex, long sentences that are difficult to communicate.. [Klaus Radunsky, Austria]	Noted

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6970					The SPM should be limited to robust findings that address the main topics of the report. Issues, that have not been well addressed in the report should not be addressed, even if those topics are very policy relevant, such as cost implications. It is expected that such information will be provided in the AR6, based on more comprehensive assessments. [Klaus Radunsky, Austria]	Noted
6972					Figures included in the SPM should be self-explanatory and simple. Complex figures should be disaggregated into the appropriate number of simple figures in order to facilitate communication. [Klaus Radunsky, Austria]	Noted - figures have been revised
9018					We think that the SPM in it's current form is too long and written in a too technical language. We will provide some suggestions on how to reduce the length of the SPM, but would acknowledge if the authors would put further efforts to reduce the length of the SPM. [Luxembourg]	Noted. The SPM has been shortened and the language clarified
9020					The Figures are always a key product of an SPM and are later on the most quoted parts of IPCC products. It is thus essential that figures are clear and self-explanatory. In the current draft this is however not the case for most of the Figures of the SPM. We strongly recommend to further work on the Figures and provide policy makers with easy to read figures. [Luxembourg]	Noted - figures have been revised
9022					In serveral sections the SPM contains assessments of non-climate drivers, which is out of scope of the report. Also because this is a special report on global warming of 1,5°C more focus should be put on the differences between levels of global warming between 1,5°C and 2°C and avoid statements that can be applied to every level of global warming. [Luxembourg]	Noted
9122					Both the SPM and Chapter 2 should have a clear and simple discussion of mitigation strategies for slowing climate change. The first major point is that there really are very few choices, so the SPM necessarily must be prescritive. There may be more choices as to how each strategy is implemented, but the basic necessary strategies for achieving either a 1.5 degree C or a 2.0 degree C target are quite simple, though the time frame for reaching zero GHG emissions will vary somewhat. First. the entire electricity supply system must be changed over to renewable energy sources as soon as possible, primarily to wind and solar, but battery and hydrogen and thermal heat storage will also be necessary. Perhaps in some regions a relatively small amount of biomass fueled electricity production will be appropriate, or geothermal, or tidal. This transition to renewables must occur for the entire existing electricity system, as well as for the rapid growth in electricity requirements that will likely ensue. Secondly, all fossil-fueled end-use technologies such as cars and building heating system, and industrial process energy, must be shifted to electricity technologies or hydrogen, as soon as possible. Perhaps some bio-fuel liquids will be needed for airplanes. Thirdly, the management of land for agriculture, forests, and biomass, must be revised to both reduce GHG emissions, as well as to achieve the SDGs such as eliminating hunger. To achieve 90 or 95% of needed climate change mitigation, even in 1.5 degree C pathways, that's all that is needed folks! There are few other choices to eliminate most GHG emissions. This is basically stated in section 4.2 of the SPM, except that it should clarify the fact that electricity sources must become 100% renewable, but this section should be moved up front in the SPM since it is so basic. These strategies need to be broken down into their components and outlined in the SPM and discussed at length in Chapter 2. But these strategies will cost a lot more per year to achieve than the report indicates, more likely in the vicinity of $9 trillion per year world wide as the Wolf, et.al. reference in Chapter 4 states, and they probably will need to be accomplished by 2040, if not sooner, given the shrinking carbon budgets described in Chapter 2. Thus, the traditional precautionary principle should convince policy makers to set the goal of achieving zero GHG emissions by 2035 if a 1.5 degree C non-overshoot pathway is desired, so that even if that goal is missed it is achieved by 2040. This implies that the SPM needs to discuss the continued relevance of the precautionary principle for establishing a fairly safe and certain pathway to either a 1.5 or 2.0 degree C goal. This implies that fossil-fuel producing countries will have to accept the fact that fossil-fuels will not be able to be produced after about 2035, or 2040 at the latest for the goals of the Paris Agreement to be achieved. Negative emissions technologies will likely prove to be too little and too late to rely on, and their use implies significant risks to the world's ecology, land-use patterns, and physical climate change impacts that would violate the precautionary principle. For example, one easy to understand risk of negative emissions technologies that should be described in the SPM is the irreversibility of the Greenland ice sheet. As it melts, raising sea levels, any additional melting due to an overshoot scenario cannot be reversed for a very long period of time, thus causing additional inundation of the world's dry land. Also, the "probability" and "likelihood" terms must be clearly defined as not representing real probabilities describing the world, but just distributional results from the ensemble of climate models. I am sure people have already completely mis-interpreted what there terms mean. We cannot know anything about the future probability of states of the actual climate system. Finally, the possible use of solar radiation management technologies should be eliminated from the report altogether, since they are not even scientifically verified as feasible in theory, without causing serious unintended consequences. These, too, would violate the precautionary principle. [Richard Rosen, Germany]	Partially taken into account - it is beyond the mandate of the IPCC to be policy prescriptive but efforts have ben taken to clarify the text where possible. Text on costs and transitioning have been strengthened in Sections C and D.
9124					The Grubler, et al, low energy demand scenario should be highlighted, even though it also assumed a 5% discount rate. But because the energy demand was so low, the high discount rate did not cause any significant amount of negative emissions technologies to be relied on in later years. [Richard Rosen, Germany]	Taken into account - SPM3 now portrays 4 archetype scenarios.

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9132					Generally, the figures in the SPM are impossible to read and understand. [Richard Rosen, Germany]	Noted - figures have been revised
9136					There are dozens of statements throughout the SPM, and other other chapters, that the impacts of risks of a 2.0 degree increase world are worse or greater than those in a 1.5 degree world. OF COURSE THIS IS TRUE! You don't need to say this more than once - for everything. This is silly to keep saying, and it undermines the analysis by making the authors sound so silly. The important question is how much worse for a particular impact is 2.0 versus 1.5 degrees. Say what is known. [Richard Rosen, Germany]	Taken into account - the text has been revised
16568					The graphs and figures SPM1 to SPM7 are not very self-explanatory and do not address the need to convey key messages to an audience consisting in policy and decision makers. The figures need either to be simplified, or, when that is not possible, be removed. For example SPM 7 has some good information in it but it is very dense. A clickable and interactive graphic of it online might help communicating its message. Most of the figures in this section could benefit from that type of interactivity. The suggestion here is to consider creating a web platform that presents the key recommendations and the important figures in an interactive way. [Valentin Foltescu, France]	Noted - figures have been revised
9134					Box SPM 1: Using 30 year averages to measure the temperature increase do not make sense when the temperature is rising quickly as in the last 30 years. So the current increase must be higher than 1.0 degrees by 2017, and other reseach articles have already claimed global average increases of 1.1-1.2 degrees C. This would be more consistent with the carbon budgets you calculate, because at 0.17 degrees per decade of further warming, this would total 1.44-1.54 degrees C in 20 years. An acceleration of the temperature trend would bring the world to 1.5 degrees by 2030, as the carbon budget indicates. Therefore, the current amount of warming must be more like 1.2 degrees or higher to be consistent with you carbon budget for 1.5 degree pathways. [Richard Rosen, Germany]	Noted: The reviewer is completely correct that using an average over the past 30 years would introduce a systematic bias in the estimate of the current level of warming under conditions of sustained warming. Hence, in SR1.5, we define the current level of warming as the estimated average temperature of a 30 year period centred on the present, taking into account any short-term climate fluctuations and assuming that any current secular warming trend continues into the future. There are a number of ways of estimating this level of warming from observations of temperatures and information regarding past climate forcing. SR1.5 does not endorse a specific method, although figures 1.2 and SPM.1 use the method detailed in Haustein et al (2017) which is based on a simple regression of observed temperatures onto the expected responses to anthropogenic and natural climate forcing to date to estimate the current level of anthropogenic warming, providing the basis for the headline statement that human-induced warming has reached 1 degree, plus or minus 0.2 degrees, above pre-industrial levels, represented by the 1850-1900 period. Other methods of estimating the current level of externally-driven warming, such as that of Foster and Rahmstorf, are also assessed and provide very similar estimates because the total externally driven warming and total anthropogenic warming are very similar at present.
16570					Some of the most powerful key findings, or messages are lost in the vast amount of messages. The Summary for Policy Makers need to be shortened considerably and only consider what is essential to communicate in order to trigger enhanced climate action. [Valentin Foltescu, France]	Noted - The SPM has been shortened and the language clarified
16574					Some of the messages refer to non-CO2 as warming agents, without specifying that, while other messages refer to aerosols (which overall may have a cooling impact) as non-CO2. All messages referring to non-CO2 need to be scrutinized, to remove any ambiguity whether a warming or a coolling impact is expected from individual or multiple pollutants. Suggest also to include a box presenting the Drivers of Climate Change: CO2 and non-CO2, and also making the distinction which ones in the latter group are warming (e.g. methane, black carbon, etc) and which are cooling agents (e.g. sulphates orginated from sulphur dioxide). [Valentin Foltescu, France]	Taken into account - non-CO2 GHG no longer refer to solely warming and their effects have been included in SPM3 and section C1.3
17788					Special attention should be required to finish the report within 15 pages which was approved at the IPCC-44. [Republic of Korea]	Noted - The SPM has been shortened and the language clarified
19088					General comment on the whole report: The SPM as well as the chapters can benefit from adding information on how 1.5C relates to well below 2C. This includes when discussing relative impacts, efforts costs, benefits and opportunities for both mitigation and adaptation. Presently it is not always clear what the relative differences are. This includes implication of timing, to what extent for instance climate neutrality impacts temperature change in below well 2C scenarios also after peak temperature is achieved. The whole report misses also information that can provide information at regional scale, which seems needed to provide for policy relevant detail. [Andrea TILCHE, Belgium]	Taken into account - the text has been revised to compared 1.5°C to 2°C where possible
19090					General comment on charts: we understand the need to compress so much information in charts; however, they have become difficult to read and understand (more than the text itself). Perhaps charts could focus on & highlight only items with high evidence or high confidence. There is also contrast between the mostly readable text of the summary and the paragraphs accompanying the charts - highly technical. [Andrea TILCHE, Belgium]	Accepted - figures have been revised
19092					Using long sentences as headings makes it very difficult to navigate the content of the summary. Instead, concepts or short sentences could be used. [Andrea TILCHE, Belgium]	Accepted - The SPM has been shortened and the language clarified
19094					The idea of trade-offs with sustainable development goals versus synergies with them is not properly explained. At times different paragraphs seem contradictory. Perhaps a session should be devoted to this in the summary. [Andrea TILCHE, Belgium]	Noted

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19132					There is a general lack of consideration of the effect of decreasing emissions of (cooling) aerosols in the report in general. A prime example is the fairly narrow range of possible non-CO2 forcing considered in figure SPM-1 (lower panel). The upper range is a mere 0.1 Wm-2 increase in forcing relative to present-day despite the aerosol forcing being estimated to be in the range -0.1 to -1.9 Wm-2 in the IPCC AR5 ! If the aerosol forcing is -1.9 Wm-2 (and it could well be), decreasing aerosol emissions by half (a very plausible scenario in a highly-mitigated world) would result in a 1 Wm-2 increase in forcing alone. [Olivier Boucher, France]	Partially taken into account - non-CO2 GHG no longer refer to solely warming and their effects have been included in SPM3 and section C1.3
19354					In terms of the story of this report, there should be more balance: Yes, aiming at 1.5°C will take us to an uncharted territory. Nobody quite knows yet how to get there, and it won't be easy. But equally, nobody knows how to adapt to a world that would warm by 3°C or more - the path we're on. That's an uncharted territory too, and unfeasible. This balance is now missing and should be drawn from across chapters. [Jennifer Morgan, Netherlands]	Taken into account - adaptation has been strengthened in the new draft of the SPM, see sections D2, D3, D5 & D6
19362					The SPM should make it more clear that negative emissions, and in particular BECCS, is not a '1.5°C matter' only. The IPCC '2°C scenario', aka RCP2.6 contains massive amounts of negative emissions too - not because it's the only way to stay below 2, but because of the conservative model assumptions and logic: a technology fix, such as BECCS, is easier to model than disruptive and non-linear technology innovations, system transformations or behavior change. The choice between a faster transition to a clean, safe and smart energy system or relying on 'fairy dust' such as large-scale BECCS is relevant not only for 1.5°C but 2°C pathways too. [Jennifer Morgan, Netherlands]	Noted
19356					According to the introductory framing, the aim of the report is to compare 1.5°C and 2°C worlds. Such a narrow framing is not in line with the intent of the COP decision that invited this report, nor with the adopted outline, according to which the report was to compare impacts, risks and mitigation and development pathways compatible with 1.5°C compared with 2°C "and, where warranted by the literature, comparison with higher levels of warming". It would highly policy relevant to stick to the agreed outline and bring in comparison to plus 3°C warming and pathways too, given that the real choice policymakers are facing right now, as they prepare for the 2018 Facilitative Dialogue under the UNFCCC, is not between 1.5°C and 2°C but between 1.5°C/well below 2°C (i.e. the Paris goal) and plus 3°C (the current "mitigation pathway' we're on, according to the UNEP and others). [Jennifer Morgan, Netherlands]	Noted - the outline of the special report states to compare to higher levels of warming where present in the literature. This assessment has been done in the underlying chapter text of chapter 3 and in chapter 2. The SPM is focusing primarily on the differences between 1.5°C and 2°C
19358					The impression one gets is that 1.5°C pathways would be incredibly tough and require immediate and big transformations where as 2°C pathways would allow to delay action even by decades. This is very problematic and confusing, knowing that in reality, 1.5 and 'well below 2C' scenarios are very similar, and limiting warming TO 2°C was never an alternative anyway, but below, or since Paris: well below. It would be highly important to elaborate, in the SPM, how the 1.5°C and 2°C pathways, as they are defined in the report, relate to the Paris Agreement temperature goal of holding warming to well below 2°C, pursuing 1.5°C. For example, explaining what 50 % likelihood scenarios for 1.5°C would mean for the likelihoods of staying below 2°C would be helpful (with Table 2.5 in Chapter 2 being a possible source, and modified accordingly). [Jennifer Morgan, Netherlands]	Noted - the scale and speed of transitions required to limit to 1.5°C and 2°C has been strengthened in the latest SPM draft
19360					The SPM lacks a para that discusses the role & limitations of the IAMs in identifying what is possible and what not. IAMs play a big role in the report in defining what's "possible". Yet in reality, just because our current models can't produce or foresee something doesn't mean it can't be done. Many times it just means that the kind of transformations, disruptions and non-linear system changes that are required for 1.5°C - and that are already happening in the real world - are hard to model. And vice versa: technology fixes, such as large-scale BECCS, are easy to model, but it doesn't mean they can be done. It tells more about the models than the actual real-life choices policymakers are facing. It will be of crucial importanc to include an informative paragraph on this to the SPM. The last paragraph in the executive summary of the Chapter 2 (page 8, lines 12-17) provides a starting point, but needs significant improvement. Relevant findings on the limitations of IAMs are discussed, for example, in chapters 2.5.1.2; 2.6.1; 2.6.3, 2.6.4 and 4.2.2.2. [Jennifer Morgan, Netherlands]	Rejected - This kind of information is indeed interesting to know but neither specific to 1.5°C nor extremely novel. Given the space constraints and the remit of the SPM to report on new insights beyond the AR5, this specific issue has not been highlighted in the limited space available.
19364					The SPM lacks clear, actionable messages for policymakers, business & investors and other non-state actors incuding on fossil fuel phase out timelines, new fossil fuel developments and on risks of locking in high-carbon infrastructure or land-use. These should be drawn from the table 2.14 in Chapter 2: "Transitions and enabling conditions that need to take place in key sectors in the short term for a 1.5°C pathway, based on available studies." [Jennifer Morgan, Netherlands]	Taken into account - further clarification on timelines of transitions have been added to Section C3
29508					A shorter and more focused SPM on elements relevant aspects of 1,5°C, would help highlight the key messages of the special report. There are many repetitions between the separate sections which could be eliminated. [Italy]	Accepted - The SPM has been shortened and the language clarified
29510					Charts and graphs should be simplified. [Italy]	Accepted - figures have been revised
29556					The role of soil is somewhat missing in the SPM as it is important in terms of achieving SDGs but also both in adaptation and mitigation. For example agricultural soils have considerable carbon sequestration potential plus side benefits. Now in the SPM soil is only recognised connected with BECCS. [Finland]	Rejected - beyond the scope of the SR. Subject will be covered in the SR on Land assessment.

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31326					It is essential for IPCC to clearly state in SPM that "most of 1.5°C scenarios imply serious tradeoffs with other environment, economic, institutional and societal goals, hence it is very challenging". In chapter 2 ES of page 2-7 L49-53, it reads: "Options that lead to a removal of CO2 from the atmospheric face multiple feasibility constraints. Therefore, the scale and speed of implementation required in the 1.5°C pathways in Chapter 2 are challenging (high confidence)... face environmental, economic, institutional and societal constraints ". Here "challenging" is a very polite word, but very misleading as well. [Japan]	Taken into account - Synergies and trade-offs have been included in greater clarity in the revised SPM figures (now labelled SPM4).
31328					The amount of supplemental material and animation is significant and it might put a great strain on policy makers to read the entire report. We would suggest that IPCC should comply with the number of pages we agreed in the plenary where we agreed the outline of SR1.5 as well. [Japan]	Noted
31330					We would request to indicate the carbon price at 2020, 2030 and 2100, as these are indicated in AR5 in Chapter 6, and describe this information precisely in SPM because this is very relevant information for policy makers. (Relative information is in p.102 in chapter2, but not enough) [Japan]	Taken into account - costs have been included in bullet points D2.1, D3.2, D5.1, C2.1, and pricing has been included in bullet D2.2
31332					There are many descriptions about equity, fairness and SD. Why are there no comments on competitiveness? Also, concrete and careful definition should be described for "equity" so that the message of this repot, 1.5 degree target can't be achieved without all countries' efforts, be clear as pointed out in subsection 5.6.2.1(from 47page 16line to 47page 20line). [Japan]	Taken into account - Competing demands has been added into BP C3.3
31334					Parentheses, such as (i) or (ii) in the explanation of key risk categories (P12) should be put as (KR i) or (KR ii) to equalize to Figure SPM2 in P11. [Japan]	Taken into account - Figure has been revised for clarity and comprehension
31336					Regarding the description of the overshoot in this SPM, it should be described about the extent of temperature overshoot and the period of the overshoot. [Japan]	Taken into account - Revised bullet point A3.1 describes this
31338					Shortened edition on sentences in lines 12-15 in Chapter 1(Executive Summary 1-4) should be put at the beginning of SPM. [Japan]	Taken into account - stabilization and net-zero emissions has been included in the revised section A of the SPM
31340					Costs of emission reductions must be reported much thoroughly, show the costs in 2020 and 2030, not only in 2050. Costs are the major concerns for policy makers. Also the most important thing that is what policy makers need to know is about the mitigation cost and quantitative information on damages in the world of 1.5° C and 2° C. Since the information is insufficient, please add this information. [Japan]	Partially taken into account - costs have been included in bullet points D2.1, D3.2, D5.1, C2.1, and pricing has been included in bullet D2.2. Less literature available for 2020 and 2030 dates
31342					According to the decision paper on outline of SR1.5 in IPCC/XLIV, the number of pages of SPM should be up to 10 pages, including headline statements, tables, and figures. And we suggest that IPCC should comply with it. [Japan]	Taken into account - the text has been shortened
31638					Please specify the basis of the literature regarding Fig. 3.19, Fig. 3.23, FIg4.5, Fig 4.6, Fig. 4.7, Box 4.11, Fig. 4.8, Table 4.8, Table 4.9, Table 4.10, 4.11, Fig. SPM.2, Fig. SPM 3. It needs to be clearly indicated which articles are referred, and what is a level of agreement as well as evidence. In case of low agreement and limited numbers of supporting articles and/or evidence, please specify so with appropriate scale of confidence since IPCC rule reads the IPCC works by assessing published literature. [Japan]	Taken into account - figures have been modified and transparency enhanced. SPM3 has been removed from the SPM due to space restrictions.
32788					The underlying assumption is that there is a 1:1 correspondence between temperature and CO2 levels, so that by reducing CO2 levels the rise in temperature will be contained. This clearly isn't true. The spike in global temperatures from 2016-2017 was clearly linked to El Nino - it had nothing to do with CO2 or GHGs. There are also long-term temperature changes that are unrelated to GHGs - such as the recorded temperature rise from 1910 to 1940. Climate change is defined as the sum of anthropogenic and natural. A discussion is needed up front to reflect the uncertainty around the Paris temperature targets in the face of the natural component. [Philip Lloyd, South Africa]	Rejected. there is no such assumption of a 1:1 correspondence between temperature and CO2 levels in the Special Report. The role of Natural Variability is considered.
32790					The data source for the observations given in SPM Fig 1 is not cited. In view of the debate about the validity of the global temperature data (Wallace, J.P., D'Aleo, J.S and Idso, C.D. 2017 On the Validity of NOAA, NASA and Hadley CRU Global Average Surface Temperature Data Abridged Research Report https://www.google.co.za/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&cad=rja&uact=8&ved=0ahUKEwjO8eXp37TZAhVKLcAKHSO6D4IQFggoMAA&url=https%3A%2F%2Fthsresearch.files.wordpress.com%2F2017%2F05%2Fef-gast-data-research-report-062717.pdf&usg=AOvVaw2Xyet3sQrw1fb57O6C6Ze8) it is very necessary to cite the source. The three main source of this data seem to be contaminated by undocumented adjustments, which leads to the conclusion that "the three GAST data sets are not a valid representation of reality" . [Philip Lloyd, South Africa]	Rejected - Traceability to the data used in SPM1 is through the section callouts of the SPM (namely BP 1.1.1). The data used in SPM1 is clearly cited in chapter 1 of the report page 16 Figure 1.2. Additionally, blogpost suggested for inclusion is not supported by the peer-reviewed literature.
32792					SPM Fig 1 shows a yellow line "Human-induced temperature change". One has to read the caption carefully to discover that this is just one estimate (with no reference to source). It is also an estimate probably made by tuning a GCM model to match historical data, and it is necessary to know what assumptions were made in the modelling process, whence the need for a citation to the origin of this estimate. [Philip Lloyd, South Africa]	Rejected - Traceability to the data used in SPM1 is through the section callouts of the SPM (namely BP 1.1.1). The data used in SPM1 is clearly cited in chapter 1 of the report page 16 Figure 1.2.
36348					Table SPM 1 needs to be modified to include the total carbon budget, an additonal column must be inserted that shows the total carbon budget since pre-industrial times in addition to the future available carbon budget. [India]	Not applicable - the table has been removed
36904					Figures SPM 2-7: The figures are too complex, and fails to give the messages clearly. They should be simplified. [Keigo Akimoto, Japan]	Taken into account - the figures have been revised.
36964					Much better now with the summary! Very helpful [Mats Winroth, Sweden]	Noted

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41272					One of important points of this Special Report should be whether there is some threshold between 1.5deg.C and 2.0deg.C in terms of impacts, or they just increase linearly. Statements from this point of view should be added in SPM, since they are missing in the current draft. [Michio Kawamiya, Japan]	Taken into account - thresholds have been incorporated into BP 3.2 of the revised SPM
41274					In the present SPM, SPM-2 is on impact assessment and SPM-3 on socio-economic scenarios, while in the main text Chap.2 is on socio-economic scenarios and Chap3. on impact assessments. I think it would be reader-friendly if SPM-2 and SPM-3 were exchanged so that they appear in the same order as in the main text. [Michio Kawamiya, Japan]	Rejected - SPM structuring / ordering will not be changed.
43726					References in review of the whole report (see above). Additions are [in square brackets]. Summary the end [Peter Carter, Canada]	Noted
44654					The author team may wish to consider adding the statement in Chapter 2, page 2-5, lines 7 to 9 on how uncertainties in the Earth system are expected to reduce the carbon budget to the appropriate place in the SPM, with a brief discussion of the implications if possible. [Penny Urquhart, South Africa]	Accepted - now included in C1.2
46100					The SPM runs the risk of -unintendendly- sending the message that reaching 1.5C is very difficult (technically, practically and in terms of governance) and therefore expensive, compared with less ambitious targets and also compared with 2C. And at the same time the potental benefits in terms of reduced risks from climate change impacts are in most cases small and very uncertain - at our current level of knowledge. To a certain extent this is not justified from the assessed literature, see the examples presented in the next section of the SR, and which is relatively young and scanty. The inadequte presentation may unduly discourage the pursuit of climate change ambitions as formulated in the Partis Agreement. [Netherlands]	Noted
46102					The figures in the SPM are too complex. We suggest to include a clear figure for each key message, which can easily be understood and is usable for presentations. We recommend the involvement of the (IPCC) communication experts [Netherlands]	Taken into account - the figures have been revised.
43858					SUMMARY The only option and imperative is the immediate rapid global emissions decline which is readily feasible, to prevent the collapse of global forests and land ecosystems, the oceans, world agriculture and civilization. The world is committed (constant composition) to at least 2.0°C equilibrium warming (IPCC AR5). The change of equilibrium warming limit to a limit only to 2100 is terribly unethical as well as unscientific. It's the only option to prevent runaway carbon dynamic (IPCC TAR) of multiple inter-reinforcing carbon feedback emissions. It's the only option to prevent passing multiple cascading planetary tipping thresholds. It is also the only option to prevent the displacement of 100s of millions, and deaths of many tens of millions of people over future decades and prevent the worst mass exitinction event ever. It is the only ethical option. All fossil fuel energy must and readily can be replaced by 100% clean renewable zero-combustion energy. Actual emissions of CO2, methane and nitrous oxide must drop to near zero (IPCC AR5). There is a so-called allowable carbon budget left to burn. The Report relies heavily for mitigation on the most undesirable, unethical, unnecessary and unfeasible measures (for over 100 years), which are fossil fuel CCS, biofuels, biomass energy combustion, and BECCS. The latter 3 will add further to crop and biodivesity losses. CDR can be achieved ethically and sucessfuly by regenerative agriculture, afforestation, and DAC, providing emissions imediately and fast to minimize CDR requiremen.t [Peter Carter, Canada]	Noted
44040					While the SPM condenses very acurately the potential threats of climate change even under a 1.5 C trajectory and compared to a 2C trajectory until 2100, it misses to say in many places that warming (considerably) greater than 2C - the pathway the world is on today based on the NDC - significantly worsen the already implied impacts of 1.5C and the higher risks for a "runaway" and non-reversible climate change scenario. The SPM misses out to to say upfront in the chapeau that meeting the Paris temperature objectives is sort of a moral imperative for the world to meet basic survival needs of poor countries, vulnerable communities, ensure food security and limit damage on nature/biodiversity. This is the background and basic reason why the 1.5C objective was enshrined in the Paris agreement by the parties to the UNFCCC and why the IPCC had been "commissioned" to execute this exercise. Despite good text in some instances, it lacks sentences on the strong and condensed findings in chapter 2 in particular that full decarbonistaion of the energy sector by mid-century, mainly with renewables and based on strong energy efficincy and conservation, though certainly a large challenge, is technically feasible and economically overall beneficial when accounting for external costs of acrbon and air pollution that still kills millions of people from the use of fossil fuels. [Stephan Singer, Belgium]	Taken into account - text has been revised to show non-uniform nature of warming in BP B1.2. Thresholds have been considered in BP 3.2. A BP on the energy sector is now found in section C3.2
44042					Despite good text in some instances, SPM lacks sentences on the strong and condensed findings in chapter 2 in particular that (almost) full decarbonistaion of the energy sector by mid-century, mainly with renewables and based on strong energy efficincy and conservation, though certainly a large challenge, is technically feasible and economically overall beneficial when accounting for external costs of carbon and air pollution that still kills millions of people from the use of fossil fuels. The text fails to highlight that based on most recent findings and in combination with (almost) full decarbonistaion of the energy and industrial emissions sector, a net-zero situation by latest 2050 is necessary to have a decent chance to meet the temperature objectives of the Paris agreement. [Stephan Singer, Belgium]	Taken into account - BPs on the energy sector and modelled transitions can now be found in section C3.2, 3.4, 3.5

Comment No	From Page	From Line	To Page	To Line	Comment	Response
46098					The summary is much too long for policy makers. The conclusions are generally very qualitative in nature and imprecise lacking quantitative specification. The report should be clearer on the need for negative emissions and the implications if these cannot be realised. The SPM focuses on the impacts of 1,5 and lacks the relevant information on additional costs and potential additional benefits of an 1,5 degree strategy compared to a 2 degree strategy. There is too limited attention for the potential of demand side options for reduction GHG emissions, including material substitution,dietal and behavioural change change. It is also unclear to what extent mitigation potentials are based on reductions with existing technologies or on technologies that still require innovation. [Netherlands]	Taken into account - text has been redrafted, shortened and language has been made more clear. Cost have been included in BPs C2.1, D2.1, D3.2, D5.1, and demand side measures are covered in C1.3, C2, C2.3, C3.2, C3.3, C3.5 and SPM3.
46256					The report mentions several times that countries lack the capacity to deal with impacts. However, there is little mention of the link between good management and good governance and the possibility to limit impacts of climate change. Bad environmental governance enhances vulnerability and this also enhances the vulnerability to climate impacts. [Netherlands]	Taken into account - The role of Governance has been incorporated into BP D6.4
48304					Analyses with dynamic global vegetation models seem to arrive at consistently lower numbers than land-use models in IAMs when confronted with similar land-use change (Krause et al., Large uncertainty in carbon uptake potential of land-based climate-change mitigation efforts, GCB, accepted DOI: 10.1111/gcb.14110). The reasons for the discrepancies in carbon uptake potential calculated with IAMs and DGMVs are currently not fully resolved. [Josef Settele, Germany]	Noted - but a more thorough assessment of these methods will be conducted in the special report on Land.
49000					In line with the statement in SPM 1.2 that emissions reductions are needed for all sectors, the SPM would benefit from a table that lays out a number of sectors in which action is needed, both for mitigation and adaptation, along with relevant sustainable development implications of those actions and, as appropriate, mitigation potential. This could build upon and elaborate Table SPM 2 on page SPM 21. [David Waskow, United States of America]	Rejected. Due to space restrictions the table has not been developed however several BPs in Section C3, D3, D4, D5 highlight transitions for different sectors.
49330					Storyline is there and much clearer. However, more sharper messages are needed especially on solutions and actions [Joyashree Roy, India]	Noted
49572					General observation for SPM: the assessment lacks systematics with regard to pathways compatible with the 1.5° target without overshood and pathways that stay witin 1.5° only after an overshoot period. The two need explicit and clearer treatment. [Karlheinz ERB, Austria]	Taken into account - clearer distinctions between overshoot and non-overshoot have been made where possible.
51138					Heck et al. 2018 Biomass-based negative emissions difficult to reconcile with planetary boundaries, Nature Climate Change 8, 151-155 argues that in order to remain within safe planetary boundaries, in particular with regard to freshwater use, biogeochemical cycles, land-use change and biosphere integrity, less than 0.1GtC/yr CDR could be realised via BECCS. Given the SDG context of the present report, IAM scenarios that rely on excessive CDR (>200 GtCO2) should be excluded from consideration as the social, ecological, political, economic and ethical risks and adverse impacts of their technology deployment assumptions make them fundamentally incompatible with sustainable development. [Linda Schneider, Germany]	Taken into account - Heck 2018 has been included in the assessment in chapter 2 and 4. The synergies and trade-offs of using land-based mitigation are also summarised in SPM figure 4
51160					There are scenarios that limit end-of-century warming to below 1.5°C that do not, or only to a very limited extent, rely on CDR: Holz et al. 2017, Grubler et al. 2017, van Vuuren et al. - they should be highlighted as the by far most desirable 1.5 pathways - rather than withheld. And again, if 25-85% of CDR is to compensate emissions from sectors for which no mitigation measures have been identified, the more useful approach would be to explore additional (e.g. demand-side) measures for eliminating such emissions, rather than relying on high-risk CDR technologies that may never materialise due to technical, ecological, social, political, economic, ethical and geophysical infeasibility (particularly not in the order of >300 GtCO2!) Given the SDG anchoring of the present report, and the fundamental SDG incompatibility of many proposed CDR technologies (Dooley/Kartha 2018, Int Environ Agreements), especially at larger scale, assuming CDR at an order of 400-1100 GtCO2 borders on the insane and is clearly no realistic SDG-compatible option. It is also a very poor scientific quality to neglect the manifold uncertainties and adverse impact associated with CDR technologies and, to the extent that they are identified in other chapters, to continue relying on them for 1.5 pathways regardless. [Linda Schneider, Germany]	Taken into account - literature has been assessed in the underlying chapters. SPM Figure 3 has been revised to highlight the different 4 architype pathways of limiting to 1.5°C warming, including one that has no reliance on BECCS
51166					It is crucial to highlight that there are safer and more sustainable ways of removing CO2 from the atmosphere than through technological means. According to Dooley/Kartha (2018), an amount of 370-480 GtCO2 could be removed through forest ecosystem restoration and, to a lesser degree, reforestation. Other ecosystem restoration, such as moors and peatland, can achieve additional CO2 removal. Such ecological options are low- to no-cost, ready to be deployed, tested and proven, safe, provide for adaptation co-benefits and allow for livelihoods, food and water security to be sustained. Given the SDG context of the present report, these options should receive great attention. [Linda Schneider, Germany]	Taken into account - afforestation/reforestation has been included in the redrafted bullets of C2.1 and C2.3
51182					The potential of redestributive policy measures for alleviating risks, but also for obtaining adequate financial resources to finance mitigation and adaptation, should be much more explored. [Linda Schneider, Germany]	Taken into account - D6.1 & D6.2 now states the importance of finance mechanisms
51292					In the entire pdf report, consective words are mixed together at several places. It is suggested that the final writeup may be fixed accordingly. [Muhammad Latif, Pakistan]	Editorial
54152					I think a clear defintion of "risk" should be included to the benefit of the PMs. [Ayman Bel Hassan Cherkaoui, Morocco]	Taken into account - Risk has been included in a definitions box in the new SPM draft
54338					Thank you for the SOD report and the impressive amount work done in syntesising the knowledge. Thank you also for the SPM FOD that is certainly a good start. [Estonia]	Noted

Comment No	From Page	From Line	To Page	To Line	Comment	Response
54340					The SPM needs to be shorten and clearer and less technical language used. The figures used could be more easilily accessible. For example the Figure 1 is an important figure, but needs 30 minutes at least to understand what exactly is presented in it. [Estonia]	Taken into account - text has been shortened and made more clear. Figures have been revised for clarity and comprehension
54342					Throughout the SPM the statements need to be checked and quantified (where possible) and repetitions removed. For example the statement on page 21 lines 21-14 that limiting warming to 1.5°C is 3-7 higher compared to 2°C needs to have the cost numbers also presented. (This is an important statement and needs to included to the highlevel messages). And how would melting permafrost change the mitigation effots and costs? [Estonia]	Taken into account - costs have been included in bullet points D2.1, D3.2, D5.1, C2.1, and pricing has been included in bullet D2.2. The text has also been shortened and made more clear
54344					The pink boxes at the beginning of each of the subsections could be brought together to form the highlevel messages. Many of them seem to be repetitions of the text that follows and in many cases also have the same length to these. [Estonia]	Noted
54882					All SPM figures: recommended that all figures have a clear title, placed at the top of the figure. This will provide helpful context to guide reader's comprehension of the figures. Currently Figure SPM3, Figure SPM 4, Figure SPM5 include titles at the start of the figure, but other figures do not. [Jordan Harold, United Kingdom (of Great Britain and Northern Ireland)]	Taken into account - figures have been revised to include these suggestions
54884					All SPM figures: the comments that I have provided in this review aim to support refinement of the drafted figures to ease their comprehension. However, it is recommended all figures are tested with the audience to check ease of comprehension. Where comprehension issues are identified in testing, it may be that figures need refinement or that alternative representations (but which are informationally equivilent) be explored. [Jordan Harold, United Kingdom (of Great Britain and Northern Ireland)]	Taken into account - figures have been revised to include these suggestions
55806					SPM is lacking the mitigation and adaptation options, including their assessments and the assessment figures which can help give more clarity to the linkages to the SDGs, which are based on mitigation options. The SPM seems to focus more on the enabling environment than on the options themselves, when there should be equal attention to both. [Debora Ley, Guatemala]	Taken into account - specific bullet points on adaptation have been incorporated (B4.2, B6, D4.1, and D3)
55836					The SPM needs to be more balanced between mitigation and adaptation. Adaptation is almost always linked with SDGs (with is true they have synergies), but also need to show the different options and assessments and how they compare (assessment figures of Ch. 4). These figures include axis for costs and scalability which can help decision-making. [Debora Ley, Guatemala]	Taken into account - specific bullet points on adaptation have been incorporated (B4.2, B6, D4.1, and D3)
55838					Besides the analysis of co-benefits and trade-offs between mitigation options and SDGs, the SPM can inlcude a table or at least a bullet indicating the synergies and trade-offs between mitigation and adaptation options. [Debora Ley, Guatemala]	Taken into account - specific bullet points on adaptation have been incorporated (B4.2, B6, D4.1, and D3)
55840					Some bullets/sentences/phrases are repeated exactly the same way several times in the SPM, making it repetitive. If it's necessary to repeat the bullet/sentence/phrase, I'd suggest to reword it as it looks as it's been copied and pasted. [Debora Ley, Guatemala]	Taken into account - repetition of statements has been removed
57120					The text of the SPM is too long to be read by policy-makers, and its high-level statements are very vague and general, and contain very few quantitative statements. Working more closely with the communication experts who are now part of the team of drafting authors could help improve the text for the next draft. [Jean-Pascal vany Ypersele, Belgium]	Taken into account - text has been shortened, made more focused and more clear.
57880					Overall the SPM needs to be much clearer about the alternative future mitigation options available to society, and the potential and need for transformative change and innovation in response to climate change. This could be achieved by ensuring a greater representation of all chapters and science summarised in the SR. Currently the SPM is very heavily reliant on Chapter 2, whereas other chapters present important caveats and policy-relevant considerations for the pathways presented in Chapter 2. It is important that Chapter 2 pathways are presented as input for wider discussion and democratic debate, rather than as defacto futures which become policy-prescriptive. [Kate Dooley, Australia]	Partially taken into account - text has been revised and shortened. Representation from all chapters is clearly found in the SPM
57882					The SPM includes a strong emphasis on biomass in the absence of adequate discussion of other mitigation approaches. As noted in specific comments on other chapters, reliance on biomass for mitigation may be currently overstated when environmental limits are considered (See Boysen et al (2017). The limits to global-warming mitigation by terrestrial carbon removal. Earth's Future, 5, doi:10.1002/2016EF000469; and Boysen, L.R., Lucht, W. & Gerten, D., 2017. Trade-offs for food production, nature conservation and climate limit the terrestrial carbon dioxide removal potential. Global Change Biology, 23(10), pp.4303–4317; and Heck, V. et al., 2018. Biomass-based negative emissions difficult to reconcile with planetary boundaries. Nature Climate Change, 10, p.105007). The assumption of carbon neutrality from biomass also needs further interrogation: See Schulze, E.-D. et al., 2012. Large-scale bioenergy from additional harvest of forest biomass is neither sustainable nor greenhouse gas neutral. GCB Bioenergy, 4(6), pp.611–616; and Booth, 2018, Not carbon neutral: Assessing the net emissions impact of residues burned for bioenergy, Environ. Res. Lett. 13 035001. [Kate Dooley, Australia]	Taken into account - Section C2 now focuses on CDR such as BECCS and bioenergy. Commenting on its use in scenarios, trade-offs, synergies and feasibility issues
57884					The carbon budgets in the SPM are 'defined' as starting on January 1, 2016. It should be made clearer that this is the remaining carbon budget, when anthropgenic emissions are looked at in entirety (from pre-industrial until a particualr temperature target peak). [Kate Dooley, Australia]	Noted

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57890					Giving power consumers the right to generate their own renewable power, at cost price is a simple way to prevent energy poverty, and promote energy democratic, and it si a way of regulations, together with the regulation that the grid should be a public road for power. This SPM should show politicians the opportunities THEY can grab, Europe just gave all Europeans the right to generate their own renewable power, Europe decided to give renewable power preference on the grid. These regulations enable citizens to generate their own power, and make mass consumer products very popular, because of their benefit, and create massive growth in renewable power. At competitive process. The SPM should address this opportunity to Policy Makers [Henk Daalder, Netherlands]	Rejected - it is beyond the mandate of the IPCC to be policy prescriptive.
58756					The report and SPM are only considering the downsides for 1.5 and 2°C. Are there any winners or benefits? [United States of America]	Rejected - the report assesses synergies as well as trade-offs of mitigation actions (e.g. revised figure SPM4). Additionally, positive impacts have been reported where stated in the literature within the chapter text however the findings of the assessment conclude that globally the negative impacts outweigh the positives. For example Ch3, Section 3.4.7.3, Projected risk at 1.5°C and 2°C.
58758					There is way too much information to make this a digestible SPM – particularly the later sections (4.4-4.9) where there is so much qualitative information. The presentation of much of this in figures might be a better approach than a long list of bullets. [United States of America]	Taken into account - the text has been revised and shortened.
58760					There are quite a few statements in the SPM that say an impact is worse at 2 than 1.5°C, without quantifying the effect. This seems almost too obvious to be stated. Some kind of quantification would be very useful anytime this statement is made, if possible. [United States of America]	Taken into account - quantification between impacts has been added where possible - as dependent of the literature
58762					Limit the redundant statements in the summary. For example, the concept that deep reductions in GHGs are required to meet the 1.5°C target is expressed multiple times in a very similar manner. While there are different subsequent statements in the bullets, one has the feeling of rereading this key message over and over and over, diminishing the value of the sub-bullets. [United States of America]	Taken into account - repetition has been removed in the new SPM draft
58764					Text-editing is needed. This is supposed to be a Summary for Policymakers, but the text and graphics are awfully complicated. Look at Figure SPM 1 -- depicting a critical topic but it really requires much careful examination and will not be understood by anyone except an expert. [United States of America]	Taken into account - text and figures have been substantially revised to improve clarity and understanding
58766					The SPM is 31 pages long, while the agreed outline specifies that it should be no more than 10 pages inclusive of tables and graphs. Shorten the summary to 10 pages to facilitate consideration by policymakers. Line-by-line comments point to a number of areas where duplicative text may be removed without a loss of content. [United States of America]	Taken into account - text had been shortened
58770					There is insufficient treatment of uncertainty throughout the SPM. Often policymakers' most important considerations are the drivers and magnitude of uncertainty. More thorough treatment would make the document more useful in decisionmaking. To name a few examples, the headline statement for SPM2 does not adequately convey regional uncertainties, the uncertainty in radiative forcing is not quantified, and the source of the wide range of CO2 removal estimates is unexplained. [United States of America]	Taken into account - revised text has a thorough assessment using IPCC uncertainty language
58768					Several statements imply greater impacts of climate change at 2 vs 1.5°C without sufficient empirical basis. It has been established by past IPCC reports that, as global mean temperature increases, impacts of climate change are expected to worsen. It would be useful for the authors to provide examples and specific descriptions and explanations of how an impact or various impacts are expected to worsen at 2 vs 1.5°C where this information exists. For example, how much worse or more frequent will droughts in the Horn of Africa be with a global mean temperature increase of 2 vs 1.5°C? Another example: Page 10 of the SPM, beginning on line 9, the authors state that the poorest will be most affected by an increase of 1.5°C. This concept does not apply only to 1.5°C, but to any increase in global mean temperature, any impact of climate change, and indeed any external shock whether natural, financial, health, or otherwise. The focus of this report, and this SPM, should be on assessing the knowledge of the differentials and critical thresholds for natural human systems in the 1.5 and 2°C global mean temperature increase scenarios. This is not what this report does now. As written, the report draft takes known information, whether from AR5 or newer literature, and simply extrapolates that, yes, it would be better to contain warming to 1.5 rather than 2°C because any half degree of warming will make things worse. This extrapolation in and of itself does not provide policymakers with any new or useful information to help inform policy decisions and subsequent action. The reader is left with the reaffirmation that less warming is better, which is already commonly understood and recognized. The report does a credible job indicating where information gaps specific to 1.5°C exist. However, the use of "expert judgement" or "revealed insights" confuses the reader as to what is actually known and proven, versus what is hypothesized as likely. A thorough scrub of the report must be made to clearly indicate to the readers what findings have an empirical basis and what findings are the opinion of the authors. [United States of America]	Partially taken into account - Section B has been revised to include more specific information on impacts at 1.5 and 2°C warming. This include regional focus where relevant. Partially rejected - it is beyond the mandate of the IPCC to conduct its own research (with respect to extrapolating results covered in AR5). the focus of this report was to provide an update from AR5 from the peer review literature and grey literature.
58772					Figure SPM 7 is very hard to read thus ineffective other than the caption that explains the wheel graphs. It has no value as a standalone visual reference. [United States of America]	Taken into account - figure has been revised and merged with figure 5.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
58774					The SPM could be shorter, or at least tighter and more focused. The most important points get lost. Create a smaller set of sharper key messages. [United States of America]	Taken into account - text had been shortened and the language edited for improved clarity
58776					This SPM seems challenged by competing purposes. Is it giving an overall assessment of 1.5°C, or is it articulating what we know that is specific to 1.5°C and not generic to pretty much every pathway to a temperature goal that requires mitigation. The SPM is filled with bullets that would apply to pretty much any pathway, but is more limited in bullets that actually provide insight that isn't generic. It might be useful for the authors to consider being more explicit about the things that are simply the way that these sorts of pathways work and those that are specific to 1.5°C. Perhaps it would be useful to explicitly split out these two types of themes so the reader can be reminded first about what is just standard stuff and then move on to what is specific to 1.5°C. [United States of America]	Taken into account - text has been revised to include more 1.5 and 2°C specific assessments
58778					One important issue that gets lost in all the complexity of the SPM is the feasibility of 1.5°C. There's a lot of information, but it's hard to discern that this is a very large challenge. It would be good to find a way to make this clearer. [United States of America]	Taken into account - feasibility has been more concretely assessed for the final draft of the main report and the next version of the spam. This now includes a multifactor assessment of the types of feasibility
58780					The comparison of 1.5 and 2°C could be strengthened. Many of the messages just say that, for example, impacts will be higher at 2 than 1.5°C. Policymakers do not need an IPCC special report to learn this. On the other hand, there are several messages that do have specifics on the differences, and this is important. Going forward, the authors might take a two-track approach to addressing the comparison to 2°C. First, it would be useful to have a table that tells us how well we understand the differences between 2 and 1.5°C – that is, how strong is the literature? How much certainty do we have? In which areas are differences discernible and in which areas are they not? Just knowing this would be useful. It seems as though the authors feel obligated to draw conclusions about the difference between 2 and 1.5°C when, in fact, the main conclusion to be drawn in many cases is that we do not have sufficient information to be able to articulate the differences in a meaningful way. Second, it would be useful to clearly articulate and bring out those places where there are clear differences. But the fact is that, in many cases, particularly with climate impacts, it is probably true that there is little information that would allow us to say anything more than the obvious that impacts are generally higher at 2 than at 1.5°C. [United States of America]	Taken into account - more specific comparisons between 1.5°C and 2°C have been strengthened where the literature allows.
58782					The material on carbon budgets is critical, including actual budgets and the possible ways to mention the budget. This is an important section to keep and polish. [United States of America]	Noted
58784					There is repetition of statements in different sections of the SPM. The document can benefit from streamlining and coordination across different sections, and looking for opportunity to make the document more concise. [United States of America]	Taken into account - repetition has been removed in the new SPM draft
58786					Needs major streamlining. Ws too much repetition and overly wordy for the information content. The streamlining should strive for the following goals: 1) reduce/eliminate repetition/redundancy, and 2) reduce weaker and nonessential material. Task an author with previous IPCC coordinating lead author experience with this assignment. Although this will take considerable effort, it will make the report more readable, reader-friendly, accessible, and hopefully more impactful. [United States of America]	Taken into account - repetition has been removed in the new SPM draft and the text has been revised for clarity
58788					The SPM (unlike Chapter 1) misuses the term "risk" in applying it to the physical climate (SPM-3/15), but does use it correctly where applied to impacts, to which it should be restrained (SPM-3/22). This problem is pervasive. Risk was never really quantified in AR5 and always involved impacts and vulnerability, it should not be used when likelihood or other statistical labeling is more appropriate. [United States of America]	Taken into account - risk has been included in a definitions box in the new SPM draft to avoid misunderstanding
58790					With over 30 pages, this SPM strays into the realm of AR6. A Special Report should be short and useful, perhaps less didactic in the SPM and with just some of the major issues. [United States of America]	Taken into account - text had been shortened and the language edited for improved clarity
58792					This summary needs to be revised from a long list of redundant bullet points to a shortened summary of key takeaways suitable for a policymaking audience. [United States of America]	Taken into account - text had been shortened and the language edited for improved clarity and purpose
58794					A filter should be applied to determine the type of findings to elevate to the SPM. For example, bullet points that describe the methodology of the authors or of the studies, or assumptions made by authors, should not be key findings. See page SPM-5 lines 8-9 and SPM-22 lines 19-20. [United States of America]	Noted
58796					Numerous bullet points repeat that impacts under 1.5 are less than under 2°C, but very little quantification is provided. There is little to no indication of how much less impacts under 1.5°C would be to that of 2°C. With so little specification, much of the repetition can just be deleted. [United States of America]	Taken into account - more specific comparisons between 1.5°C and 2°C have been strengthened where the literature allows.
58798					This SPM would be greatly improved by focusing only on where impacts between 1.5 and 2°C are significant, rather than repeating findings from AR5 on all impacts of climate change. Despite noting a lack of literature on this subject, the entire report drones on anyway, and is thus excessively long and repetitive. Removing redundancies within chapters, across chapters, and with the AR5 would significantly reduce length and improve readability and comprehension of the most important takeaways. [United States of America]	Taken into account - more specific comparisons between 1.5°C and 2°C have been strengthened where the literature allows. The text has also been made more concise and policy-relevant

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58800					There is excessive reference to synergies with the Sustainable Development Goals (SDGs). Such lengthy descriptions and repeated connections to policy topics is inappropriate for a scientific, technical assessment. SDGs should only be referred to in this report where there is peer-reviewed literature assessing impacts on, or relationship of, climate change to these policies. Effort should be given to refocus this text to the purpose of scientific assessment. As such, having three figures in the SPM focusing on SDGs (Figures SPM 5,6,7) is unnecesary. [United States of America]	Taken into account - Figures have been revised. One figure now focuses, more concisely and clearly, on synergies and trade-offs with the SDGs
58802					Careful review and consideration should be given to the levels of confidence, evidence, and agreement in these findings, as there are several instances of questionable assignments of uncertainty levels and inconsistencies across bullet points. For example, the key finding on page SPM-19 lines 26-29 provides a list of examples of areas of uncertainty in solar radiation management. This key finding is given a "low agreement" ranking. This implies the authors found low agreement that uncertainties exist, or that these examples are included in a list of such uncertainties. Either interpretation is questionable. [United States of America]	Taken into account - revised text has a thorough assessment using IPCC uncertainty language
58804					Be more specific in the language used in key findings. Many bullet points are missing key information, like the time period being considered (e.g., SMP-3 line 15-16), whether the increase in temperature is absolute or on top of what has already occurred (e.g., SPM-31 lines 25-27), or what the direction of impacts (adverse or beneficial) are projected (e.g., SPM-22 lines 12-13 or SPM-27 lines 34-36). For example, on page SPM-7, line 33, the text notes "An increased risk from hot days (10% of warmest days)" but neither explains whether this is an increase in occurrence (e.g., temperature experienced on days that are currently in the top 10% will occur more frequently) or magnitude (e.g., the top 10% hottest days will be hotter), nor quantifies how much the risk has increased. On page SPM-7, the key finding on lines 19-21 is very confusing, as it is unclear what time period is being referred to by the second half of the sentence: "during which time". The reader could assume "during which time" refers to 1991-2010 or that it refers to 1960-1979. However, the time period the authors most likely meant is 1960-2010, which is never referenced in the sentence. These findings are further confounded by significant grammar errors that alter the meaning of the sentences, odd or awkward phrasing (e.g,. SPM-19 lines 17-20), lack of examples (e.g., SPM-18 lines 9-11), poor wording choice (e.g., "include" or "involve" is often used in place of "require", like on page SPM-20 line 27; the word "synergies" is used to excess and often improperly), and generally confusing language. For example, on page SPM-24 line 5, the authors likely mean "lack of energy access" or "limitation to energy access" rather than just "energy access". [United States of America]	Taken into account - revised text has a thorough assessment using IPCC uncertainty language with great specificities included where relevant and available from the main chapter assessments. For example, great information on timeframes
58808					At 31 pages, the SPM is excessively long. There are numerous qualitative statements that are not necessarily specific to 1.5°C that could be deleted. [United States of America]	Taken into account - text had been shortened and the language edited for improved clarity and purpose
58810					The SPM should clarify if it is definiting carbon budgets consistently with previous IPCC (AR5) assessments, and how numbers presented in the SPM relate to AR5 cumulative carbon emission numbers estimated to be commensurate with 2°C. Furthermore, assumptions about historic emission estimates (a key factor determining remaining future cumulative carbon budgets) need to be clarified. [United States of America]	Taken into account - carbon budgets have been revised for clarity and the difference from AR5 highlighted
58814					The paragraph on p. 4-10 (lines 39-46) offers important conclusions, if valid (including that global emissions will need to move from ~50 GtCO2e/yr to net zero by mid-century). These should be considered for inclusion in the SPM and possibly in the high-level statements in SPM 1.2. [United States of America]	Noted
58816					A theme throughout the underlying chapters is the lack of information specific to 1.5°C. Yet the SPM reads as if there is no knowledge gap. The SPM could be improved by including a section with a list of research gaps collected from all of the underlying chapters. It is as important to inform policymakers about what we do not know as it is to inform them of what we do know. [United States of America]	Noted
58818					One statement from Chapter 5 that appears to be missing from the SPM is the lack of any evidence that higher mitigation ambition reduces the need for investments in adaptation. This concept should be explored in more depth within Chapter 5 and also highlighted in the SPM, if the statement is supported by a review of the literature. [United States of America]	Noted

Comment No	From Page	From Line	To Page	To Line	Comment	Response
58806					The SPM needs to be shortened so that it does not need its own Executive Summary; providing a decisionmaker a 30-page document to read would really tax the attention span of quite a number of leaders. There are five key points to make. (1) Both society and the environment, including the ecological services that the environment provides for the world's peoples, are already being significantly stressed by the 1°C increase in global average temperature and associated impacts that have already become evident, and there is high confidence that further warming will lead to much more disruptive consequences. (2) The consequences for society and the environment of an increase in the global average temperature to 1.5°C will be significantly greater than the consequences now being experienced, especially if this elevated temperature level is sustained and becomes the long-term increase in global average temperature that is considered acceptable. (3) There will be substantial benefits to the environment and society if the peak increase in global average temperature can be kept at 1.5°C rather than allowing it to rise to 2°C, even if it is much later brought back down to 1.5°C or lower. (4) Many of the consequences for society and the environment will be primarily determined by the peak increase in global average temperature that occurs, and thus overshooting of the 1.5°C target temperature, as will be inevitable if the Paris commitments are not very significantly strengthened, will result in very adverse and disruptive consequences for society and the environment. And (5) while it is very important to minimize the peak temperature increase, having the target long-term global temperature increase be as low as possible, preferably no more than 0.5°C above preindustrial, would make it significantly easier to overcome the long-term challenges enunciated in the sustainable development goals that have been agreed to as essential to meet to ensure the well-being of society and future generations. Then, there can be a few supporting points briefly added to expand on each of these – the really key messages (no more than the fingers on one hand) one would want national leaders to understand very clearly as a message from this Special Report. [United States of America]	Noted
58812					Key statements in the SPM do not reflect the material in the underlying chapters, and some key statements in the SPM are policy-prescriptive. The final sentence in the final high-level statement in the SPM, section 1.2 (page 4, lines 6-7), is policy-prescriptive as it presumes patterns of investment that are heavily dictated by policy choices. Moreover, given the large volume of literature documenting the shortcomings in integrated assessment models, presenting model results (page 4, lines 6-7) without qualification in a high-level statement is inappropriate in the extreme. Despite being wide, the scenario set is incomplete and thus cannot be considered the basis for a robust high-level conclusion. The statement that the scenarios collected "cover a wide range" is misleading (Chapter 2, page 11, lines 39-40). The assembled scenarios do not include scenarios in which temperature remains below 1.5°C with at least 66% probability, as stated on lines 28 and 29. The authors argue since the "underlying scenario set covers a wide range of assumptions" this gives a robust indication of the lower limit of remaining fossil fuel and industry emissions. However, despite being wide, the scenario set is incomplete and thus cannot be considered the basis for "robust" conclusions. The SPM statement appears to critically depend upon one paper in the literature (Kriegler et al.). While one paper is informative, it does not provide the high level of confidence required to make such a statement. The statement is not consistent with the potential of technological innovation and recent developments discussed in Chapter 4, sections 4.2.2 (lines 38-45) and 4.4.4.1 (lines 1-17). Throughout the document, the authors employ the term "risk" as a close synonym for costs. However, the plain English meaning of "risk" relates more to uncertainty than it does to costs. SPM boxed statement 2.6 is an example of this misleading framing. SPM section 3 invokes the potential of CO2 removal in overshoot without acknowledging the intergenerational inequity of such a policy. That context is critically important for any high-level discussion of overshoot scenarios and as such should be included in all SPM discussion of such scenarios. The SPM highlights discussion of coal use (e.g., section 4.2, lines 13-17), but does not discuss use of natural gas. This imbalance is inappropriate in an SPM meant for policymakers who must make critical decisions about investment in natural-gas infrastructure. The discussion of scenarios in section 2.2.3.2 (lines 23-28) does not describe scenarios with limited or no negative emissions. That is a critical absence and should be addressed. [United States of America]	Taken into account - perceived policy prescriptive statements have been revised.
62698					The current draft of the SPM is *much* too long and not really focused on information needed by policy-makers. There is also a lot of repetition. Many of the bullet points are facts that may be scientifically interesting, but are not critical for the SPM. [Greg FLATO, Canada]	Taken into account - text has been shortened and made more clear. Figures have been revised for clarity and comprehension
62700					The figures in the current draft of the SPM are much to complex for the intended audience. Figure SPM1 for example, is one I really like (as a scientist), but I am very sure it will be unintelligible to most policy-makers, their staff, etc. It just tries to pack to much into a single figure. Indeed *all* of the SPM figures suffer from the problem of being vastly too complex and detailed. Figure SPM7 is the worst of the bunch in my view. I stared at it for a long time and have absolutely no idea what it is trying to convey. [Greg FLATO, Canada]	Taken into account - Figures have been revised for clarity and comprehension number of figures has been reduced from 7 to 4

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63006					Headline statements should avoid repeating content that is in the bullet after them, in all cases. The headline should always provide the broad picture, and the bullets some supplementary information, without any repetition. Repetition of the same idea on several pages should also be avoided. Each section should have a title, no section should start immediately with a box. Each headline statement in a box should be self-sufficient, with the bullets only providing details for those interested, but not essential information required to understand the headline statement. The number of bullet points should be reduced, keeping those that are essential in an overview document. [Belgium]	Noted
63008					There are several messages provided in each figure. This contributes to making them too complex. We suggest that you consider removing from the SPM figures any element that is not in the top priorities for communication to policymakers. [Belgium]	Taken into account - Figures have been revised for clarity and comprehension number of figures has been reduced from 7 to 4
63010					Structure : The document should start with the high-level statements. The request from the UNFCCC should be indicated at the beginning of the "Context" section, in a short form. [Belgium]	Noted
62230					A key deficiency of the SPM is its overarching high-level message suggesting that society can no longer hold temperature rise below 1.5C without overshoot: “Modelling suggests that having a 66% likelihood of holding warming below 1.5°C throughout the 21st century without overshoot is already out of reach.” (SPM 1.2, lines 6-7). This statement is misleading on several counts and should be removed: (1) The SOD reviews pathways consistent with a 66% probability of holding warming below 1.5°C without overshoot, and the SPM must acknowledge these pathways and make clear to policymakers the range of policies needed to achieve them. The SPM should clearly define for policymakers the types and scale of policy innovation and transformative change needed to achieve 1.5°C with and without overshoot. (2) The high-level statement that our ability to hold warming below 1.5°C is “already out of reach” does not accurately reflect the underlying chapter content and is inappropriately policy prescriptive. The probability of meeting a 1.5°C target is heavily dictated by the specific policy choices embedded in the IAMs by the modeling groups, which at present (a) do not reflect the full range of policy choices and patterns of development and investment that could lead to lower levels of warming, and (b) do not accurately represent the fast-moving pace of technological advances in clean energy technologies and energy storage systems, nor the rapidly plummeting cost of clean solar and wind technologies and energy storage systems. Certainly given the greater damages and risks that come from overshooting 1.5C, the SOD has a moral imperative to spell out for policymakers what is needed to avoid these harms, regardless of whether the modeling groups believe that society will implement this scale of change. [Shaye Wolf, United States of America]	Taken into account - text has been revised
63004					The Plenary agreed on an outline that indicates a 10 pages SPM, following a proposal by Belgium. The SOD SPM is 30 pages long in its current draft form, and would likely exceed 20 pages even in a final formatted document. This is much too long for decision makers. We remind the authors that it was also agreed to have a Technical Summary. A short SPM will facilitate the approval Plenary and improve readability. We suggest to remove from the SPM (while keeping most this material in the TS) : - any redundancy (including between headline boxes and texts in bullet lists) - the most complex figures, including figure 7 and possibly figure 6 as well as figure 3 (unless information about 1.5°C can be added to it) and figure PM5 [Belgium]	Taken into account - text has been shortened and made more clear. Figures have been revised for clarity and comprehension
63012					Headlines statements are important - they should provide the key messages, currently most of them appear weak and uninformative. The meaning of the messages should appear quickly and clearly. Those messages need to be as concrete, precise and substantial as possible. [Belgium]	Taken into account - HS have been revised and strengthened
77					Several messages are repeated several times throughout the SPM. Streamlining the messages may help shortening the Summary. It can also help to place the human consequences following their respective physical consequences (e.g. temperature change followed by crop productivity changes; sea level rise followed by displacement) which may help policy makers better understand the direct consequences of warming at 2 and 1.5 degrees. I also suggest framing the discussion on 1.5 in comparison with 2 degrees to increase the appeal of advancing towards 1.5. This will prevent policy makers from coming out of reading this document thinking "1.5 is terrible, 2 is also terrible but easier and 4 is terrible but much easier, so let's just settle with 2 or 4" [Guillermo Montt, Switzerland]	Taken into account - repetition has been removed from the draft.

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78					Certain important policy measures seem to be missing from the discussion. These include a reduction / elimination of fossil fuel subsidies, a reduction / elimination of subsidies to agriculture and livestock (which could be replaced by subsidies for afforestation in non-viable areas). Social protection is also missing when speaking of adaptation policies to support displaced workers (e.g. in the fossil fuel industry) or as protection to natural disasters, increasing fuel and food prices (The ILO's World Employment and Social Outlook 2018 has a chapter on this issue). The SPM could also articulate the links to industrial policy and investment priorities to achieve the different scenarios: investment in construction and building (for energy efficiency in buildings), investment in research and development (for carbon capture), investment in renewable energy sources through public bidding, etc. It could also articulate investment and financing incentives, noting how discount rates may give too low a priority to long-term investments in sustainability and how interest rates could be adjusted to better reflect the social and economic value of investing in sustainability. [Guillermo Montt, Switzerland]	Taken into account - subsidies are now included in D2.3, adaptation focused on in D2 & D3, social protections in D3.2, investments in D2.3, D3.2, D4.4 and D6.2
414					HEADLINE STATEMENTS: Headline statements (HS) in red boxes: there are 26 HS in sr15. I think this is far too many and I strongly recommend that their number be reduced substantially. In AR5 the WGI SPM had only 19 that were more succinct and direct. By having a large number of HS you dilute the message and diminish their power in communication. [Thomas Stocker, Switzerland]	Taken into account - number of HS have been reduced
422					USER GUIDE: There needs to be an explanatory statement about the role of the Headline Statements in the red boxes. In AR5 WGI SPM, the second sentence of the second paragraph in section A was the foundational basis for this new text element. I would advise to explain to the reader the intention of the red-boxed statements at the beginning of the SPM. [Thomas Stocker, Switzerland]	Noted
424					FIGURES: I had high expectations regarding the figures in the SPM of this first AR6 product. Unfortunately I am quite disappointed. These figures are even more complex than what we had in AR5. By perpetuating the well-known "IPCC figure style" you miss the opportunity of elevating themselves to new levels of simplicity and compellingness. I acknowledge that it is very difficult, but your must try at least. Figs. 4 and 5 and 7 are in particular need of revision towards much simpler structures and a reduced messaging. The present complexity would be well placed in a Technical Summary (of which there is none). [Thomas Stocker, Switzerland]	Taken into account - figures have been revised, simplified and reduced in number
426					FIGURES: Regarding figure complexity. Why dont you try something new? For instance, you could move the present figures (or slight revisions thereof) into an appendix to the SPM (with just the figure caption but no further text to negotiate). These figures would then represent the basis of SIMPLIFIED VERSIONS that are part of the SPM main body. [Thomas Stocker, Switzerland]	Noted
416					HEADLINE STATEMENTS: HS tend to be too long and complicated (e.g., 2.1, 2.6, 3.2., 3.5, 4.1, 4.2., 4.3, 4.5., 4.9). Please work more on the language: short, direct, simple and understandable, free of jargon. Also avoid sentences with little content, sentences stating the obvious, or sentences combining too many different aspects. Guide yourself of what you would like to read in a newspaper, in a briefing note to your PM, what you would like to hear in a high-level speech by a minister, e.g., "Human influence on the climate system is clear" from AR5 is a typical example of a powerful HS approved by all governments in consensus. This draft of the SPM still has a long way to go. Sufficient time and high priority must be allocated to the drafting of HS. This is not a routine job and it is worth the significant investment! [Thomas Stocker, Switzerland]	Taken into account - length of HS and BPs have be revised to be more concise and specific.
428					FIGURES: a helpful criterion for a compelling SPM figure could be the following: would you show this figure in a presentation you give to non-scientists or the wider public? [Thomas Stocker, Switzerland]	Noted
1514					Overall, I think the SPM is in good shape for a FOD. In particuar, the highlighted headline statements are generally pertinent, clear, and suitable for a non-specialist policymaker audience, and together provide a strong narrative. [David Wratt, New Zealand]	Noted
5418					Suggest to include introductory statement that relative uncertainties about budgets and timing of events become larger as get closer to the target (e.g. 1.5C rather than 2C). [Andreas Oschlies, Germany]	Taken into account - Although not an introductory statement, Section C1.2 and C1.3 include remaining carbon budget statements that include uncertainties associated with the budget.
5456					Assessed confidence is missing from many of the statement in this SPM. Suggest that confidence be given for every SPM conclusion. [Haroon KHESHGI, United States of America]	Taken into account - revised text has a thorough assessment using IPCC uncertainty language
5482					It is noteable that the draft SPM only mentions technology once. Assumptions about how technology develops will be an important factor and indicator of which pathways my be more likely, and that technology policy and development are important. There is some text on this in chapters 2 and 4. [Haroon KHESHGI, United States of America]	Taken into account - technology is now discussed in C3, SPM Figure 3 & 4, D2
5768					Figures 3, 4, 5, and 7 are too complicated for an SPM. They may be fine for the Technical summary. SPM is meant for policymakers and non-experts and hence it should contain illustrations that can be interpreted and understood by just looking at them. Even Fig. 2 which is a repeat from AR5 is too complex for SPM. These figures would make the communication of the messages from this report harder. [Govindasamy Bala, India]	Taken into account - figures have been revised, simplified and reduced in number
5776					A zonal mean (from an ensemble of models) of T for 1.5 deg and 2 deg would be very useful. A plot of a spatial pattern that shows regional T change would be even better. Governments can see the T change in their country when global mean warming is 1.5 or 2 deg. Inclusion of spatial pattern of changes in precipitation would be also good to have. [Govindasamy Bala, India]	Rejected - these data / figures are available in the chapter 3 text and SM. Space restrictions of 10 IPPC pages prevents this being included in the SPM

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8272					Regarding the Special Report on Global Warming of 1.5?, the international community is most concerned about the feasibility of limiting the temperature increase to 1.5?, above pre-industrial levels, including the differences in impact between 1.5? and 2?, the differences in emission reduction costs and their impact on achieving the Global Sustainable Development Goals (SDGs). With this in mind, the SPM should answer government concerns in a more accessible language. A finding/conclusion included in a SPM should be supported with a high level of confidence. In case that a conclusion that some governments are concerned about but is of much uncertainty in science is included in the SPM, there is a need to give an objective clarification in this connection. A SPM can be structured as the headline sentences plus the major findings. The current SPM is too long, with a too complex presentation of figures, hence inapproachable and difficult for policymakers to understand. It is suggested to shorten the length and redesign the figures to be more reader-friendly. In addition, we note that there is a discrepancy between the SPM and IPCC AR5 in terms of findings. For example, “Future global warming will be mainly due to future cumulative carbon dioxide emissions”, which is inconsistent with AR5 WGI SPM – “Global average surface warming in the late 21st century and beyond is largely dependent on cumulative CO2 emissions. Most aspects of climate change will persist for many centuries even if CO2 emissions are stopped, which means that the past, present and future CO2 emissions will produce a significant and committed climate change over many centuries. {12.5}” (WG1 SPM P27). Its reformulation is suggested. [China]	Partially taken into account - feasibility text has been strengthened in A5 of the SPM. The text has been revised a shortened. The figures have been simplified and made clearer, and the numbers reduced from 7 to 4. Partially rejected - statement of less than high confidence can still be of policy interest and thus will be included where relevant.
8628					Congratulations on making this SPM so much more readable than those of previous IPCC reports and I have read many, (certainly most if not all of them); also for doing this without dumbing down - well done! [Pauline Midgley, Germany]	Noted
9012					Figures in general are difficult to understand and contain extremely much information. It might be useful to rethink the intention of figures in the SPM. Should they be a) informative, easy to read and to understand and being something that can be presented to underline main messages or b) just contain as much information as possible. I would strongly plead for the former [Urs Neu, Switzerland]	Taken into account - figures have been revised, simplified and reduced in number
9014					Since SDGs are increasingly important in the political discussion it might be good to have some headline statements concerning mitigation opitons and SDGs (there are a number of corresponding statements in the second part of the SPM) or to even have a separate headline statement section concerning SDGs). [Urs Neu, Switzerland]	Noted - SDG are covered in the revised figure 4 of the latest draft
11194			31		General: The SPM exceeds the page limit agreed by the Panel. We recognise that the pdf under review has fewer words/page than the published format, so direct comparison is not possible, but there is a need to ensure that information is relevant and within the agreed scope and that text is clear and concise. We have suggested areas where text can be shortened. [United Kingdom (of Great Britain and Northern Ireland)]	Taken into account - the new SPM draft has been considerably shortened (from 31 to 22 word pages - roughly 11 IPCC pages). Repetition has been reduced. Headline statements have been revised and strengthened.
8630					It is surely intuitive or even obvious that if there are changes between today and 1.5C, there will be more between 1.5 and 2C. Thus many of the headline statements and other condensed text of the SPM read as statements of the obvious. I am not sure how you avoid this but what the policymakers and public are interested in is the extent of the difference/risk avoided by keeping to 1.5C. One of the few instances where a specific example is given rather than just saying that risks will be higher, impacts worse, etc,. is on page SPM-8 about corals. Other examples are given in the paragraphs about land at the top of page SPM-9 (2.4). It would make the SPM more convincing if you could provide more specific examples. [Pauline Midgley, Germany]	Taken into account - text has been revised to include more specificities with more direct comparisons between 1.5°C and 2°C
9440					‘In this report, the term risk is often used to refer to the potential, when the outcome is uncertain, for adverse consequences on lives, livelihoods, health, ecosystems and species, economic, social and cultural assets, services (including environmental services) and infrastructure (Glossary, SR15 SOD).’ This definition (risk = probability of adverse outcome) widely used in SR15 SOD is the ultimate cause of many misinterpretations in the report, because severity and scale of consequences are not taken into account. If something negative occurs somewhere, this does not mean automatically that we should pay attention to it in a decision-making process. May be the damage actually is absent or negligible. Therefore, the full enumeration using risk = probability x damage approach is needed to compare +1.5C with +2C worlds. Unfortunately, this is not the case in the report. [Russian Federation]	Rejected - the definition of risk for the SR1.5°C including the SPM is 'The potential for adverse consequences where something of value is at stake and where the occurrence and degree of an outcome is uncertain. In the context of the assessment of climate impacts, the term risk is often used to refer to the potential for adverse consequences of a climate-related hazard, or of adaptation or mitigation responses to such a hazard, on lives, livelihoods, health and wellbeing, ecosystems and species, economic, social and cultural assets, services (including ecosystem services), and infrastructure. Risk results from the interaction of vulnerability (of the affected system), its exposure over time (to the hazard), as well as the (climate-related) hazard and the likelihood of its occurrence.' and can be found in the Glossary.
9708					1- the SPM is very general and broad. 2- It does not address clearly the decions makers needs for the special assessment, i.e. it does not provide specific answers to questions such as how feasible is 1.5c, how it comares to 2c, how large of an effort needed to transit from 2c to 1.5c worlds, what are the implications of 1.5c in terms of avoided impacts and incremental costs comapred to 2c, what are the additional policy responses needed to transit to 1.5c in the context of sustainable development and poverty eradication. 3-It does not clearly highlight the state of knoweledge gap and uncertainities related to 1.5c. [Mustafa BABIKER, Sudan]	Taken into account - text has been revised to be more specific, policy-relevant, concise, more directly comparing 1.5°C and 2°C, it now covers cost more and discusses enabling conditions needed for transitioning

Comment No	From Page	From Line	To Page	To Line	Comment	Response
11192			31		General: We thank the authors for their efforts in putting together a first-order draft of the SPM recognising that the underlying report still requires some revision. On style, there are some common themes that emerge throughout our comments. Firstly, a different style of writing is required for the SPM. At the moment, it is very much written in a style appropriate for a scientific journal and not in style that engages a non-technical, or policy, audience. There is considerable use of technical jargon throughout and sentences could be phrased more simply without loss of detail or nuance.We have pointed out specific places where this occurs. Additionally, there are some inconsistencies in terminology usage - for example page 8 row 15 says “larger at 2C than at 1.5C” but on page 9 row 2 we have “lower at 1.5C than 2C”. If the authors agreed on a style and used it consistently it would be easier to read and understand. [United Kingdom (of Great Britain and Northern Ireland)]	Taken into account: Comments on readability and the technical nature of the FOD draft are well taken and an effort has been made to use clearer language in this IPCC assessment cycle by including communications experts in the drafting. Inconsistencies in phrasings have been removed.
11196			31		General: Throughout the SPM and the report it is difficult to distinguish what is specific to global warming of 1.5°C and what could equally apply to 2°C or even higher levels. Suggest that efforts are made to clarify and quantify this where possible. It is also not clear what additional actions are required compared with the current situation or a 2C pathway. [United Kingdom (of Great Britain and Northern Ireland)]	Taken into account. Key messages strengthened and refocused to findings specific to 1.5 and 2°C. Repetition has been removed and key messages strengthened and refocused to findings since AR5.
15410					The SPM is too long, it should be no more than 10 pages, as agreed at the Plenary meeting. Please simplify significantly to more clearly convey the key findings of the report for the target audience. This could be achieved by focusing on the key question of 1.5°C vs 2°C or higher warming. Please use short statements, basic schematics, and quantitative examples of risks and opportunities. [Australia]	Taken into account - text has been shortened and made more clear. Figures have been revised for clarity and comprehension
15412					The figures in the SPM are too technical for the target audience. Please include figures only if they capture headline statements in a simple way that does not detract from the key points they are trying to make. A very simple conceptual figure of the different emissions pathways (if altered and simplified significantly to show just that there are different ways of reaching the end goal of 1.5 degrees C) might be appropriate. [Australia]	Taken into account - figures have been revised, simplified and reduced in number
17886					All figures in the SPM are very hard to assess (except SPM6). Normally figures are meant to simplify a complex statement, however, here I have the feeling that the figures make the issue even more complicated. Figure SPM7 is so detailed, but can hardly be seen on A4, it only works as a poster. The message does not at all come across.Figure SMP5 contains at least 6 different dimensions, it is not accessible. Instead, it would be great to have figures in there as e.g. here by CarbonBrief, explaining 1.5 vs. 2C: https://www.carbonbrief.org/guest-post-what-can-climate-models-tell-about-impacts-onepointfive-two-degrees . [Brigitte Knopf, Germany]	Taken into account - figures have been revised, simplified and reduced in number
17894					Why is CDR as abbreviation not even mentioned in the SPM? The Exec Sum of Chp. 2 contains so many details on CDR, some more should be given in the SPM. [Brigitte Knopf, Germany]	Noted - efforts to avoid using abbreviations were taken in the first SPM draft. This is revised in the next draft version but abbreviations, where used are initially defined
18762					The choice, explained in BOX SPM 1, to use '1.5 °C global mean temperature' to refer to a world that is 1.5 °C warmer than in during the pre-industrial period (1851-1900) is very confusing, and it is even not correct. The annual global mean surface temperature of the Earth is about 16 °C. Please use the term '1.5 °C global mean warming' rather than '1.5 °C global mean temperature' to refer to a world that is 1.5 °C warmer than in during the pre-industrial period. [Andrea TILCHE, Belgium]	Taken into account - box has been removed and the definition of what global mean temperature is clear defined in the glossary.
18764					GENERAL COMMENTS TO SPM: (1) Some of the conclusions/bullet points are rather obvious, like the insistence on lower risks at 1.5°C than at 2°C. It is probably not necessary to repeat this message for almost all expected impacts, because it is rather intuitive; (2) the SPM should insert examples of policies/actions, as presented in the core report; (3)we suggest to insert a bullet point on decoupling, explaining like in the core report that it already happened in 2015-2016, but not in 2017; (4) innovation is missing in the SPM, while the core report includes several relevant reflexions on its role and actual results/failures (innovation and technology deployment/difussion is critical in achieving the Paris Agreement goals). SUGGESTION FOR IPCC REFLEXION: Please also consider the possibility of reordering the items of the SPM. Perhaps starting with the impacts at a 1.5°C world, which are disruptive (e.g. coral reefs, icesheet melting, impacts on human health) and the ready at hand solutions and the demand for urgent systemic change. This will help also the fast reader to better grasp the gravity of the report and increase the uptake and responsiveness of decision makers. [Andrea TILCHE, Belgium]	Taken into account. 1) repetition removed. 2) examples from the main report have been lifted 3) although decoupling is not explicitly mentioned this topic is touched upon in several places in the SPM, for example SPM3 4) technology and innovation is now included 5) Ordering of the SPM has been revised to remove high level messages and bring impacts further up front in section B followed by immediate actions in section C.
18766					General comment on the whole report: Compiling this report in the time available has clearly been a challenge for the scientists involved. The report contains a great deal of useful information but is in need of substantial editing taking a holistic (rather than chapter-specific) approach. We have the following suggestions in this regard: * many chapters cover material beyond their individual scope. In particular the interlinked nature of the themes has so far led to substantial duplication. e.g. framing material is contained in Ch2 & Ch3 as well as Ch1, the separation of focus between between Ch4 (response) and Ch2 & 3 (mitigation, impacts & adaptation) is not clear. It may be useful to undertake a cross-chapter search for duplicated insights in order to identify where specific findings should be placed, what should be merged/moved/deleted etc. * perhaps because of the above, the report is too long [Andrea TILCHE, Belgium]	Taken into account - SPM has become more integrated in nature this is reflected, for example, in the new figures that span at least two chapters' assessment.

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18768					General SPM comment: Findings should be more specific and promote key insights from the body of the report. Many of the SPM's findings (in particular the high-level messages) are fairly general and do not add much knowlege compared to AR5. There is also repetition of near-identical messages several times (e.g. the fact that delaying climate action carries risks). The SPM could be strengthened by communicating some of the main findings from the body of the report, focusing mainly on new knowledge since AR5. The following cells give examples of more specific messages related to mitigation from Ch2 that could be communicated in the SPM (page references in parentheses). A similar exercise could be undertaken to extract key (quantified) messages where applicable: [Andrea TILCHE, Belgium]	Taken into account. Repetition has been removed and key messages strengthened and refocused to findings since AR5.
18770					(general comment ctd.) The need for short-term mitigation • Emissions implied by the NDCs and current & planned coal plants would exhaust the TPB for 1.5°C by 2030 (2-28, lines 38-47). Meaning that efforts to limit warming to 1.5°C must concentrate on i) accelerating short-term mitigation beyond the NDC commitments; ii) operationalising negative emissions technologies. • Meeting stringent mitigation targets requires early retirement of carbon-intensive infrastructure, in particular coal without CCS (2-60). The largest differences between 1.5°C and 2°C pathways are seen in the 1st half of the 21st century. All available 1.5°C scenarios show global GHG emissions declining by 2030, and many models are unable to produce 1.5°C pathways starting from 2030 emissions in line with the NDCs (2-60). • Below 1.5°C scenarios (>66% possibility of return) are clearly characterised by lower CO2 emissions by 2030 compared to likely below 2°C scenarios, while both 2°C and 1.5°C scenarios are characterised by net negative CO2 emissions by the end of the century. (2-32). • Compared to 2°C scenarios, 1.5°C scenarios show greater progress by 2030 in reducing final energy demand and carbon intensity of energy, and faster electrification of energy demand. (2-46). Energy demand reductions, combined with end-use efficiency improvements, are a key characteristic, and can achieve significant decoupling between energy use and economic growth (2-67). [Andrea TILCHE, Belgium]	Taken into account. Messages have been incorporated into the new SPM draft.
18780					(general comment ctd.) Negative emissions [negative emission requirements in 1.5°C and 2°C scenarios should be described as annual amounts, not just cumulative] • The largest CDR contribution comes from BECCS (2-55), though in some scenarios, it is possible for net afforestation to make a larger mitigation contribution (2-58). There is also scope for improving models' coverage of other technologies (2-56). [Andrea TILCHE, Belgium]	Taken into account - Afforestation is discussed in Section C2.
18782					General comment: adaptation The summary does not provide a clear comparison between adaptation efforts needed at 2° versus 1.5°, perhaps because the information is scattered throughout the summary or poorly referenced from the actual chapters of the report. A more cohesive view of adaptation could be achieved. [Andrea TILCHE, Belgium]	Taken into account - Adaptation has been strengthened in the new SPM draft, primarily in section D3 but additionally in Sections D1 and D2.
19192					Generally speaking, figures and graphics tend to be very busy, accumulating to much information. We think that the SPM should have much simpler figures, almost selfexplanatory. Possibly, some of the figures could be simplified, reformulated or even split into more figures. [Spain]	Taken into account - Figures have been completely revised for the new SPM draft, adopting a more integrative nature that is clearer for the reader.
18772					(general comment ctd.) 1.5°C Scenario characteristics (mostly from Table 2.9): * zero-emission energy supply by mid-century; * carbon neutrality by mid-century; * substantial non-CO2 reductions, including N2O & CH4 in the agricultural sector (including through diet change) + HFC reductions at the maximum bounds of those achievable through the Kigali Amendment; * ~4-12 GtCO2e of CDR deployed by mid-century; with some substitution between BECCS and terrestrial, and lower requirements if greater mitigation in other sectors. * Substantial investment is needed in low carbon energy supply and demand side measures. However, most of this is not additional, but replaces fossil fuel investments that would otherwise take place. Annual low carbon investments overtake fossil fuel investments in 202-25. * Industry emissions can be reduced by over 50% compared to 2010 by 2050 in 2,0°C & 1.5°C scenario (Fig 2.24). * Bottom-up models suggest that there may be greater potential for industry and demand-side measures to contribute to low emission pathways than suggested by the integrated assessment models from which most scenarios are derived. By contrast, 1.5°C scenarios could not be produced in socio-economic conditions with limited and late-starting climate polices and regional fragmentation (2-87 – 2-90). [Andrea TILCHE, Belgium]	Taken into account - More quantitative overview of the 1.5°C scenarios can be found in Section C and SPM3.

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18774					(general comment ctd.) Energy 1.5°C requires a more efficient, more electrified energy supply, with completely decarbonised electricity by mid-century and carbon neutral fuels (2-47 – 2-48). The defining challenge for the second half of the century will be decarbonising the substantial quantities of liquid fuels that are still required in transport (especially freight, shipping & aviation (2-76)) and industry (requiring several hundred EJ of bioenergy in most scenarios) (2-48) Coal without CCS is rapidly phased out by mid-century. Most fossil CCS will be reserved for use in industry (2-49). Greater use of fossil fuels implies greater use of BECCS to compensate (2-65). All carbon neutral energy scenarios share a substantial reliance on bioenergy, with BECCS projected to account for at least half of total biomass demand by 2050 (2-65). Other pathways, though not yet comprehensively modelled, are possible. These would require substantially lower energy and product demand so as to reduce the need for liquid fuels. (2-53) [Andrea TILCHE, Belgium]	Taken into account - More quantitative overview of energy supply and CCS including BECCS has been drafted in Section C.
18776					(general comment ctd.) Non-CO2 • All 1.5°C scenarios require the maximum feasible reductions in HFC emissions under the Montreal Protocol Kigali amendment. Projected implementation levels will not be sufficient. (2-35, lines 47-49 & Fig 2-9). • SLCFs are strongly mitigated in 1.5°C & 2°C scenarios. Public health benefits of stringent mitigation in line with 1.5°C is potentially larger than the initial mitigation cost. (2-36) • Scenarios with greater emphasis on energy efficiency and limiting energy demand can reduce warming from methane and ozone, leading to a net reduction of radiative forcing of up to 0.2 W/m2 that allows a larger budget to remain within 1.5°C (2-37) [Andrea TILCHE, Belgium]	Taken into account. The Kigali agreement is now included in the Chapter 4 assessment. SLACFs and non-CO2 GHGs are covered in Section C1, particularly C1.3, of the SPM.
18778					(general comment ctd.) Land [Land use in 1.5°C and 2°C scenarios should be described in absolute terms, not just area converted per year] • 1.5°C scenarios require negative CO2 emissions from the AFOLU sector by 2100, and in most cases by 2050. (Fig 2.15) • 1.5°C (no overshoot) scenarios are characterised by markedly lower levels of N2O emissions compared to 2°C scenarios, driven by more sustainable food consumption (2-35, lines 1-7). • Reducing CH4 and N2O emissions in the agricultural sector is particularly important in stringent mitigation scenarios. This can be achieved, with health co-benefits, by reducing demand for GHG-intensive food, as well as reducing food waste. In addition, yield improvements and intensification can reduce pressure on forest cover, which in turn reduces reliance on CDR technologies. (2-51, 2-78). • 1.5°C scenarios require large quantities of land (around 25 Mha per year by 2050) to be converted to energy crops and/or forest, mostly from conversion of pasture and, to some extent, cropland (2-80). [Andrea TILCHE, Belgium]	Noted. Efforts will be made to show these numbers in the SPM final draft. N2O and CH4 are not shown in Figure SPM1.
19194					The SPM lack of a simple iconic figure which could represent the entire report. [Spain]	Noted - Figures have been revised for the new SPM draft.
21576					Many of the figures are very complicated and contain to much information, which reduces their delivery of information. Streamlining or even omission of some of the figures should be considered. [Sweden]	Taken into account - Figures have been completely revised for the new SPM draft, adopting a more integrative nature that is clearer for the reader.
21578					Quite a few of the statements lack confidence assessment. In SPM-2 section, it is indicated that such statements will be forthcoming. This should also apply to SPM-1.2 and SMP-1.3 [Sweden]	Taken into account - uncertainty language has been added to all statements in the SPM.
21580					The SPM would seem to be rather long. There is some duplication of messages (including in the headline statements and boxes), which should be avoided. [Sweden]	Taken into account - duplications removed and figures simplified to reduce the SPM length.
21582					The language of the overall report, and also of the SPM is rather complex, technical and not always very lucid, and thus may not be readily accessible by policymakers on different levels of society. The headline statements could be more integrated, and their fuller policy-relevance ensured. [Sweden]	Taken into account - text has been revised.
28996					We would like to encourage the authors to strengthen their discussions on issues related to biodiversity conservation and on sustainable land management as a land-based option to support climate change mitigation and adaptation (see particularly SDG 15 on land). [Germany]	Partially taken into account: Biodiversity is assessed in Section B2 however a more thorough assessment will be done by the IPCC Special Report on Land.
28998					Overall, the SPM is much too long and should be shortened. Especially, since many of the subsections contain redundant statements. It may be helpful to include a short paragraph on the structure of the SPM at the end of the introduction to give the reader a structure for the following subsections. Additionally, most of the figures (i.e., all besides Figure SPM 1) are overcomplicated and might confuse the layman reader more than that they contribute to an improved comprehension of the matter. [Germany]	Taken into account - the new SPM draft has been considerably shortened (from 31 to 22 word pages). Repetition has been reduced. Headline statements have been revised and strengthened.
29008					We strongly encourage the authors to improve figures that are considered for the SPM. SPM-level figures should not be overly complex, have a focused message that is visualized in a way that it becomes apparent very quickly also to the non-expert. The current SPM figures are all much too complex, with too many layers of information, too many details in the captions and legends and too many messages enclosed to actually work as a visual. Authors may consider to seek support from communication and graphics specialists early in the process to improve the figures at a conceptual level. [Germany]	Taken into account - Figures have been completely revised for the new SPM draft, adopting a more integrative nature that is clearer for the reader.

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28990					It becomes not clear why 2°C is constantly used as a reference point to compare 1.5°C scenario consequences. Comparison between 1.5 and 2 °C pathways is useful but should not mislead to the impression that 2°C is easily reached. The language could be more clearly pointing out what is necessary to meet the scenarios. At the end of the SPM there already are several paragraphs using very clear wording (e.g. page 26 line 25). Comparison between 1.5 and 2 °C pathways could lead to the impression that the increase of global average temperature will be either 2°C or 1.5°C. Illustrating the possibility and consequences of reaching 3 or 4 °C (compared to 1.5°C) should be part of the SPM. [Germany]	Taken into account - The panel requested this report to assess differences between 1.5 and 2°C global warming and thus a focus on these two levels has been established in the SPM, however high levels of warming are included if updates from AR5 and relevant, for example Section B3.1, D1.
28992					Based on the important finding of the report that pathways exist that limit global warming to 1.5C, we would recommend to amend the presentation in the SPM and to the degree necessary the analysis in the underlying report in order to highlight several "archetype" pathways and their assumptions, and the trade-offs and political challenges attached to such pathways. Such an approach could enable decision makers to more clearly assess the associated risks and benefits, e.g. those attached to the dependence on (late-century) large-scale negative emissions, or other sustainable development trade-offs. The report does feature a large amount of quantitative and qualitative information on trade-offs between different development pathways (in scenarios represented by the SSP1-5) and how they determine the overall sustainable development benefits and the mitigation and adaptation challenges in Chs 2, 4 and 5. We are confident that presenting this information in a more structured fashion, highlighting how policies that do not constitute directly targeted climate change responses support or counteract the mitigation and adaptation challenge, would add substantial value to the SPM. [Germany]	Taken into account - Figure SPM3 highlights four archetype pathways that achieve 1,5°C warming that different in the type of actions that would be taken.
28994					We strongly encourage authors to include a comparison between current NDCs and 1) best estimates for the 1.5°C budget and 2) cost-effective 1.5 and 2°C pathways. It would be extremely helpful if authors could provide guidance on the upscaling that would be necessary in the short term in order to match the NDCs with cost-effective 1.5 and 2°C pathways, drawing on material from Cross Chapter Box 4.1, and also include information on short-term policies that may help to bridge the gap between current NDCs and 1.5°C pathways to the extent that the 1.5°C target remains within reach without assuming disruptive policies post-2030. It may be useful for some of the information to framed conditional on the availability of large scale NETs. [Germany]	Taken into account - NDC are indeed defined in a wide variety of ways some of which lead to a wider uncertainty in the estimation of the 2030 emissions levels resulting from these levels. These factors, and the estimation of global emission levels from the current NDCs, are discussed in Cross-chapter Box 11 in Chapter 4 of the FGD. The space constraints of the SPM do not allow to elaborate all these factors in full depth. However, an cost assessment of the transitions for pathways that limit warming to 1.5°C can be found in chapter 4.
29000					The SPM is written in a very technical style that is suitable for scientists but not the target group of the SPM, i.e. policy makers. Please improve the language referring to the findings of the IPCC Expert Meeting on Communication and to recent IPCC Panel discussions that indicate the need for an accessible SPM (short sentences, non-technical terms, etc.). Please note that according to the Decision IPCC/XLIV-4 the SPM must not be longer than 10 pages and include headline statements, see for example the AR5 WG1 SPM. Please also note that he text in the headline statements in the orange boxes should not be repeated in the following paragraphs, please remove such duplications. [Germany]	Taken into account - the new SPM draft has been considerably shortened (from 31 to 22 word pages - roughly 11 IPCC pages). Repetition has been reduced. Headline statements have been revised and strengthened.
29002					We strongly recommend for the authors to include and highlight robust information about common features of 1.5°C-pathways. For example, what is the timeframe when 1.5°C-scenarios reach net-zero emissions, or when is unabated coal use phased out. We understand that - despite the large range of scenarios going into the assessment - some of these key indicators show very narrow windows, e.g. the timing of net-zero emissions close to 2050, which is a defining feature of 1.5C compared to 2C pathways. We encourage the authors to identify and report such robust indicators that can be helpful in guiding decisions makers. Ch 2 provides ranges for such values, e.g. in 2.3.5 and table 2.9, and could explore further. [Germany]	Taken into account - The SPM has been substantially redrafted to include greater emphasis on the 1.5°C pathways. This is highlighted in Sections C and in SPM3.
29370					the figures 1,3 and 4 shd be made more accessible. See elaborations below. Language should be easier and also abbreviations need to be explained. Consider to include more clarity when visualising results. [Susanne Droege, Germany]	Taken into account - Figures have been completely revised for the new SPM draft, adopting a more integrative nature that is clearer for the reader.
29372					Results are highlighted which compare 1.5°C world with 2°C world. Is this within the mandate of this report? If so, it could be helpful to give an overview (e.g. table) on these comparisons. [Susanne Droege, Germany]	Noted - the results that highlight the differences in 1.5 and 2°C have been streamlined in section B.
29374					Language needs to be clearer and more accessible. [Susanne Droege, Germany]	Noted
29376					The report should be clear from the outset that it draws heavily on AR5 and that AR6 is coming next. Maybe a disclaimer could be useful that highlights the characteristics of this report - it summarizes findings of AR5 and adds new findings if these are available. It leaves a number of tasks to AR6 which will give another uptdate. [Susanne Droege, Germany]	Taken into account. Key messages strengthened and refocused to findings since AR5.
29378					There is a great potential to shorten the SPM considerably. Key messages could be accompanied by shorter explanations (avoiding repetition). See also details below. [Susanne Droege, Germany]	Taken into account - the new SPM draft has been considerably shortened (from 31 to 22 word pages). Repetition has been reduced.
29380					double checking needed on the cross-references to main chapters. E.g. box 2.7 cites chapter 3.4.10.1., but this section does not contain the issue mentioned in the key message. [Susanne Droege, Germany]	Taken into account. Text has been revised to cross-reference correct sections of the main chapter text.

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29004					A large share of the most robust assessment in the current SPM draft relies on analysis from integrated assessment models (IAMs). Chapter 1, 2 and CC box 2.1 offer some background on the strength and weaknesses of this particular tool. In the light of their current weight within the SPM, it may be appropriate to reflected some of the key challenges and main advantages of IAMs in either section 1 (background) or section 3 of the SPM. Issues we would think of include the ability of IAM to represent technological change, the (lack of) differentiation between proven and unproven technologies, the (lack of) integration of climate change impacts on the economy, the role of carbon pricing and the instant diffusion of policies. This would be very helpful for policymakers to better understand the unique contributions of IAMs to the debate as well as their limitations, and might strengthen the debate around transformation pathways and ensure a more informed interpretation of results. [Germany]	Rejected - This kind of information is indeed interesting to know but neither specific to 1.5°C nor extremely novel. Given the space constraints and the remit of the SPM to report on new insights beyond the AR5, this specific issue has not been highlighted in the limited space available.
29006					We support the notion of the SPM that agriculture, forestry and other landuse mitigation measures, if done well, harbour large synergies for both adaptation and other sustainable development goals, while also carrying a large risk if not managed and implemented in a sustainable and inclusive way. We would encourage the authors to consider highlighting the crucial role of the landuse sector for successful mitigation, adaptation and the SDGs beyond its current form, e.g. in a headline statement (e.g. replacing the current version of 4.3). [Germany]	Partially taken into account: Land use requirements for mitigation measures are focused upon in section C2 and SPM3. Additional and more comprehensive assessments of land use as mitigation at high degrees on warming will be covered in the IPCC Special Report on Land.
29522					The first draft of the SPM provides a good basis for further work. The text can be shortened e.g by removing overlapping text. Bolded key messages need to be sharpened; and some of them can be deleted. [Finland]	Taken into account - the new SPM draft has been considerably shortened (from 31 to 22 word pages). Repetition has been reduced and key messages sharpened.
29540					The boxes in the SPM are somewhat difficult to understand. Rewriting the boxes with less technical way (clearer messages) could highlight the important content of this report. [Finland]	Not applicable. Box has been removed.
29566					In analysing and comparing 1.5 and 2 degree worlds, it would be useful to give consideration in the SPM also to longer time scales; i.e. beyond 2100 in a dedicated section. [Finland]	Taken into account - long time scales are mentioned in section A2.
29568					Overshoot is one of the important issues in the report and undoubtedly and it will get much attention in discussion. Please, make sure that both the high level statements and highlighted text boxes in the SPM chapters cover key findings on e.g scenarios and pathways (including timing issues and non CO2 issues), technology related information as well as uncertainties and risks. [Finland]	Noted
29570					There are 26 key message boxes in the SPM. There is some overlap, and some of the messages are less sharp than expected. Overall consideration of the number of boxes as well as the length of the report is needed. [Finland]	Taken into account - the new SPM draft has been considerably shortened (from 31 to 22 word pages). Repetition has been reduced and key messages sharpened. The Box has been removed.
29892					In the SPM2, some sections present the risks associated with a 2°C warming, while others present the fewer risks of a 1,5°C warming. It would be useful to harmonize the presentation to enhance the communication of climate impacts. [France]	Taken into account - an effort has been made to harmonise how these assessment results are presented.
29894					Among non-CO2 drivers, methane is often cited, whereas N2O isn't (p.3, l18 ; p.14, l41). Can this specification be explained or other non-CO2 drivers cited as well as far as they are relevant? [France]	Taken into account - non-CO2 GHGs and SLCFs have been presented in the new SPM draft, namely in SPM1 and Section C1.
29896					We suggest to better explain the separation between CO2 and non-CO2 scenarios since it seems odd to consider them separately, and to explicit where non-CO2 are all non-CO2 and where they are only short lived climate pollutants. [France]	Taken into account - non-CO2 GHGs and SLCFs have been presented in the new SPM draft, namely in SPM1 and Section C1.
31146					Although there are many descriptions that climate-resilient pathways have synergy with SDGs, IPCC should clearly write what sort of behavior / measures specifically have synergies with SDGs goals. In addition, IPCC has to clarify which SDGs would be achieved though the measures. [Japan]	Taken into account - this has been reflected in SPM4 and in the Table 5.2 in Chapter 5.
31154					Figures SPM 2-7 are too complex, and fail to give the messages clearly. They should be simplified. [Japan]	Taken into account - Figures have been completely revised for the new SPM draft, adopting a more integrative nature that is clearer for the reader.
32152					Linkages between SDGs and 1.5 are solely related to mitigation action. There is no integration of impacts of climate change on SDGs. This relates to figure SPM 5-7. Every effort should be made to achieve the integration of impacts into the SDG analysis. If this is not possible due to lack of literature, synthesis products need to be either deleted or very clearly framed as being solely related to mitigation. It is extremely misleading as it stands. [Jamaica]	Taken into account - adaptation has been strengthened in the new draft of the SPM, see sections D2, D3, D5 & D6 and SPM4.
32238					The compounding effect of flooding from cyclones on the hazard of sea level rise should be highlighted in the SPM. [Jamaica]	Rejected - literature assessed in chapter three mainly focuses on assessing the increase in frequency and/intensity of cyclones does not cover links to sea level rise and flooding. Chapter three does cover compound effects of flooding from sea level rise and development but not with cyclones.
33676					SPM 3 and SPM 4: We find little attention on reducing deforestation in the SPM. Please consider to include more information on the mitigation possibilities, impacts and sustainability of reducing deforestation in the context of 1.5 degrees global warming. [Norway]	Taken into account - Deforestation is now referenced in D6.3 and SPM4. Furthermore greater focus on climate change and land use change will be covered in the upcoming IPCC Special Report on Land.
33682					The summary for policy makers assumes quite an advanced understanding of both climate change science and the jargon that has developed within the IPCC community. Please keep in mind that this document is intentionally is written for non-experts. The summary also contains some rather obvious statements along the general lines that climate change and related impacts will occur at 1.5C , and it will be worse at 2C. This is pretty obvious. Please consider other ways to differentiate between 1.5 and 2C impacts. [Norway]	Taken into account - text has been redrafted, shortened and language has been made clearer.

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31142					For each paragraph, please present a level of confidence, evidence, or agreement in the text. Policy relevant statements should be presented as much as possible with confidence qualifier as has been the norm in the previous SPMs, in order not to detract from their scientific importance as well as to provide the scientific and objective evidence supporting such statements. In addition, following the IPCC norm, further effort should be given to strike the right balance in the scientific description of policy relevant statements so that they would not be seen as being policy prescriptive. Also, specific references to the respective chapters should be explicitly mentioned in all the paragraphs throughout the SPM, so that the readers can easily refer to the original chapter contents. [Japan]	Taken into account - uncertainty language has been added to all statements in the SPM.
31144					<Glossary> As has been the case in AR5, the Glossary is very important in order to have a common ground for substantive scientific discussions among the WGs. For instance, to illustrate one example of such connotative term, the word 'carbon budget' will be taken up for the first time in the IPCC Glossary. As such, it is requested that the description should not only focus on the differences between the four terms but should also elaborate on the basic concept in an easy-to-understand manner. Please note that 'carbon budget' has been used exclusively for a different meaning, As can be seen in the American Meteorological Society's Glossary, this term is defined as the change in the amount of carbon in a reservoir via fluxes of carbon into and out of the reservoir. http://glossary.ametsoc.org/wiki/Carbon_budget [Japan]	Accepted
31148					Uncertainty of NDCs must be described clearly. Some countries have not set total national emissions targets. They submit NDCs only with intensity targets, and therefore the change in GDP growth rate in those countries causes a great deal of differences in prospects of global emissions estimated by piling NDCs of all countries. Therefore, when discussing the gap between 2°C and1.5°C pathways and NDCs, it is crucial not only to discuss the difference in emission pathway due to the achieving probabilities for the temperature target (uncertainty of climate sensitivity) etc., but also to discuss the uncertainty in NDCs in those countries which emit large amount of GHG including China and India. NDCs with intensity targets have large uncertainties and it is important to discuss them together (see and do mention the following papers in this report). However, the draft has barely mentioned the subject. It should be specified in Entire Report and SPM. Rogelj J, Fricko O, Meinshausen M, et al., Nature Communications 8 (2017) https://www.nature.com/articles/ncomms15748 [Japan]	Taken into account - NDC are indeed defined in a wide variety of ways some of which lead to a wider uncertainty in the estimation of the 2030 emissions levels resulting from these levels. These factors, and the estimation of global emission levels from the current NDCs, are discussed in Cross-chapter Box 11 in Chapter 4 of the FGD. The space constraints of the SPM do not allow to elaborate all these factors in full depth. However, by reporting a range in the estimated emissions outcome in 2030 (50-54 GtCO2eq/yr and 52-58 GtCO2eq/yr) in the SPM this uncertainty is transparently reported, also at the highest level.
31150					Since there are many general descriptions that can apply even for targets of more than 2°C and are not limited to the case of a 1.5°C warming world, IPCC has to indicate clearly what are particularly unique events, risks, and influences of 1.5°C compared to 2°C. And those descriptions have to be a quantity because the number is the most indispensable information for policy makers. In addition, general and common mentions such as "the risk increases in the 1.5°C warming world compared to the 2°C warming world" are conspicuous. Such descriptions are highlighted especially by SPM. It is misleading and should be revised so that policy makers can understand how different the impacts or risks between 1.5°C and 2.0°C are. We also have concerns that SR1.5 might be used for justification of the 1.5°C goal due to those general descriptions, hence it should be more neutral. IPCC is expected to and has to quantitatively describe to what extent it actually changes. [Japan]	Taken into account - The SPM draft now contains greater specificity and quantity in the key messages and have been more tailored to 1.5 and 2°C warming specifically, rather than higher levels of warming.
31152					SPM2 should be written with more careful consideration. Risk assessment involves a high degree of uncertainty, but it is not explicitly/well mentioned in the SPM. In Chapter3 page20 line 10-1, it is said that "One approach for assessing impacts on natural and managed systems at 1.5°C consists of roughly multiplying observed impacts by a 1.5 factor." This approach is too simple to get robust conclusions and implies that impacts at 1.5°C are inherently bigger than those at 2°C. Furthermore, the executive summary of Chapter 3 says that "Distinguishing between 1.5°C and 2°C is difficult in the short run and the impacts of 1.5°C global warming cannot be determined without some associated degree of uncertainty" and "Socioeconomic drivers, however, could have greater influence on risks than those associated with the difference between1.5°C and 2°C global warming" With these limitations SPM2 can be shortened because it has assessments with less value and includes large uncertainties, or should be rewritten precisely. [Japan]	Taken into account - The SPM draft now contains greater specificity and quantity in the key messages around risk and have been more tailored to 1.5 and 2°C warming specifically, rather than higher levels of warming.
33684					Please consider describing and quantifying the use of negative emissions technologies that will be required to reach 1.5C and 2C global warming, for example by quantifying required extent of re- and afforestation measures and deployment of direct air capture technologies. Please also consider describing how likely it is to develop and deploy these technologies to the extent required under the relevant scenarios. [Norway]	Taken into account - Greater focus on negative emissions is now present in Section C2.
33688					Please consider to explain in the SPM, either as a footnote or in Box SPM.1, the terms related to overshoot and its temporality. The terms "overshoot", "temperature overshoot", "Threshold return budget" and "temporary overshoot" are currently used in the SPM in a similar manner, in the glossary overshoot covers not only temperature, but also emissions and concentrations. This may lead to misunderstandings and please consider to use one easy understandable term more consistently e.g. "temperature overshoot" or "temporary overshoot" both in the report and the glossary. [Norway]	Taken into account - Remaining carbon budget and Overshoot have been described in a short "Definitions central to SR1.5" box.

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33690					Please clarify how the report deal with net emissions (both related to definitions and how it is modelled in the scenarios) including both emissions by sources and removals by sinks. This is especially important related to how the AFOLU sector is dealt with, and how it relates to the IPCC reporting guidelines for AFOLU and also whether it is only anthropogenic emissions and removals. The most relevant are the anthropogenic part. [Norway]	Taken into account - Net-zero CO2 emissions has been described in a short "Definitions central to SR1.5" box.
33678					A key conclusion in this report is that with current pledges under the Paris agreement most of the remaining carbon budget under 1.5 constraints would be exhausted by 2030. Thus, the SPM should focus more on the 2030 timeframe. For example, this SPM should highlight results that could guide governments, cities and companies in the period 2019-2030. This should be as specific and targeted as possible, regarding actions, measures and sectors concerned. Please consider, for example, to include a table in the SPM with the most important content from Table 2.14 from the SOD/Chapter 2 on "Transitions and enabling conditions that need to take place in key sectors in the short term for a 1.5°C pathway, based on available studies." [Norway]	Taken into account - The 2030 timeframe is visible in multiple sections of the new SPM draft.
33680					Please reconsider the statement in the highlighted (orange) boxes: to reduce the number of boxes, to reduce the amount of text in each box, and only provide the very key results that are most relevant for policy response. The highlighted boxes as a tool are very useful, making it easier for policy makers to access and navigate through results in an otherwise quite technical and scientific language. But please consider that the primary target groups for this report are policy makers at different levels, who will use this report as a basis to develop new policies and measures, when responding to the risks. [Norway]	Taken into account - the new SPM draft has been considerably shortened (from 31 to 22 word pages). Repetition has been reduced. Headline statements have been revised and strengthened.
33686					Regarding the length of the SPM; we find it more important that useful information for policy makers is readily available, rather than making a very short and general summary (10 pages). Some parts of the SPM would benefit from condensing the content and avoiding repetition (especially SPM 4). This will then naturally shorten it. However, we think other parts of the SPM needs more information about certain topics, e.g. treatment of negative emissions in SPM 3. If it was easier to navigate in the SPM to find specific information, document of about 30 pages is not necessarily too long. However it is important that the SPM is written in a form that better takes into consideration the target groups of politicians, decision makers and policy makers. [Norway]	Taken into account - the new SPM draft has been considerably shortened (from 31 to 22 word pages). Repetition has been reduced. Headline statements have been revised and strengthened.
33692					Please consider to address relation between the atmospheric concentrations, carbon budgets and scenario classes. One way could be to include associated concentrations in Table SPM.1. [Norway]	Rejected. Due to space restrictions the table has not been developed although aspects of carbon budgets and scenario classes are found in Section C.
33926					All SPM figures: Please consider using formats of figures that can be easily re-used in for examples presentations and other formats/situations after publication of the SPM. In some cases that may require reducing the complexity, and/or number of messages, in a given figure, and/or splitting the information into more than one figure. [Norway]	Taken into account - Figures have been completely revised for the new SPM draft, adopting a more integrative nature that is clearer for the reader.
34230					All SPM figures: Please consider applying the relevant principles from the Guidance for data visuals (J. Harold. et.al., Tyndall Centre, 2017) to SPM figures. In addition, please consider using common colour coding and symbols throughout the SPM (and report if possible). [Norway]	Taken into account - Figures have been completely revised for the new SPM draft, adopting a more integrative nature that is clearer for the reader.
34324					The SPM contains a lot of useful assessment. However, some parts, detailed in specific comments below, are repetitive, and other parts contain much jargon with the key messages obscured. Overall, I think it could be shortened substantially, and the main messages brought out more clearly. [Nathan Gillett, Canada]	Taken into account - the new SPM draft has been considerably shortened (from 31 to 22 word pages). Repetition has been reduced. Headline statements have been revised and strengthened.
34392					The term 'trade offs' is used in a confusing way in the SPM. Oxford Dictionary definition 'A balance achieved between two desirable but incompatible features; a compromise'. For example pg 24, ln 22 'increased risk of sustainable development trade offs', I think means 'increased risk of negative impacts on sustainable development'. And on pg 18, ln 6 'There is a high chance that the levels of CO2 removal implied in the scenarios might not be feasible due to... trade offs with sustainable development objectives' I think means 'might not be feasible due to... their incompatibility with sustainable development objectives'. I suggest re-phrasing using clearer plain-language alternatives. [Nathan Gillett, Canada]	Rejected - Trade-offs are clearly explained in Chapters 4 & 5. The feasibility section in chapter 4 highlights the six components to feasibility assessed in this report.
34402					The figures in this chapter are in general too complex, in particular Figures SPM.2, 3, 5 and 7. Figure SPM.7 is an extreme example. Readers will not be able to digest all the information in these figures. These figures should be simplified and focus on a few key results. Interested readers can always refer to the underlying chapters for more complete information. [Nathan Gillett, Canada]	Taken into account - Figures have been completely revised for the new SPM draft, adopting a more integrative nature that is clearer for the reader.
36600					Linkages between SDGs and 1.5 are solely related to mitigation action. There is no integration of impacts of climate change on SDGs. This relates to figure SPM 5-7. Every effort should be made to achieve the integration of impacts into the SDG analysis. If this is not possible due to lack of literature, synthesis products need to be either deleted or very clearly framed as being solely related to mitigation. It is extremely misleading as it stands. [Snaliah Mahal, Saint Lucia]	Taken into account - adaptation has been strengthened in the new draft of the SPM, see sections D2, D3, D5 & D6 and SPM4.
36640					The compounding effect of flooding from cyclones on the hazard of sea level rise should be highlighted in the SPM. [Snaliah Mahal, Saint Lucia]	Rejected - literature assessed in chapter three mainly focuses on assessing the increase in frequency and/intensity of cyclones does not cover links to sea level rise and flooding. Chapter three does cover compound effects of flooding from sea level rise and development but not with cyclones.
36906					There are lots of general statements (e.g., p.26 L.32-36), not limited to the case of a 1.5°C warming world. Should describe differences from the other targets such as 2°C world [Keigo Akimoto, Japan]	Taken into account. Repetition has been removed and key messages strengthened and refocused to findings specific to 1.5 and 2°C.

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38930					I think and explanation about the choice of main time frame (i.e. 21st century) is needed. This framing is obviously based on what is available - which should be stated - but choice of time frames is also a value-related choice. Thus, it needs some explicit attention. (Something is said about this on page 2 , line 12-13, but more is needed in my view). [Jan Fuglestvedt, Norway]	Rejected - time frame are discussed in chapter 1. Due to the SPM being focused on the most policy relevant assessment results, nearer term timeframes have been used (2030, 2050 predominantly). 2100 or longer time frames are only used for particularly policy relevant topics, for example, sea level rise.
37266					In general, the IPCC report, it seems good to me. However, it persists: a) that scientists write only for scientists, Will a person from the non-urban area understand what scientists say? b) We can advance in the scientific findings, but if for example the USA continues with its "green carbon" economy, the effort of others is not significant. c) The scientific community should also show that despite the SDGs and the advances, the consumer economy continues and the detriment of resources advances. d) It is urgent and obligation of the scientific community, that the IPCC reports are mediated, that is to say: with simple and easy-to-understand words to show how affects the interference of human beings in ecosystems and other spaces. Not only executive reports for decision makers. [Fátima Castaneda, Guatemala]	Partially taken in to account: A,D) Comments on readability are well taken and an effort has been take to use clearer language in this IPCC assessment cycle by including communications experts in the drafting. B) The IPCC does not comment on policies of individual countries but provides policy-relevant information for that audience. C) Synergies and trade-offs with the SDGs a long with an assessment of current pledges with respect to levels and warming are found in Section D of the SPM.
39036					I think slightly modified structure could be considered. As it is now, "background" is placed between SPM 1.2 High level statements and SPM 2, which i find strange. I suggest making Background into a separate section at the highest level (with a different title; see sepratae commen on this). and to take the high level statements out of the structure and present it as something on a separate level; a bit like a box, but without calling it that. Since the High level staments builds on all the rest of the text, it makes sense, in my view, to lift it up like this. [Jan Fuglestvedt, Norway]	Taken into account - High level statements have been incorporated into the main four SPM structures (now labelled Sections A,B,C,D). Background has become the introduction that only presents contextual statements, leaving all assessment statements to follow.
39038					I think this is a very promising FOD of the SPM. Of course it will develop further as the chapters are revised after their SOD review. In the further work on the SPM I hope the authors can try to avoid general and rather obvious statements. If they find that some well known points are needed as "reminders" then these should not be presented as findings, but rather as starting points for more 1.5/2 specific statements on implications etc. [Jan Fuglestvedt, Norway]	Taken into account. Repetition has been removed and key messages strengthened and refocused to findings specific to 1.5 and 2°C.
39040					Regarding my comment on general statements, I feel that especially the later sections contains a bit too much of this. I understand that this may be a consequence of less literature available on 1.5/2. If so then it is better to try to sharpen and cut so the important messages there can be seen more clearly and not hidden behind general text, which may reduce the efficency of communication of these parts of the report. [Jan Fuglestvedt, Norway]	Taken into account. Key messages strengthened and refocused to findings specific to 1.5 and 2°C.
39042					The integration across chapters in the way that the statements are formulated is very useful. I hope this will be taken further so more integration and synthesis of findings and knowledge can be built in to the statements, avoiding sequential presentation. Perhaps material form ch5 can be used even more together with findings form the ealier chapters. [Jan Fuglestvedt, Norway]	Taken into account - SPM has become more integrated in nature this is reflected, for example, in the new figures that span at least two chapters' assessment.
40408					add a paragraph of extreme phenomena [Jonathan Gómez Cantero, Spain]	Taken into account - Extreme events are now covered in Section B1
41714					The SPM should be clear and frank about 1.5C and SRM: if a combination of mitigation and carbon removal actions prove unable to keep warming below 1.5C, and if SRM could be made to work, then it would be the only option for doing keeping temperature rises below 1.5C This is a basic physical fact because not other method for quickly stopping the rise in global temperatures has been proposed. It is not a pleasant fact, but it would be an abrogation of responsibility if a report on 1.5C did not mention this basic but ugly physical predicament. It is equally important to point out that this does not mean that humanity should do SRM to stay under 1.5C as the physical and sociopolitical effects could prove much more risky than passing 1.5C. But the people and governments of the world have to be made aware of the basic physical situation and the IPCC should not fudge this. [Andrew Parker, United Kingdom (of Great Britain and Northern Ireland)]	Taken into account - a feasibility assessment of SRM is undertaken in chapter 4. the SPM draft now states 'Solar radiation modification (SRM) measures are not included in any of the available assessed pathways. Though some may be theoretically effective in reducing an overshoot, SRM measures face large uncertainties and knowledge gaps as well as substantial institutional and social constraints to deployment related to 27 governance, ethics, and impacts on sustainable development (medium confidence).'
44620					The author team is commended for a good effort on the FOD of the SPM, and encouraged to keep working towards an accessible and flowing SPM, rather than what were often rather staccato and overly-technical SPMs in the past. [Penny Urquhart, South Africa]	Noted
44622					In the absence of a Glossary, or at least a clear definition of key terms, it is difficult to assess fully the consistency of use of such terms. [Penny Urquhart, South Africa]	Taken into account - Definitions central to SR1.5 box has been added to the new SPM draft.
46356					The SPM does not mention "migration" as a consequence of CC whereas the issue is addressed extensively in chapter 3 (esp. 3.4.10.2) meanwhile the SPM mention "displacements" and "population displacements" several times. A difference should be made between displacement and migration and clear definitions should be given for both terms (also in the glossary). I would suggest to use IDMC definition of displacement and IOM definition of migration. [Etienne Piguet, Switzerland]	Rejected - The SPM is focused on new finding since the AR5. Few examples of literature exist on migrate from climate change at global warming levels of 1.5°C, although at high levels this is present but this is not new from the AR5.
46358					The SPM faces a huge communication challenge that was not present in other IPCC reports because the present report delivers two antinomic messages : message A : 1.5 is already very bad ! Message B: 2 instead of 1.5 would be much worse (which implicitly means that 1.5 is not that bad.)... This is a challenging message to communicate to policy-makers and some preliminary explanation should be given at the beginning of the SPM. In the current state the SPM is a mix of statements that clearly put to the fore type A message and statements insisting on type B messages (2.3, 2.4, 2.5,) . Both types of messages should probably be more clearly sorted in the SPM (see 2.6, 2.7) [Etienne Piguet, Switzerland]	Noted

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49280					Confidence statements are pivotal elements of IPCC assessments. However, in the current draft of this report, it appears that confidence assessments are not done in any systematic fashion and appear rather erratically throughout the different chapters, at time even without a robust literature base. This needs to be reworked substantially in order for this report to be policy relevant and might follow the directive that sometimes 'less is more'. [Bill Hare, Germany]	Taken into account - uncertainty/confidence language has been added to all statements in the SPM.
50104					The SPM is too much focused on listing the problems in achieving the 1.5C warming limit and by far not enough on listing the possible solutions, while the chapters do provide the material for that. This imbalance needs to be repaired. [Bert Metz, Netherlands]	Taken into account - Sections C (Emission pathways and system transitions consistent with 1.5°C global warming) and D (Strengthening the global response in the context of sustainable development and efforts to eradicate poverty) have been developed to address solutions.
53588					Indicate better how Box SPMs relate to high level statements. [Switzerland]	Taken into account - Headline Statements have been redrafted into more chapeau statements that integrate the content in the below bullet points.
53590					The absence of level of confidence for many statement should be corrected. [Switzerland]	Taken into account - uncertainty/confidence language has been added to all statements in the SPM.
53884					SPM is good and I think correctly balanaced on risks and solutions. It is still rather technical, all figures could be simplfied but they are along the right lines. Some of the orange boxed texts -are not really headlines. They are more introductory material. I would reserve orange boxes for the most interesting headlines [Piers Forster, United Kingdom (of Great Britain and Northern Ireland)]	Noted/Taken into account: Headline Statements have been redrafted into more chapeau statements that integrate the content in the below bullet points.
53892					The mix of long paragraphs and one setence statements makes it hard to see the structure, I would try to harmonise and imporve signposting of the structure so readers have better context [Piers Forster, United Kingdom (of Great Britain and Northern Ireland)]	Taken in account: Efforts have been made to reduce the length of statements and making them clearer to the reader.
53894					Can we make a clear statement comparing where knowledge is now with reference to where it was in AR5? [Piers Forster, United Kingdom (of Great Britain and Northern Ireland)]	Taken into account - references to new/updated knowledge since the AR5 are explicitly stated in the new SPM draft, for example, in SPM2 or in Section B5.6.
55358					The draft SPM is far too long in my view to be approvable. I urge the authors to cut its length by at least 50%. Otherwise there is a severe risk that during the approval process, some parts will be lost due to lack of time, without sufficient control by the authors to ensure balance. Given the amount of reduction required, I'm not making specific suggestions. Please take the length seriously. [Andy Reisinger, New Zealand]	Taken into account - the new SPM draft has been considerably shortened (from 31 to 22 word pages - roughly 11 IPCC pages). Repetition has been reduced. Headline statements have been revised and strengthened.
55360					The SPM uses uncertainty language only sporadically and inconsistently (reflecting the inconsistent use in the underlying chapters). This is a problem because it might force the authors to come up with appropriate uncertainty language during the approval process, which is highly problematic on several fronts. Please do all you can to generate more consistent use of uncertainty language in the underlying chapters so that the SPM can consistently make use of it for its key statements of substance. (As a rule, if in the view of the authors a statement does not need any uncertainty language because it's an obvious fact: if it's self-evident, is it worth saying and does it belong in the SPM of this report? If it is anything other than self-evident, uncertainty language is probably relevant and important.) [Andy Reisinger, New Zealand]	Taken into account - uncertainty/confidence language has been added to all statements in the SPM.
55362					The word "risk" is used inconsistently in this SPM, reflecting its inconsistent use in the underlying chapters - please try to address this. Based on the definition in the glossary, the concept of risk is based on an assessment of both probability of an event occurring and its consequences, and uncertainties relating to both. However, there are many phrases in this report like "There is a risk that..." or "This increases the risk of X happening." In these statements, the word risk is by and large used synonymously with probability alone, and the expressions should be changed to "there is a chance of X happening", or "the probability of X happening is increased." The word risk should only be used where the consequences have been explicitly assessed as well as the likelihood (even though the likelihood doesn't have to be quantified). I.e. phrases "The risks FROM X increase" or "System X is at increasing risk" are correct, but the "Risk of X happening" or a "Risk THAT something happens" are not. Consistency is important because the concept of risks is at the heart of how IPCC frames understanding and responding to climate change, and turning it into a lazy proxy for unquantified probabilities is not helpful for this. [Andy Reisinger, New Zealand]	Taken into account - the term risk is defined in the SR1.5°C Glossary and is now used consistently in the chapters unless otherwise stated.
55564					Many headline statements (Highlighted in colour and larger type in boxes) merely state the obvious: ie 1.5C is bad, but 2C is worse. Eg: 2.2; 2.4; 2.5; 2.6(first sentence); 2.7. (By contrast, 2.3 at least gives information that the difference for sea ice and coral reefs is significant). So either the report is not telling us much new, or the headline messages are not refelcting this well. This lack of further information is also problematic given measures to acheive 1.5C limit are so much bugger than those to acheive 2C limit (see, eg, table spm1). [David Cooper, Canada]	Taken into account. Key messages strengthened and refocused to findings specific to 1.5 and 2°C. Repetition has been removed and key messages strengthened and refocused to findings since AR5.
55606					I note that the SPM is FOD and it would seem that some of the improvements made from FOD to SOD in the chapters have not yet been captured in the narrative of the SPM. This includes (1) clearler messages on impacts especially with regard to distictnion between 1.5C and 2C; (2) treatment of BECCS vs AR/AFOLU/Ecosystem mitigation measures in models and scenarios; (3) more balanced used of terms with respect to ecosystm management (which includes not only A/R, but: (a) reduced deforestation and other loss of native high C habitats; (b) ecostystem restoration; and (c) soil/land management in agriculture. [David Cooper, Canada]	Noted
55762					The SPM should acknowledge the potential for AFOLU/ecosystem based mitigstion measures to provide sugnificant, early contributions to reducing net emissions while also contributing to adpatation. [David Cooper, Canada]	Taken into account - AFOLU and Ecosystem based mitigation are now covered in sections C2 and C3.

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50240					Overall, I find the report completely underestimates the seriousness of global warming, and will in my opinion, will be detrimental. We can keep going with out current plans and will be greeted by decision makers with a sigh of relieve. This work is only comparable to the western world underestimating the rise of Hitler in the 1930's and will be considered so, in my view, by later generations. There is a reliance on climate models to give precipitation forecasts, and it is well known and accepted that climate models get rainfall wrong (e.g. up to 2m precipoitation a year for the Indian monsoon, (e.g. Latham et al, 2012 , d.o.1. 10.1098/rsta.2012.0086 but also many others). Amazingly, the role of clouds and atmospheric convection hardly make an appearance in this document. This reliance of climate models as the truth, especially regarding precipitation is hugely detrimental to the quality of this report. Climate models are wrong with rainfall over a large fraction of the planet. This particularly affects Chapters 3, 4 and by implication Chapter 5. There is strong evidence that climate models are in accurate for anything but temperature. (e.g. precipitation, ice cover). Why has all the work of Peter Wadhams, an eminent expert on polar ice (and an author of "Farewell to Ice") been ignored and not referenced. His work, in several papers, suggests a much more serious impact on Arctic Ice than is represented here. In my view this is reprehensible and demeans the report. In section 3.7, of the SPM "Issues related to governance and ethics, public acceptability and impacts on sustainable development could render solar radiation management economically, socially and institutionally infeasible.", is in my view not justified. It may be correct, BUT by omission of the discussion of other science which contradicts this view is reprehensible. Economically, the costs of "Marine Cloud Brightening" geoengineering, is the cost of running one large warship. This report only represents a conclusion based on a biased selection of the science discussed in the chapters by authors who do not represent or cover the whole subject area. My specific comments relate only to chapter 4, and if not found below. Specific comments I will refer only to the section in geoengineering, which appears in chapter 4, where the subject of geoengineering is discussed. None of the lead authors has done any noticeable work on geoengineering. None of the contributing authors has any experience of geoengineering. Only one of the contributing authors on the x-chapter boxes has any experience of geoengineering (and he is opposed to the concept). Thus I find the whole section biased and does not represent the subject area. This report is biased, just as the press barons who control the press and media in the western world would give a good and comprehensive discussion if the advantageous of running the world on socialist lines. The lack of anyone of these 50 authors who has any experience or a positive view that geoengineering should be discussed and considered in a less than negative light is reprehensible. Also this section of the report document is totally biased, and ignores work done on the subject by for example, Stephen Salter and Peter Wadhams, to mention just two names. There is no reference to their work. This is also is reprehensible and will be noted when the report is published. There is a reliance on climate models to give precipitation forecasts, and it is well known and accepted that climate models get rainfall wrong (e.g. up to 2m a year for the Indian monsoon, (e.g. Latham et al, 2012 , d.o.1. 10.1098/rsta.2012.0086 but also many others). As a meteorologist, and user of climate models, the reliance on climate models in the report is unjustifiable in the sense that these models do not represent many of the physical processes going on in the real world and atmosphere. Section 4.3.9.2 This section discusses the cost of geoengineering, with reference to the sulphur injection, and puts the cost as USD 1-10 billion per annum. This is a reasonable estimate for the sulphur scheme. However, why is there little discussion of the side	1) Noted 2) knowledge gaps including limitations to methodologies used are expressed in the end of every chapter, for example Chapter 3 Section 3.7.1 'Gaps in Methods and Tools'. 3) Arctic as a hot spot is covered in Sections 3.5.4.1 & 3.5.4.2 of chapter 3 and with be comprehensively assessed in the Working Group 1 main assessment report (AR6)? Referring to the work of Peter Wadhams in Chapter 3: We have not identified any peer reviewed article by this author referring specifically to changes in the Arctic at 1.5°C global warming. The IPCC bases its assessment on peer-reviewed literature, which does generally not include books. 4) Taken into account, we have added reference to Salter et al, 2008 to this report, but spatial constraints doesn't allow us to discuss the cost of MCB in the details. Especially if this assessment based on a couple of references. But we have mentioned that cost of MCB will be lower than cost of SAI
52666					There is an inconsistency between the SPM, which summarizes the findings regarding impacts of 1.5°C global warming (SPM2) followed by the findings on emissions pathways and policy responses compatible with 1.5°C (SPM3), and the order of the underlying chapters (pathways followed by impacts). Given that there are many pathways to 1.5°C that result in different impacts, should the SPM follow the order of the Chapters? Furthermore, the high-level statements are not respecting the order in the SPM. [Iulain Florin VLADU, Germany]	Rejected - there is no mandate for the SPM to follow the structure / order of the underlying chapters.
53586					Careful attention has to be paid how this scientific report makes reference to "in the context of sustainable development, poverty eradication and equity" in order to avoid that the findings of the report would not be qualified and/or associated to a kind of "disclaimer' that dilutes their meaningfulness for the UNFCCC 2018 Talanoa Dialogue. [Switzerland]	Noted
19086		27		27	Can something be said about disproportional (non-linear) increase of risks along with scenarios ? [Andrea TILCHE, Belgium]	Taken into account - non linearities of risks is covered in the SPM Figure 2 - Burning Embers.

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234	1		31		Suggest to discuss the topic of natural adaptation of terrestrial and marine ecosystems/key organisms. These may affect the outcomes of global change scenarios. Few literature examples that reveal the wide range of suggestions/ideas/results: Grassein, F., Lavorel, S., Till?Bottraud, I. (2014). The importance of biotic interactions and local adaptation for plant response to environmental changes: field evidence along an elevational gradient. Global change biology, 20(5), 1452-1460; Gallagher, R. V., Makinson, R. O., Hogbin, P. M., & Hancock, N. (2015). Assisted colonization as a climate change adaptation tool. Austral Ecology, 40(1), 12-20; Javeline, D., Hellmann, J. J., McLachlan, J. S., Sax, D. F., Schwartz, M. W., Cornejo, R. C. (2015). Expert opinion on extinction risk and climate change adaptation for biodiversity. Elem Sci Anth, 3; Lavorel, S., Colloff, M. J., Mcintyre, S., Doherty, M. D., Murphy, H. T., Metcalfe, D. J., et al. (2015). Ecological mechanisms underpinning climate adaptation services. Global change biology, 21(1), 12-31; Brang, P., Spathelf, P., Larsen, J. B., Bauhus, J., Bonc?ina, A., Chauvin, C., et al.(2014). Suitability of close-to-nature silviculture for adapting temperate European forests to climate change. Forestry: An International Journal of Forest Research, 87(4), 492-503; Long, E., Biber, E. (2014). The Wilderness Act and climate change adaptation. Envtl. L., 44, 623.?? [Baruch RINKEVICH, Israel]	Whilst a certain amount of natural adaptation may occur, particularly in some taxa, for large assemblages of taxa rates the literature does not at present suggest that this would be significant, except for natural adaptation by dispersal, which is taken into in the underlying literature that we cite in the underlying report and which supports the statements made in the SPM. The literature cited by the reviewer does not actually refer to natural adaptation, (which refers to natural responses on the part of species without the influence of humans). These citations refer instead to mechanisms that humans can use to help natural or managed ecosystems to adapt. This is again beyond the scope of the present SPM and is best handled in AR6. The potential for species in the ocean to move in response to warming is discussed in the underlying chapter and this level of detail is not appropriate for the SPM.
9074	1		31		As a whole, the document is very repetitive. Very few Policy maker will go through 31 pages where he/she will read tens of times that the risk for such or such problem... will be higher if the warming is +2°C instead of +1.5°C? There would be a need of a summary of one to two pages maximum synthesizing the major issues (with a table?). [Frédéric Durand, France]	Taken into account - The SPM has been completely restructured.
9076	1		31		Why is there no reference to the RCP scenarios and especially to the RCP 2.6 which the only that make a maximum +2°C possible? RCP 2.6 should be mentioned at least in the following pages: page 2, lines 20-21; page 3, lines 16-17; page 3, lines 40-41; page 14 lines 17-19; page 15 lines 15-16. [Frédéric Durand, France]	Rejected - The reviewer suggest that RCP2.6 suggests that only a maximum +2°C is possible. However, this is inconsistent with the available most recent evidence to this assessment, as being carried out in Chapter 2 of the report.
18784	1		31		general question: If during an overshoot large permafrost areas in Alaska and Siberia defreeze and relase GHGs, would this be reversable during this century? How does such a scenario influence the whole calculations? [Andrea TILCHE, Belgium]	Taken into account. The mandate of the SR15 report is to look specifically at questions related to 1.5°C. Therefore this question has been assessed in the context of pathways that limit warming to 1.5°C to 2°C. Chapter 2 assessed the impact of permafrost over the 21st century to add up to an additional 100 GtCO2 release, thus making reversal of warming more difficult. For higher warming levels this is expected to be a larger effect.
31046	1		28		the figures are all very nice but in many cases there is so much information being communicated in them that they are hard to follow. The value of a good graphic, in my opinion, is that you can understand what is being communicated at a quick glance and without having to read too much text. the figures here, for me, do not do this and need as much concentration and effort as reading the text (fig SPM7 is particularly complicated to get a grasp of). [James FORD, Canada]	Taken into account - Figure SPM7 has been revised based on this comment, matching colour intensity to the intensity of a synergy or trade-off with a specific SDG. This should make the information immediately graspable.
31048	1		28		The mitigation or adaptation assessments from chpater 4 are largely missing. [James FORD, Canada]	Taken into account - Sections B6 (adaptation) and C2 (CDR) and C3 (mitigation) now host more information on options.
50758	1		1		Supplementary Material 4.B - Box "Power infrastructure resilience". In the column "synergies" the following should be added "Weather forecasting for energy supply management, extreme weather resilient electric power supply systems and flood resilient electric equipment make power supply more efficient and reliable ". Literature references: a) Diverse authors (editor Alberto Troccoli) "Weather & Climate Services for the Energy Industry, Palgrave Macmillan", ISBN 978-3-319-68417-8. B) Michelle Davis, Steve Clemmer "Power Failure How Climate Change Puts Our Electricity at Risk— and What We Can Do" - Union of Concerned Scientists, April 2014. [Francisco Javier Hurtado Albir, Germany]	Not applicable - section removed
58178	1				Overall: there are three figures on SDGs and none on emission pathways and/or carbon pricing. This is nnot balanced and raises the question whether this report is on a cliimate objective or on SDGs. [Nico Bauer, Germany]	Taken into account - the SPM now has 1 figure on the SDG (SPM4) and 1 figures on the emission pathways (SPM3).
343	1	1	31	48	ALL figures of SPM are difficult to be known by the experts. It is much more difficult for policy-makers. [Zong-Ci Zhao, China]	Taken into account - The review comments to the FOD SPM have been extremely helpful and all figures have been redone, changed or dropped for the FGD.
355	1	1	31	48	adding a table to compare 1.5 degree with 2.0 degree [Zong-Ci Zhao, China]	Taken into account - even though a table could not be added, the results for 1.5°C are now presented alongside comparisons with the results for 2°C.
356	1	1	31	48	adding a table or figure to compare 1.5 pathways with RCPs and SRES [Zong-Ci Zhao, China]	Editorial - copyedit to be completed prior to publication. It was decided to focus the SPM on 1.5°C-related scenarios in line with the mandate of the report. Figures in Chapter 2 provide context for the 1.5°C pathways to the wider scenario literature, but the comparison to the RCPs and potentially SRES has not been included explicitly.
7144	1	1	31	48	The SPM well reflects the chapter summaries but does not point to the most important conclusions. The SPM would gain to be shorter and focusing on key conclusions (in general those with quantitaive aspects).The figures are much too complex (e.g in particular 2 and 5) ; figures are largely used to convey the main messages of an IPCC report. This will be difficult without improvments (simplification) of the SPM figures [Jean Jouzel, France]	Taken into account - The SPM has been shortened by a third and figures have been simplified.
32656	1	1	31	48	despite individual comments above the SPM as a whole is readable and understandable, but not left with the sense of a clear narrative or message. Consider a short high-level summary of the summary at the beginning? Maybe less necessary when down to 10 pages from 31 but still useful. [Jonathan Lynn, Switzerland]	Taken into account - the length was indeed reduced by 10 pages.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
39302	1	1	31	1	Writing the SPM before the final draft of all chapters is completed, could be a reader trust concern - for example, have all findings been geniuinely collated, to be appropriately represented in the SPM? [Lindsey Cook, Germany]	Noted - In the meantime, all chapters have been concluded and the SPM has been amended - also in response to the previous review process, which would not have been possible to take place otherwise.
9630	1	1	31	48	To be useful, this IPCC report needs to preach to the unconverted, which means it also has to be very sensitive and precise about the full range of concerns helds by the world's citizens and how its content might be read, and potentially misread, by a very wide audience coming at the issue from a broad array of perspectives and histories and worries. It would be deeply helpful if the SPM included a very clear, completely explicit (even blunt) statement of the importance, when working to achieve emissions reductions, of both (1) maintaining and promoting social equity, including avoiding poverty traps that mitigation measures can contribute to, which is well-emphasized in Chapter 1 but not clearly stated in the SPM, and (2) even more fundamentally, ensuring full compliance with basic individual rights and freedoms, such as those outlined in the United Nations Universal Declaration of Human Rights (http://www.un.org/en/universal-declaration-human-rights/). For example, the somewhat vaguely worded passage on page 17, "…the geographical and economic scale of the energy, land, urban and industrial transitions implicit in pathways consistent with a 1.5*C warmer world… require more planning, coordination, and disruptive innovation across actors and scales of governance than (any) spontaneous or coincidental changes observed in the past", can be too easily misconstrued to mean that the IPCC supports the use of draconain measures (the passage might conceivably even be misread to mean support of forced mass migration) to achieve the emissions reductions required to limit warming to 1.5*C. A clear, explicit, and unequivocal statement in the SPM that all action on emissions is subject to both social equity and individual rights and freedoms would help a lot in avoiding any potential misunderstandings. [Sean Fleming, United States of America]	Noted - however, the FOD SPM draft already put equity forth as a prerequisite for both mitigation and adaptation and we do not agree that more "coordination, planning and disruptive innovation" can be interpreted to imply measures like forced mass migration.
39306	1	1	31	3	The SPM does not seem to reflect the depth of exploration and finding as reflected in the chapters. [Lindsey Cook, Germany]	Noted - However, it is in the nature of a summary that the full depth and all findings of the chapters cannot be replicated here.
42878	1	1	31	48	Given the policy maker audience for the SPM, positive, action-oriented framing is very important (e.g., framing effect https://www.behavioraleconomics.com/mini-encyclopedia-of-be/framing-effect/). While some summary bullets do this well, there are several instances where positive framing consistent with the underlying science could replace the existing negative framing. For example, SPM-4, L2-7 is currently framed around delayed action. It could be reformulated as follows: “Fast action and strong near-term policies reduce mitigation challenges in the long-term and reduce the risks associated with exceeding …”. [Kristin Campbell, United States of America]	Accepted - the framing around delayed action has been removed.
42880	1	1	31	48	Differentiate levers for policymakers. For example, in discussions of decarbonization of electricity generation, clarify the effect of co-emitted non-CO2 cooling and warming emissions. These should be considered separately from sector-specific non-CO2 emissions, such as methane, HFC, and black carbon. SPM Figure 1 obscures these different levers by grouping all non-CO2 pollutants together. Would it be possible to add a panel to differentiate co-emitted from non-co-emitted emissions? Or at least include a description in the figure caption explaining the differences among the non-CO2 levers and effects. See for example the supplementary material in Xu and Ramanathan (2017) for a disaggregation. See Xu and Ramanathan (2017) Well below 2 °C: Mitigation strategies for avoiding dangerous to catastrophic climate changes, Proc. Natl. Acad. Sci., doi: 10.1073/pnas.1618481114. [Kristin Campbell, United States of America]	Taken into account. Although a detailed discussion as proposed by the reviewer would not fit within the space constraints of the SPM, the revised text highlights the different effects and impacts of non-CO2 and CO2 forcers, and non-CO2 forcers are also highlighted separately in Figure SPM3
42882	1	1	31	48	Will there be an SPM5 section? Chapter 5 discusses the interactions between climate mitigation and adaptation pathways and the sustainable development goals. It should, however, make clear that the greatest risk to SDGs is the failure to keep warming below 1.5, given the cluster of tipping points between 1.5 and 2C, and given the acceleration of warming from the feedbacks as 1.5C is exceeded. Failure to slow climate change will be fatal to aspirations of achieving SDG. Section 5.2.4 briefly acknowledges this (5-4, L44-46: “Limiting temperature to 1.5°C can reduce significantly the risks of failure in achieving certain SDGs, e.g. on poverty, health, and water and sanitation, although there will be differences between countries.” [Kristin Campbell, United States of America]	Accepted. The link between mitigation, adaptation and SDGs is now discussed in Section D.
42884	1	1	31	48	The special report acknowledges several gaps, specifically in section 2.6.4. It would be worth noting in the SPM some of these key gaps, and what is needed to improve understanding of the different risks between a 1.5 vs 2.0 world, including consideration of fat tails, and understanding feedbacks and tipping points vulnerable in case of overshoot. [Kristin Campbell, United States of America]	Taken into account - As overshoot scenarios indeed are fraught with larger uncertainties, the SPM has been completely revised to focus on scenarios with limited or no overshoot. Knowledge gaps on SRM and uncertainties in climate response have been additionally highlighted. There was no space nor basis from the chapters to go into details with respect to fat tails.
42930	1	1	31	48	Given the policy maker audience for the SPM, positive, action-oriented framing is very important (e.g., framing effect https://www.behavioraleconomics.com/mini-encyclopedia-of-be/framing-effect/). While some summary bullets do this well, there are several instances where positive framing consistent with the underlying science could replace the existing negative framing. For example, SPM-4, L2-7 is currently framed around delayed action. It could be reformulated as follows: “Fast action and strong near-term policies reduce mitigation challenges in the long-term and reduce the risks associated with exceeding …”. [Durwood Zaelke, United States of America]	Accepted - the framing around delayed action has been removed.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
42936	1	1	31	48	The special report acknowledges several gaps, specifically in section 2.6.4. It would be worth noting in the SPM some of these key gaps, and what is needed to improve understanding of the different risks between a 1.5 vs 2.0 world, including consideration of fat tails, and understanding feedbacks and tipping points vulnerable in case of overshoot. [Durwood Zaelke, United States of America]	Taken into account - As overshoot scenarios indeed are fraught with larger uncertainties, the SPM has been completely revised to focus on scenarios with limited or no overshoot. Knowledge gaps on SRM and uncertainties in climate response have been additionally highlighted. There was no space nor basis from the chapters to go into details with respect to fat tails.
42886	1	1	31	48	Focus on the positive framing. For example, SPM-4, L2–7 can be rephrased as: “Fast action or strong near-term policies reduce mitigation challenges in the long-term and reduce the risks associated with exceeding 1.5°C global warming temporarily (referred to as 'overshoot') or of warming remaining above 1.5°C by the end of the century. Fast action or strong near-term policies reduce the severity of projected impacts and adaptation needs. Modelling suggests such fast or strong near-term policies are needed to stay within 33% likelihood of holding warming below 1.5°C throughout the 21st century without overshoot.” [Kristin Campbell, United States of America]	Taken into account - In response to several of these review comments, more positive formulations have been used to frame the challenges.
42932	1	1	31	48	Differentiate levers for policymakers. For example, in discussions of decarbonization of electricity generation, clarify the effect of co-emitted non-CO2 cooling and warming emissions. These should be considered separately from sector-specific non-CO2 emissions, such as methane, HFC, and black carbon. SPM Figure 1 obscures these different levers by grouping all non-CO2 pollutants together. Would it be possible to add a panel to differentiate co-emitted from non-co-emitted emissions? Or at least include a description in the figure caption explaining the differences among the non-CO2 levers and effects. See for example the supplementary material in Xu and Ramanathan (2017) for a disaggregation. See Xu and Ramanathan (2017) Well below 2 °C: Mitigation strategies for avoiding dangerous to catastrophic climate changes, Proc. Natl. Acad. Sci., doi: 10.1073/pnas.1618481114. [Durwood Zaelke, United States of America]	Taken into account. Although a detailed discussion as proposed by the reviewer would not fit within the space constraints of the SPM, the revised text highlights the different effects and impacts of non-CO2 and CO2 forcers, and non-CO2 forcers are also highlighted separately in Figure SPM3
42934	1	1	31	48	Will there be an SPM5 section? Chapter 5 discusses the interactions between climate mitigation and adaptation pathways and the sustainable development goals. It should, however, make clear that the greatest risk to SDGs is the failure to keep warming below 1.5, given the cluster of tipping points between 1.5 and 2C, and given the acceleration of warming from the feedbacks as 1.5C is exceeded. Failure to slow climate change will be fatal to aspirations of achieving SDG. Section 5.2.4 briefly acknowledges this (5-4, L44-46: “Limiting temperature to 1.5°C can reduce significantly the risks of failure in achieving certain SDGs, e.g. on poverty, health, and water and sanitation, although there will be differences between countries.” [Durwood Zaelke, United States of America]	Accepted. The link between mitigation, adaptation and SDGs is now discussed in Section D.
42938	1	1	31	48	Focus on the positive framing. For example, SPM-4, L2–7 can be rephrased as: “Fast action or strong near-term policies reduce mitigation challenges in the long-term and reduce the risks associated with exceeding 1.5°C global warming temporarily (referred to as 'overshoot') or of warming remaining above 1.5°C by the end of the century. Fast action or strong near-term policies reduce the severity of projected impacts and adaptation needs. Modelling suggests such fast or strong near-term policies are needed to stay within 33% likelihood of holding warming below 1.5°C throughout the 21st century without overshoot.” [Durwood Zaelke, United States of America]	Taken into account - In response to several of these review comments, more positive formulations have been used to frame the challenges.
54542	1	1	31	48	Figure 4.6 on the feasibilty assessment of 28 mitigation options shall be added. It will enrich the SPM with clear and simple to understand evidence on feasibility of the technical options [Paolo BERTOLDI, Italy]	Taken into account - While with SPM3, there already is a figure with selected mitigation options and their interactions with other SDGs, the feasibility of mitigation options in the different systems is now more explicitly addressed in the text in C3.
36218	1	7			In Glossary Page 1 - Definition of 1.5 degree C warmer world, the exact base period used as a reference for pre-industrial times to be added. [India]	Accepted
29524	2				It could be useful that the text explaining what the levels of confidence and agreement (currently in a footnote) would be put in a box - they would be easier to find it. [Finland]	Accepted
36220	2		31		SPM is a summary for Policy Makers it should be easy to read and graphics should be easy to understand. However, currently graphics and some of the text is complicated and difficult to understand [India]	Taken into account - The text has been reduced by a third and simplified and the graphics all have been revisited on this basis as well.
50760	2		2		Supplementary Material 4.B - Box "Built environment". In the column "synergies" the following should be added "Improved insulation, passive climatisation and improvements to HVAC, heating, ventilation and air conditioning". Reference T.A.J. van Hooff, B.J.E. Blocken, J.L.M. Hensen, H.J.P. Timmermans, “On the predicted effectiveness of climate adaptation measures for residential buildings”. Building and Environment, Vol. 82(2014), p. 300-316, 2014 . Reference B) [Francisco Javier Hurtado Albir, Germany]	Not applicable - section removed
50762	2		2		Supplementary Material 4.B - Box "Built environment". In the column "trade-off" , insert "Air conditioning in buildings also leads to emissions of HFCs. In the health sector, trade–offs occur when adaptation to heat stress includes increased air conditioning, which leads to higher energy use and thus higher emissions." [Francisco Javier Hurtado Albir, Germany]	Not applicable - section removed
50764	2		2		Supplementary Material 4.B - Box "Energy use in industry". In the column "synergies" insert "Mainly the improvements are due to the use of extreme weather and flood resilient electric equipment. See "Power infrastructure resilience" in this table, page 4.1." [Francisco Javier Hurtado Albir, Germany]	Not applicable - section removed
53886	2		2		Is all this context necessary - it is very boring [Piers Forster, United Kingdom (of Great Britain and Northern Ireland)]	Taken into account - background section has been streamlined into a short introduction.
21584	2	1	2	4	This text could benefit from a reference to the original request of this report coming from the UNFCCC [Sweden]	Accepted

Comment No	From Page	From Line	To Page	To Line	Comment	Response
21442	2	1	31	1	In the SPM climate change of 2 degree C is essentially presented as a counterfactual which I find highly problematic as limting temperature change to 2C is an extremely ambitious challenge in the first place. Particularly for the SPM section on impacts this is an issue, since with current mitigtaion effort, we are more likely to face warming of 3C or more. While the approved SR1.5 outline mentions a comparison between 1.5 and 2C explicitly, from my point of view this does not suggest to exclusively focus on these two temperature targets which introduces the tendency of interpreting the less ambitious one as the baseline. I would therefore ask the wiritng team to consider bringing other reference points, in particular when it comes to the discussion of residual impacts. [Volker Krey, Austria]	Rejected. We agree that impacts at levels higher than 2°C are important and not to be excluded at this point. However, the mandate of the report was to look at impacts at 1.5°C and 2°C and thus the SPM reflects that scope. At the same time, the revised SPM indicates that current emissions are not in line with keeping temperatures to 1.5°C.
36764	2	1	4	1	The absence of context is evident in articles on the IPCC SPM leaked draft, here are examples of no context headlines: -"1.5°C is extremely unlikely." - "Most ambitious climate goal is practically impossible." - "Very high risk the planet will warm beyond key limit." - "Warming set to breach toughest limit by midcentury." - "Global warming set to exceed 1.5°C". [Birgit van Munster, United Kingdom (of Great Britain and Northern Ireland)]	Taken into account - text revised. Statements regarding context in section 1.2 have been clarified.
36766	2	1	4	1	Headlines with context would be: - “Sustainable development including climate stabilization is ‘extremely unlikely’." - "On current and near future trends, global collapse is inevitable." - "Humanity's Climate Stabilization and Sustainable Development Objectives: 40 years of past and projected failure." - "To stabilize the climate and development sustainably ‘closed mass’ laws are required." [Birgit van Munster, United Kingdom (of Great Britain and Northern Ireland)]	Rejected - no scientific evidence/publication provided to support changes suggested by the reviewer. No peer-reviewed evidence is provided in support of these statements.
36762	2	1	4	1	“Context” means “circumstances fully understood", IPCC’s 1.5°C Report is to be “in the context (circumstances fully understood) of strengthening the global response to the threat of climate change and sustainable development". Mandatory for this ‘context’ are: - the UN Climate Objective, the UN Sustainable Development Objective, - reviews of the past, current and projected States of these Objectives. The above required contexts of the Objectives and State of the Objectives are NOT in the current draft IPCC 1.5°C Summary for Policy Makers (SPM), they should be because these are the pages most likely to be read, quoted and remembered. [Birgit van Munster, United Kingdom (of Great Britain and Northern Ireland)]	Taken into account - text revised. Statements regarding context in section 1.2 have been clarified.
36768	2	1	4	1	Re Closed mass. If IPCC wrote a summary for a manned space mission which did not contain the mission's 'climate stabilization' and 'sustain the crew' objective and the state of the objectives, the result could be death of the crew. The same could be true with death of millions or billions of humans and other species - the "passengers and crew" of "Spaceship Earth". Humanity's Climate and Sustainable Development Objectives and past, current and projected States of the Objectives have to be includedto understand the context. [Birgit van Munster, United Kingdom (of Great Britain and Northern Ireland)]	Rejected - no scientific evidence/publication provided to support changes suggested by the reviewer
36770	2	1	4	1	Context 1.5°C. To avert global collapse (see below) please include the following context in the IPCC 1.5°C SPM: [Birgit van Munster, United Kingdom (of Great Britain and Northern Ireland)]	Noted
36772	2	1	4	1	• 1. Climate context. In 1992 humanity’s Climate Objective was agreed by all nations in order to stabilize atmospheric greenhouse gas concentrations to prevent dangerous human inference with the climate system. For 26 years there has been Objective Failure: no stabilization, destabilization has broken records every year, and is projected to continue to do so until after 2030, 40 years of Objective Failure. Today destabilization is basically such that 1.5°C global warming will occur - and at current trends in just 18 years atmospheric destabilization will lock in dangerous 2°C, by 2100 catastrophic 4°C, and it won’t stop there. [Birgit van Munster, United Kingdom (of Great Britain and Northern Ireland)]	Rejected - not supported by the peer-reviewed published literature. A warming in excess of 1.5C is not geophysically unavoidable.
36774	2	1	4	1	• 2. Sustainable development context. Humanity’s Sustainable Development Objective (1987) is to not compromise future generation’s ability to meet their needs for natural resources - from which humans and all their products are made. All 17 UN SDGs depend on 1 Goal: sustainable extraction, production and consumption of resources. There is Objective Failure; the global rate of resource extraction - doubling nearly every generation - is not sustainable. The annual extraction of 2000 may not be sustainable, extraction has nearly doubled since, and projected extraction by the 2040s “represents an unsustainable future… far beyond what is likely sustainable… not a trend that is in anyway sustainable”, and it won’t stop there (International Resource Panel [IRP], the global science authority on natural resources / sustainable development) [Birgit van Munster, United Kingdom (of Great Britain and Northern Ireland)]	Rejected - outside the scope of the chapter. This is a general statement about resource use, outside scope of IPCC

Comment No	From Page	From Line	To Page	To Line	Comment	Response
36776	2	1	4	1	• 3. Cause context. Unsustainable development – resource consumption and climate destabilization are caused by humans, but not equally; responsibility is linked to development level. The 1.2 billion poorest people account for 1% of the world's natural resource consumption, while the 1 billion richest consume 72% of the world's resources. Cumulative emissions are the cause of climate change, and in cumulative CO2 emissions UN Very High Developed (US, EU) cause 70 times more per capita than Low Developed (Nigeria and other Africa nations), 19 times more than Medium Developed (India), 5 times more than High Developed (China) (IRP/IPCC data). [Birgit van Munster, United Kingdom (of Great Britain and Northern Ireland)]	Rejected - outside the scope of the chapter. This is a general statement about resource use, outside scope of IPCC
36778	2	1	4	1	• 4. Solution context. Voluntary actions have not and cannot succeed, laws are required. Earth is a closed mass system, for sustainable development including climate stabilization and another 5,000 years of civilizations, humanity's laws must conform to nature's Closed Mass Laws: change from quantity to quality by law; extract the fewest possible natural resources, make only the very best, cyclical products - not the most / worst / linear including greenhouse gases; make products that are shared the most, and products that last the longest; remove dangerous, destructive products; reduce and remove products by per capita responsibility; halt and reverse population growth, increase laborsaving products; increase nonmaterial happiness - happiness is humans, nature and activities, not products. [Birgit van Munster, United Kingdom (of Great Britain and Northern Ireland)]	Rejected - outside the scope of the chapter. IPCC cannot prescribe policy solutions
36780	2	1	4	1	Sustainable development context graph and table: see worksheet SD Context Graph & Table [Birgit van Munster, United Kingdom (of Great Britain and Northern Ireland)]	Noted
36782	2	1	4	1	Climate stabilization context graph and table: see worksheet CS Context Graph & Table [Birgit van Munster, United Kingdom (of Great Britain and Northern Ireland)]	Noted
36784	2	1	4	1	Solution context graph: see worksheet Solution Context Graph [Birgit van Munster, United Kingdom (of Great Britain and Northern Ireland)]	Noted. Note that 18 years to 1.5C at current warming rate is consistent with the statement that 1.5C will be reached around 2040.
36786	2	1	4	1	Putting together global extractions, emissions, world product, population, longevity - illustrates that after 5,000 years of civilizations in just 200 years, by means of dangerous anthropogenic interference: 1. global warming is set to increase from 0°C to 4°C, and 2. the number of Earths required to supply natural resources to sustain is projected to increase from 1 to 4, with 3 Earths unavailable. [Birgit van Munster, United Kingdom (of Great Britain and Northern Ireland)]	Rejected - no scientific evidence/publication provided to support changes suggested by the reviewer. No peer-reviewed evidence is provided in support of these statements.
36788	2	1	4	1	In just 200 of H. sapiens 130,000+ years history, population will have exploded from 1.7 to 11.2 billion, life expectancy increased from 31 to 83 years, and by 2100 humanity's average lifetime natural resource extraction will have increased from 0.2 to 27.3 trillion tonnes, 136 times - this is the equivalent of stripping the top 20 centimeters, 1/5th of a meter from all ice-free land. [Birgit van Munster, United Kingdom (of Great Britain and Northern Ireland)]	Rejected - no scientific evidence/publication provided to support changes suggested by the reviewer
36790	2	1	4	1	Combined with 4°C global warming, this massive natural resource extraction will cause food, freshwater and other essential resource shortages - resulting in famines, pandemics, wars; a billion plus refugees, hundreds of millions of deaths, quintillions of dollars of damage. Huge portions of nature will be irreversibly degraded, depleted, destroyed; civilization will collapse. [Birgit van Munster, United Kingdom (of Great Britain and Northern Ireland)]	Rejected - no scientific evidence/publication provided to support changes suggested by the reviewer
36792	2	1	4	1	Political (man) vs reality (nature) context: As to 'reality' relevancy: It is possible that all IPCC scientists agree with Einstein's warning: The laws of man must obey the laws of nature or man will not survive. [Birgit van Munster, United Kingdom (of Great Britain and Northern Ireland)]	Rejected - no scientific evidence/publication provided to support changes suggested by the reviewer
36794	2	1	4	1	As to "political" relevancy, politicians themselves often ruefully remark that to be and stay elected, to satisfy the status quo and those who demand change they must: 'Promise everything, do nothing, appear to do everything' [Birgit van Munster, United Kingdom (of Great Britain and Northern Ireland)]	Rejected - no scientific evidence/publication provided to support changes suggested by the reviewer
36796	2	1	4	1	"Reality" is defined as "factuality, actuality, things as they are". The High Level Statements – which are likely to be the most read, remembered and quoted – may be "politically relevant" (no context) but are not sufficiently "reality relevant" (in context). [Birgit van Munster, United Kingdom (of Great Britain and Northern Ireland)]	Noted
36798	2	1	4	1	To realize the Sustainable Development and Climate Stabilization Objectives the context of political (man) vs reality (nature) must be known. [Birgit van Munster, United Kingdom (of Great Britain and Northern Ireland)]	Noted
46068	2	1	4	7	The laws of man must obey the laws of nature, or man will not survive (Albert Einstein). The High Level Statements – which are likely to be the most read, remembered and quoted – may be "politically relevant" but are not "reality relevant". "Reality" is defined as "factuality, actuality, things as they are". As to "political", politicians themselves often ruefully remark that to be and stay elected, to satisfy the status quo and those who demand change they must: "Promise everything, do nothing, appear to do everything". Here are four key science oppositions of political and reality: [Michael Wadleigh, United States of America]	Noted

Comment No	From Page	From Line	To Page	To Line	Comment	Response
46070	2	1	4	7	1. Climate stabilization. - Reality relevant. From IPCC data here are key “reality” statements (non-science language): • In 1992 the world’s Climate Objective was agreed in order to stabilize atmospheric greenhouse gas concentrations to prevent dangerous human inference with the global climate. However for 26 years there has been Objective Failure: no stabilization, destabilization has broken records every year, and is projected to continue to do so until after 2030, 40 years of Objective Failure. Today destabilization is basically such that 1.5°C global warming will occur - and at current trends in just 18 years destabilization will cause dangerous 2°C, by 2100 catastrophic 4°C, and it won’t stop there. (see worksheet graph 1) - Politically relevant. Contrast the foregoing with the very first SPM1.5°C High Level Statement: • There is very high risk that under current emission trajectories and current national pledges global warming will exceed 1.5°C above preindustrial levels. Limiting global warming to 1.5°C would require a rapid phase out of net global carbon dioxide (CO2) emissions and deep reductions in non-CO2 drivers of climate change such as methane, with more pronounced and rapid reductions required than for limiting global warming to 2°C. - In short, this is likely to be read by press and public as ‘limiting warming to 1.5°C is still possible, with just faster and more emission reduction some time in the future (after today’s politicians are gone from office) than for 2°C’. [Michael Wadleigh, United States of America]	Rejected - outside the scope of the chapter. Commenting on policy is beyond the scope of IPCC. Statement that 1.5C will occur in 18 years also assumes a policy outcome. If emission reductions begin immediately, reducing the current warming rate to zero in 36 years' time, then exceeding 1.5C can be avoided.
46074	2	1	4	7	2. Sustainable Development. - Reality relevant. Climate change is a part of unsustainable development. The International Resource Panel (IRP) is the global science authority on natural resources / sustainable development, here are key data and conclusions from their reports • Humanity’s Sustainable Development Objective (1987) is to not compromise future generation’s ability to meet their needs for natural resources, from which humans and all their products are made. All 17 UN SDGs depend on 1 goal: sustainable extraction, production and consumption of resources. There is Objective Failure; the global rate of resource extraction - doubling nearly every generation - is not sustainable. The annual extraction of 2000 may not be sustainable, extraction has nearly doubled since, and projected extraction by the 2040s “represents an unsustainable future… far beyond what is likely sustainable… not a trend that is in anyway sustainable”. (see worksheet graph 2) - Politically relevant. Contrast the foregoing with the only SPM1.5°C High Level Statement on sustainable development - which will likely be most read and quoted: • Different portfolios of emission reduction measures have different implications for sustainable development including regional climate change, food security, biodiversity, the provision of ecosystem services, and the vulnerability of the poor. - It’s nearly impossible to understand what this means, which politicians tend to favor, it allows “promise everything, do nothing”. Of far greater concern is that in the IPCC 1.5°C Report - which contains more than 500 references to sustainable development - there is nothing even close to the dire IRP warnings of Objective Sustainable Development Failure above - which ought to be included in all IPCC reports because climate stabilization is a subset of sustainable development / natural resource extraction stabilization. [Michael Wadleigh, United States of America]	Taken into account - text revised. Statements regarding the implications of 1.5C for SDGs have been clarified in the revised SPM.
46088	2	1	4	7	Laws required not voluntary actions. The most important politization of solutions is that IPCC, IRP and nearly all science organizations allow politicians to “do nothing” by not recommending LAWS NOW. For decades voluntary action has achieved Objective Failure causing unsustainable development, resource depletion and climate destabilization which will inevitably, imminently result in global collapse. [Michael Wadleigh, United States of America]	Noted. Unclear what revision is requested here
46090	2	1	4	7	Reality relevant solutions derived from IRP and IPCC and other science data. Earth is a closed mass system, there are no meaningful material imports or exports including emigrations to other celestial bodies, and none are scientifically probable in any century soon, perhaps ever. For another 5,000 years of civilizations, for sustainable development including climate stabilization voluntary actions have not, do not and will not succeed, what is realistic and will succeed is closed mass laws. [Michael Wadleigh, United States of America]	Noted. Unclear what revision is requested here

Comment No	From Page	From Line	To Page	To Line	Comment	Response
46092	2	1	4	7	Closed Mass Laws • Change from quantity to quality by law, • Extract the fewest possible natural resources, • Make only the very best, cyclical products - not the most / worst including climate changing greenhouse gases, • Make products that are shared the most, • And products that last the longest, • Remove dangerous, destructive products, • Reduce and remove products by per capita responsibility, • Halt and reverse population growth, • Increase laborsaving products, • Increase nonmaterial happiness – happiness is humans and nature not products. [Michael Wadleigh, United States of America]	Noted. This is too policy prescriptive for an IPCC assessment
46094	2	1	4	7	In sum - Sustainable development including climate stabilization requires closed mass laws. For another 5,000 years of civilizations science must change its recommendations from politically-relevant to reality-relevant, adhering to closed mass laws or global collapse is inevitable. Earth is a closed mass system, there are no meaningful material imports or exports including emigrations, and none are scientifically probable in any century soon, perhaps ever. Compared to the hellish life offered by Mars, Moon and other celestial bodies Earth is heaven. To stop imminent destruction of paradise closed mass laws are required now. [Michael Wadleigh, United States of America]	Noted. This is too policy prescriptive for an IPCC assessment
46078	2	1	31	48	3. Human cause, anthropogenic responsibility. - Reality relevant. Data from IPCC and IRP: • Unsustainable development – resource consumption and climate destabilization are caused by humans but not equally, responsibility is linked to development level. The 1.2 billion poorest people account for 1% of the world's natural resource consumption, while the 1 billion richest consume 72% of the world's resources. Cumulative emissions are the cause of climate change, and in cumulative CO2 emissions UN Very High Developed (US, EU) cause 70 times more per capita than Low Developed (Nigeria and other Africa nations), 19 times more than Medium Developed (India), 5 times more than High Developed (China). - Politically relevant. The following are the only 'human responsibility' references and numbers in the IPCC 1.5°C Report: • There are 3 key points of equity: "in the contributions to the problem; in impacts and vulnerability, such that the worst impacts may fall on those that are least responsible for the problem, including future generations; and in the power to implement solutions and response strategies." [Michael Wadleigh, United States of America]	Taken into account - the point on equity has been integrated in new HS A4.1. However, anthropogenic responsibility for climate change has been established before and is not 1.5°C-specific.
46082	2	1	4	7	4. Solutions for sustainable development including climate stabilization. Putting together global extractions, emissions, world product, population, longevity - illustrates that after 5,000 years of civilizations in just 200 years, by means of dangerous anthropogenic interference, global warming is set to increase from 0°C to 4°C, and the number of Earths required to supply natural resources to sustain is projected to increase from 1 to 4 with 3 Earths unavailable (see worksheet graph 3). In just 200 of H. sapiens 130,000+ year history, population will have exploded from 1.7 to 11.2 billion, life expectancy increased from 31 to 83 years, and by 2100 humanity's average lifetime natural resource extraction will have increased from 0.2 to 27.3 trillion tonnes, 136 times - this is the global equivalent of stripping the top 20 centimeters, 1/5th of a meter from all ice-free land. Combined with 4°C global warming, this massive natural resource extraction will cause food, freshwater and other essential resource shortages - resulting in famines, pandemics, wars; a billion plus refugees, hundreds of millions of deaths, quintillions of dollars of damage. Huge portions of nature will be irreversibly degraded, depleted, destroyed; inevitably, imminently civilization will collapse, complete, sudden failure. [Michael Wadleigh, United States of America]	Noted. Unclear what revision is requested here

Comment No	From Page	From Line	To Page	To Line	Comment	Response
46084	2	1	4	7	Politically relevant solutions. IPCC SPM1.5°C, High Level Statement: • Emissions reductions in all sectors would be needed in order to meet the long-term temperature goal of the Paris Agreement. All available 1.5°C pathways include three broad approaches, to varying extent. The first is lowering energy demand in buildings, industry and transport, and demand for agricultural products. The second is lowering emissions from energy supply, land use and agriculture through, for example, the deployment of low carbon energy technologies. The third is through removing carbon dioxide from the atmosphere. The first two recommendations - stabilize atmospheric greenhouse gas concentrations by reducing demand and supply sometime in the future - have been recommended since IPCC's first report in 1990 and have resulted in Objective Failure with new destabilization records set every year projected on to 2030, forty years of failure. As a result of this failure, IPCC now has to make the third new recommendation: remove greenhouse gases (CO2) from the atmosphere. IPCC does not state that it is unrealistic to expect that humanity will "restabilize" - remove atmospheric GHG - when for decades and projected into the future humanity has never even "stabilized" by reducing greenhouse gas emissions. Looking to the future, since many conclude that the quantities of Carbon Dioxide Removal required are 'too expensive and difficult' with 'undesirable side effects', the logic is that science will next be forced to suggest the fourth politically appealing 'cheap and easy' solutions - 'geoengineering', 'aerosols', etc. with potentially 'dangerous and disastrous effects' - which in and of themselves could cause global collapse. [Michael Wadleigh, United States of America]	Rejected - not supported by the peer-reviewed published literature. Greenhouse gas removal plays a key role in assessed cost-effective scenarios meeting 1.5C. Potential implementation barriers are discussed.
46086	2	1	4	7	Politically relevant solutions. Sustainable Development: International Resource Panel 2017 report: With resource use expected to double by 2050 better natural resource use is essential… Resource efficiency policies and initiatives can cut resource use 26% … (also) keep per capita resource use at current levels in high-income countries…Resource efficiency alone is not enough… What is needed is a movement from linear to circular material flows through a combination of extended product life cycles, intelligent product design, and standardization, reuse, recycling and remanufacturing. The reality is that global "resource efficiency" is currently minus 0.8% per year (increased resource inefficiency), "recycling" tonnes are a miniscule 0.6% of extraction tonnes, "circular" economies basically don't exist and will not without laws which aren't called for. IRP concludes that the level of "high-income countries" resource use is not sustainable, therefore is not sufficient to call for stabilization, high-income (Very High Developed) resource use must be drastically reduced. Finally IRP's recommended "26% resource use cut", if done, will result in annual extractions exceeding the 2040s level which IRP concludes "represents an unsustainable future… far beyond what is likely sustainable… not a trend that is in anyway sustainable". [Michael Wadleigh, United States of America]	Noted. Unclear what revision is requested here
49734	2	1	4	1	• 3. Cause context. Unsustainable development – resource consumption and climate destabilization are caused by humans, but not equally; responsibility is linked to development level. The 1.2 billion poorest people account for 1% of the world's natural resource consumption, while the 1 billion richest consume 72% of the world's resources. Cumulative emissions are the cause of climate change, and in cumulative CO2 emissions UN Very High Developed (e.g. US, EU) cause 70 times more per capita than Low Developed (Nigeria and other Africa nations), 19 times more than Medium Developed (e..g. India), 5 times more than High Developed (e.g. China). [Birgit van Munster, United Kingdom (of Great Britain and Northern Ireland)]	Rejected - no scientific evidence/publication provided to support changes suggested by the reviewer
54260	2	1	31	48	A general comment - the SPM is too long and will not readliy communicate to the policy community. There is considerable scope for reducing text and bringing to the fore key messages. It is not easy to deduce how much worse the impacts at 2C are relative to 1.5, due to a lack of quantification in the text. Neither is it easy to deduce the scale of the added effort of a more rapid reduction in emsisions. The policy debate will be about relative costs and benefits and so the more this can be quantified or at least qualified the better. [David Warrilow, United Kingdom (of Great Britain and Northern Ireland)]	Accepted - the text has been reduced by a third and messages and graphics made more accessible.
29010	2	3	2	39	Given the importance of scientific integrity to this report and the IPCC process, we strongly recommend to include a paragraph that highlights the challenges met by the author teams (including e.g. time-line, scarcity of meta-analyses/structured assessments in the literature, large volume of new literature late in the process, integration across scientific disciplines, limited capacity of climate models to assess lower warming levels). The statement should emphasize that despite these caveats the existing scientific literature enables the authors to provide robust information relevant to 1.5°C-pathways. The authors should indicate the robustness of the main statements of the reports by using the IPCC's uncertainty language. It should also be mentioned that only such research could be considered in this assessment, that corresponds to the IPCC's scientific standards and rigor; and point towards the AR5 as the standing and the AR6 as the forthcoming comprehensive assessment of the state of scientific knowledge, that will then also include the relevant knowledge related to 1.5°C, and expand the findings in the SR1.5. [Germany]	Taken into account - text has been added to the Introduction in the new SPM draft
33694	2	3			SPM 1.1 Context: Please clarify in this section your intentions with both the high level statements in SPM 1.2 and the conclusions given in the orange highlighted parts throughout the SPM. [Norway]	Taken into account - High level statements have been incorporated into the main four SPM structures (now labelled Sections A,B,C,D).

Comment No	From Page	From Line	To Page	To Line	Comment	Response
44624	2	3	2	39	Suggest you include a brief framing in terms of the Anthropocene as set out in Chapter 1, as this is both important context and likley to compel attention / enhance readability. [Penny Urquhart, South Africa]	Rejected due to space limitations.
52670	2	5	5	25	Consider moving SPM1.3 before SPM1.2 (merge context and background) [Iulain Florin VLADU, Germany]	Rejected. The first section frames the SPM, and need to provide basic information, which we think should flow in a logical order: describing where are at currently (1.1 and 1.2) and what the impacts of this will be (1.3).
56476	2	5	2	39	The opening of the SPM should be easily understandable and engaging to people not versed in climate science or the IPCC process. As is, this section is far too terse and needs more writing style. [Eleanor Johnston, United States of America]	Noted
58820	2	5	2	6	The Paris Agreement seeks to limit global warming to 1.5°C. This does not mean that there was agreement that an increase of 1.5°C would become the long-term target for stabilizing the global climate. Indeed, if the world does what needs to be done to stay below 1.5°C, or to return to 1.5°C in the event of an overshoot, then it will have to stop taking a number of actions to keep the warming up at 1.5°C (e.g., if enough CO2 pulled out of the air to get back to 1.5°C from an overshoot to 2 or 3°C or more above preindustrial, a very extensive system would be needed, and there would really be no good reason to not keep going and return to, say, 0.5°C or less above preindustrial). In that some areas of the Earth that are populated today may well not be suitable for outdoor work and life with global warming at 1.5°C, it would really seem wasteful to not try to return temperatures and the weather regime to the mid- to late-20th century so that there is a good likelihood of success of agriculture in much of the tropics and subtropics and so reduce the rate of rise of sea level, etc. So, it needs to be made very clear that this value of 1.5°C is not some level that has been preferred or safe. It was a political decision, not a scientific one. Make very clear that there is no endorsement of a sustained 1.5°C temperature increase, and that the scientific community should make very clear what the implications are for various long-term stabilization levels (as well as for various peak levels). [United States of America]	Noted
29012	2	8	2	9	The headline statement should not only provide the narrative of the report, they are overarching highlighted conclusions, as defined in the AR5, see for example http://ipcc.ch/news_and_events/docs/ar5/ar5_syr_headlines_en.pdf. Please modify this sentence and provide appropriate headline statements as also requested by Decision IPCC/XLIV-4. [Germany]	Taken into account - Headline Statements have been redrafted into more chapeau statements that integrate the content in the below bullet points.
63014	2	8	2	9	The sentence "The narrative of the summary" can be removed without loss of substance. It is an example of sentence that can be removed to shorten the text. [Belgium]	Accepted
29014	2	11	2	15	We do not see that the current note on the use of likelihood statements is required. In its current form, it may also be misleading because it suggests that due to constraints in time and literature the authors could not fully apply the IPCC's uncertainty guidance. The report contains a number of statements with likelihood-information, and according to the IPCC's uncertainty guidance there is no obligation to provide likelihood statements. We therefore strongly suggest to delete this statement to avoid misinterpretation. However, it ís of key importance for the usefulness as well as for the credibility of the report that information is provided on the certainty of all key statements in the SPM. We therefore strongly encourage the authors to indicate the robustness of the main statements of the reports by using the IPCC's uncertainty language (footnote 1). [Germany]	Taken into account - the paragraph has been removed
32582	2	11	2	11	good practice to minimize use of abbreviations, especially at first reference. So rather than "AR5" footnoted with full Fifth Assessment Report, suggest "IPCC Fifth Assessment Report (AR5) Working Group…" and no footnote [Jonathan Lynn, Switzerland]	Accepted
33696	2	11	2	11	Footnote: Please consider providing a figure with text explaining levels of confidence, for example as in the IPCC uncertainties guidance note, showing relationship between different evidence and agreement levels. Also consider the need for a likelihood scale, such as that from the same document (https://www.ipcc.ch/pdf/supporting-material/uncertainty-guidance-note.pdf). [Norway]	Taken into account - a figure has not be used but a more full explanation of the IPCC confidence language has been added to the footnote.
38444	2	11	2	14	Really nice and to the point. [Linah Ababneh, United States of America]	Noted
40572	2	11	2	14	It should be made clearer what the numbers in curly brackets ({}) mean. [Jonny Williams, New Zealand]	Editorial
10352	2	12	2	14	The constraints on the timeline and literature available for the preparation of this report means that many policy-relevant statements are presented with a confidence qualifier, not a likelihood and this does not detract from their importance. The last 'and' could be replaced with 'but'. [Hungary]	Not applicable - the paragraph has been removed
21586	2	12	2	14	This reads a bit cryptic. Assumedly, many statements would have been in terms of confidence rather than likelihood in any case. The text in section 1.6 would not either really seem to correspond to what is given here. [Sweden]	Not applicable - the paragraph has been removed
32584	2	12	2	13	The constraints…mean… (not means) [Jonathan Lynn, Switzerland]	Editorial
38932	2	12	2	13	means that is not precise enough. Could be reformualted to say this is a choice taken. [Jan Fuglestvedt, Norway]	Not applicable - the paragraph has been removed
54894	2	13	2	14	Throughout the document there is inconsistent use of likelyhoods and confidence. Some policy sensitive conclusions do not contain confidence qualifiers, such as exceeding 1,5 degrees limit or the trends in cyclonic activity. Please apply consistent use throughout the document. [Bram Bregman, Netherlands]	Not applicable - the paragraph has been removed
5888	2	14			but rather than and here? [Peter Thorne, Ireland]	Not applicable - paragraph removed
6850	2	14	2	14	.., not a likelihood; however, this does not detract from their importance. [Klaus Radunsky, Austria]	Not applicable - the paragraph has been removed

Comment No	From Page	From Line	To Page	To Line	Comment	Response
32586	2	14	2	14	…quaifier, not a likelihood, and this… (add comma after likelihood) [Jonathan Lynn, Switzerland]	Not applicable - the paragraph has been removed
50340	2	14	2	14	The word "importance" should be replaced by the words "scientific robustness and policy relevance ". [Switzerland]	Not applicable - the paragraph has been removed
19372	2	15	2	19	The definition of "to 2°C" must be spelled out, so that the reader doesn't confuse, for example, "limiting warming to max 2°C with 50 % likelihood" pathways with "limiting warming to well below 2°C with high certainty" pathways. [Jennifer Morgan, Netherlands]	Taken into account - levels of warming have been defined in the 'Definitions central to SR1.5' box in the new version of the SPM.
5428	2	16	2	17	This sentence on the context of report preparation is confusing since it is a different context than that expressed on lines 6-8. Additionally, since the report is exmining both reductions in emissions and temperature, it is confusing to state that the context is increasing emissions and temperature. Suggest that this sentence be removed. [Haroon KHESHGI, United States of America]	Not applicable - the paragraph has been removed
5890	2	16	2	17	Calling out generic 'global warming' and then very specifically sea level rise feels very odd. Perhaps redraft along the lines: The special report is prepared in the context of sustained changes in all aspects of the climate system arising primarily from human emissions of heat trapping gases from the combustion of fossil fuels. This would also address that currently this highlights the unequivocal warming but not the clear human influence highlighted in AR5 WG1 SPM? [Peter Thorne, Ireland]	Not applicable - the paragraph has been removed
11198	2	16	2	17	The Special Report is prepared in the context… What does this mean exactly? Couldn't it begin with something along the lines of: "Unequivocal and sustained global warming and sea level rise is taking place and emissions of greenhouse gases continue.This Special Report assesses..."? [United Kingdom (of Great Britain and Northern Ireland)]	Not applicable - the paragraph has been removed
19196	2	16	2	17	substitute related effects for sea level rise, since sea level rise is not the only direct effect of global warming [Spain]	Not applicable - the paragraph has been removed
45058	2	16	2	17	Global warming is cause but sea level rise is impact, Therefore, we can not bring them together. need to remove " . . . and sea level rise . . ." [Iman Babaeian, Iran]	Not applicable - the paragraph has been removed
50342	2	16	2	16	Write "This Special Report is prepared …". [Switzerland]	Not applicable - the paragraph has been removed
50344	2	16	2	17	Reverse the order of the elements in the sentence in order to go from detection to attribution: " … in the context of continued emissions of greenhouse gases and unequivocal and sustained global warming and sea level rise." [Switzerland]	Not applicable - the paragraph has been removed
55342	2	16	2	26	Could this section be presented by bullets (Article/bullet)? It would be more clear. [ELISA BERDALET, Spain]	Not applicable - the paragraph has been removed
58822	2	16	2	26	There are very significant limits on the Special Report's consideration of approaches to dealing with the problem that would involve society taking alternative types of actions to offset the buildup of greenhouse gases and the resulting impacts on climate; that is, consideration of using Carbon Dioxide Removal and Solar Radiation Management as part of a comprehensive response strategy that is based primarily on mitigation and adaptation first with CDR and SRM to fill in necessary gaps (in timing, intensity of the effort, etc.) is not undertaken, mainly due to limitations on research progress on these topics rather than a belief that mitigation and adaptation can be sufficient to limit the impacts of climate change to what society would prefer and what the 1.5°C aspirational upper limit for warming implies. [United States of America]	Noted
31156	2	17	2	19	Please clarify which word or phrase "for natural and human systems" refers to. If it is supposed to read "impacts and risks for natural and human systems," an "and" after "vulnerabilities" might make it easier for the non-English speaker to understand. [Japan]	Not applicable - the paragraph has been removed
45056	2	17	2	18	The sentence need to be revised as bellow: The Special Report assesses knowledge on climate change in global and regional scale and related vulnerabilities, ... [Iman Babaeian, Iran]	Not applicable - the paragraph has been removed
50346	2	17	2	17	Write "This Special Report assesses…". [Switzerland]	Not applicable - the paragraph has been removed
21588	2	18	1	18	global -> "global-scale" (as regions are part of the global) [Sweden]	Not applicable - paragraph removed
39020	2	18	2	18	Is "pronounced" the right word here? You may consider using simpler words like "earlier, stronger, seeper, sooner" - after careful considerations about what ch2 and 4 say. [Jan Fuglestvedt, Norway]	Not applicable - the paragraph has been removed
19366	2	2	2	26	According to this introductory framing, the aim of the report is to compare 1.5°C and 2°C worlds. Such a narrow framing is not in line with the intent of the COP decision that invited this report, nor with the adopted outline, according to which the report was to compare impacts, risks and mitigation and development pathways compatible with 1.5°C compared with 2°C "and, where warranted by the literature, comparison with higher levels of warming". It would highly policy relevant to stick to the agreed outline and bring in comparison to plus 3°C warming and pathways too, given that the real choice policymakers are facing right now, as they prepare for the 2018 Facilitative Dialogue under the UNFCCC, is not between 1.5°C and 2°C but between 1.5°C/well below 2°C (i.e. the Paris goal) and plus 3°C (the current "mitigation pathway' we're on, according to the UNEP and others). [Jennifer Morgan, Netherlands]	Noted - due to space limitations the SPM is concentrating primarily on 1.5 and 2°C global warming. Higher levels are discussed in the main chapters and in the SPM where relevant, e.g.. Section B1.2.
31036	2	2	2	26	The text explicity notes insights will be provided on impacts and mitigation pathways. Need to also explicity note the report evaluates adaptations needed in-light of 1.5 (i.e. in chp4) [James FORD, Canada]	Taken into account - Pathways are focused upon in sections C and D as well as SPM3 in the new SPM draft.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
40928	2	2	2	21	The sentence…new insights on impacts that may be avoided with 1.5C global warming compared to 2C - should also be accompanied by lines 3-6 (p36, Ch 1) to clearly convey that 1.5C is not really a 'safe' level either - there will be impacts at both these warming levels. Lines 3-6, Ch 1, p36 - "Differentiating the impacts of 1.5°C from those of 2°C does not imply a scientific statement of safe vs. unsafe conditions of environmental change. An additional 0.5°C (i.e., a 2°C warming world versus 1.5°C) for heat–related extremes in the tropics marks the difference between events at the upper limit of current day natural variability and a new climate regime." [Neelam Singh, United States of America]	Not applicable - the paragraph has been removed
38412	2	21	2	22	Here and hereinafter reference is made to the "pre-industrial levels" e.g. "It explores global greenhouse gas emission pathways consistent with limiting global warming to 1.5°C above pre-industrial levels". The glossary defines "pre-industrial" as the period before 1750. However the assessment deals with the baseline of 1850-1900 e.g. in Box SPM1 it reads "The climatology of pre-industrial global mean is based on the 51-year period 1850-1900.", Figure SPM 1 reads "relative to the reference period 1850-1900" and so on. In spite of very little difference between 1750 and 1850 in terms of cumulative emissions and temperatures such interchangable use of different reference periods may create a sense of inconsistency in the narrative. A footnote or editorial changes in the Glossary may be suggested to fix this inconsistency. [Volodymyr Demkine, Kenya]	Rejected - glossary term for this report is consistent with the use of pre-industrial levels in the chapters and SPM
38486	2	21	2	21	The text "compared to 2°C global warming" should be extended with "and higher temperatures". [Valentino Piana, Italy]	Not applicable - the paragraph has been removed
50348	2	23	2	23	Introduce here the words "(referred to as 'overshoot')" instead of in SPM page 4 lines 3 and 4. [Switzerland]	Not applicable - the paragraph has been removed
56922	2	23	2	23	After "century" an extra thought is needed, either as a new clause or a new sentence, along these lines: "The special report does not consider ways to limit warming by altering the planet's albedo so that it reflects more light out into space." This change is needed becsuse such techniques may well be able to limit warming. Though the report contains useful material on the issues surrounding the governance, public acceptability and impacts on sustainable development that albedo modification/solar geoengineering might have, it does not analyse the role it might play in mitigating warming, for reasons for reasons explained in 3.6.3. I think it would be a service to readers to make this clear from the beginning, lest they think that the relatively low level attention paid to the subject reflects the potential it might have, rather than a prior decision about what counts as a mitigation pathway. [Oliver Morton, United Kingdom (of Great Britain and Northern Ireland)]	Not applicable - the paragraph has been removed
21590	2	25	2	25	Could add that a global mean warming in excess of 2 degrees would imply yet larger and more widespread effects. This is of course evident, but the point might still be valid to make. [Sweden]	Not applicable - the paragraph has been removed
50350	2	25	2	26	Here, the context is appropriately set because the text refers to the pace and scope of the transformation needed to limit global warming to 1.5°C. Especially the pace of the transformation might indeed depend on other priorities, such as sustainable development and poverty eradication (although, efforts to promote sustainable development and to eradicate poverty should be undertaken in line with efforts to reduce GHG emissions, and these efforts are not mutually exclusive but ideally, go hand in hand). [Switzerland]	Not applicable - the paragraph has been removed
58824	2	25	2	26	Lines 25-26 appear to reinterpret the mandate of the report. The agreed outline specifies that the report is "on the impacts of global warming of 1.5°C above preindustrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty." Lines 25-26 change this agreed language: "in the context of sustainable development, poverty eradication, and equity". Please revert to agreed language for this context. [United States of America]	Not applicable - the paragraph has been removed
9024	2	28	2	38	If in this report concepts are cited, that have a clear definition in the UNFCCC (e.g. loss and damage) it is important that the definition of the UNFCCC is used. Otherwhise policy-makers within the UNFCCC might get a different message than intended. If the literature assessed does not permit to use the same definition, an alternative wording should be used. [Luxembourg]	Noted
10354	2	28	2	39	We suggest not to list certain articles of the Paris Agreement as we believe the report is relevant to the Agreement as a whole. Therefore we would suggest to end the sentence after the term Paris Agreement: "This report includes information to the Paris Agreement". [Hungary]	Accepted - the paragraph has been removed
11200	2	28	2	39	Delete. Suggest that judgement as to whether information is relevant to specific articles of the Paris Agreement is left to the policymakers themselves. [United Kingdom (of Great Britain and Northern Ireland)]	Accepted - the paragraph has been removed
15414	2	28	2	39	Agree that this report is relevant to the Paris Agreement, but it is unclear what point the paragraph is making in its references to the Articles of the Paris Agreement. It is unclear whether the phrase following each Article is intended to summarise the operation of that Article, or to indicate the parts of each Article to which this report are particularly relevant. Either way, the description of the Articles appear to be incomplete and somewhat selective. Article 4 for example is broader than the Agreement to achieve a balance between emissions and removals in the second half of the century. [Australia]	Taken into account - the paragraph has been deleted and replaced with a quote from the UNFCC invitation.
18786	2	28	2	39	Please add "The report also explores the synergies and trade-offs with Sustainable Development Goals (SDGs)". [Andrea TILCHE, Belgium]	Not applicable - the paragraph has been removed

Comment No	From Page	From Line	To Page	To Line	Comment	Response
18788	2	28	2	39	The itemised listing of relevant sections of the Paris Agreement is not appropriate. The report's requested scope from the UNFCCC is made clear in decision 1/CP.21 para 20, and refers to impacts of 1.5°C and related pathways. The terms of IPCC's acceptance of this invitation is made clear in the IPCC's adopted outline. Relevance to specific articles of the Paris Agreement is for readers to judge. A clear, thematic structure within the chapters will help with this. Saying that the whole report is relevant to basically the whole Agreement adds nothing. [Andrea TILCHE, Belgium]	Accepted - the paragraph has been removed
19368	2	28	2	39	This text is too long and detailed for an intro and does not belong to the SPM. [Jennifer Morgan, Netherlands]	Taken into account - the paragraph has been deleted.
29920	2	28	2	39	This paragraph could be summed in a sentence specifying that this SR is the answer from IPCC to UNFCCC, and specifically, the request coming from COP21. The mention of articles is useful but it addresses the context of the SR and does not need to be located in the SPM. It could be relocated in Chapter 1 in order to shorten the SPM. What is more, the articles of the Paris Agreement don't have titles. As such, it could seem preferable to say "Article in relation to" than "Article on". In this case, a mention of Article 5 on conserving and enhancing, as appropriate, sinks and reservoirs of greenhouse gases of terrestrial and marine ecosystems, could be added. [France]	Not applicable - the paragraph has been removed
32588	2	28	2	39	this is very useful for negotiators but given need to cut SPM length by 2/3 maybe not necessary to spell out the various articles [Jonathan Lynn, Switzerland]	Taken into account - the paragraph has been deleted.
38484	2	28	2	4	The relevance to the Paris Agreement is duly recognized but this list is incomplete. You fail to recognize that this report is the answer of the IPCC to point 20 and 21 of the COP21 1/CP.21 Decision to which the PA is attached as Annex, according to which this report is tasked to review the best available science to inform the "a facilitative dialogue among Parties in 2018 to take stock of the collective efforts of Parties in relation to progress towards the long-term goal referred to in Article 4, paragraph 1, of the Agreement and to inform the preparation of nationally determined contributions pursuant to Article 4, paragraph 8, of the Agreement". This role of the report is confirmed by COP23 Presidency Approach to the Talanoa Dialogue, the new name of the facilitative dialogue, which states "A dedicated space will be provided in the dialogue, both during the preparatory and the political phase to facilitate the understanding of the implications of the Special Report by the Intergovernmental Panel on Climate Change on Global Warming of 1.5°C" (http://unfccc.int/files/bodies/cop/application/pdf/approach_to_the_talanoa_dialogue.pdf). Note that this document has been approved by the COP23. In short, the text should be extended - in line 40 - with the following words - or equivalent ones: "This report aims to provide a survey of best science available for the Facilitative dialogue among Parties of the Paris Agreement established to take stock of the collective efforts of Parties in relation to progress towards the long-term goal and to inform the preparation of nationally determined contributions. Literature published after the 15th of May 2018 could not be included". [Valentino Piana, Italy]	Not applicable - the paragraph has been removed
39018	2	28	2	39	Are we sure that this para is needed? [Jan Fuglestvedt, Norway]	Taken into account - the paragraph has been deleted.
44626	2	28	2	39	This is good, and could be converted into a diagram. [Penny Urquhart, South Africa]	Not applicable - the paragraph has been removed
46108	2	28	2	39	It is not necessary to list all the specific articles here; a simple reference to the relevance to the Paris agreement would suffice. Furthermore, the SPM doesn't deal directly with Article 8 (L&D) or article 9 (finance) [Netherlands]	Not applicable - the paragraph has been removed
49282	2	28	2	39	Reference to texts of Articles should not exclude important elements [Bill Hare, Germany]	Not applicable - the paragraph has been removed
49500	2	28	2	28	Chapter 5 elaborates thoroughly on links to SDGs. Should be mentioned also here [Karlheinz ERB, Austria]	Not applicable - the paragraph has been removed
50352	2	28	2	39	Delete the reference to the number of the Paris Agreement articles and maybe keep only the themes, which is by the way difficult because e.g. Article 9 is broader than only provision of financial resources to assist developing countries (it includes also mobilization by all). [Switzerland]	Not applicable - the paragraph has been removed
55344	2	28	2	39	Could each Article be presented by bullets? It would be more clear. [ELISA BERDALET, Spain]	Not applicable - the paragraph has been removed
58826	2	28	2	32	References to specific articles of the Paris Agreement should be removed. In attempting to use shorthand descriptions, the paragraph potentially misconstrues or selectively portrays what the articles are about, and that there may well be many Articles in the Paris Agreement for which the report is relevant but does not need to (and is not mandated to) list, describe, or interpret their meaning. [United States of America]	Accepted - the paragraph has been removed
63016	2	28	2	39	Providing the context is important, it should come earlier in the text. However, the current text is too long, the details of Articles of the Paris Agreement do not need to be in the SPM. [Belgium]	Not applicable - the paragraph has been removed
29016	2	29	2	32	Please do not cite individual Articles of the Paris Agreement and less so parts of the carefully designed language of individual Articles. If kept, please add reference to Art. 6 of PA as voluntary cooperation enable for higher ambition and could provide to reach 1.5°C. [Germany]	Not applicable - the paragraph has been removed
7426	2	31	2	32	Add reference to Art. 6 of PA, as the availability of cooperative approaches has an impact on the ability to reach 1.5°C [Axel Michaelowa, Switzerland]	Not applicable - the paragraph has been removed
387	2	32	2	32	to add before the word equity: "common bu diffrentated responsibiity and equity….." [Nedal KATBEHBADER, Switzerland]	Not applicable - the paragraph has been removed
58828	2	35	2	35	Should be "Article 9 on THE GLOBAL EFFORT TO provide[E] AND MOBILISE" financial resources... since Article 9 speaks of the "global effort" and of "provision" and "mobilization." [United States of America]	Not applicable - the paragraph has been removed
11038	3		3		Include a separate bullet in SPM 1.2 to expalin the 'balance' required by the Paris Agreement (Article 4) and the role that CCS (including CDR with geological storage) will play in achieving it. [Wilfried Maas, Netherlands]	Taken into account. Addressed in section C2 of revised SPM

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15428	3		3		Also suggest adding from Ch1, p45, lines 38-41: "Implementation challenges of 1.5°C pathways are larger than for well below 2°C particularly concerning... Barriers to implementation can be overcome by...". [Australia]	Taken into account - text revised. Text has been revised, subject to length constraints
15430	3		3		Missing a few statements that we think shoud be included here as high-level, e.g. Suggest adding from p4 (lines 39-44) but phrase lines 41-44 as in line 18-19 of chapter 1, page 4: "Limiting global mean warming to 1.5°C would require rapid and deep reductions in greenhouse gas emissions, even with a temporary overshoot and later return to 1.5°C warming. Implementation of the current level of NDCs specified under the Paris Agreement by 2025 or 2030 will not in themselves be sufficient to limit warming to 1.5°C". [Australia]	Taken into account - text revised. See bullet A2 of revised SPM
15432	3		3		Suggest adding from SPM p5, lines 11-15: "Many impacts are different in a world where global warming is limited to.... As some impacts are irreversible, such as ...". [Australia]	Taken into account - text revised. See bullets A3 and A3.1 of revised SPM
15434	3		3		Suggest adding from SPM section 3.6, p19, lines 1-7: "The transformations necessary to limit warming to 1.5°C are qualitatively similar to those for a 2°C limit, but more pronounced and rapid over the next decades". [Australia]	Rejected - outside the scope of the chapter. This is addressed in Section D of the revised SPM
19202	3				Although all high level statements (SPM1.2) are relevant, possibly some of them could be presented and visualized in a coloured box summarizing the main messages of the SR. In particular, those referred to the"high risk that under current emission trajectories and current national pledges global warming will exceed 1.5°C above preindustrial levels" and "delayed action or weak near-term policies increase mitigation challenges in the long-term and increase the risks associated with exceeding 1.5°C global warming temporarily or of warming remaining above 1.5°C by the end of the century" [Spain]	Taken into account - text revised. Revised SPM contains headline statements that are designed to be presented in this way. A separate box would complicate the approval process.
45752	3		31		The SPM looks like it was a cut and past from the various chapters. It needs a lot of work on overall framing and focus, logical flow, reduction of redundant material and of overall length, calibrated risk language, tighter and more clear language (lots of loose, unspecific and inconsistent material there), iconic figures etc. Policy-makers are not looking for a broad tutorial but answers to specific questions. An example of the latter may be page 9 lines 13 to 16. Examples of the former abound. Key statements such as page 18 line 45 to page 20 line 7 are lost in the bulk. Statements such as page 23 lines 42 to 46 are not carried through to guidance on how they can be managed. Others such as page 26 line 40 with a bald statemtn of blanket cost-effectiveness need to be nuanced. [Mark Howden, Australia]	Taken into account - the flow of the SPM has been improved while restructuring and shortening the text.
9144	3	1	3	9	When the global average temperature has been rising rapidly, as it has been in recent years, it is not helpful nor accurate to measure temperature increases based on 30 year average trends. This could dramatically under-estimate the amount of warming today, at the end point of the last 30 year trend. At least show the difference using these two different methodologies for 2017. [Richard Rosen, Germany]	Accepted. We take pains to avoid characterising "present warming" as the average over the past 30 years for precisely this (very good) reason.
21592	3	1	3	3	global mean surface temperature -> "global mean temperature". Even thoug the former is more rigorously correct, what is been defined is really the latter, as that expression is then used (for example, next-to-last line in the box). [Sweden]	Rejected. It is important to distinguish between surface and sub-surface temperature change, particularly in the context of climate stabilisation when GMST stabilisation does not imply stabilisation of sea level.
38446	3	1	2	1	Box SPM1 better in conveying the point if moved to the front of page 1. [Linah Ababneh, United States of America]	Taken into account - text revised. SPM has been re-ordered.
331	3	1	3	1	It should meantion that Surface air temperature is different from sea surface temprature. [Zong-Ci Zhao, China]	Taken into account - text revised. Both mentioned in GMST definition in Box SPM1
5892	3	1	3	1	It feels very odd to finish this box without making a clear statement as to where we stand today relative to PI. This box should clearly state the best estimate and uncertainty as to where we stand today based upon the range of evidence (see my comments to Chapter 1) . This may then also need to reconcile that with the 0.85C basis that seems to be the starting point for many subsequent analyses if the value assessed differs from this premise. [Peter Thorne, Ireland]	Accepted - text revised. See bullet A1 of revised SPM
9446	3	1	3	1	It is an appropriate place to present an estimate of absolute value of the pre-industrial temperature with its uncertainty. The report reflects our concern about 2.0 vs. 1.5 warming. Do we know the preindustrial global temperature with 0.5C accuracy or more precisely? The last two lines give the impression that +1.5C anthropogenic warming could be dangerous, while 1.5C natural does not bother us. [Russian Federation]	Taken into account - text revised. Text revised to avoid implying a natural 1.5C warming would be harmless (although, by definition, it would be without human-induced harm). Uncertainty in absolute pre-industrial temperature is ill-defined, since it depends on the time-scale considered: this is addressed in Chapter 1.
19370	3	1	3	1	The definition of "to 2°C" must also be spelled out, so that the reader doesn't confuse, for example, "limiting warming to max 2°C with 50 % likelihood" pathways with "limiting warming to well below 2°C with high certainty" pathways. [Jennifer Morgan, Netherlands]	Taken into account - text revised. The definition of a 1.5C consistent pathway has been clarified. To insert and identical definition of a 2C consistent pathway seems redundant.
29018	3	1	3	9	Explanations and definitions on global mean surface temperature change and 1.5°C global warming are extremely helpful for readers, in particular politicians. In order to provide transparency on the findings of the SR.15, we strongly urge to add information to this Box about how the temperature levels have been dealt with across topics, i.e. in impact and mitigation studies and climate resilient development pathways, given the pathway conditionality (transient, equilibrium, overshoot) of the findings, see also Ch 1 page 56 line 4-14. [Germany]	Taken into account - text revised. A box of definitions is now provided.
29598	3	1	3	9	The blue Box SPM 1 defines term '1.5 C global mean temperature'. There is a risk that key messages (e.g. 1.1), taken individually apart, may create confusion. The other option '1.5 warmer world' is clearer. [Finland]	Taken into account - text revised. We have tried to harmonise the text.
33698	3	1	3	1	Please consider the need for explaining key concepts, such as carbon budget, temporary overshoot and climate sensitivity, for policymakers who are not familiar with such concepts. [Norway]	Taken into account - text revised. See box SPM1 - good suggestion
43728	3	1	3	1	Add [EQUILIBRIUM] warming to all global temperature increases. [Peter Carter, Canada]	Rejected. Most temperature increases refer to a world that is still not in equilibrium.
50354	3	1	3	1	Include in Box SPM 1 a simple and basic graphics illustrating the way global mean surface temperature is calculated. [Switzerland]	Rejected - outside the scope of the chapter. This seems excessive for the SPM of SR1.5, given the calculation of GMST follows exactly the procedures of AR5.

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55508	3	1	3	1	It would be useful to remind that several sources of information measure the increase of temperature with respect to more recent years (eg. wrt 1951-1980 average temperatures). It would be also useful to provide the average temp increase of these years, so that policy makers understand well the values they may hear from different sources. This is well described in chapter 1, but a mention in the SPM would be important. [Maryse Labriet, Spain]	Rejected. We understand the reasoning, but since this is addressed in chapter 1, we focus on warming relative to pre-industrial in the SPM for clarity.
56478	3	1	3	9	This definition is very likely not intelligible for most policymakers and non-scientists. [Eleanor Johnston, United States of America]	Taken into account - text revised. We have attempted to clarify.
58510	3	1	3	1	In order to avoid confusion, it would be useful of the definition of 1.5C warming includes content on how overshoot can happen temporarily, with 1.5C still achievable as an equilivium GMT. In other words, it would be useful if the concepts of climate sensitivity and equilibrium were also introduced in this paragraph. Otherwise, the last sentence in this paragraph could give the false impression to non-experts that there is a small probability that 1.5C is feasible. [Rachel Licker, United States of America]	Taken into account - text revised. Revised definition of 1.5C consistent pathways explicitly mentions return to 1.5C by 2100
58830	3	1	3	1	Box SPM 1: It is interesting that, by definition, the warming since preindustrial mean 1850-1900 is "human-induced". How much warming, either since or after 1900, might be natural variability? [United States of America]	Rejected - no scientific evidence/publication provided to support changes suggested by the reviewer. It is not correct that all the warming since 1850-1900 is human-induced by definition: it so happens that human-induced warming, at the present time, equals total warming within uncertainties. This is explained in detail in chapter 1.
58832	3	1	4	7	The high-level conclusions section needs careful text-editing. The English is rough and meaning of these important statements is ambiguous. [United States of America]	Editorial - copyedit to be completed prior to publication. The SPM structure and content have been revised
18790	3	3	3	7	Clarify whether the choice of reference period is consistent with earlier assessments (AR5) or differs. In the latter case why? This matters because 1850-1900 is well into the industrial era, and some temperature rise was between 1800-1850. [Andrea TILCHE, Belgium]	Accepted. We have clarified that 1850-1900 was adopted by AR5 as an approximation of pre-industrial temperatures, noting it was not in fact a pre-industrial period.
29020	3	3	3	3	How are policy makers supposed to understand "working definition"? Please delete the word "working" by "in the context of this report". [Germany]	Accepted - text revised
63018	3	3	3	9	The word "climatology" appears 3 times but its use is not clear. The text should be as short and clear as possible. Could you consider removing the word 'climatology' and just mention global mean or average? [Belgium]	Accepted - text revised
332	3	4	3	6	It confused by 30 years ,also 51years. [Zong-Ci Zhao, China]	Taken into account - text revised. The 51-year reference period is used for consistency with AR5.
8622	3	5	3	5	climatology of pre-industrial: article (the?) missing before "pre-industrial" [Pauline Midgley, Germany]	Accepted - text revised
19198	3	5	3	5	add air after surface [Spain]	Taken into account - text revised. Definition of GMST makes clear it is a combination of air and sea surface temperature.
50356	3	5	3	6	The sentence on the preindustrial climatology is not clear: indicate that what is referred to here is the "reference period" for this report, as it is done in Figure SPM 1 in page SPM 6. [Switzerland]	Accepted - text revised
6064	3	6	3	6	This is different from "impacts", which are stated as being assessed relative to 1850-1879 cf. Chapter 3, P18, L33-34 [Timothy Carter, Finland]	Accepted. Reference periods have been harmonised in the FGD
333	3	8	3	9	Is it the first year reached warming of 1.5?? Is Warming of 1.5? an annual mean? Or several years mean? [Zong-Ci Zhao, China]	Accepted - text revised. Definition of global warming in a particular year or decade in revised SPM makes clear it refers to the estimated average GMST over a 30 year period centred on that year or decade, relative to 1850-1900, and is not restricted to human-induced warming.
5420	3	8	3	9	Consistency of definition of 1.5C global warming with the text and the notion of the Paris Agreement needs to be discussed. This concerns in particular the use of, and the need for introducing, 'human induced' warming. [Andreas Oschlies, Germany]	Taken into account - text revised. Definition of global warming in a particular year or decade in revised SPM makes clear it refers to the estimated average GMST over a 30 year period centred on that year or decade, relative to 1850-1900, and is not restricted to human-induced warming.
11204	3	8	3	8	…1.5°C global mean temperature... Shouldn't this be "global mean temperature rise"? [United Kingdom (of Great Britain and Northern Ireland)]	Accepted - text revised
11206	3	8	3	9	Does this infer that human-induced warming is calculated seperately from any natural background warming/cooling that may occur?It reads to me as though it is not purely a 1.5ºc degree average global temp rise above pre-industrial but an assessment on only the human induced element of this? Could this be clarified? [United Kingdom (of Great Britain and Northern Ireland)]	Taken into account - text revised. Definition of global warming in a particular year or decade in revised SPM makes clear it refers to the estimated average GMST over a 30 year period centred on that year or decade, relative to 1850-1900, and is not restricted to human-induced warming.
18792	3	8	3	9	See similar regarding the confusing use of the term '1.5 °C global mean temperature' [Andrea TILCHE, Belgium]	Taken into account - text revised. Definition of global warming in a particular year or decade in revised SPM makes clear it refers to the estimated average GMST over a 30 year period centred on that year or decade, relative to 1850-1900, and is not restricted to human-induced warming.
19200	3	8	3	8	add increase after global mean temperature [Spain]	Taken into account - text revised. We have added increased where there is the possibility of confusion.
41650	3	8	3	9	Add the reference for "human induced" in this sentence. [Czech Republic]	Taken into account - text revised. Definition of global warming in a particular year or decade in revised SPM makes clear it refers to the estimated average GMST over a 30 year period centred on that year or decade, relative to 1850-1900, and is not restricted to human-induced warming.

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32598	3	1	27	23	labelling of orange boxes is simlar to labelling of sections so potentially confusing e.g. box 1.3 on p5 2-6 in section 1.3 which also includes orange boxes 1.1 and 1.2 [Jonathan Lynn, Switzerland]	Accepted - colouring has been improved.
334	3	11	3	11	Meaning of high level? Main (or key) points? Or high certainties? These points are too general to put here. [Zong-Ci Zhao, China]	Not Applicable - section no longer included in the SPM
33700	3	13			SPM 1.2 High level statements: We think this section is important and should be a part of the SPM, and we welcome it as an innovative and useful means of communication. However, in its current format we think findings are somewhat obvious and does not bring new insight to readers, e.g. bullet point 4. As we understand this section, you want to tell a story about the key messages of the SPM, please consider making an even shorter and more coherent narrative. You might also consider writing this story without using bullet points to make it more continuous for the reader and to make this section stand out from the rest of the SPM. [Norway]	Taken into account - text revised. Revised SPM contains headline statements that are designed to be presented in this way. A separate box would complicate the approval process.
33702	3	13			Please consider to give reference to at least which parts of the SPM that are the source of the different statements. [Norway]	Taken into account - callouts / cross-references have been added to each paragraph of the SPM
418	3	13	4	8	HIGH LEVEL STATEMENTS: You present "High level statements" in section SPM 1.2. What is their purpose? What is the difference to to the Headline Statements in the red boxes? Which of the two is more important? What is the difference between the High level statements and the Headline statements? You are presenting two important text-based instruments, but it is not clear to the reader, which has more weight. The consequence is a procedural challenge to find consensus in the Plenary as you are offering multiple choices and different formulations of similar affirmations. This evidences a genuine problem of the FOD of this SPM: there is not yet sufficient effort on the clarity of the language of the HS. Ambiguities must be avoided as it dilutes the messages and jeopardizes the consensus-finding process. [Thomas Stocker, Switzerland]	Accepted - text revised. The SPM structure and content has been revised
420	3	13	4	8	HIGH LEVEL STATEMENTS: In contrast to the HS, the high level statements are not traceable. This is a big problem [Thomas Stocker, Switzerland]	Accepted - text revised. The SPM structure and content has been revised
6066	3	13	3	13	These high level statements are very useful [Timothy Carter, Finland]	Noted
8274	3	13	4	7	This section, which is a recapitulation of the current SPM, fails to cover the elements of the SPM. It is suggested to restructure the SPM by field and area, presented by the format of the headline sentences plus the major findings, and delete Section 1.2. [China]	Accepted - text revised. The SPM structure and content has been revised
9026	3	13	4	7	Section SPM 1.2 "High level statements from this report" is supposed to provide a high level summary of the report. However we think that the statements as they are, are difficult to link with the rest of the SPM and thus also with the underlying report. Also we think that the current statements do not contain enough quantitative information. On the other hand, the statements in orange boxes in the SPM are often repetitions of the main text. We would suggest to make these statements in orange boxes in the SPM more succinct and collect them in a later step to form the high level statements in a similar way as was done for WGI contribution to AR5. [Luxembourg]	Accepted - text revised. The SPM structure and content has been revised
11202	3	13	4	7	Useful summary of high level messages. But what is missing, here or elsewhere in the SPM, is a summary of how the costs and benefits of achieving a 1.5 degree compare to a 2 degree target, and a clearer statement of what that means for efforts to try and keep temperature increases to 1.5 degrees [United Kingdom (of Great Britain and Northern Ireland)]	Accepted - text revised. The SPM structure and content has been revised
15416	3	13	3	13	Each region is allocated 3 impact categories, presumably judged as having highest risk levels. For Australasia, the risks for reefs and flooding are certainly high already, and risks for some coastal areas will increase, but it's unclear why the diagram excludes "Extreme heat events and fire", given recent disasters. If we have to choose between coasts and fire/heat, what's the highest risk now and in future? [Australia]	Not Applicable - figure no longer included in the SPM
17864	3	13	4	7	I suggest to delete the whole section, as nearly all statements are so high-level that they are trivial (perhaps except the first and the last paragraph) [Brigitte Knopf, Germany]	Accepted - text revised. The SPM structure and content has been revised
21594	3	13	4	7	Should provide degree of certainty statements and references to the report's sections. [Sweden]	Accepted - text revised. The SPM structure and content has been revised, and certainty statements have been provided
29022	3	13	4	7	We strongly suggest to replace the current list of "High level statements from this report" by headline statements embedded in all sections throughout the entire SPM, like e.g. in the AR5 SYR, as requested by the Panel in Decision IPCC/XLIV-4. Most of the statements in the current Section 1.2 are too general, sometimes almost trivial for high level statements, and they lack indications of their robustness (IPCC uncertainty guidance). In addition, we are very concerned that having to agree on such a list of high level statements at the start of the approval session would severely hamper the process at the approval plenary. Some of the statements should be taken up in later sections, in particular line 39-44: Please keep the threefold list of approaches, including the important statement on the energy sector in current bullet 5. The headline statements should not only address the challenges of ambitious climate policy but also address co-benefits and synergies. [Germany]	Accepted - text revised. The SPM structure and content has been revised
29572	3	13	4	7	The headline statements contain carefully (and basically well) crafted main messages of the Report. The messages are focussed and sharp. Please add references to relevant sections of the report. Similar orientation is recommended throughout the SPM. [Finland]	Accepted - text revised. The SPM structure and content has been revised

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31158	3	13	3	13	We request a clarification on how "high level statements" have been included and how the contents were selected, as this was not discussed in the agreed Outline. [Japan]	Not Applicable - figure no longer included in the SPM
32590	3	13	4	7	Implication of the heading SPM 1.2 High level statements from this report is that it summarizes the high-level statements, but unclear how this relates to the statements in orange boxes [Jonathan Lynn, Switzerland]	Accepted - text revised. The SPM structure and content has been revised
32592	3	13	3	13	high-level with hyphen [Jonathan Lynn, Switzerland]	Not Applicable - section no longer included in the SPM
39024	3	13	4	4	I think it is a good idea to have this section on high level statements. Having such a condenced short summary of the SR will be very in the outreach activities. These statements will obviously develop from this FOD to the final draft, and in this process I suggest you try to make them shorter by splitting some of them up into shorter statements; in addition to trying to find simpler and more efficient language in general. Furthermore, the layout/design should be adapted to make this section clearly stand out in the structure. [Jan Fuglestvedt, Norway]	Accepted - text revised. The SPM structure and content has been revised
50008	3	13	4	7	Having high level statements means you are summarising the summary. This inevitably leads to rather general and bland statements that do not do justice to the findings of the report that are contained in the rest of the SPM. My strong advice would be to delete this whole section. The Headlines in the rest of the SPM are a much better reflection of the key findings. [Bert Metz, Netherlands]	Accepted - text revised. The SPM structure and content has been revised
50358	3	13	4	7	Introduce a confidence level for each of the high level statements of this report. [Switzerland]	Accepted - text revised. The SPM structure and content has been revised
51082	3	13	4	7	Add to the bullet points from the executive summary of chapter 1 (page 6, lines 28-30): "Recognising that the impacts of climate change for warming levels beyond 1.5C and associated response to these impacts could fall disproportionately on the poor and vulnerable, ethics and equity are essential elements of this assessment." [Doreen Stabinsky, United States of America]	Taken into account - covered in Section A41. The statement reads as follow: The poor and vulnerable are disproportionately affected by many impacts of global warming as well as the challenges of remaining below global warming of 1.5°C; with associated mitigation options implying a combination of significant benefits and adverse effects, depending on the various mitigation options (high confidence). {1.1.1, 1.1.2, 1.4.3, 2.5.3, Cross-Chapter Boxes 4 in Chapter 1, 7 and 8 in Chapter 3 and 13 in Chapter 5}
57792	3	13	4	7	Highly policy relevant information found in this report is not reflected in the 7 high level statements found in section SPM 1.2 In particular this report should make a high-level statement about HOW to best limit warming to 1.5 degree. To this end, the material in Chapter 4 and the synthesied secitons SPM 4.2 and SPM 4.4 should be reflected in the High level statements found in SPM 1.2 [Hunter Cutting, United States of America]	Accepted - text revised. The SPM structure and content has been revised
58834	3	13	3	5	As the title "SPM 1.2 High level statements from this report" suggests, this section seems intended to provide high-level key messages of the report, or a summary of the summary. If this is the case, some repetition from the rest of the document is OK, but the points raised in this section need to be enhanced to reflect the key findings of the report. [United States of America]	Not Applicable - section no longer included in the SPM
58836	3	13	4	99	SPM 1.2 should be strengthened by: (i) clarifying key aspects of 1.5°C pathways (e.g., zero emissions by 2060-2080), (ii) noting the critical role of carbon-dioxide removal (see SPM 3.5), (iii) more clearly identifying the relative costs and benefits of 1.5 vs 2°C, (iv) explaining the role of SLCPs, (v) characterizing the role of SRM/RMM, and (vi) identifying key knowledge gaps. It should reflect the point, stated later in the SPM on page 17, that "There is ... no documented precedent for the geographical and economic scale of the energy, land, urban, and industrial transitions implicit in pathways consistent with a 1.5°C warmer world." [United States of America]	Accepted - text revised. The SPM structure and content has been revised
63020	3	13	4	7	Section SPM1.2: The structure of the high level statements should be worked on so that the order of topics is more logical: in particular, scenario-related issues should be provided within a group of paragraphs, impacts into another group, etc - to the extent possible. Bullets 1 and 5 needs to follow each other and express the key elements of 1.5°C pathways in a clear way : both these bullets express requirements to follow such pathways. Providing all the features of these pathways together would help the reader getting a comprehensive view and avoid the impression that there are two potentially conflicting messages. [Belgium]	Accepted - text revised. The SPM structure and content has been revised
9146	3	15			If there ever were a certainty, such a scenario is certain, not just high risk. [Richard Rosen, Germany]	Noted
18802	3	15			The first sentence is a huge understatement and in contradiction with various other comments later in the SPM. E.g. page4 line 40 - 44. [Andrea TILCHE, Belgium]	Taken into account - the bullet have been removed
34326	3	15			The word 'risk' refers to the combination of probability of an event and the exposure to that event. 'probability' would be more correct here. [Nathan Gillett, Canada]	Not applicable - the paragraph has been removed
57640	3	15		15	Do not use the word "risk" exclusively in the sense of likelihood, as this confuses the use of the term in the risk framework. Replace by "chance", "likelihood" or the like, or say "risk from". [WGII TSU, Germany]	Not applicable - the paragraph has been removed
58140	3	15		19	The statement is inappropriate. First of all, the most high level statement is what the warming is by 2018, what additional warming has been committed by historic emissions up until 2018 (assuming zero emissions afterwards)and what the likelyhood is that the 2°C target has been exceeded on this basis. The statement that there is a high risk that that under NDC up until 2030 1.5°C will be exceeded with a high likelyhood is only of secondary importance here. The first question is, whether 1.5°C is already exceeded or not. And then comes the question about likelyhoods for exceedence given certain future emissions. [Nico Bauer, Germany]	Not applicable - the paragraph has been removed

Comment No	From Page	From Line	To Page	To Line	Comment	Response
58142	3	15			The expression "There is very high risk" suggests that exceedence of 1.5°C is subject to natural issues alone. The conditioning phrase "under current emission trajectories and current NDCs" puts this into perspective, but the main message will be read as this "There is very high risk that [...] global warming will exceed 1.5°C degree above pre-industrial levels." The headline message must be well-phrased. The important message is that 1.5°C have not been exceeded and can still be prevented. However, under current NDCs this is very difficult and the risk for exceedence is very high. [Nico Bauer, Germany]	Not applicable - the paragraph has been removed
41	3	15	3	19	Would be good to be clear from the start about the CO2 removal assumptions under;ying these conclusions [Meinhard Doelle, Canada]	Taken into account - a clear headline statement on the role of CDR in mitigation pathways is included in the revised SPM
5430	3	15	3	19	In the first sentence I expect that the term "probability" better represents this conclusion than does "risk", but no probabilities are given, and the sentence is unclear (is it posing the hypothetical scenarios that current trends in emissions would occur in the future?). Suggest that this first sentence be removed, and a sentence from Chapter 1 ES be added to the end of this paragraph: Ch1 page 4 lines 18-20. [Haroon KHESHGI, United States of America]	Not Applicable - section no longer included in the SPM
6068	3	15	3	15	Is very high a confidence measure? If so it should be italicised [Timothy Carter, Finland]	Not Applicable - section no longer included in the SPM
10204	3	15	3	19	Focus should be on all greenhouse gases as achieving the 1.5oC would require deep emissions cut from all GHGs. [Saudi Arabia]	Taken into account - role of non-CO2 greenhouse gases is made clear in the revised SPM
10934	3	15	3	19	Focus should be on all greenhouse gases as achieving the 1.5oC would require deep emissions cut from all GHGs. [Nedal KATBEHBADER, Switzerland]	Taken into account - role of non-CO2 greenhouse gases is made clear in the revised SPM
11070	3	15	3	15	Preferable to write 'nationally determined contributions' instead of 'national pledges' in order to avoid confusion [Denmark]	Not Applicable - section no longer included in the SPM
11208	3	15	3	15	The term 'very high risk' does not appear to relate to a criteria in footnote 1. Can a confidence be assigned to this statement? [United Kingdom (of Great Britain and Northern Ireland)]	Not Applicable - section no longer included in the SPM
15418	3	15	3	16	Define "very high". When will 1.5 C be reached, under different RCPs? SPM1.2 states "At current rates of warming, global mean temperature would reach 1.5°C by the 2040s." The layperson needs to know what emissions are included, so be specific in a footnote: trace greenhouse gases (carbon dioxide, methane, nitrous oxide, CFCs and HFCs) and aerosols (sulfate, soot, etc). [Australia]	Taken into account - The rate of human-induced warming is used to compute the 2040s statement. This is clearly elucidated in Figure SPM1 of the revised SPM.
15420	3	15	3	16	It is unclear what "current national pledges" means in this paragraph -- does it refer to Paris Agreement NDCs or is it broader, possibly also referring to pre-2020 targets and mitigations actions? Suggest clarifying [Australia]	Taken into account - Statements pertaining to the NDCs have been more explicit in the revised SPM
17852	3	15	3	16	It is only said that current NDCs will not lead to 1.5°C. But it would be very important to say that the current pledges rather lead to ~3.2°C. The gap should be made clear, otherwise readers could think that the NDCs could lead to 2°C. At least it should be mentioned that with the NDCs, a large share of the budget would be exhausted by 2030 (chp. 2) [Brigitte Knopf, Germany]	Taken into account - Revised SPM includes a statement on the estimated emissions ranges in 2030 for the conditional and unconditional NDCs (D1.1).
18794	3	15	3	15	Suggest to use probability instead of risk [Andrea TILCHE, Belgium]	Not Applicable - section no longer included in the SPM
18796	3	15	3	19	This conclusion is weak and has already been established by previous reports. The bullet should provide more concrete evidence concerning how great the risk of exceeding 1,5°C is and how much mitigation is required. [Andrea TILCHE, Belgium]	Taken into account - Revised SPM includes a statement on the estimated emissions ranges in 2030 for the conditional and unconditional NDCs (D1.1).
18798	3	15	4	7	The high-level statements are often too general to be useful to policymakers, and do not do justice to the findings of the main chapters. The following findings come directly from the report and should be stated here. - Chapter 2 clearly states that limiting warming to 1.5°C by 2100 requires CO2 neutrality before 2050 in most scenarios, whereas below 2°C scenarios display neutrality later this century (though a Ch2 distinction between neutrality timing of >66% 2°C scenarios and those with lower probability is needed). - Chapter 2 also finds that 'societal choices' regarding non-CO2 emissions have a strong impact on the prospects for 1.5°C. (+/- 500 GtCO2 of carbon budget, compared to a median of around 600 GtCO2 as per Fig 2.4. Or 0.5°C warming contribution in 2050 as per page 19. [Andrea TILCHE, Belgium]	Accepted - text revised. The SPM structure and content has been revised
18800	3	15	4	7	The order of the bullets needs to change. A logical sequence would be the following: risk of exceeding 1.5°C, impacts, need for mitigation and consequences of delay, need for adaptation, need for climate action (mitigation and adaptation) to be compatible with sustainable development. The current placement discusses the negative risks of poorly implemented mitigation & adaptation before establishing the need for climate action in the first place, giving the impression that climate action is a potentially dangerous endeavour, which misses the larger point: namely the need for climate action in order to mitigate the effects of climate change of 1.5°C and above. See also Ch5 p4 lines 23-27 which discuss the importance of limiting the extent of climate change in order to limit its adverse impacts on sustainable development. [Andrea TILCHE, Belgium]	Taken into account - covered in Section A, C, and D of the new SPM
19130	3	15	3	15	What is a "very high" risk? How does this relate to the calibrated language (very high confidence) introduced in the footnote of page 2? I think chapter 2 says "high risk" but again without a clear definition of what this means. [Olivier Boucher, France]	Not Applicable - section no longer included in the SPM

Comment No	From Page	From Line	To Page	To Line	Comment	Response
19374	3	15	3	19	Please add a statement here about the risk of exceeding 2°C as well. Otherwise the reader might be misguided to think that it's 'just the 1.5°C goal' that's slipping out of reach with current trajectories and pledges, not 2°C. It would be very helpful to add here (as well as to the underlying chapter) a sentence that is as clear as the UNEP (Emission Gap Report 2017) finding that: "Even if the current NDCs are fully implemented, the carbon budget for limiting global warming to below 2°C will be about 80 percent depleted by 2030." [Jennifer Morgan, Netherlands]	Not Applicable - section no longer included in the SPM
21596	3	15	3	15	Risk is a central concept in the report and should be used consequently. In this line the risk is used in a context of a possibility of exeeding a temperature, whereas in page 5 line 2 it referes to natural, managed and human systems. [Sweden]	Accepted - The revised SPM includes the definition of risk, and its text uses the term consistently with this definition
29024	3	15	3	16	If the high-level statement are not deleted: The term "risk" is not consistently used in this report, please see also our general comment on this issue. The expression "there is very high risk" at the beginning of this phrase is confusing. Both SPM and underlying chapter clearly state that current emission trajectories and current NDC pledges are insufficient for reaching 1.5C (or 2C for that matter), as stated, e.g., in SPM4.1 on p 19 ln 35 with "very high likelihood", and in Cross Chapter Box 4.1 Therefore, please replace the expression "there is very high risk" with the adequate expression/confidence statement ("it is virtually certain" or "it is very likely"). [Germany]	Not Applicable - section no longer included in the SPM
29382	3	15	3	16	insert the year/time period that is meant by "current". Add "by end of this century" (or other date if appropriate) at the end of the sentence. [Susanne Droege, Germany]	Not Applicable - section no longer included in the SPM
29596	3	15	3	15	The text uses the term 'very high risk'. Would it be possible to use terminology in footnote 1? [Finland]	Not Applicable - section no longer included in the SPM
33704	3	15	3	19	Suggestion for re-phrasing for your consideration: "Under current emission trajectories and current national pledges, there is very high risk that global warming will exceed 1.5°C above preindustrial levels. Limiting global warming to 1.5°C would require a rapid phase out of net global carbon dioxide (CO2) emissions. In addition, deep reductions in non-CO2 drivers of climate change, such as methane, are needed, with more pronounced and rapid reductions required than for limiting global warming to 2°C." [Norway]	Not Applicable - section no longer included in the SPM
36222	3	15	3	16	May use the appropriate likelihood statement as per uncertainty guidance here - not just risk. [India]	Not Applicable - section no longer included in the SPM
36224	3	15	3	16	SPM 1: The paragraph should not begin with an emphasis on current and future emissions. This negates completely the role of past emissions. The first paragraph should begin with a sentence about temperature rise that has already happened due to historic emissions. It is only the additional rise that will happen due to future emissions. Suggested change in paragraph - “The global mean temperature in 2017/18 is estimated to be 1 degree C higher relative to pre-industrial levels, and there is very high risk that it will exceed 1.5 degree C in this century given current emission trajectories and national pledges.” First sentence is already in the report at another place. It just needs to move upfront. [India]	Taken into account - the first headline statement of the revised SPM concerns warming to date
37060	3	15	4	7	It is surprising that high level statements do not have any reference to cost implication. As stated above, it is obvious that 1.5 degrees scenario is "better" than 2 degrees scenario from sole viewpoint of climate mitigation. It is economic cost associated with mitigation actions that discourage Parties to take as ambitious actions as expected. High level statements without clear reference to cost implication would have little utility for policy makers. [Jun Arima, Japan]	Taken into account - covered in Section D of the new SPM
37062	3	15	4	7	Points enumerated in the high level statements are relevant not only to 1.5 degree but also 2 degree scenario. For the sake of utility for policy makers, there should be explanation as to how 1.5 degree scenario differs from 2 degree scenario in terms of benefits and challenges. [Jun Arima, Japan]	Accepted. The SPM structure and text have been revised
43732	3	15	3	19	There is very high risk that under current emission trajectories and current national pledges [long term global equilibrium] warming will exceed 1.5°C above preindustrial levels. Limiting global warming to 1.5°C (equilibrium, very high certainty) would require [an immediate rapid decline in global emissions] and rapid phase out of fossil fuel energy and] net global carbon dioxide (CO2) emissions [and immediate decline] with deep reductions in non-CO2 drivers of climate change such as methane [and nitrous oxide[, with more pronounced and rapid reductions required than for limiting global warming to 2°C[at long term equilibrium warming [The IPCC AR4 and AR5 and other high-level sources show immediate emissions decline is for 1.5°C and 2°C pathways (even just by 2100). IPCC AR5 RCP2.6 better than the median probabilitity calls global emissions decline immediately (at and before 2020). Immediate global emissions decline is also in the May 2016 UN climate Secretariat update of the INDCs explicitly in Figure 2, footnote 4 ‘immediate onset mitigation P1 scenario with better than 66% likelihood of staying below 2C’ (only by 2100)]. [Peter Carter, Canada]	Not Applicable - section no longer included in the SPM
44628	3	15	3	16	What does 'very high risk' mean here? Isn't this at least very likely? Stating that there is a very high risk seems to contradict or undermine the statement on page SPM-4, lines 24-26. At any rate, the two statements would need to be clearly consistent. [Penny Urquhart, South Africa]	Not Applicable - section no longer included in the SPM
46072	3	15	3	19	This first SPM High Level Statement can easily be used by politicians to “promise everything, do nothing, appear to do everything”. Shouldn’t we be deeply worried that with this Statement the past 26 years of Objective Failure will continue, with no stabilization and new destabilization records set in 2018, 2019 and on and on? [Michael Wadleigh, United States of America]	Noted
50360	3	15	3	15	Does "current emission trajectories" include the NDC and other planned and additionnal measures, in the terminology of the UNFCCC? [Switzerland]	Taken into account - Statements pertaining to current warming rates or the NDCs have been more explicit in the revised SPM

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51296	3	15	3	16	Should use the appropriate likelihood statement as per uncertainty guidance here - not risk. [Anand Patwardhan, United States of America]	Not Applicable - section no longer included in the SPM
52668	3	15	3	27	Consider starting with the avoided impacts by limiting global warming to 1.5°C and then talk about the current emission trajectories. Avoid a negative/policy prescriptive formulation such as “Even if global warming…” by focusing on the avoided impacts rather than on the additional impacts from current level of warming. [Iulain Florin VLADU, Germany]	Not Applicable - section no longer included in the SPM
52678	3	15	4	8	The high level statements are already in a good shape, but they can be further strangthened based on the rich materail and findings from the report to maximize the usefulness for the decision-making community and keeping in mind that perhaps half of them will only focus on these high level messages and not on the entire SPM. For example, the point of transformational change can be strengthened and substantiate better what it means compared to the ongoing mitigation and adaptation action that we witness now. Also, the message on the urgency of action somehow seems more prominent in chapter one than in these high level messages. Perhaps the notion of urgency of action could be further srengthened by stressing on the risk stemming form reliance on large volumes of negative emissions that is associated with high risks and uncertainties. [Iulain Florin VLADU, Germany]	Accepted. The SPM structure and text have been revised
54150	3	15	3	19	Rapid must be specified more clearly and there is a plethora of upporting research and consensus on this. By 2020 (consensus on this as an outcome of COP23, see part 3 of Decision 1/CP23). By 2030 (see The Emissions Gap Report 2017 of UNEP) [Ayman Bel Hassan Cherkaoui, Morocco]	Taken into account - A new figure (SPM3) in the revised SPM clearly outlines (and quantifies) what is meant by rapid
54736	3	15	3	15	Is "risk" the right word here, it is more "likelihood"? Message 1.1, on page 4, says very confidently 1.5C crossed in 2040s. [Glen Peters, Norway]	Not Applicable - section no longer included in the SPM
54896	3	15	3	16	This conclusion will be an important focus of this document. Check whether a confidence level is needed (see my first remark) [Bram Bregman, Netherlands]	Noted
55364	3	15	3	15	very high risk that... is a good example of incorrect use of the concept of risk. Correct to "There is an increasing probability that…" The authors may claim that this phrasing is based on considering increasing impacts, too, but that is not what the rest of the sentence substantiates, and in any case, it should then say something like "warming in excess of 1.5 degrees creates increasing risks [to what?]..." - but I don't think that it the intended message of this statement. [Andy Reisinger, New Zealand]	Not Applicable - section no longer included in the SPM
55566	3	15	4	7	High level statements are useful. However suggest to add to last point (or add new point) that delayed action would increase long term costs of mitigstion and adapation. [David Cooper, Canada]	Accepted. The SPM structure and text have been revised
55568	3	15	4	7	High level statements (and elsewhere). Check use of "would" vs "Will" This is more than editorial. I would suggest in first bullet (line 17) and fifth bullet (line39) should be "will", given Paris Agreement, while in thrid bullet (line 29) should be "would", in light if subsequwnt sentence. [David Cooper, Canada]	Accepted. The SPM structure and text have been revised
56480	3	15	3	16	What about opening with a statement that emphasizes that this is conditional on radical action. E.g. "There is very high risk that under current emission trajectories and current national pledges global warming will exceed 1.5°C above preindustrial levels, WITHOUT URGENT ACTION." This would also provide a better lead in to the next sentence. [Eleanor Johnston, United States of America]	Not Applicable - section no longer included in the SPM
63022	3	15	3	16	This seems to be an understatement : shouldn't something such as "largely" be added ("will LARGELY exceed 1.5°C") ? [Belgium]	Not Applicable - section no longer included in the SPM
5894	3	16			It feels a disservice to those elements of the underlying assessment I managed to review not to take an attempt in this statement to characterise by when this threshold would be breached under current NDCs [Peter Thorne, Ireland]	Taken into account - the timeline of NDCs has been incorporated into Section D1 of the new SPM draft
6002	3	16			preindustrial should be: pre-industrial [Sara Budinis, United Kingdom (of Great Britain and Northern Ireland)]	Editorial
10356	3	16	3	16	The time period should be included after "above preindustrial levels" and "warming to 1.5 °C" as 1.5 would be reached sooner or later. Suggestion is using "within the 21st century". [Hungary]	Not Applicable - section no longer included in the SPM
29026	3	16	3	16	If the high-level statement are not deleted: These statement are major findings from previous reports. Please add references and uncertainty language. Chapter 1 introduces the Anthropocene as a framing, this could be taken up here. [Germany]	Not Applicable - section no longer included in the SPM
32594	3	16	3	16	pre-industrial (as in next 3-21) - should standardize on hyphenated version which is clearer to read [Jonathan Lynn, Switzerland]	Editorial - copyedit to be completed prior to publication
33706	3	16	3	19	Please clarify what is meant with "net global CO2 emissions" in this context. [Norway]	Not Applicable - section no longer included in the SPM
54230	3	16	3	16	Although it is said later it would be more useful to say here that this "is likely to occur by the 2040s" at the end of the sentence. [David Warrilow, United Kingdom (of Great Britain and Northern Ireland)]	Not Applicable - section no longer included in the SPM

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56924	3	16	3	19	[W]ould require (line 17) is being used in an imperative logical sense, similar to "must entail". It is therefore misleading to have no subsequent mention of albedo modification, which could also limitl warming to the desired degree ythough it might in doing so have very undesirable side effects.To avoid having a sentence which is untrue, that ommission needs to be addressed. I can suggest two ways this might be done. One way would be to change the beginning of the sentence to read "One way to limit global warming to 1.5C would require." This change on its own would satisfy the requirement of accuracy. It would be more informative, though, to add a new bullet pointed section immediately below this one saying. "It is also possible that albedo modification could be used to limit warming to 1.5C. This would raise significant issues in terms of biogeophysical side effects, lost co-benefits, governance, ethics and public acceptability." Another way to address the same problem would be to add to the end of the sentence "or some form of albedo modification, an option which would raise significant issues in terms of biogeophysical side effects, lost co-benefits, governance, ethics and public acceptability." [Oliver Morton, United Kingdom (of Great Britain and Northern Ireland)]	Not Applicable - section no longer included in the SPM
57126	3	16	3	19	Does this sentence apply to staying below 1.5°C permanently or also to come back to 1.5°C after overshooting this target? [Philippe Marbaix, Belgium]	Not Applicable - section no longer included in the SPM
57194	3	16	3	18	Are deep reduction in methane emissions required even to reduce global warming to 1.5°C after an overshoot (it does not seems obvious because such pathways typically involve CDR, also reducing the total radiative forcing, so one might have to chose between the drawbacks of early mitigation + CDR, and those of deep CH4 emission reduction related to agriculture, unless removing the fugitive CH4 emissions due to fossil fuels already qualifies as 'deep CH4 emission reduction') ? [Philippe Marbaix, Belgium]	Rejected. Clarification question. Reductions in CH4 will contribute to lowering temperatures irrespective of whether this occurs before or after an overshoot.
44044	3	17		19	rapid phase out of CO2 emissions and "deep reductions" of non-CO2 emisions ned to be clarifed: It should read "rapid phase out by 2050 latest" and "deep reductions of more than 50% by mid century" [Stephan Singer, Belgium]	Taken into account - the redrafted SPM has included greater quantification and specificities where relevant.
15422	3	17	3	17	Should read "would require a rapid reduction of global carbon dioxide (CO2) emissions" A "phase out" of "net emissions" implies moving to zero or negative net emissions by manipulating sinsk - possilbe of course but should be made explicit. [Australia]	Taken into account - Clarified in the revised SPM that "All 1.5C-consistent pathways imply rapid reductions in net global anthropogenic CO2 emissions to reach net-zero around mid-century")
40930	3	17	3	18	Net global GHG or CO2e emissions (as opposed to CO2 emissions) or at least net long lived gases? [Neelam Singh, United States of America]	Not Applicable - section no longer included in the SPM
54232	3	17	3	17	it would help the reader to know what a rapid phaseout means here - could for example add "(by 2060s)" after phaseout. [David Warrilow, United Kingdom (of Great Britain and Northern Ireland)]	Taken into account - A new figure (SPM3) in the revised SPM clearly outlines (and quantifies) what is meant by rapid
388	3	18	3	18	to delete: "such as methane". Because it is very misleading if we exclusivley mentioned only methane. [Nedal KATBEHBADER, Switzerland]	Not Applicable - section no longer included in the SPM
9448	3	18	3	19	", with more pronounced and rapid reductions required than for limiting global warming to 2°C." It is evident, no analysis is required. [Russian Federation]	Not Applicable - section no longer included in the SPM
19376	3	18	3	19	with more pronounced and rapid reductions required than for limiting global warming to 2°C. This sentence should be replaced with a text along the lines of: "Such a pathway would give a high probability for limiting warming below 2°C". [Jennifer Morgan, Netherlands]	Not Applicable - section no longer included in the SPM
29922	3	18	3	18	Mentionning only methane and no other non-CO2 drivers (such as N2O) puts the emphasize on specific emitters. We suggest to specify other emitters including aerosols or delete this mention. [France]	Not Applicable - section no longer included in the SPM
38414	3	18	3	18	Given findings of Chapter 2 this line should read "reductions in non-CO2 drivers of climate change such as methane and other SLCF". Also, the glossary should provide the definition of "driver". [Volodymyr Demkine, Kenya]	For wording suggestion: Not Applicable - section no longer included in the SPM. For "driver" - The word "driver" does not feature in the revised SPM
58838	3	18	3	19	with more pronounced and rapid reductions is an obvious qualitative statement; some kind of quantification would be useful here. [United States of America]	Not Applicable - section no longer included in the SPM
6004	3	19			towards the end of this paragraph it should say somehwere how likely is this CO2 phase out to happen, at the pace needed for meeting the 1.5 degree target. In the way it is phrased at the moment, meeting the 1.5 degree target sounds difficult but feasible. is this the message of the report? [Sara Budinis, United Kingdom (of Great Britain and Northern Ireland)]	Not applicable - the paragraph has been removed
38488	3	19	3	19	Add: ", with an increase of the ambition of planned action and a timely and effective implementation." [Valentino Piana, Italy]	Not Applicable - section no longer included in the SPM
38490	3	19	3	21	Add bullet points on the main benefits of limiting warming to 1.5°C. For instance: "Achieving the limitation to 1.5°C contains damages, allow for strategies that reduce other stressors to be effective, provides time and resource room for adaption, and reduces the number of tipping points crossed by the climatic system. Planning in line with the 1.5°C is the best guarantee that, even if there are implementation delays and failures, the world remain "well below degrees", while reducing the probability of higher temperature for a wide range of particularly high values of climate sensitivity". [Valentino Piana, Italy]	Not Applicable - section no longer included in the SPM
38492	3	2	3	22	Add a bullet point on the technical feasibility of the goal and the societal effects of the mobilization towards it. For instance: "Limiting warming to 1.5°C is technically feasible. However, it requires immediate and comprehensive mobilization of government, business sector, investors, and civil society. This mobilization improves social and international cohesion, solidarity and sense of purpose, providing a common goal, frame and alignemen of incentives." [Valentino Piana, Italy]	Not Applicable - section no longer included in the SPM

Comment No	From Page	From Line	To Page	To Line	Comment	Response
38494	3	2	3	22	Add a bullet point on the consequences in failure to plan consistently with the 1.5°C goal. For instance: "If countries collectively fail to produce plans consistent with deep decarbonization, such as implied by the 1.5°C goal, skepticism about rational and consensus-based common solution might lead to conflicts, requests of recompensation and paralysis of the global governance". [Valentino Piana, Italy]	Not Applicable - section no longer included in the SPM
6070	3	21	3	27	This may not be the place, but somewhere it would be important to point out that there are also positive impacts under 1.5 degC warming; relative to today and possibly even positive at 2 degC relative to 1.5 deg C for some sectors/regions [Timothy Carter, Finland]	Taken into account - Definition of impacts has been added, which notes that impacts can have "positive or negative outcomes for…"
9450	3	21	3	26	The statement is unclear with regard to the scale. In general it means that 'warmer' is worse. However, there are some places on the Globe where this is not the case. [Russian Federation]	Not Applicable - section no longer included in the SPM
10646	3	21	3	27	Need to make argument for adaptation more explicit. Even warming of 1.5 deg will require adaptation as is being seen in regions already facing this level of heat (e.g. In india, 60% of states are warming by more than 1.5C, at 1.5C global warming). See Yaduvanshi et al. submitted to Clim Change "Regional impacts of 1.5 and 2 degree Global warming: implications on vulnerabilities across India" [Chandni Singh, Myanmar]	Not Applicable - section no longer included in the SPM
11210	3	21	3	23	…climatic trends and…larger than today could be more concise e.g. "trends in climate and extreme events over land and in the ocean may mean increased risks for ecosystems and human societies, especially for the most vulnerable." [United Kingdom (of Great Britain and Northern Ireland)]	Not Applicable - section no longer included in the SPM
17854	3	21	3	27	These paragraphs are somehow trivial. Unless no concrete number e.g. for sea leval rise or or impacts are given, these should not be declared as high-level statements [Brigitte Knopf, Germany]	Not Applicable - section no longer included in the SPM
18804	3	21	3	27	The bullet mentions that impacts of 2C would be much higher than 1.5, in particular where vulnerabilities are highest, but does not provide information of where vulnerabilities would be highest, or in which sectors/ecosystems. [Andrea TILCHE, Belgium]	Not Applicable - section no longer included in the SPM
18806	3	21	3	34	vulnerability and vulnerable systems: vulnerable to what. A short explanation should be added. [Andrea TILCHE, Belgium]	Not Applicable - section no longer included in the SPM
31038	3	21	3	27	Note that even if warming is limited to 1.5C adaptation will still be needed. This is alluded to in the text but not explictly referred to. [James FORD, Canada]	Not Applicable - section no longer included in the SPM
31160	3	21	3	34	These two paragraphs should be removed from high level statement or rewrite clearly how a 1.5°C warmer world is different from a 2°C warmer world in a quantitative manner so that policy makers can understand how different the impacts or risks between 1.5°C and 2.0°C are. The reason is that there is little value added to the two paragraphs because the descriptions in the paragraphs are so general that they are applicable to any climate targets, not limited to 1.5°C. SR1.5 is expected to focus on the difference between 1.5°C and 2°C because this information is indispensable for policy makers to make a decision. [Japan]	Not Applicable - section no longer included in the SPM
32210	3	21	3	23	The term "even if" at the start of the sentence weakens message. Consider rephrasing to "At a temperature increase of 1.5 degrees C above pre-industrial levels …" [Jamaica]	Not Applicable - section no longer included in the SPM
33708	3	21	3	27	We suggest a re-phrasing or separating this paragraph into more sentences. In addition, the word "larger", as used in the first sentence here, reflects back to "human societies", and not "risks", as we expect is the meaning. [Norway]	Not Applicable - section no longer included in the SPM
36226	3	21	3	23	The sentanece requires clarity. Are risks larger only where vulnerabilities are highest or elsewhere as well? [India]	Not Applicable - section no longer included in the SPM
36612	3	21	3	23	The term "even if" at the start of the sentence weakens message. Consider rephrasing to "At a temperature increase of 1.5 degrees C above pre-industrial levels …" [Snaliah Mahal, Saint Lucia]	Not Applicable - section no longer included in the SPM
43734	3	21	3	27	Even if global warming is limited to 1.5°C above pre-industrial temperatures, climatic trends and changing extreme events in oceans and over land imply impacts for ecosystems and human societies larger than today [and risks even larger of ongoing catastrophic impacts, especially on food and health security] oespecially where vulnerabilities are highest. Projected impacts are larger at 2°C, with the potential to affect more strongly economic development, increase costs of adaptation, damage, and loss, and cause increasing [impacts and] risks by exceeding the adaptive capacity of vulnerable systems , [including agriculture]. [Climate change impacts will last many centuries years. 'Many aspects of climate change and associated impacts will continue for centuries, even if anthropogenic emissions of greenhouse gases are stopped' (IPCC 2014 AR5 SYR Headline)]. Sea level rise will continue for centuries at both 1.5°C and 2°C global warming. [Peter Carter, Canada]	Not Applicable - section no longer included in the SPM
46104	3	21	3	27	This illustrates comment 2: the same statement can be reformulated by putting the second sentence up front: Impacts are larger at 2C than at 1.5C. The remainder then serves to provide the caveat that we should not think 1.5C is totally without risk. [Netherlands]	Not Applicable - section no longer included in the SPM
51298	3	21	3	23	Are risks larger only where vulnerabilities are highest or elsewhere as well? Confusing as written. [Anand Patwardhan, United States of America]	Not Applicable - section no longer included in the SPM

Comment No	From Page	From Line	To Page	To Line	Comment	Response
58840	3	21	3	27	Should include critical framing / contextual point contained in Chapter 4, page 80, lines 14-18: "For impacts and adaptation, large literature gaps remain with respect to the assessment of incremental economic and climate impacts between end-of-century warming levels of 1.5 and 2°C, especially during mid-century overshoot. There is a lack of knowledge on how much climate damage is reduced globally as a result of being more ambitious and no information on avoided adaptation investments associated with keeping warming to 1.5°C compared to business-as-usual or 2°C." [United States of America]	Not Applicable - section no longer included in the SPM
58842	3	21	3	27	Vague. The only comparison given (1.5 vs 2°C) may not be convincing. Are there good examples of absolutes or current trends? [United States of America]	Not Applicable - section no longer included in the SPM
19378	3	22	3	22	Is it only risks that will be higher than today with 1.5°C or isn't it impacts too? [Jennifer Morgan, Netherlands]	Not Applicable - section no longer included in the SPM
44630	3	22	3	22	Using 'imply' here is unnecessarily weak - even at current levels of warming there are real risks and impacts - thus with increased warming, risks are not just impied, but expected - it is the extent of the risks that would have different levels of likelohood. [Penny Urquhart, South Africa]	Not Applicable - section no longer included in the SPM
9148	3	23			The word "much" should be inserted before 'larger". [Richard Rosen, Germany]	Not applicable - the paragraph has been removed
72	3	23	3	24	When referring to the impact on economic development, please specify "with the potential to negatively affect more strongly economic development…" [Guillermo Montt, Switzerland]	Not Applicable - section no longer included in the SPM
11212	3	23	3	26	Projected impacts… vulnerable systems could be more concise e.g. "Projected impacts are larger at 2°C, and could affect economic development, and increase the costs of adaptation, damages and losses. The adaptive capacity of vulnerable systems could be exceeded, further increasing risks." [United Kingdom (of Great Britain and Northern Ireland)]	Not Applicable - section no longer included in the SPM
14150	3	23	3	23	It is a little obscure for readers to understand "where vulnerablilities are highest"? Where and when? It would be better to present some specific regions. [Rongshuo Cai, China]	Not Applicable - section no longer included in the SPM
29924	3	23	3	27	This part could be placed at the beginning of this paragraph. It really depends on what the authors want to highlight: that 1.5°C will have unavoidable impacts, or that it will have lower impacts than 2°C [France]	Not Applicable - section no longer included in the SPM
39304	3	23	3	27	Greatest impacts should begin with life, health, food security (etc) not economics. What is the difference in human suffering and biodiversity between 1.5C and 2C? This is your most important policy maker information. [Lindsey Cook, Germany]	Not Applicable - section no longer included in the SPM
39982	3	23	3	26	The big question is: how much larger? No one will be surprised that the impacts are larger at 2 degree C, but for the future decision making it is critical to know how much larger. This really belongs in the high level statement. Now it sounds very incremental (if that is the case, then fine, but report that). [Kornelis Blok, Netherlands]	Not Applicable - section no longer included in the SPM
63024	3	23	3	24	As it is, the statement is rather obvious and thus provides little relevant information. We think that it is important to check that the impacts are *significantly* larger at 2°C (or not) and adapt the sentence to provide this information. Furthermore, it would be useful to put this in a broader context : how is the change in risk between 1.5 and 2°C as compared to larger levels of warming ? (Please note that this is not out of scope for the SR1.5, as the approved outline had a provision for considering "where warranted by the literature, comparison with higher levels of warming"; here the objective is to provide the context which may justify the efforts needed to follow 2 or 1.5°C pathways) [Belgium]	Not Applicable - section no longer included in the SPM
389	3	24	3	24	to replcae " economic development" by "sustainable development". [Nedal KATBEHBADER, Switzerland]	Not Applicable - section no longer included in the SPM
19380	3	24	3	24	with the potential to affect more strongly seems like an understatement here. [Jennifer Morgan, Netherlands]	Not Applicable - section no longer included in the SPM
32212	3	24	3	24	Clarification is needed on this sentence in terms of "affect more strongly economic development" Is it positive or negative change? Consider changing to "...with potential to: affect more strongly economic development, increase costs of adaptation, increase damage, and increase loss..." [Jamaica]	Not Applicable - section no longer included in the SPM
36614	3	24	3	24	Clarification is needed on this sentence in terms of "affect more strongly economic development" Is it positive or negative change? Consider changing to "...with potential to: affect more strongly economic development, increase costs of adaptation, increase damage, and increase loss..." [Snaliah Mahal, Saint Lucia]	Not Applicable - section no longer included in the SPM
40740	3	24	3	24	Reading ease, suggest rewording: … potential to more strongly affect economic .. [Liese Coulter, Australia]	Not Applicable - section no longer included in the SPM
58844	3	24	3	25	Is "damage, and loss" in this paragraph an effort to include the political term "loss and damage" into the list of projected increased impacts from 2°C of warming? If so, it is very unclear how its inclusion provides any more information into this statement which already notes the increase in impacts from higher warming scenarios. Loss and damage is a political term that has no agreed political definition. Remain true to scientific mandate and avoid the use of controversial political terms where they are unneeded. [United States of America]	Not Applicable - section no longer included in the SPM
31162	3	25	3	25	We suggest modifying "adaptation, damage, and loss" to "adaptation, and damage and loss that occur despite adaptation measures to be clearer about what is meant. [Japan]	Not Applicable - section no longer included in the SPM
44046	3	26		27	give range of projected sea level rise post-2100 under available scenarios [Stephan Singer, Belgium]	Rejected - ranges beyond 2100 for sea level are not presented in this SPM however longer-time frames are mentioned in section A2. Furthermore a comprehensive and detailed assessment of sea-level rise will be conducted in the IPCC Special Report on Oceans and Cryosphere in a Changing Climate and the Working Group I main assessment report.
42	3	26	3	27	Should clarify that the rates of sea level rise will be different for 1.5 and 2 [Meinhard Doelle, Canada]	Not Applicable - section no longer included in the SPM
75	3	26	3	27	You can specify that sea level rise may be higher at 2-degree than 1.5 degree. [Guillermo Montt, Switzerland]	Not Applicable - section no longer included in the SPM

Comment No	From Page	From Line	To Page	To Line	Comment	Response
5432	3	26	3	27	I expect that while projected sea level rise would continue for centuries at either level of temperature rise, the pace of sea level rise would be greater for 2 than for 1.5. Suggest adding at the end ", although the pace of sea level rise would be lower for 1.5 C than for 2C. [Haroon KHESHGI, United States of America]	Not Applicable - section no longer included in the SPM
29028	3	26	3	27	If the high-level statement are not deleted: The current statement makes no distinction between sea level rise (SLR) at 1.5C and 2C - suggest to rephrase in order to clarify that while SL will continue to rise at both stabilization temperatures, overall SL may be (significantly) lower for 1.5C compared to 2C in the long term (e.g. "while rate and magnitude of SLR are greater at 2C, SL will continue to rise for centuries at both 1.5C and 2C"), and also depend on the extent and duration of overshoot during the 21st century. [Germany]	Not Applicable - section no longer included in the SPM
38416	3	26	3	26	There is no doubt that "Sea level rise will continue for centuries at both 1.5°C and 2°C" however, as long as this is an IPCC assessment, the likelihood/confidence of this event is supposed to be provided [Volodymyr Demkine, Kenya]	Taken into account. "Sea level rise will continue beyond 2100 (high confidence)"
39022	3	26	3	26	Add "stabilization at" before "both"? [Jan Fuglestvedt, Norway]	Not Applicable - section no longer included in the SPM
39984	3	26	3	27	Important here is to indicate how much higher sea-level rise is, and how much more land is at risk of flooding. [Kornelis Blok, Netherlands]	Not Applicable - section no longer included in the SPM
46106	3	26	3	27	Can something (even with low confidence) be said about the reduced risk of rapid SLR excursions under 1.5 versus 2C? Again this suggests: don't bother, SLR will happen anyway. [Netherlands]	Not Applicable - section no longer included in the SPM
63026	3	26	3	27	sea level rise will continue for centuries at 1.5°C is a potentially insufficient and thus misleading statement because it relates to a specific theoretical situation were temperatures would be stabilized at 1.5°C. Such a stabilization scenario is not something that we should expect, because staying below, or coming back, to 1.5°C implies a huge effort, most probably with some form of CDR. IF the humanity is able to satisfy this objective, then it may be able to decrease temperature even further than 1.5°C, thus potentially halting sea-level rise. RCP 2.6 is a well known example of this behavior, as illustrated in AR5 WGI figure 12.44 (for thermal expansion, but declining temperatures also reduce the risk of large-scale melting of polar ice caps, according to AR5 WGI SPM). Declining temperatures is a property of many, if not most, very low scenarios, and it could be an important motivation to pursue efforts in order to follow such scenarios. [Belgium]	Not Applicable - section no longer included in the SPM
11214	3	27	2	27	..warming, threatening coastal communities (including densely populated cities) which would likely require costly adaptation measures. [United Kingdom (of Great Britain and Northern Ireland)]	Not Applicable - section no longer included in the SPM
6852	3	27	3	27	Please add after warming; "but sea level rise will be ultimately significant less for 1.5oC warming. [Klaus Radunsky, Austria]	Not Applicable - section no longer included in the SPM
38934	3	28	2	16	I think "levels" should be changed to "level". [Jan Fuglestvedt, Norway]	Editorial
76	3	29	3	34	Specify how these effects exist but are stronger in a 2-degree scenario. We don't want policy makers to come out of reading this document thinking (1.5 is terrible, 2 is also terrible but easier, so let's just settle to 2). [Guillermo Montt, Switzerland]	Not Applicable - section no longer included in the SPM
8978	3	29	3	34	This remark is generally valid for any amount of warming and is not specific for 1.5°. It is therefore not a "high level statement" for this report. In contrary, it might be understood/interpreted that also 1.5°C warming is bad and therefore mitigation is hopeless. I recommend to skip this point. [Urs Neu, Switzerland]	Not Applicable - section no longer included in the SPM
9078	3	29	3	32	This wording is somehow misleading, and tend to abusively downplay the risk in Western countries. -> propose change: instead of "but those most at risk will be" -> "and not only the"... [Frédéric Durand, France]	Not Applicable - section no longer included in the SPM
9452	3	29	3	3	“In a 1.5°C warmer world, climate change and climate change responses will affect people in countries at all levels of development.” Will the effects be negative everywhere? [Russian Federation]	Not Applicable - section no longer included in the SPM
11216	3	29	3	29	Shorter sentences would help with readability. [United Kingdom (of Great Britain and Northern Ireland)]	Noted
18808	3	29	3	34	The bullet is vague and conflates the costs and benefits of both climate change and climate action in a misleading manner. It implies that the costs of both climate change and climate action will be felt similarly by the same groups of people, which is surely not a scientifically accurate statement. It is better to treat the costs/impacts of climate change and the costs of climate action separately. Regarding impacts of climate change itself, this should include statement of different impacts for 1,5°C compared to higher levels of warming. Regarding impacts of climate action, this should recognise the benefits of avoided impacts of climate change were mitigation to limit warming to 1,5°C. [Andrea TILCHE, Belgium]	Not Applicable - section no longer included in the SPM
29030	3	29	3	34	If the high-level statement are not deleted: What is meant here by climate change responses - policy responses and actions to mitigate climate change and/or adapt to it? If so, the statement seems to suggest that negative effects of climate change (impacts) and policy responses are equally affecting poor and deprived populations most, suggesting a similar impact on these populations - such a generalization seems not appropriate in the context of this report. Please clarify and rephrase accordingly. [Germany]	Not Applicable - section no longer included in the SPM
31164	3	29	3	34	It is important to acknowledge that concerns for equity and fairness are given for countries at different levels of development. However we would suggest to make the key messages of SR1.5 clear, which would be "all countries, independent of their income level or development status, as well as non-state actors, will need to strengthen their contributions" as pointed out in subsection 5.6.2.1 (from page 47 line 16 to page 47 line 20). [Japan]	Not Applicable - section no longer included in the SPM

Comment No	From Page	From Line	To Page	To Line	Comment	Response
36228	3	29	3	34	Combining climate change impacts and climate change responses weakens the statement. Will the same people be at risk due to both climate change and climate change responses? How do we argue for stronger climate change responses if that is the case? [India]	Not Applicable - section no longer included in the SPM
37416	3	29	3	37	The emphasis (order of wording) on adaptation in these two points is confusing and inappropriate: Limiting warming to a temperature target means first and foremost taking action on GHG mitigation. Any temperature target has implications on adaptation, but emphasizing this here is not conducive to clear SPM messaging. [Matthias Honegger, Germany]	Not Applicable - section no longer included in the SPM
51300	3	29	3	34	Combining climate change impacts and climate change responses weakens the statement. Will the same people be at risk due to both climate change and climate change responses? How do we argue for stronger climate change responses if that is the case? [Anand Patwardhan, United States of America]	Not Applicable - section no longer included in the SPM
57128	3	29	3	3	How large will be those effects globally ? That disadvantaged people will suffer more is logical, but in addition, the statement should given an idea of the whole picture and magnitude of the problem, otherwise one may have the impression that this overstates the risks associated to climate change as compared to other risks faced by humanity. [Philippe Marbaix, Belgium]	Not Applicable - section no longer included in the SPM
58846	3	29	3	34	There are many bullets like this that don't really seem new. Don't we already know that climate change will have important implications of this sort? Perhaps the point of this bullet is to say that "even at only 1.5°C of change" there will still be effects. If so, it would be good to make this clearer. [United States of America]	Not Applicable - section no longer included in the SPM
45744	3	3			Here and elsewhere, the language focusses on risk. It needs to be expanded to include opportunity language and thinking where appropriate. [Mark Howden, Australia]	Not applicable - the paragraph has been removed
11218	3	3	3	3	Remove "but" and start new sentence. By adding "but" the authors appear to dismiss the importance of impacts wherever they are. [United Kingdom (of Great Britain and Northern Ireland)]	Not Applicable - section no longer included in the SPM
55348	3	3	4	31	What does "more important" mean? Which is the message of this sentence? [ELISA BERDALET, Spain]	Accepted - "more important" is ambiguous
1516	3	31			Can "multidimensional" (in "multidimensional poverty") be replaced by a few words which will be more familiar to a non-specialist audience? [David Wratt, New Zealand]	Not applicable - the paragraph has been removed
49284	3	31			It is not clear why limiting warming to below 1.5°C requires transformational adaptation. [Bill Hare, Germany]	Not applicable - the paragraph has been removed. Adaptation is now covered in Section D3.
6854	3	31	3	31	The current wording "multidimensional poverty" lacks clarity. The following wording is suggested: experiencing different stresses, such as poverty, persistent vulnerabilities, … [Klaus Radunsky, Austria]	Not Applicable - section no longer included in the SPM
58848	3	31	3	32	Persistent vulnerabilities to what? Consider including "low resilience" to the list of challenges being experienced by communities since resilience literature uniquely captures certain analytical concepts not well represented in the vulnerability literature (i.e., alternative stable states, social-ecological feedbacks, and thresholds). See Miller et al. (2005): https://www.ecologyandsociety.org/vol15/iss3/art11/ [United States of America]	Not Applicable - section no longer included in the SPM
34328	3	32			Replace 'This is unless' with 'This risk will be reduced if'. [Nathan Gillett, Canada]	Editorial
29926	3	32	3	32	This is unless adaptation and mitigation actions are.. Unclear sentence. We would suggest to formulate it as "This could be attenuated if adaptation and mitigation actions..". [France]	Not Applicable - section no longer included in the SPM
40742	3	32	3	34	Too absolute. Current wording implys inequity can be stopped by concern, suggest rewording from ' … This is unless adaptation and mitigation actions are guided by concerns for …" to " … This will be lessened by guiding adaptation and mitigation actions by concerns for ..." [Liese Coulter, Australia]	Not Applicable - section no longer included in the SPM
46110	3	32	3	34	unclear reference [Netherlands]	Not Applicable - section no longer included in the SPM
50362	3	32	3	34	Write: "This is unless adaptation and mitigation actions are guided by concerns for equity, and fairness and capacities and enhanced support for efforts to eradicating poverty and reducing inequalities. The statement has to be balanced: equity and fairness are indeed important, but as important as that is that all big emitters undertake the responsibility and act according to their capacities. Also, narrowing it down to support for eradicating poverty and reducing inequality reads like: developed countries are to provide financial support to developing countries to eradicate poverty and reduce inequalities in order to reduce impacts of a 1.5°C warming. That's not wrong, but the responsibility again lies not only on developed countries to provide financial support but on everyone to undertake efforts (also developing countries). [Switzerland]	Not Applicable - section no longer included in the SPM
55366	3	32	3	34	delete "This is unless…". The preceding statement is true even if efforts based on equity and fairness are made (that's the whole reason why fairness and equity are so important). [Andy Reisinger, New Zealand]	Not Applicable - section no longer included in the SPM
58632	3	32	3	34	For clarity: "guided by concerns for equity and fairness and enhanced support" --> "equity and enhanced support where needed in light of different national circumstances" [New Zealand]	Not Applicable - section no longer included in the SPM
58850	3	32	3	34	The last sentence of this paragraph is a general concern, and not specifically related to 1.5°C vis a vis other climate scenarios. It should be removed. Moreover, the sentence describes this in terms of intention or motivations rather than concrete action - what is the basis for saying that this will be the case unless actions are "guided by concerns" for certain things – particularly with "equity" and "fairness" which are concepts for which meaning/application is not universally agreed. [United States of America]	Not Applicable - section no longer included in the SPM

Comment No	From Page	From Line	To Page	To Line	Comment	Response
58852	3	32	3	34	This sentence mischaracterizes how adaptation and mitigation actions are implemented. Suggest deleting as (i) it may be interpreted as policy-prescriptive, which is inconsistent with the principles governing the IPCC, and (ii) the more general theory postulated in this sentence suggests that there is significant evidence that adaptation and mitigation actions can address systemic socio-economic challenges, such as multidimensional poverty, forms of deprivation, and poverty. There is insufficient evidence provided here to reach such a conclusion. In addition, the authors do not suggest how adaptation actions could be guided by these concerns. A policymaker might make the assumption that because these actions are implemented locally, it is up to individual countries to take up these concerns. Is that indeed what the sentence means? The way the sentence reads now it is left up to many interpretations and therefore not useful for policymakers. [United States of America]	Not Applicable - section no longer included in the SPM
9150	3	36			You must either define the word "transformational", or make it clear that you are talking about major changes to the world economy and institutions here. You need to be much clearer about exactly what you mean for all high level statements. [Richard Rosen, Germany]	Not applicable - the paragraph/high level statements have been removed.
15426	3	36			Please use consistent language: limiting to 1.5C, or holding global warming to below 1.5C. To or below? [Australia]	Taken into account - the consistent use of terms are now used in the new version of the SPM.
58144	3	36			It is more adequate to say "requires" than "implies". Behavioural changes by consumers and households regarding mitigation are not necessarily required. [Nico Bauer, Germany]	Rejected - policy prescriptive
43	3	36	3	37	I understand the importance of adaptation in dealing with the impacts of 1.5, but the reference to adaptation here seems to incorrectly imply adaptation is a tool for holding increases to within 1.5 [Meinhard Doelle, Canada]	Not Applicable - section no longer included in the SPM
73	3	36	3	37	This point also applies to warming at 2-degrees, may be emphasize that the difference between 2- and 1.5-degree warming in terms of political action and policies is one of degrees and ambition than a substantial one in the type of policies to be enacted. [Guillermo Montt, Switzerland]	Not Applicable - section no longer included in the SPM
5434	3	36	3	36	It is not intuitive that limiting global warming (as opposed to its impacts) requires transformational adaptation? Sugget removing adaptation. [Haroon KHESHGI, United States of America]	Not Applicable - section no longer included in the SPM
6006	3	36	3	37	same comment as above: here it sounds difficult but feasible [Sara Budinis, United Kingdom (of Great Britain and Northern Ireland)]	Not Applicable - section no longer included in the SPM
7428	3	36	3	36	Insert behind "mitigation" "through significantly more far-reaching mitigation policies, especially carbon pricing" [Axel Michaelowa, Switzerland]	Not Applicable - section no longer included in the SPM
10648	3	36	3	37	Transformational or transformative? Ch 4 was using the latter in FOD and checked with TSU. Changed to transformational to match with AR5 glossary. Need clear guidelines to be consistent over the report. [Chandni Singh, Myanmar]	Editorial - copyedit to be completed prior to publication
11072	3	36	3	36	It is a bit unclear what is meant by 'adaptation' in this context - i.e. normally you would not think about adaptation measures as something that would enable holding the global warming under a given target, but rather as something that would enable responding to a given situation caused by global warming [Denmark]	Not Applicable - section no longer included in the SPM
11220	3	36	3	36	There is no reference to holding warming to *below* 1.5°C in the Paris Agreement. Instead the PA says "pursuing efforts towards limiting warming to 1.5°C". Correct this sentence. [United Kingdom (of Great Britain and Northern Ireland)]	Not Applicable - section no longer included in the SPM
11222	3	36	3	37	To what extent would this be applicable to 2°C as well? [United Kingdom (of Great Britain and Northern Ireland)]	Not Applicable - section no longer included in the SPM
15424	3	36	3	36	Suggest replace "implies transformational" with "requires both incremental and transformational" [Australia]	Not Applicable - section no longer included in the SPM
17856	3	36	3	37	this is on the one hand a trivial statement (and not a high-level one) and on the other hand it is ridiculous, that behavioural change is mentioned before even mentioning lowering emissions from energy supply [Brigitte Knopf, Germany]	Not Applicable - section no longer included in the SPM
17858	3	36	3	37	what is transformational adaptation? It sounds rather like a very politicized word and not very academic [Brigitte Knopf, Germany]	Taken into account - The definition of "transformational adaptation" is provided in the glossary.
18810	3	36	3	36	Delete "adaptation and": holding temperatures below 1.5 degrees implies mitigation, without prejudice to adaptation. [Andrea TILCHE, Belgium]	Not Applicable - section no longer included in the SPM
18812	3	36	3	36	Reference to specific adaptation options and their effectiveness would seem to belong to a different section of the SPM. [Andrea TILCHE, Belgium]	Not Applicable - section no longer included in the SPM
18814	3	36	3	37	It is not clear why 'adaptation' is mentioned, even before mitigation, as necessary for holding global mean temperature below 1.5 °C. Holding temperature below a certain limit is determined by mitigation only. Limiting the remaining impacts is addressed by adaptation. Please drop the term 'adaptation' in this sentence or add a separate sentence on the need for adaptation, even if mitigation is successful in limiting global mean warming to 1.5 °C. [Andrea TILCHE, Belgium]	Not Applicable - section no longer included in the SPM
19382	3	36	3	37	Please add the bolded words in the middle, to make the sentence more relevant for the Paris Agreement goal: "Holding global warming to below 1.5°C, or well below 2°C with high certainty, implies transformational adaptation and mitigation, behaviour change, supportive institutional arrangements and multi-level governance." [Jennifer Morgan, Netherlands]	Not Applicable - section no longer included in the SPM

Comment No	From Page	From Line	To Page	To Line	Comment	Response
29032	3	36	3	37	If the high-level statement are not deleted: This generic short list needs to be substantiated and clarified. For example, one might argue that behaviour change is an important component of transformational adaptation and mitigation. What is meant by "Holding global warming to below 1.5C implies" - "requires"? in the sense that it can't happen without? or "is helped by?" Also, finance seems to be missing as an important enabling sector. Please insert after "global warming" the words "in a sustainable manner". Please revise. [Germany]	Not Applicable - section no longer included in the SPM
31040	3	36	3	37	this only implies transformational adaptation for certain risks and regions - the statement implies this is needed globally for all risks [James FORD, Canada]	Not Applicable - section no longer included in the SPM
31166	3	36	3	36	The definition of "transformational adaptation and mitigation", especially "transformational adaptation"?is ambiguous. It should be explained how "transformational adaptation" is different from usual adaptation. Usually, holding global warming to below 1.5°C requires small adaptation needs compared to substantial global warming. Why "Holding global warming to below 1.5°C implies transformational adaptation"? We would appreciate further explanation. [Japan]	Taken into account. Statement D3.1 in the revised SPM provides callouts to the relevant chapter sections that support that notion of the need for transformational (and incremental) adaptation. Definitions of "transformational" and "incremental adaptation" are provided in the glossary.
32854	3	36	3	36	• p.3, line 36; p 22, line 36 and Glossary, p.1 on Adaptation: The text talks about 'transformational' adaptation and mitigation. Consider to use a more updated terminology of 'transformative' adaptation and mitigation as it appears to have already been adopted in most of the rest of the report. In this regard, the current glossary seems still use an rather outdated opposition between 'incremental adaptation' and 'transformational adaptation' while incremental may better be related to the speed of transformation rather than of actual substantive /disruptive nature of a particular system reconfiguration. Hence it is possible to design incremental strategies aimed at deep transformations (otherwise called as 'transformative incrementalism') as it is possible to implement very fast policy measures to keep most of the systems intact –as it was the bail out of the US banks during the last economic crisis. For a more recent discussion on this terminology: Tàbara, J.D., Jäger, J., Mangalagiu D. & Grasso, M. 2018. Defining Transformative Climate Science in the context of high-end climate change. Regional Environmental Change. IMPRESSIONS project Special Issue. http://doi: 10.1007/s10113-018-1288-8 [J. David Tabara, Spain]	Throughout the report, 'transformative' action is used as an adjective to describe structural, systemic changes. For adaptation especially, we use transformational adaptation based on recent literature (e.g. Few et al. 2018 https://www.nature.com/articles/palcomms201792). The term is also explained in an FAQ at the end of Chapter 4.
33710	3	36	3	37	This statement seems to suggest that transformational adaptation is necessary to hold the global warming to below 1.5C, although this presumably is not the intention. Also the rest of the sentence seems superfluous in the high level statement, which supposedly should be very short and concise. [Norway]	Not Applicable - section no longer included in the SPM
33712	3	36	3	37	Please consider to rephrase or explain the term "transformational adaptation" e.g. in the glossary. [Norway]	Taken into account - The definition of "transformational adaptation" is provided in the glossary.
36230	3	36	3	37	Why transformational *adaptation*? The central argument for 1.5 degree C is that it will permit ecosystems and societies to adapt more readily to the change. Also, does it "imply" or "require"? [India]	For "transformational adaptation": Taken into account. Statement D3.1 in the revised SPM provides callouts to the relevant chapter sections that support that notion of the need for transformational (and incremental) adaptation. Definitions of "transformational adaptation" and "incremental adaptation" are provided in the glossary. For "imply": Not applicable - section no longer included in the SPM
36908	3	36	3	36	The authors should clearly describe why the "transformational adaptation" is required even for the 1.5 C target with the differences in the adaptation characteristics for larger levels of temperature targets. [Keigo Akimoto, Japan]	Taken into account. Statement D3.1 in the revised SPM provides callouts to the relevant chapter sections that support that notion of the need for transformational (and incremental) adaptation. Definitions of "transformational" and "incremental adaptation" are provided in the glossary.
38496	3	36	3	37	Add ", such as those envisaged in the Paris Agreement". [Valentino Piana, Italy]	Not Applicable - section no longer included in the SPM
40932	3	36	3	37	Transformational mitigation (and adaptation) encompasses technological, infrastructure, AND behaviour and institutional change. Rephrase. [Neelam Singh, United States of America]	Not Applicable - section no longer included in the SPM
43736	3	36	3	37	•Holding global warming to below 1.5°C implies, [as in 'holding' in the Paris Agreement excludes prescribed overshoot options], transformational adaptation and mitigation, behaviour change, supportive institutional arrangements [radical changes in investment patterns and financial flows (e.g. UNFCCC 2008 Investment and financial flows to address climate change]) and multi-level governance. [Peter Carter, Canada]	Not Applicable - section no longer included in the SPM
44632	3	36	3	37	Again, 'implies' is too weak - I realise that it is necessary to avoid being policy prescriptive, but these actions are not merely implied, they are necessary - as found by the asessment. Thus suggest that "would necessitate" or "requires" is used instead. [Penny Urquhart, South Africa]	Not Applicable - section no longer included in the SPM
50364	3	36	3	36	Replace the word "implies" by "would require" and reverse the order of adaptation and mitigation so the sentence reads: "Holding globall warming to below 1.5.C would require mitigation and transformational adaptation , behavioural change, …". The problem with "transformational adaptation and mitigation* is that "transformational adaptation* is defined in the Glossary, and there is no explicit "transformational mitigation*, althogh there is tansformation, transformation pathways, etc.. [Switzerland]	For "implies": Not Applicable - section no longer included in the SPM. For "transformational mitigation": Taken into account - Transformational mitigation does not appear in the revised SPM
51084	3	36	3	37	Add to this bullet a sentence from the executive summary of chapter 1 (page 5, lines 23-24): "Avoiding exceedance of 1.5C requires rapid and deep reductions in greenhouse gas emissions. [Doreen Stabinsky, United States of America]	Not Applicable - section no longer included in the SPM

Comment No	From Page	From Line	To Page	To Line	Comment	Response
51302	3	36	3	37	Why transformational *adaptation*? The central argument for 1.5 C is that it will permit ecosystems and societies to adapt more readily to the change. Also, does it "imply" or "require"? [Anand Patwardhan, United States of America]	For "transformational adaptation": Taken into account. Statement D3.1 in the revised SPM provides callouts to the relevant chapter sections that support that notion of the need for transformational (and incremental) adaptation. Definitions of "transformational adaptation" and "incremental adaptation" are provided in the glossary. For "imply": Not applicable - section no longer included in the SPM
54234	3	36	3	36	will require rather than "implies" [David Warrilow, United Kingdom (of Great Britain and Northern Ireland)]	Not Applicable - section no longer included in the SPM
55510	3	36	3	36	transformational adaptation and mitigation is vague. It might be better to remove it. Or explain it. [Maryse Labriet, Spain]	Taken into account - The definition of "transformational adaptation" is provided in the glossary.
58854	3	36	3	37	Transformational should be defined in the SPM, as in the underlying chapters, as it is a somewhat contested term with significant implications. As IPCC products are policy-neutral and not -prescriptive, the tense should be conditional rather than indicative: Replace "implies" with "would require." [United States of America]	A definition of "transformational adaptation" is provided in the glossary. For "imply": Not applicable - section no longer included in the SPM.
58856	3	36	3	37	This point is rather general. The point should be enhanced by drawing from discussion in SPM 4.4, both to provide more specifics and to discuss the challenges of societal transformation to meet the 1.5°C goal. [United States of America]	Not Applicable - section no longer included in the SPM
58858	3	36	3	36	The treatment of adaptation and mitigation as equally implicated by 1.5°C is confusing. Relative to a business-as-usual pathway, 1.5°C requires much more mitigation and demands much less adaptation. [United States of America]	Not Applicable - section no longer included in the SPM
63028	3	36	3	36	This sentence is confusing: adaptation will not help holding the global warming below 1.5°C. Please rephrase. [Belgium]	Not Applicable - section no longer included in the SPM
6856	3	37	3	37	The current wording "multi-level governance" lacks clarity. The following wording is suggested: .., supportive institutional arrangements at all levels of governance. [Klaus Radunsky, Austria]	Not Applicable - section no longer included in the SPM
36232	3	37	3	37	Replace “behaviour change,” with “behaviour change, especially inequitable consumption,” [India]	Not Applicable - section no longer included in the SPM
44048	3	39		4	Change to : "Deep emissions reductions towards net-zero of all GHG gases, in all sectors, in all countries are required by 2050 latest……" [Stephan Singer, Belgium]	Not Applicable - section no longer included in the SPM
401	3	39	3	44	Lowering energy demand - but what about countries or communities where there is no access to modern energy? Report should assess how to reconcile energy access and decarbonisation [Harald Winkler, South Africa]	Taken into account - Implications of mitigation pathways for energy access is assessed in chapters 4 and 5.
9152	3	39	3	44	This is a very important high level statement. As discussed above, this bullet point should give policy makers a much clearer idea of the main mitigation strategies. I would re-write the paragraph along the following lines: All GHG emissions will need to be reduced to zero, whether or not a 1.5 or 2.0 degree C pathway is pursued under the Paris Agreement. Obviously, net global GHG emissions will need to reach zero in a 1.5 degree C scenario well before this target will need to be reached to achieve a 2.0 degree C scenario. Both pathways require the same two broad strategic approaches. The first is to lower the energy demand needed by buildings, industry, agriculture, and transportation to the lowest reasonable levels by introducing a wide-range of more energy efficient end-use devices and technologies into each sector, including more energy efficient building shells and more effective land-use management techniques to minimize GHG emissions. The second is to convert almost all end-use technologies in all sectors of the economy to electricity, and in parallel to de-carbonize the entire electricity supply sector by relying on solar, wind, geothermal, tidal, and sustainable biomass electricity supply technologies. These may need to be supplemented with battery storage and hydrogen storage technologies, and with a limited amount of biomass gases and liquid fuels. [Richard Rosen, Germany]	Not Applicable - section no longer included in the SPM
10650	3	39	4	7	The last three bullet points do not discuss adaptation which is extensively covered in Ch 4, 5. 'transformational adaptation' is touched upon but doesn't find mention in any bullet point. Also something on adap-mit tradeoffs and synergies can be highlighted in the SPM (e.g. emission reductions through afforestation and EBA as an adaptation option). [Chandni Singh, Myanmar]	Accepted. The SPM structure and text have been revised
18816	3	39	3	44	A quick assessment of feasibility of the three options (notably option 3), based on the core report, would be welcome after this paragraph, in order to avoid policy-makers' misleading interpretations (and decisions). [Andrea TILCHE, Belgium]	Not Applicable - section no longer included in the SPM
18818	3	39	3	44	The paragraph mentions the need for mitigation in all sectors but mentions nothing about the need for mitigation action to be global (i.e. in all regions, sectors). Also, the bullet should state clearly the extent of mitigation required for 1,5°C compared to 2°C and higher since this is a clear finding of Chapter 2 and is also summarised in Fig SPM1 (which appears to suggest that achieving global CO2 neutrality in 2060 is consistent with peak warming of 1,5°C). [Andrea TILCHE, Belgium]	Not Applicable - section no longer included in the SPM
18820	3	39	3	44	The paragraph proposes three "broad approaches" as the sole to address mitigation. However, the proposed one is not a full summary, because process-based emissions from industry (e.g. cement, steel, chemicals) are completely missing, while they represent a two-digit fraction of total emissions. [Andrea TILCHE, Belgium]	Not Applicable - section no longer included in the SPM
18822	3	39	3	5	These bullets should make clear the extent of action required for 1,5°C pathways. Also, the comparison of supply-side and demand-side measures is misleading and unclear. At the moment, they highlight the different approaches available (demand, supply, CO2 removal) but give the misleading impression that there is a choice between these actions - i.e. that some can be neglected, while still pursuing a path consistent with 1,5°C. [Andrea TILCHE, Belgium]	Taken into account - covered in Section C
21598	3	39	3	4	The long-term temperature goal from Paris is "well-below two, etc.". The text would seem to associate the goal to 1.5 degrees instead. [Sweden]	Not Applicable - section no longer included in the SPM

Comment No	From Page	From Line	To Page	To Line	Comment	Response
31168	3	39	3	44	The descriptions are too general. Lowering energy demand, lowering emissions and carbon dioxide removal are also necessary for the pathways for 2°C and other targets. We would appreciate if it is focused on the approach in particular to 1.5°C pathways and quantitative descriptions including the differences between 1.5°C and other targets. [Japan]	Not Applicable - section no longer included in the SPM
33714	3	39	3	4	Consider using a "stronger wording" like: "Emissions reductions in all sectors are needed in order to meet…" [Norway]	Not Applicable - section no longer included in the SPM
36234	3	39	3	4	Which goal? 2 degree C or 1.5 degree C? [India]	Not Applicable - section no longer included in the SPM
37418	3	39	3	44	Subsuming carbon dioxide removal as the third point within one bullet point diminishes the potentially grave implications of this set of mitigation activities. The significant societal relevance of presumed large-scale removal action demands a separate point that highlights: 1. The unequivocal need for some form of CO2 removal and long-term storage, 2. the preliminary status of research and development, and 3. the need for public deliberation on feasibility and desirability of various techniques in context of sustainable development. [Matthias Honegger, Germany]	Not Applicable - section no longer included in the SPM
37420	3	39	3	39	A qualifier of the scale and pace of emissions reductions associated with 1.5°C mitigation pathways is absolutely crucial if this report is to be true to ongoing trends. Otherwise the message is hollow and equally apply to 2-3°C mitigation pathways. I suggest the wording: "Dramatic / historically unprecendented emissions reductions" see: Michaelowa, A., Allen, M., & Sha, F. (2018). Policy instruments for limiting global temperature rise to 1.5 C–can humanity rise to the challenge?. Climate Policy, 18(3), 275-286. [Matthias Honegger, Germany]	Not Applicable - section no longer included in the SPM
38500	3	39	3	44	The current text does not capture well the reduction of emissions from cement. [Valentino Piana, Italy]	Not Applicable - section no longer included in the SPM
38502	3	39	3	44	The current text does not capture well the reduction of emissions due to the electrification of transport, which increases demand for electricity and only by chance reduces total energy, and yet cuts direct emissions, with indirect emissions depending on the decarbonisation of the electricity sector. [Valentino Piana, Italy]	Not Applicable - section no longer included in the SPM
38504	3	39	3	44	The text is to be modified and extended with something like: "The deep decarbonisation of electricity, which is already happening, is included in many countries' commitments under the Paris Agreement and is requested in most 1.5°C pathways, increases the positive effects - in terms of emissions - of the electrification of transport, buildings, and industrial processes, away from fossil fuels". [Valentino Piana, Italy]	Taken into account - covered in Section C3 (and C3.2) of the FGD version SPM. The C3 headline statement reads as follow: Limiting global warming to 1.5°C would require rapid and far-reaching systems transitions occurring during the coming one to two decades, in energy, land, urban, and industrial systems. {2.3, 2.4, 2.5, 4.2, 4.3, 4.5, 5.4}
38506	3	39	3	44	deployment should become "the accelerated diffusion". Mere examples here and there of some technology do not have any meaningful impact on global emissions; only a large scale diffusion would do, in conjunction with the phase out of the emitting technologies. [Valentino Piana, Italy]	Taken into account - covered in Section C3.4. the statement reads as follow: Emissions from industry in 1.5°C-consistent pathways are about 70-90% lower in 2050 compared to 2010. Energy-intensive industry can achieve these reductions through combinations of novel technologies and practices, including low-emission electrification, hydrogen, bio-based feedstocks, product substitution, and in several cases CCS (high confidence). Although technically proven, the deployment at scale of these options is limited by economic feasibility and institutional constraints. Energy efficiency can have a positive effect (synergy) on a large number of SDGs and is a more economically feasible enabler of industrial system transitions, though by itself provides insufficient emission reductions in industry (Figure SPM4) (high confidence). {4.2.1, 4.3.4, 4.5.2, 5.4.1}
38508	3	39	3	44	of low carbon energy technologies should become "of zero and near-zero carbon technologies, with the phasing out of emitting technologies". Adding new low-carbon plants (e.g. natural gas) would not reduce emissions, unless it crowds out e.g. coal. Moreover, in Ch. 2 deep cuts in non-CO2 GHG (such as methane) are a pre-requisite for any viable carbon budget for CO2. [Valentino Piana, Italy]	Taken into account - covered in Section C3.2. The statement reads as follow: In energy systems, 1.5°C-consistent pathways include a substantial reduction in energy demand, 47 a decline in the carbon intensity of electricity to zero by mid-century, and an increase in electrification of energy use (high confidence). By 2030, the median level of primary renewable energy (including bioenergy, hydro, wind and solar) in 1.5°C-consistent pathways increases by 60% compared to 2020, while primary energy from coal decreases by two-thirds. By 2050, renewables are expected to supply 49–67% of primary energy, while coal would be expected to supply 1–7%. The political, economic, social and technical feasibility of solar energy, wind energy and electricity storage technologies
42838	3	39	3	44	Recommend this bullet differentiate what must be done from how it can be accomplished. Specify the “what”: reduce CO2 emissions and achieve the Paris carbon neutrality goal; reduce short-lived climate forcers for near-term benefits of reducing the rate of warming; and carbon dioxide removal. Then specify the “how”: lowering energy demand; decarbonizing the energy supply; managing sources of SLCPs from various sectors (e.g., residential, agriculture, industry); deploy carbon removal technologies at scale. [Kristin Campbell, United States of America]	Taken into account - covered in Section C1. The headline statement reads as follow: All 1.5°C-consistent pathways imply rapid reductions in net global anthropogenic CO2 emissions to reach net-zero around mid-century, together with rapid reductions in other anthropogenic emissions, particularly methane. Greater emissions reductions by 2030 lead to a higher chance of limiting global warming to 1.5°C without, or with only limited overshoot (zero to 0.2°C). (high confidence) (Figures SPM1 and SPM3) {1.3, 1.2, 2.2, 2.4, 2.3, 2.5}
42888	3	39	3	44	Recommend this bullet differentiate what must be done from how it can be accomplished. Specify the “what”: reduce CO2 emissions and achieve the Paris carbon neutrality goal; reduce short-lived climate forcers for near-term benefits of reducing the rate of warming; and carbon dioxide removal. Then specify the “how”: lowering energy demand; decarbonizing the energy supply; managing sources of SLCPs from various sectors (e.g., residential, agriculture, industry); deploy carbon removal technologies at scale. [Durwood Zaelke, United States of America]	Taken into account - covered in Section C1. The headline statement reads as follow: All 1.5°C-consistent pathways imply rapid reductions in net global anthropogenic CO2 emissions to reach net-zero around mid-century, together with rapid reductions in other anthropogenic emissions, particularly methane. Greater emissions reductions by 2030 lead to a higher chance of limiting global warming to 1.5°C without, or with only limited overshoot (zero to 0.2°C). (high confidence) (Figures SPM1 and SPM3) {1.3, 1.2, 2.2, 2.4, 2.3, 2.5}

Comment No	From Page	From Line	To Page	To Line	Comment	Response
49004	3	39	3	44	This bulleted paragraph does not include waste among the relevant mitigation involved (e.g. food waste, wastewater treatment); this is quite an important set of mitigation measures for short-lived climate pollutants in particular. [David Waskow, United States of America]	Taken into account - covered in Section C, particularly food waste in the context of synergies and trade-offs between climate change mitigation and the SDGs (Figure SPM 4)
49496	3	39	3	5	After the presentation of the three broad approaches, only the first approach is elaborated in the para pg3ln46. The feasibility and/or implications of the second (lowering emissions) and third approach (removing Carbon from the atmoshpere) should also be presented. [Karlheinz ERB, Austria]	Taken into account - covered in Section C
49002	3	39	3	44	This bulleted paragraph characterizes CDR as a form of 'emissions reductions,' which is not a fully appropriate way to frame them (this could be misunderstood as suggesting they reduce gross emissions rather than GHG in the atmosphere). CDR should be treated distinctly, separate from measures to reduce gross emissions and not as a third categroy of emisisons reductions. [David Waskow, United States of America]	Taken into account - covered in Section C2. The headline statement reads as follow: 1.5°C-consistent pathways can have different levels of carbon dioxide removal (CDR). Some limit global warming to 1.5°C without relying on bioenergy with carbon capture and storage (BECCS). Behaviour change, demand-side measures and emission reductions in the short term can limit the dependence on CDR (high confidence). {2.3, 2.5, 4.3}
50366	3	39	3	44	The words "to varying extent" leave open which "percentage" or "rank" would each one of the three contribution have in reaching the stabilisation at 1.5 degrees? It would be very informative to get an idea of the relative contribution of each one of the three broad contributions to the 1.5 pathways. [Switzerland]	Taken into account - covered in Section C: Emission pathways and system transitions consistent with 1.5°C global warming
51140	3	39	3	39	Bullet point should read: "Emissions reductions in all sectors are [rather than would be] needed in order to meet the long-term temperature goal of the Paris Agreement." The relationship is unambiguous, and given the Paris Agreement's establishment of the long-term temperature goals as an international legal obligation, no need for a subjunctive here. [Linda Schneider, Germany]	Not Applicable - section no longer included in the SPM
51142	3	39	3	44	There are scenarios that limit end-of-century warming to below 1.5°C that do not, or only to a very limited extent, rely on CDR: Holz et al. 2017, Grubler et al. 2017, van Vuuren et al. - they should be highlighted as the by far most desirable 1.5 pathways - rather than withheld. [Linda Schneider, Germany]	Taken into account. Section C discusses the issue of emission pathways and system transitions consistent with 1.5°C global warming and highlight the portfolio of measures deployed to achieve emissions reductions
51304	3	39	3	4	Which goal? 2 C or 1.5 C? [Anand Patwardhan, United States of America]	Not Applicable - section no longer included in the SPM
52674	3	39	3	4	Emission reductions in all sectors… does not seem to reflect adequately the notion for urgency of action/emission reductions to maintain reasonabe chances to attain to the 1.5°C [Iulain Florin VLADU, Germany]	Not Applicable - section no longer included in the SPM
54236	3	39	3	39	after sectors add "and all countries" - this should be understaood but worth saying. [David Warrilow, United Kingdom (of Great Britain and Northern Ireland)]	Not Applicable - section no longer included in the SPM
56562	3	39	3	44	It would be useful to include more on the rapid speed of reductions. If not specific timeframes, then words that connote urgency. E.g., most 1.5 scenarios have a near elimination of emissions from the energy supply sector not just a "lowering" of emissions. [Eleanor Johnston, United States of America]	Taken into account - covered in Section C1. The headline statement reads as follow: All 1.5°C-consistent pathways imply rapid reductions in net global anthropogenic CO2 emissions to reach net-zero around mid-century, together with rapid reductions in other
58862	3	39	3	46	Consistency between terms "emissions reductions" in line 39 and "emission reduction" in line 46. Stick to one term: emission or emissions. [United States of America]	Accepted - text revised. The term "emission reductions" is now used across the SPM
58864	3	39	3	41	Delete "to varying extent" - not needed. [United States of America]	Not Applicable - section no longer included in the SPM
58866	3	39	3	44	It may be worth pointing out the importance of reducing non-CO2 emissions here. [United States of America]	Taken into account - covered in Section C1.3. The statement reads as follow: Different amounts of non-CO2 mitigation result in variations in the remaining carbon budget consistent with 1.5°C of ±250 GtCO2 (medium confidence). In the next two to three decades, removal of SO2 would add to future warming, but reductions in methane emissions would partially compensate (high confidence). However, emissions of N2O increase in some pathways with high bioenergy demand. (Figures SPM1 and SPM3) {2.2.2, 2.3.1, 2.4.2, 2.5.3}
58860	3	39	3	44	Why is solar radiation management not considered here? [United States of America]	Taken into account - covered in Section C1.1. The statement reads as follow: 1.5°C-consistent pathways differ in the portfolio of measures deployed to achieve emissions reductions. This results in different implications regarding synergies and trade-offs with sustainable development, poverty eradication and reducing inequalities. Solar radiation modification (SRM) measures are not included in any of the available assessed pathways. Though some may be theoretically effective in reducing an overshoot, SRM measures face large uncertainties and knowledge gaps as well as substantial institutional and social constraints to deployment related to governance, ethics, and impacts on sustainable development (medium confidence). (Figures SPM3 and SPM4) {2.2, 2.4, 2.5, 4.3, 4.3.8, 4.5, Cross-Chapter Box 10 in Chapter 4, 5.4.2, 5.5.2}
36236	3	4			Available or feasible? [India]	Not Applicable - section no longer included in the SPM
51306	3	4			Available or feasible? [Anand Patwardhan, United States of America]	Not Applicable - section no longer included in the SPM
58508	3	4	2	41	This sentence is akwardly worded, please refine. [Rachel Licker, United States of America]	Not Applicable - section no longer included in the SPM
10206	3	4	3	44	Energy supply and demand dynamics when managed properly don't necessarily affect the climate - not specific to the 1.5oC. The focus should be on removing and avoiding emissions from the atmosphere. The first measure should be Energy Efficiency instead of reducing energy demand which should be raised sustainably to address the need of additional populations. [Saudi Arabia]	Taken into account - covered in Section C

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10936	3	4	3	44	Energy supply and demand dynamics when managed properly don't necessarily affect the climate - not specific to the 1.5oC. The focus should be on removing and avoiding emissions from the atmosphere. [Nedal KATBEHBADER, Switzerland]	Taken into account - covered in Section C
52898	3	4	3	44	This may be better stated as reduce and eliminate emission from etc combined with efficiency gains [Ireland]	Taken into account - covered in Section C
53472	3	4	3	41	The statement "All available 1.5°C pathways include three broad approaches, to varying extent." is inconsistent with the analysis of chapter 2, which highlights several CDR-free scenarios (e.g. Grubler et al 2017, Holz et al 2017, etc) [Christian Holz, Canada]	Taken into account - covered in Section C
56926	3	4	3	4	Change "temperature goal" to "net-zero emissions goal". As mentioned in earlier comments, if one keeps in mind the possibility (however inadvisable) of deliberate albedo modification, it is not true to say that reductions are necessary in order to meet the paris Agreement's long term temperature goal. They are however necessary to meet the sinks-matching-sources requirement of article 4.1 of the agreement. The suggested change would clear that up. [Oliver Morton, United Kingdom (of Great Britain and Northern Ireland)]	Taken into account - text revised. The term "temperature goal" is no longer used
390	3	41	3	42	to delete the text: "in buildings, industry and transport, and demand for agricultural products". This is not to send a misleading message by exclusive menetion of buildings, industry and transport, and demand for agricultural products. [Nedal KATBEHBADER, Switzerland]	Taken into account - covered in Section C
9454	3	41	3	43	“The first is lowering energy demand in buildings, industry and transport, and demand for agricultural products. The second is lowering emissions from energy supply, land use and agriculture” To whom this appeal is addressed? To all countries? To developing world? It should be specified. Otherwise, it sounds ambiguously. [Russian Federation]	Taken into account - covered in Section C
17860	3	41	3	44	Is the order the three most imporatant options in line with chp 2? In chp. 2 it is clearly stated that a rapid phase-out of CO2 emissions is the most important thing, and not demand reduction [Brigitte Knopf, Germany]	Taken into account - covered in Section C
18824	3	41	3	42	The text as it stands suggests that all 1.5 °C pathways would require lowering the demand for (all) agricultural products, without any qualification regarding the type of agricultural products. This could be be interpreted as saying that a 1.5 °C world is incomatible with SDG 2. Please be more specific regarding the implications of mitigation pathways for global agriculture. [Andrea TILCHE, Belgium]	Taken into account - covered in Section C
18826	3	41	3	42	lowering of enery demand in buildings, etc: Is this a relative lowering per unit or total. Please specify. [Andrea TILCHE, Belgium]	Taken into account - covered in Section C
29526	3	41	3	42	The sentance is somewhat unclear. Does it mean "lowering energy demand and demand for agricultural products" or "lowering energy demand for agricultural products"? If it meas "demand for agricultural products" is conflicting with food security/hunger and population growth aspects. Might be useful to reformulate. Please also check page 20, lines 44-45 [Finland]	Taken into account - covered in Section C
29928	3	41	3	41	We would suggest to specify "The first is lowering GLOBAL energy demand in.." [France]	Taken into account - covered in Section C
33716	3	41	3	42	Please consider to add "with high GHG footprints" after "agriculture products". This way it is a clearer reference to a shift in demand from the agricultural sector (e.g. dieatry shift), rather than lowering the demand for all agricultural products. [Norway]	Taken into account - covered in Section C
33718	3	41	3	42	Please consider to qualify "lowering" in this sentence. As the sentence is now it may be read as an absolute reduction in the demand for energy and agriculture products. However, in Ch. 2, page 47, line 3-6, it seems that the absolute final energy demand is expected to increase in 1.5 C scenarios. Please consider to rephrase "lowering" in this sentence, e.g. if it means "limiting" or lowering relative to a business as ususal pathway. [Norway]	Taken into account - covered in Section C
39308	3	41	3	44	This is misleading, as in the main report concerning agriculture, it was not just 'low carbon technology', but also diet was a significant for mitigation and this is not highlighted sufficiently here. [Lindsey Cook, Germany]	Taken into account - covered in Section C of the new SPM
55346	3	41	3	44	Could each Approach be presented by bullets? It would be more clear. [ELISA BERDALET, Spain]	Taken into account - covered in Section C of the new SPM
56482	3	41	3	42	Unclear what is meant by "lowering…. demand for agricultural products"? This sounds like people eating less food, which is not an accurate interpretation of scenarios. [Eleanor Johnston, United States of America]	Taken into account - covered in Section C
58650	3	41	3	44	Could add The second is lowering emissions from energy supply, land use and agriculture through, for example, the deployment of low carbon energy technologies [, INCREASING AGRICULTURAL AND LIVESTOCK PRODUCTIVITY AND REDUCING FOOD LOSS AND WASTE] REF: http://www.fao.org/3/a-i6132e.pdf [New Zealand]	Taken into account - covered in Section C of the new SPM
58868	3	41	3	42	This sentence implies that 1.5°C scenarios require decreasing agricultural production, which is inconsistent with sustainable development and efforts to eradicate poverty, among other priorities. Suggest rephrasing this as "The first is lowering energy demand in buildings, industry and transport, and NET EMISSIONS ASSOCIATED WITH agricultural products." Or "The first is lowering energy demand in buildings, industry and transport, and demand for HIGH-EMISSIONS-INTENSITY agricultural products." [United States of America]	Taken into account - covered in Section C
58870	3	41	3	42	change: ""The first is lowering energy demand in buildings, industry and transport, and demand for agricultural products." to: ""The first is lowering direct emissions from energy use in buildings, industry and transport by enhancing efficiency and substituting low and no-carbon fuels, and lowering demand for agricultural products particularly those with high carbon intensity." [United States of America]	Taken into account - covered in Section C

Comment No	From Page	From Line	To Page	To Line	Comment	Response
45746	3	42			The first and second approaches are essentially similar in that they are emission-reduction but quite different to the third. Perhaps be more clear in terms of difference. [Mark Howden, Australia]	Not Applicable - section no longer included in the SPM
44	3	42	3	42	would be good to be clear that this includes reducing food waste and switching to more climate friendly food sources [Meinhard Doelle, Canada]	Taken into account - covered in Section C of the new SPM
391	3	42	3	44	to delete the text: "from energy supply, land use and agriculture through, for example, the deployment of low carbon energy technologies ". This is not to send a misleading message by exclusive menetion of energy supply, land use and agriculture through, for example, the deployment of low carbon energy technologies. [Nedal KATBEHBADER, Switzerland]	Taken into account - covered in Section C of the new SPM
19384	3	42	3	42	Need to explain what "lowering demand for agricultural products" means in practise, unless the reader is expected to associate this with less food. [Jennifer Morgan, Netherlands]	Taken into account - covered in Section C of the new SPM
19386	3	42	3	44	There needs to be a clear message here about facing out energy related emissions to zero. Just "lowering emissions" isn't communicating the task at hand. [Jennifer Morgan, Netherlands]	Taken into account - covered in Section C of the new SPM
21600	3	42	3	42	Does this refer to all "agricultural" or rather to "meat and dairy", or suchlike? [Sweden]	Taken into account - covered in Section C of the new SPM
29930	3	42	3	42	The focus on the demand for agricultural products is not justified and should be removed. We suggest to rephrase it as "buildings, industry, transport and agriculture". [France]	Taken into account - covered in Section C of the new SPM
36238	3	42	3	42	Replace “demand for agricultural products”, with “energy demand for agricultural products” [India]	Taken into account - covered in Section C of the new SPM
38498	3	42	3	42	and demand for agricultural products should become "and demand for certain agricultural products". There are many agricultural products that do not imply large-scale emissions. Climate change mitigation is not in contrast to feeding the world and the fight to hunger, as the current text would imply. [Valentino Piana, Italy]	Taken into account - covered in Section C of the new SPM
38936	3	42	3	42	Do you mean "reduce demand for agricultural products" ? Food? Or reduced energy demand in agriculture? Would be good with clarification. [Jan Fuglestvedt, Norway]	Taken into account - covered in Section C of the new SPM
39986	3	42	3	42	Suggest to be more specific here about the type of products (e.g. animal-derived) [Kornelis Blok, Netherlands]	Taken into account - covered in Section C of the new SPM
40744	3	42	3	42	agricultural products' should read 'agricultural production' [Liese Coulter, Australia]	Accepted - text revised. The term "agricultural products" is no longer used
45876	3	42	3	43	Low carbon technologies such as renewables and CCS also apply to the energy demand sectors and not only energy suuply. [Deger Saygin, Turkey]	Taken into account - covered in Section C of the new SPM
49494	3	42	3	42	demand for agricultural products is ambiguous. Maybe demand for agricultural production and processing. What about other land-based products, such as forestry products (in particular short-lived material, but the entire emission chain is important)? [Karlheinz ERB, Austria]	Accepted - text revised. The term "agricultural products" is no longer used
55368	3	42	3	42	add "demand for EMISSIONS INTENSIVE agricultural products". Unless we want people to starve it's very hard to reduce demand for agricultural products per se (except for waste reduction, but the concept that is meant here is much wider than just waste reduction). The point is the emissions intensity of different agricultural products. [Andy Reisinger, New Zealand]	Not Applicable. The term "agricultural products" is no longer used
57124	3	42	3	42	and demand for agricultural products: that seem a little broad, it gives the impression that eating is a problem, not just overconsumption of agricultural products. In addition, should the demand of products be limited only for agricultural ones ? Would substituting the demand for rice or cattle in countries that heavily rely on them to feed their population have more effect than reducing the demand for luxury goods ? [Philippe Marbaix, Belgium]	Accepted - text revised. The term "agricultural products" is no longer used
58872	3	42	3	42	Lowering demand for agricultural products is misleading in that population will increase, thus agricultural product demand will also increase. Perhaps the intent is to state that demand for some types of agricultural products that result in large GHG emissions must be lowered. [United States of America]	Accepted - text revised. The term "agricultural products" is no longer used
58874	3	42	3	42	Does demand for all agricultural products need to decrease? [United States of America]	Taken into account - covered in Section C of the new SPM
18828	3	43			Low carbon is not enough and low not really specified! It should rather be "net zero carbon". [Andrea TILCHE, Belgium]	Not Applicable - section no longer included in the SPM
5436	3	43	3	44	Suggest removing the example in this sentence since it does not address agriculture and land use emissions (which are the sectors mentioned before the example), or move the example to a parenthetical statement following "energy supply". [Haroon KHESHGI, United States of America]	Taken into account - covered in Section C of the new SPM
43738	3	43	3	44	example, the deployment of low carbon energy technologies. The third is through removing carbon dioxide from the atmosphere. [These approaches require energy conversion to zero fossil fuel and biomass combustion. This is because ‘…pathways would require near zero emissions of carbon dioxide and other long-lived greenhouse gases…’ This is actual CO2 emissions not net CO2 emissions. Bio energy with assumed carbon capture and storage is the least feasible and most damaging (biodiversity, food production) method of CO2 removal. BECCS should avoided and is not necessary One 1.5°C scenarios specifically excludes the use of CCS and BECCS (Grubler et al., 2017)] [Peter Carter, Canada]	Taken into account - covered in Section C of the new SPM
49006	3	43	3	44	The phrase 'for example, the deployment of low carbon energy technologies' should be broadened to include sustainable agriculture and land-use, waste streams, etc. [David Waskow, United States of America]	Taken into account - covered in Section C of the new SPM
49498	3	43	3	43	land use and agriculture - terminology. Agriculture is part of land use. Amn improvement would be "land use, including agriculture", but what about other land uses, e.g. forestry, or infrastructure expansion? Eventually, why not AFOLU, which is IPCC terminology and well-defined. [Karlheinz ERB, Austria]	Taken into account - covered in Section C of the new SPM

Comment No	From Page	From Line	To Page	To Line	Comment	Response
53346	3	43	3	44	low carbon energy technologies should be "zero carbon energy technologies" [Kjell Kühne, Mexico]	Taken into account - covered in Section C of the new SPM
55370	3	43	3	44	add "and reduction of non-CO2 emissions". Other statements in the SPM make it clear that mitigation of non-CO2 emissions is an essential part of 1.5 pathways. [Andy Reisinger, New Zealand]	Taken into account - covered in Section C of the new SPM
55512	3	43	3	44	Even if it is started with "for example", the piece "for example, the deployment of low carbon energy technologies" gives a very limiting view of all the measures which are needed in land use and agriculture. I would suggest to remove it, or add other examples focused on land use and agriculture. [Maryse Labriet, Spain]	Taken into account - covered in Section C of the new SPM
5896	3	44			I think giving a flavour of the means by which the CO2 could be removed is important here for the closing of this high level statement to make sense. Via land management, sequestration and capture and storage or something like that could be added here that at least gives a flavour as to the how. [Peter Thorne, Ireland]	Not Applicable - section no longer included in the SPM
18830	3	44	3	44	Add "and other climate forcers" after carbon dioxide. Removal of N2O and possibly other GHGs could be just as useful, and not necessarily less feasible. [Andrea TILCHE, Belgium]	Taken into account - covered in Section C of the new SPM
36240	3	44	3	44	MAy consider adding at the end of current sentence in line 44, " In view of consideration of equity and the principle of common but differentiated responsibilities and respective capabilities, the extent of such reductions will need to vary between developeing and developed countries. [India]	Not Applicable. The SPM structure has been revised and equity is now discussed in section D
52680	3	44	3	44	Perhaps here in the last sentence you can already include the concept of negative emissions that is essential throughout the report [Iulain Florin VLADU, Germany]	Not Applicable. The term negative emission is not used in the SPM
52682	3	44	3	44	It would be helpful to add how carbon dioxide is removed from the athmosphere, i.e by carbon storage and sequestration or/and by removal by LULUCF [Iulain Florin VLADU, Germany]	Taken into account - covered in Section C of the new SPM
19388	3	45	3	45	Pathways with faster emission reductions correlate with a lower dependence on the future availability and desirability of CDR. (See for example: Chapter 2, page 31, lines 19-20 and page 32, lines 16-31) [Jennifer Morgan, Netherlands]	Taken into account - covered in Section C of the new SPM
58146	3	46		5	1.5°C scenarios come with strong improvements in air quality benefits. This must be mentioned. Moreover, it is not clear what trade-offs are meant at the end of the paragraph. [Nico Bauer, Germany]	Not Applicable - section no longer included in the SPM
74	3	46	3	5	Please clarify, through examples, what are demand- and supply-side measures. This is a key point and might get missed by policymakers who cannot ground the difference between the two. [Guillermo Montt, Switzerland]	Taken into account - covered in Section C of the new SPM
8980	3	46	3	5	While in the preceding paragraph three approaches for emission reduction are explained, in this paragraph the third one (removing carbon dioxide) is missing and a corresponding explanation should be added (portfolios that strongly rely on removing carbon dioxide have trade-offs, too). [Urs Neu, Switzerland]	Taken into account - covered in Section C of the new SPM
17862	3	46	3	47	Different portfolios … have different implications… - this is a banal statement. [Brigitte Knopf, Germany]	Taken into account - covered in Section C of the new SPM
18832	3	46	3	46	Delete "sustainable". There are implications on "development" whether or not it is considered "sustainable". [Andrea TILCHE, Belgium]	Taken into account - covered in Section C of the new SPM
44786	3	46	3	5	An example for supply side measure should be shown. If not, the reason why supply side measures have trade-off may be difficult to understand. [Hiroaki Kondo, Japan]	Taken into account - covered in Section C of the new SPM
46076	3	46	3	5	It's nearly impossible to understand what this means, which politicians tend to favor, it allows "promise everything, do nothing". Of far greater concern is that in the IPCC 1.5°C Report - which contains more than 500 references to sustainable development - there is nothing even close to the dire IRP warnings of Objective Sustainable Development Failure above - which ought to be included in all IPCC reports because climate stabilization is a subset of sustainable development / natural resource extraction stabilization. [Michael Wadleigh, United States of America]	Taken into account. The SPM structure and content have been revised, and SDGs are taken into account in Section D
56564	3	46	3	5	Surprised that this comment made it to the high-level statements. It almost sounds like it is suggesting that we can achieve 1.5 without supply side interventions, which from I have seen is shortsighted. It would seem more useful for the point to highlight the urgent need for instituitions to design for cobenefits and seek out synergies with SDGs rather than reduce this to a supply side vs. demand side statement that may encourage policymakers to dismiss the difficult work of limiting fossil fuel development and choosing renewable energy (for example). [Eleanor Johnston, United States of America]	Taken into account - covered in Section C of the new SPM

Comment No	From Page	From Line	To Page	To Line	Comment	Response
62236	3	46	3	5	The meaning of “supply side measures” should be clarified in the following statement: “portfolios that mainly consider supply side measures and affect patterns of land use carry a greater risk of trade-offs.” A commonly understood definition of “supply side measures” is that used in the review of supply-side climate policy by the Stockholm Environment Institute (SEI), which defines supply-side measures as limiting fossil fuel supply, including removal of producer subsidies, compensation of resource owners for leaving fuels unburned, and restrictions on resource development. The SEI review concludes that these supply side measures “could bring important benefits” including allowing for greater emission reductions than demand-side measures and limiting carbon lock-in effects, making it easier for low-carbon alternatives like clean solar and wind to compete. See Stockholm Environment Institute, Supply-side climate policy: the road less taken, authored by Michael Lazarus, Peter Erickson and Kevin Tempest, WORKING PAPER NO. 2015-13 (2015). There are well-documented harms from fossil fuel production, in addition to fueling climate change, including serious human health harms, water/air pollution, earthquake risks, and biodiversity loss. Therefore, substantial evidence indicates that supply side measures—as defined as reducing fossil fuel supply—would have numerous positive co-benefits. The statement that supply side measures would have “greater risk of trade-offs” is thus misleading. [Shaye Wolf, United States of America]	Taken into account - covered in Section C of the new SPM
1518	3	48	3	5	This sentence is very terse and verging on jargon . Could it be expanded a little, perhaps by including some examples of what is meant by "supply-side measures" and the sort of "trade-offs" being alluded to? [David Wratt, New Zealand]	Taken into account - covered in Section C of the new SPM
11224	3	48	3	5	Could an example be added to clarify this statement for policy makers? Or suggest replacing the sentence on lines 48-50 with (if correct) “Portfolios which permit sustainable development have a strong emphasis on demand side measures. Scenarios which affect patterns of land use are much less likely to enable sustainable development” [United Kingdom (of Great Britain and Northern Ireland)]	Taken into account - covered in Section C of the new SPM
18834	3	48	3	5	This sentence opposes demand-side and supply-side measures (esp. land based) on the basis that the former tend to offer sustainable development cobenefits whereas the latter carry greater risks of trade-off. This seems to be a bold extrapolation on particular examples rather than a scientific finding. An alternative selection of examples could lead to conclude the opposite: constraining energy demand can lead to under-heating poorer households and associated health hazards, whereas forest conservation and reforestation can provide ample sustainable development cobenefits. [Andrea TILCHE, Belgium]	Taken into account - covered in Section C of the new SPM
32596	3	48	3	49	demand-side, supply-side (hyphenated) [Jonathan Lynn, Switzerland]	Editorial - copyedit to be completed prior to publication. These concepts have been corrected in Section C of the new SPM
33720	3	48	3	5	This is a very important statement, however it seems to be communicated in somewhat diffuse terms. Please don't take for granted that the readers of the high level statement immediately know what "demand side measures" and "supply side measure" are. Perhaps they can be shortly explained or substituted with more understandable terms? [Norway]	Taken into account - covered in Section C of the new SPM
35452	3	48	3	5	It would be useful to qualify this by also stating that limiting demand to "too low" a level would also lead to negative developmental outcomes in countries and regions with low per-capita energy consumption and development levels. [Ashok Sreenivas, India]	Taken into account - covered in Section C of the new SPM
36242	3	48	3	5	This statement presents a somewhat misleading picture by selectively highlighting only certain aspects of sustainable development. For example, measures that reduce final consumer demand may be associated with income loss. This statement should specifically refer to co-benefits and co-costs vis a vis the SDG's. [India]	Taken into account - covered in Section C of the new SPM
44634	3	48	3	5	Very useful distinction. Suggest brief examples of 'demand-side' and 'supply-side' measures are provided for greater clarity for all readers. [Penny Urquhart, South Africa]	Taken into account - covered in Section C of the new SPM
46112	3	48	3	5	While not strictly incorrect, the sentence suggest there is a choice between demand and supply measures, and that the former are typically less risky. But, as stated earlier, meeting 1.5C will require a rapid and drastic deployment of measures throughout the economy, often referred to as 'transition'. [Netherlands]	Taken into account - covered in Section C of the new SPM
51144	3	48	3	5	Recent literature on supply side measures show that they are more effective and more efficient than demand side measures when it comes to limiting emissions from burning fossil fuels. See: https://www.sei-international.org/publications?pid=2835, https://www.sei-international.org/publications?pid=3249 [Linda Schneider, Germany]	Taken into account - covered in Section C of the new SPM
51308	3	48	3	5	This statement presents a somewhat misleading picture by selectively highlighting only certain aspects of sustainable development. For example, measures that reduce final consumer demand may be associated with income loss. This statement presents a somewhat misleading picture by selectively highlighting only certain aspects of sustainable development. For example, measures that reduce final consumer demand may be associated with income loss. This statement should specifically refer to co-benefits and co-costs vis a vis the SDG's. [Anand Patwardhan, United States of America]	Taken into account - covered in Section C of the new SPM
52900	3	48	3	5	The statement warrants further elaboration [Ireland]	Taken into account - covered in Section C of the new SPM

Comment No	From Page	From Line	To Page	To Line	Comment	Response
56484	3	48	3	5	Sentence about demand side and supply side is ambiguous. Not sure what it is implying. [Eleanor Johnston, United States of America]	Taken into account - covered in Section C of the new SPM
58876	3	48	3	5	The last sentence in this bullet is not specifically related to 1.5°C pathways, and does not appear to be universally applicable. Please remove. Further, they do not represent consensus within the relevant academic literature (e.g., see Mendelsohn; Nordhaus.) [United States of America]	Taken into account - covered in Section C of the new SPM
45878	3	49	3	5	It is not clear why demand side measures have synergies and not supply side. [Deger Saygin, Turkey]	Taken into account - covered in Section C of the new SPM
49008	3	49	3	5	The statement concerning the sustainable development implications of supply side energy measures appears misleading. It implies a focus on trade-offs associated with supply side measures and thereby fails to properly the many synergies. It should explicitly note the many sustainable development benefits of supply side measures, e.g. the use of renewable energy for modern energy supply, sustainable transport, sustainable agriculture and land-use, etc., as noted in chapters 4 and 5. If the intent is to focus specifically on the trade-offs involved with bioenergy in particular, that should be specifically articulated as a concern rather than conflating with a wide range of supply side measures that have sustainable development benefits. [David Waskow, United States of America]	Taken into account - covered in Section C of the new SPM (Figure SPM 4)
52676	3	49	3	5	For some of the supply side measures, it is difficult to come up with trade-offs, e.g. for renewable energy. Hence, it would be more accurate to modify the last part of the last sentence to read "… mainly consider supply-side measures that affect patterns of land-use carry greater risk of trade-offs [Iulain Florin VLADU, Germany]	Taken into account - covered in Section C of the new SPM (Figure SPM 4)
34330	3	5			For clarity replace 'trade-offs' with 'negative impacts on sustainable development'. 'trade-offs' appears to be used to mean a negative impact in this SPM, but the meaning is not immediately clear to a non-specialist. [Nathan Gillett, Canada]	Taken into account - The meaning of trade-offs has been made clearer in the revised SPM.
5438	3	5	3	5	Suggest replacing "risk of" with "potential for" since this statement is better charaterized as a possibility of trade-off rather than a probability of large tradeoff. [Haroon KHESHGI, United States of America]	Taken into account - covered in Section C of the new SPM (Figure SPM 4)
7232	3	5	3	5	Please, add after the words "risk of trade-offs" the words "due to large amount of land and water reserved for afforestation and production of the biomass energy with carbon capture and storage (BECCS)." [Ilkka Savolainen, Finland]	Taken into account - covered in Section C of the new SPM (Figure SPM 4)
50368	3	5	3	5	Write: " … a greater risk of environmnetal, economic and social trade-offs.". [Switzerland]	Taken into account - covered in Section C of the new SPM
51086	3	5	3	5	edit last phrase to say "carry a substantial risk of trade-offs." The first phrase in the sentence doesn't talk about risks of trade-offs, so having the word "greater" in the second phrase is out of place. The underlying report certainly notes substantial risks of suppy side measures such as BECCS. [Doreen Stabinsky, United States of America]	Taken into account - covered in Section C of the new SPM
55514	3	5	3	5	The meaning of "Greater risk of trade-offs" is not clear. [Maryse Labriet, Spain]	Taken into account - covered in Section C of the new SPM
19208	4				The background (SPM1.3) section could benefit very much of some reference to the animation: SR15_SOD_Chapter1_Figure1.5_animation.mp4. This figure illustrates very well some concepts (e.g., scenarios and pathways) which are extensively used along the SPM. In particular, this reference could be located in the orange box 1.2. [Spain]	Noted
5774	4	1	4	7	Can we just simplify this statement by saying that the likelihood of limiting warming to 1.5 deg is only 33%? [Govindasamy Bala, India]	Not Applicable - section no longer included
36244	4	1	4	7	Raftery et al. (2017) reported their findings in Nature Climate Change showing that there is only 1 (5)% chance to limit global mean temperature below 1.5 (2.0) deg C by the end of 21st century. This should be included with citation. [India]	Not Applicable -This valuable literature has not assessed by the author team before the cut-off date of submission of the final report draft. But, it will be assessed in the main assessment report
5898	4	2			longer-term rather than long-term as none of the challenges are truly long-term. Almost all challenges to attaining 1.5C are within the current lifetime of the majority of the global population. Use of long-term risks people thinking can kick the can down the road for future generations to concern themselves with? I would try to avoid language that could be construed to build a narrative around 'not my problem'. [Peter Thorne, Ireland]	Not Applicable - section no longer included
8056	4	2	4	7	Saying that "acting less today means acting more tomorrow" is quite a weak statement for a key highlight! I think the first sentence of this highlight could be removed. On the contrary, the llast sentence should be completed. It says that negative emission will be necessary to reach 1,5°C. But it should be added here that the feasibility of these negative emissions - at scale - is fare from granted! (Hence the need to act quickly, to avoid a dangerous bet) [Quentin Perrier, France]	Not Applicable - section no longer included
8982	4	2	4	7	If meeting the 1.5° target is already basically very difficult, does it really make sense to discuss delayed action then? If yes, more concrete effects of delayed action might be added (from p. 20, lines 15/16) [Urs Neu, Switzerland]	Not Applicable - section no longer included
11074	4	2	4	7	Suggest to move this paragraph up, so that it figures as the fourth high-level statement [Denmark]	Not Applicable - section no longer included
19390	4	2	4	2	Please consider replacing the following lines "Delayed action or weak near-term policies increase mitigation challenges in the long-term" with "Delayed action or weak near-term policies increase overall mitigation challenges". [Jennifer Morgan, Netherlands]	Taken into account - covered in Section D of the new SPM
29034	4	2	4	7	Maybe join this statement with information from the first headline statement on page 3 indicating that "even with emissions reductions in line with countries' pledges under the Paris Agreement, there is a high risk that warming will exceed 1,5°C during the 21th century and remain above it by 2100", also stated in the Executive Summary of Ch 2. [Germany]	Not Applicable - section no longer included

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29036	4	2	4	7	This bullet point describes issues and implications of delayed action or weak near-term policies for 1.5pathways. However a notion is missing, that the current discussions on the achievability of not-exceeding 1.5C limit will come up again in just a few years, after TPB for 1.5C are consumed, only in regard to the 2C-limit. If the high-level statement are not deleted, we'd suggest to add a note to this end to the final bullet. [Germany]	Not Applicable - section no longer included
29932	4	2	4	7	Another bullet point could be added here. It would start with the last sentence "Modelling suggests that having a 66% likelihood of holding warming below 1.5°C throughout the 21st century without overshoot is already out of reach". We then suggest to add a sentence emphasizing that although all 1.5°C scenarios rely on negative emissions, the political and economic feasibility is far from granted. [France]	Not Applicable - section no longer included
31170	4	2	4	2	Delayed action or weak near-term policies increase mitigation challenges in the long-term (…)is a statement that is too obvious. It seems that "delayed action or weak near-term policies" implies deviation from the optimized pathways gained by IAMs; however, other parts of this report (Chapter 2) point out that IAMs do not include disruptive technologies and the mitigation costs can be smaller, which implies that the mitigation pathway assessment is not optimal, and the optimal pathways can be larger emissions in near-term and smaller in long-term if disruptive technologies are considered. Consistency within the report would be necessary. [Japan]	Not Applicable - section no longer included
32898	4	2	4	5	Additional language (here and in the corresponding sections below) regarding the economic and human costs of delayed action should be incorporated here or as a separate bullet point. "Increasing risks" will not capture policymakers attention as much as these other data points. [Thomas Damassa, United States of America]	Not Applicable - section no longer included
36910	4	2	4	2	Delayed action or weak near-term policies increase mitigation challenges in the long-term (…)is too obvious statement. It seems that "delayed action or weak near-term policies" imply deviation from the optimized pathways gained by IAMs, but other parts of this report (Chapter2) point out that IAMs don't include disruptive technologies and the mitigation costs can be smaller, which implies that the mitigation pathway assessment are not optimal, and the optimal pathways can be larger emissions in near-term and smaller in long-term if disruptive technologies are considered. Consistency within the report would be necessary. [Keigo Akimoto, Japan]	Not Applicable - section no longer included
42840	4	2	4	7	Important for the report to note upfront that we still have a possibility of achieving the 1.5C target, but the probability for achieving this gets less every year. The closing sentence here should be revised to clarify what this 66% likelihood implies and how it comports with other statements throughout the report of the ability to limit warming below 1.5C. This also suggests that later statements in the report should specify when they are allowing for overshoot and when they are not. Note that the risks included in overshoot are tipping points and feedbacks that once surpassed cannot be easily or quickly rectified, and the self-reinforcing feedbacks will further amplify warming, thus making the challenge of returning to 1.5C that much more difficult. [Kristin Campbell, United States of America]	Not Applicable - section no longer included
42890	4	2	4	7	Important for the report to note upfront that we still have a possibility of achieving the 1.5C target, but the probability for achieving this gets less every year. The closing sentence here should be revised to clarify what this 66% likelihood implies and how it comports with other statements throughout the report of the ability to limit warming below 1.5C. This also suggests that later statements in the report should specify when they are allowing for overshoot and when they are not. Note that the risks included in overshoot are tipping points and feedbacks that once surpassed cannot be easily or quickly rectified, and the self-reinforcing feedbacks will further amplify warming, thus making the challenge of returning to 1.5C that much more difficult. [Durwood Zaelke, United States of America]	Not Applicable - section no longer included
43742	4	2	4	7	Delayed action or weak near-term policies [past immediate rapid global decline] increase mitigation challenges in the long-term and increase the risks associated with exceeding 1.5°C global warming temporarily (referred to as 'overshoot',["which should not be a prescribed option but may happen accidentally)] or of warming remaining above 1.5°C by the end of the century and above 1.5C at equilibrium .Delayed action or weak near-term policies [past immediate rapid global emissions decline] increase the severity of projected impacts and adaptation needs. Modelling suggests that having a 66% likelihood of holding warming below 1.5°C throughout the 21st century without overshoot may be already out of reach and is out of reach [without an immediate rapid decline in global emissions. Only a 66% likelihood a surface warming limit is an unethical intolerably high risk of many catastrophic impacts to the planet and populations. Prevention (very high certainty) requires over 90% probability]. [Peter Carter, Canada]	Not Applicable - section no longer included
46114	4	2	4	7	Temporary or lasting overshoot of 1.5C is strictly linked here to "deleyed action or weak near-term policies", but these qualifications are highly unprecise or scientific. Moreover, as most analytical results suggest: even with mobilizing all forces as rapidly as conceivable may at the least not suffice to prevent any overshoot from occurring. [Netherlands]	Not Applicable - section no longer included
52902	4	2	4	7	The key point is at the end and may warrant a seperate bullet also the para could be more succiinct [Ireland]	Not Applicable - section no longer included
52904	4	2	4	7	Mention of costs should be included here [Ireland]	Not Applicable - section no longer included
54154	4	2	4	2	Near term should be quantified more precisely [Ayman Bel Hassan Cherkaoui, Morocco]	Not Applicable - section no longer included

Comment No	From Page	From Line	To Page	To Line	Comment	Response
54238	4	2	4	5	This is an important bullet but lacks impact as it is trying to deal with too many ideas in one sentence. Suggest saying: "Delayed action or weak near term policies increases the risk of exceeding 1.5 C and the severity of projected impacts and the need for greater adaptation. Bringing the global temperature back down to 1.5C subsequently increases the mitigation challenge overall." [David Warrilow, United Kingdom (of Great Britain and Northern Ireland)]	Not Applicable - section no longer included
54898	4	2	4	3	The risk of exceeding 1,5 degrees warming is already very high (see conclusion page 3, lines 15-16). So delayed action makes the risk virtually certain, Why not add this to the conclusion? [Bram Bregman, Netherlands]	Not Applicable - section no longer included
58878	4	2	4	5	The two instances of the term "weak policies" here are normative and do not adhere to the neutral tone of IPCC products. "fewer emission reductions in the near-term" is more appropriate. [United States of America]	Not Applicable - section no longer included
58880	4	2	4	7	This is a good point, and should be elevated to the beginning of the section. [United States of America]	Not Applicable - section no longer included
9154	4	3	4	7	insert the word "greatly" before the word "increase" on line 3. Eliminate the sentence on lines 6-7, because the IAM-based modeling being referred to here is a very limited sub-set of the modeling that could have been done, and this result primarily reflects the use of an inappropriate discount rate of 5% real, as discussed above. [Richard Rosen, Germany]	Not Applicable - section no longer included
9456	4	4	4	5	'Delayed action or weak near-term policies increase the severity of projected impacts and adaptation needs.' Proposed: add 'in some regions', because it is evidently not everywhere. [Russian Federation]	Not Applicable - section no longer included
11226	4	4	4	4	or of warming remaining significantly above 1.5deg C by the end of the century.'- Or could even put 'by as much as x deg C by the end of the century.' [United Kingdom (of Great Britain and Northern Ireland)]	Not Applicable - section no longer included
50370	4	4	4	4	A footnote indicating the range of duration of possible overshoots is usefull (e.g. 5, 10, 20 years). [Switzerland]	Not Applicable - section no longer included
10652	4	5	4	6	Suggest rewording from "Adaptation and mitigation measures also have consequences for sustainable development." to "Adaptation and mitigation measures also have consequences for sustainable development but these are differentiated across regions and over time." The differential vulnerability aspect that Ch 5 sets up concretely needs to come into the orange box labelled 1.3. [Chandni Singh, Myanmar]	Taken into account - issue covered in Section A4 of the new SPM. The headline statement reads as follow: Sustainable development, poverty eradication and implications for ethics and equity will be will be key considerations in mitigation efforts to limit global warming to 1.5oC and by efforts to adapt to 1.5oC global warming {high confidence}. {1.1, 1.4, Cross-Chapter Box 4 in Chapter 1, 5.2. 5.3}
4254	4	6			the use of the figure "66%" in the whole SPM may give a missleading impression of precision . Better to use 2/3 or two out of three in all the document? [Abanades Carlos, Spain]	Accepted. The SPM structure and text have been revised
5440	4	6	4	7	Suggest replacing "without overshoot" with "-- without overshoot of 1.5 during the 21st century --" since this is simply a clarification of what is meant by holding warming below. [Haroon KHESHGI, United States of America]	Taken into account - issue covered in the new SPM
5900	4	6	4	7	Seems odd to me to be burying the lede in this manner. This is the statement that will be picked up. If you wish to include in these key statements it probably should lead one of the messages and not be an afterthought. Perhaps reorder the current key message accordingly? [Peter Thorne, Ireland]	Taken into account - issue covered in the new SPM
29934	4	6	4	6	« 66 % likelihood » : The mention of climate uncertainties is essential, but it would deserve more explanations. It should be clarified which uncertainties are taken into account in the concerned statements in particular by distinguishing between uncertainties and sensivitity arising from climate models and those arising from energy-economic models (e.g. growth, technical progress, etc.) [France]	Accepted. The chance of limited global warming to 1.5°C is discussed in section A2 and C1, and a footnote on page 3 clarifies the IPCC calibrated language for certainty of findings
32786	4	6	4	7	Modelling suggests that having a 66% likelihood of holding warming below 1.5°C throughout the 21st century without overshoot is already out of reach. Myriads of assumptions (e.g. choice of models, which theory of transformation? or which discount rates) are underlying to this statement. The language which discribes this message should not sound that much as apodictic certainty. [Manfred Treber, Germany]	Accepted. The chance of limited global warming to 1.5°C is discussed in section A2 and C1, and a footnote on page 3 clarifies the IPCC calibrated language for certainty of findings
32900	4	6	4	7	Is it not then also true that there is a 33% chance that 1.5°C is still within reach? It seems that there has been a specific choice made here in terms of framing that will impact how media and others interpret this report. I think both the likeliness and unlikeliness of holding temperatures below 1.5°C should be presented. [Thomas Damassa, United States of America]	Accepted. The chance of limited global warming to 1.5°C is discussed in section A2 and C1, and a footnote on page 3 clarifies the IPCC calibrated language for certainty of findings
36246	4	6	4	7	Consider framing this as a statement that quantifies the likelihood of holding warming below 1.5 degree C - with and without overshoot? [India]	Accepted. The chance of limited global warming to 1.5°C is discussed in section A2 and C1, and a footnote on page 3 clarifies the IPCC calibrated language for certainty of findings
38448	4	6	4	7	Modeling suggests --> which modeling? [Linah Ababneh, United States of America]	Taken into account - issue covered in the new SPM
38512	4	6	4	7	The text does not specify if overshooting is minor or major (the latter including situations in which the "well below two degrees" goal is not met). By how much there is overshooting is a legitimate cleavage issue. [Valentino Piana, Italy]	Taken into account - issue covered in the new SPM
39988	4	6	4	7	This statement may be too strong. I think that the statement should be: No scenarios are yet available that have a 66% likelihood, etc. This is in line with the text in Chapter 2, page 11, linke 28-29 and Table 2.1. Remember that 10 years ago no scenarios were available for 1.5 degree C. Also, be aware of the disclaimers in Chapter 2, page 31, lines 30 - 33 and page 40, lines 12 - 14.. [Kornelis Blok, Netherlands]	Taken into account - issue covered in the new SPM

Comment No	From Page	From Line	To Page	To Line	Comment	Response
38510	4	6	4	7	The models mentioned in this sentence have limitations well explained in ch. 2 (2.5.1.2). They do not include explicitly many of the Paris Agreement instruments, ratcheting up and facilitative mechanisms. The political will expressed in the Paris Agreement can well avoid something that has not yet happened and that will take about 20 year at the current level of emissions - as l.25 in the same page indicates - and many more years if deep decarbonisation strategies (including banning certain technologies for which alternatives are already available) would be implemented soon. Accordingly, the sentence should be extended with ", if the political will expressed in the Paris Agreement will not translate into particularly deep decarbonization strategies". [Valentino Piana, Italy]	Noted
41458	4	6	4	7	Sentence is not clear. Does author want to say: "Modelling suggests that holding warming below 1.5°C throughout the 21st century without overshoot is already out of reach (66% likelihood)." [Maria Pia Carazo Ortiz, Germany]	Taken into account - issue covered in the new SPM
44638	4	6	4	7	Highly significant finding which while clear in the present wording, somehow does not quite convery the seriousness of the situation. Communications staff would be best to advise on how to re-formulate this for greater 'punch', for the average reader. [Penny Urquhart, South Africa]	Taken into account - issue covered in the new SPM
46470	4	6	4	7	The sentence conclusion stated here that models suggest that having a 66% likelihood holding warming below 1.5°C throughout the 21 st century without overshoot is already out of reach does not accurately reflect the findings from the underlying chapter 2. In chapter 2 summary it is said that "Historical emissions and policies already mean that pathways with at least a 66% likelihood of holding global warming below 1.5°C are out of the reach of models". This formulation constraints the statement more to the models, while the SPM statement can more easily be read that even beyond models it is out of reach. However, this is not sufficiently qualified with the methodological limitations of the models, which may also underestimate some positive dynamics. Furthermore, it would be appropriate to add here in the SPM that when applying a 50% likelihood, with already 10 available scenarios, the statement tat 1.5C is out of reach no longer holds true. On chapte 2, page 5, line 20 it says If current pledges are followed to 2030, there are no model scenarios in which average warming is kept below 1.5°C. However, this sentence also implies that with much greater action before 2030 this statement might no longer be true. [Sven Harmeling, Germany]	Taken into account - issue covered in the new SPM
51146	4	6	4	7	This is an inaccurate and deeply misleading statement. The physical climate models yield a range of temperature results when given even a single emissions trajectory, and, for logical reasons, not all models can be equally true. We don't know yet which climate model is most accurate. Hence what is treated as likelihood here really is a distribution of results across the different models, to which an equal probability of accuracy is (wrongly) assigned. The results from the MAGICC model, from which the 66% "likelihood" was derived only reflects the distribution of physical climate model results, not real-world probabilities. In addition to that, the non-physical integrated assessment models cannot estimate a likelihood of any emissions trajectory. Since the broader public will not understand the intricacies of modelling assumptions and epistemological limitations of modelling results and how they translate into the real world, a statement that falsely claims that a "66% likelihood of holding warming below 1.5°C throughout the 21st century without overshoot is already out of reach" is deeply problematic and will be received very pessimistically by the broader public and media. This concern has already been substantiated by media responses to the SPM leak in January, where media picked up this particular sentence and interpreted it to say that the 1.5 goal is already lost. [Linda Schneider, Germany]	Taken into account - issue covered in the new SPM
51310	4	6	4	7	Why not frame this as a statement that quantifies the likelihood of holding warming below 1.5 C - with and without overshoot? [Anand Patwardhan, United States of America]	Taken into account - issue covered in the new SPM
52684	4	6	4	7	Limiting global warming below 1.5°C is not consitent with the Article 2 of the Paris Agreement. In this hogh-level statement it may be approriate to talk about "at" 1.5°C (stabuiliation at 1.5°C) [Iulain Florin VLADU, Germany]	Taken into account - issue covered in the new SPM
55516	4	6	4	7	This sentence is alarmist (that's ok) and does not provide any solution, I would recommend to always propose a counter-solution to policy-makers, and not leave them with only a negative fact. For example, here, say that having a XX% likelihood of holding warming below 1.5D without overshoot exist. Or, that solutions exist to compensate the consequences of overshoot and keep global warming below 1.5D in the long term. [Maryse Labriet, Spain]	Taken into account - issue covered in the new SPM
56022	4	6	4	7	There are however pathways remaining for a 50% 1.5 budget. That is worth saying explicitly here as this first page and a bit is what most people will read. It is worth saying explicitly that the rest of the report finds that there are pathways to 1.5 still, but that the world is not currently on track. [Kelly Stone, United States of America]	Taken into account - issue covered in the new SPM
56566	4	6	4	7	This is going to be the statement from this report that journlaists and the public sees that makes them give up on 1.5degC. To present this without caveat about the limits of modeling or acknowledgement of all the 1.5C scenarios that can be achieved with 50% probability, especially in the high level statements, is irresponsbile. [Eleanor Johnston, United States of America]	Taken into account - issue covered in the new SPM
58882	4	6	4	7	This sentence has the potential to be confusing for policymakers. Suggest finding a different way of expressing this important point without using scientific jargon. [United States of America]	Taken into account - issue covered in the new SPM

Comment No	From Page	From Line	To Page	To Line	Comment	Response
57790	4	6	4	7	The final high-level statement in the SPM, section 1.2, regarding the probability of global limiting warming no more than 1.5? C (page 4, lines 6 and 7), is policy prescriptive as it presumes patterns of investment and economic development, embedded in the integrated assessment models, that are heavily dictated by policy choices. Moreover given the large volume of literature documenting the shortcoming in the integrated assessment models, presenting model results without qualification of these limitations in a high-level statement is inappropriate in the extreme. See for example Creutzig et al. 2017 listed in the bibliography for Chapter 4 which establshes that the IAMS significantly underestimate the potential of solar power to mitigate climate change. More recently see Ritchie and Dowlatabadi, 2018: Defining climate change scenario characteristics with a phase space of cumulative primary energy and carbon intensity. Environmental Research Letters, Volume 13, Number 2 which analyzes results of integrated assessment models against observed decarbonization trends and suggests that climate change targets outlined in the Paris Accord are more readily achievable than projected to date. Despite being wide, the scenario set is incomplete and thus cannot be considered the basis for a robust high-level conclusion such as this. Moreover, the final high-level statement in the SPM, section 1.2 statement appears to critically depend upon one paper in the literature (Kriegler et al.). While one paper is informative it does not provide the high level of confidence required to make such a statement. Moreover this statement is not consistent with the potential of technological innovation and recent developments discussed in Chapter 4, section 4.2.2 [Transitions and rates of change], see lines 38-45 in particular, and section 4.4.4.1 [The nature of technological innovations and some recent developments], (see lines 1-17 in particular) [Hunter Cutting, United States of America]	Taken into account - issue covered in the new SPM
62144	4	6	4	7	Modelling by IAMs is criticized throughout chapter 2 and should not be used for such a definitive sentence. "Out of reach" supposes that we know what policies governments are able to decide and implement and thus is out of what the SPM should say… Addition shows the wide range of additional policies that could void this statement; [Antoine Bonduelle, France]	Taken into account - issue covered in the new SPM
63030	4	6	4	7	This message is very important, but it is currently formulated with a language that is not sufficiently clear for communication to policymakers. Please make all possible efforts to write that in simple words. Everything that is impossible should be made clear, and what is potentially feasible but with difficulties should also be made clear with the necessary nuances. This discussion should be integrated with the explanation of what a temperature overshooting scenario is. [Belgium]	Taken into account - issue covered in the new SPM
9628	4	1	4	26	Ensure clarity by briefly but explicitly stating the drivers of anthropogenic climate change - sustained global-scale fossil fuel combustion, planetary-scale deforestation, massive industrial livestock production, and others - and that these drivers ultimately are associated with population growth, economic growth, and certain technological choices. It's fundamentally important context and a surprising number of people, including some working in this field, aren't fully aware of it. [Sean Fleming, United States of America]	Accepted - text revised. We believe this context is adequately provided in the revised SPM, and note that the brief of SR1.5 is to build on previous IPCC assessments.
18836	4	1	5	25	While the report righty focusses on +1.5 vs. +2° as per its terms of reference, readers might overlook lower-probability/higher-impact climate risks typically associated with >+3° scenarios. A key issue is that 2-3° pathways not only lead to higher impacts, but also involve higher risks of drifting towards 4-5° and associated impacts. Maybe a note of caution on that in the background section could help. [Andrea TILCHE, Belgium]	Rejected. This report is devoted to differences between 1.5 and 2 degrees, and thus the report is not allowed to review the literature (already reviewed in AR5) on impacts from 3 degrees.
29038	4	1	5	24	Scope and intention of the Background Section are not entirely clear. As a background section, we would assume it would serve to inform about a) important starting points and b) central concepts. Whereas 1.1 and 1.2 each have a somewhat clearer focus, 1.3 lumps together risk, impacts, mitigation, adaptation and climate resilient development pathways. Also, it is not always clear whether the section presents key findings of the report or is setting the scene. We'd recommend to revise this section in its entirety in order to better do the latter, and check for redundancies with other sections of the report. It may be helpful to introduce key concepts and advances since AR5 here (e.g. Carbon Budget, availability of IAM literature that considers SDGs, ..). We would also find it helpful to reiterate, however briefly, the main AR5 findings: "Climate change is happening, it is human induced, and impacts are already widespread and pervasive. Emissions are still rising". A more informative title would also be useful, e.g. "Key concepts and starting points". [Germany]	Taken into account - text revised. This bullet point is separated into three separate points and more clearly denoted as a background context
29574	4	1	4	1	The title of the section is Background. It is somewhat difficult to judge which issues need to be taken up in this section. The current text contains some issues that are dealt with in a very similar manner in other sections. Is the backgound section meant to deal with observed climate change ? [Finland]	Taken into account - issue covered in the new SPM

Comment No	From Page	From Line	To Page	To Line	Comment	Response
39034	4	1	4	1	Background is not an ideal title for this section, but I am not able to suggest anything better at this stage… So I encourage the authors to try and find something more interesting. (The section title could contain something with "current state of the climate" but it would not cover all the content). [Jan Fuglestvedt, Norway]	Taken into account - issue covered in the new SPM
39320	4	1	4	16	We are worried with the contents of box 1.1, mainly by its final sentence: "At current rates of warming, global mean temperature would reach 1.5°C by the 2040s". In our view this sentence could produce on the society (including policymakers) the false conclusion that there is still a long time to reach 1.5 ºC. We think that this conclusion is, at least, hasty. The projection of the temperature increase, based only in the average rate of its growth since 1950 it's not, in any case conclusive "per se". According to AR5, this average rate, is clearly bigger if we consider the recent decades (specially the last three). Moreover, in this SPM there are other statements, for instance in pag. 15 lines 5-8, that contradict this shocking and so controversial initial statement: "At current rates of warming, global mean temperature would reach 1.5°C by the 2040s". Furthermore, according to the Carbon Budget analysis made in this report, we could conclude, that with a 66% likelihood, we would have used the 100% of the Carbon Budget corresponding to 1.5°C, at the current level of CO2 emissions, in 10 years (see also the highlighted statement 4.1. of pag.19 lines 35-43). Finally, in our view, this box 1.1. should be definitively deleted. [Olga Alcaraz, Spain]	Taken into account - text revised. This projection is based on multiple lines of evidence taking into account the acceleration in drivers of warming since the 1950s. It is not a simple extrapolation of the 60-year trend. Projected warming and carbon budgets are more consistent in the revised SPM.
49286	4	1			The underlying Ch 01 contains many problematic and at times policy prescriptive elements. The framing of this report needs to be transparently linked to the Paris Agreement and its underlying scientific basis, the AR5. Any changes need to be made transparent. These include changes in the base period as well as GWPs. Under no circumstances should the report rewrite the Paris Agreement by modifying AR5 definitions. Furthermore, the current chapter 1 pre-empts a lot of the information fromt the following chapters and should be shortened considerably. [Bill Hare, Germany]	Accepted. The underlying Chapter 1 has been revised
50010	4	1	5	24	This Background section of the SPM is in fact covering many key issues that belong to the sections on climate impacts, adaptation and emission reduction. Only the first headline (1.1) may be appropriately placed in this section (although it would also fit in section 3), the rest (1.2 and 1.3) is definitely better placed in the respecttive section 2 or 3. If 1.1 is retained here,then the figure SPM 1 needs to be changed to show the BaU (or current policy) projection that leads to overshooting 1.5 degrees in the 2040's. That could be taken from chapter 1, figure 1.2. The current graph is a "below 1.5 without overshoot" scenario. The CO2 and non-CO2 graphs need to be removed then as well. In a retained 1.3 -1.1 section the headline in the Exec summary of chapter 1 (page 1-4, line 12) would also nicely fit. Alternatively, also 1.1 could be moved to section 3 and the graph then could be modified to reflect both the BaU as well as the 1.5 degree scenarios. The second sentence of the second bullet under 1.2 (on the NDCs) could remain in a background section, but it should be made clear that the NDC's - if fully implemented- would put us still on a trajectory to 3 degrees or more (see 2017 UN Emissions Gap Report). I think it is important to say that clearly. [Bert Metz, Netherlands]	Taken into account - text revised. This bullet point is rewritten and separated into several bullet points to more clearly provide background context for the SPM.
53888	4	1	7	4	The structure too much follows the chapters hence section SPM 1.3 overlaps to much with SPM2 and SPM3 - the background section could be little more than thre first two bullets in SPM1.3 and box SPM.1 - then the bits of SPM1.3 on risk and emissions cuts could be move into SPM2 and SPM3? The figure speaks better to SPM.3. If you have a figure here it should. cover risks as be really introductry - it could haelp explain the structure of the SPM? [Piers Forster, United Kingdom (of Great Britain and Northern Ireland)]	Taken into account - text revised. Text revised to better provide background information for the rest of the SPM
63032	4	1	5	24	The scope of SPM1.3 Background is not clear to us. Please consider moving its content to sections that have a clear focus, and consider merging at least the headline statement 1.3 with content currently in other sections to reduce the overall text length. For example, bullet 1 on page 5 is a definition and could be moved close to the box (SPM.1) defining mean temperature change. We think that is important to keep bullets 2 and 4 of page 5 (while also moving them to improve the structure). [Belgium]	Taken into account - text revised. This bullet point is rewritten and separated into several bullet points to more clearly provide background context for the SPM.
344	4	12	4	26	2040s reached 1.5?, how about carbon? [Zong-Ci Zhao, China]	Noted. Projections and carbon budgets have been reconciled.
4458	4	12	4	15	The same paragraph that appeared in page 4, lines 12-15 in Chapter 1 should be put in SPM also. The following is the paragraph appeared in Chapter 1: "For stabilisation of global temperatures at any level, total net global greenhouse gas emissions, if expressed in terms that give all climate drivers a similar global temperature impact as CO2, must be reduced to zero. CO2 emissions accumulate in the climate system, so warming will continue until anthropogenic CO2 emissions reach net zero, with equivalent reductions in other climate drivers. [Mitsutsune Yamaguchi, Japan]	Accepted - text revised
5904	4	12	4	26	The box 1.1 and the two bullets are redundant with one another. I'm not convinced that a summary of two bullet points is warranted. I would retain the box or the two bullets but not both here. The current duplication doesn't aid readability. This is the first case but the issue is quasi-generic. From a reader's perspective, the box summaries should summarise a substantive number of bullets not just a handful or even a couple in this case. [Peter Thorne, Ireland]	Accepted - text revised

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41276	4	12	4	13	Greenhouse… global warming-> this statement is not a finding of this assessment. The point of this box would be clearer if this sentence is omitted and the word "which" right after it is replaced with "Global warming due to human activities". [Michio Kawamiya, Japan]	Accepted - text revised
41748	4	12	4	28	stabilisation ===> stabilization [Egypt]	Editorial - copyedit to be completed prior to publication
48368	4	12	4	16	Correct: "warming, which has been occurring at an average rate of 0.17°C (±0.07°C) per decade since 1950". Replace "since 1950" with "since 1980" or "over recent decades". Linear trend since 1950 is ~0.12°C per decade. [David Clarke, Canada]	Accepted - text revised
52906	4	12	4	16	Not clear on time period,perhaps since the 1950 should come earlier in the statement. Is there a likelihood? [Ireland]	Accepted - text revised
55570	4	12	4	12	replace "is estimated to be" by "about" [David Cooper, Canada]	Accepted - text revised
57130	4	12	4	14	The wording might be unclear: it may not be fully clear that "global warming" here is related to the period after 1950. Would it be correct to start the sentence with "Since 1950, ...", in which case it would be clearer? [Philippe Marbaix, Belgium]	Accepted. Statement was confusing - deleted.
58884	4	12	4	14	There must be a level of confidence associated with this statement, as it currently expresses absolute certainty. On page 1-4, the qualifier "it is extremely likely" is used, which is a defensible statement. [United States of America]	Accepted - text revised
58886	4	12	4	19	While the footnote explaining the method of comparing 2017/8 with preindustrial levels is appreciated, the premise of comparing a 51-year base period with a 2-year period is fundamentally flawed. Comparisons should be like with like: single years can be singled out from other single years as the hottest on record, or preferably, climatologically relevant time periods 30 years or longer can be compared. To use projected temperatures for the current time frame, particularly given the recent acknowledgement of the so-called warming hiatus driven by lack of understanding between measured and modeled near-term warming, is of particular concern. [United States of America]	Accepted. As the definitions now make clear, when referring to a time-period shorter than 30 years, warming in a particular year refers to the 30-year average centred on that year, after accounting for any trend or short-term variability within that 30-year period.
58888	4	12	4	16	This heading treats both warming since preindustrial times and warming since 1950 as entirely attributable to human activities, and does not specify that for a variety of reasons there is greater attribution of warming to human activities since 1950. [United States of America]	Accepted - text revised
58890	4	12	4	16	Suggest rephrasing: "GHG emissions from human activities have been the dominant cause of global warming since 1950. The warming has been occurring at an average rate of 0.17°C per decade over that time period." This way, authors distinguish the warming since 1950, which is almost entirely anthropogenic, from the warming before 1950, for which the science is more uncertain. Also, replace "relative to" with "than". [United States of America]	Accepted - text revised. Conclusions are now framed in terms of total human-induced warming relative to 1850-1900, which is more directly relevant to the charge for this report.
58892	4	12	4	16	This uses different format and numbers from Chapter 1. Use simple and consistent language. [United States of America]	Accepted - text revised
34332	4	13		14	This warming rate appears to be substantially higher than the warming rate assessed over a similar period in the IPCC AR5. It corresponds to 1.12 C warming over 1950-2016. IPCC AR5 WGI SPM reports that the warming rate over 1951-2012 is 0.12 C/decade. [Nathan Gillett, Canada]	Accepted. Warming has accelerated. Revised text makes clear this refers to the current rate of warming.
5902	4	14	4	15	1C higher than PI … but also suggest giving a range on this number. There is uncertainty on it and it may not be symmetric per comments to Chapter 1. This assessment should ideally more holistically account for uncertainty in both true-PI and the observations than is currently the case. [Peter Thorne, Ireland]	Accepted - text revised
7146	4	14	4	14	Using 2017/18 is very confusing (it cannot be understood without going in the full report while the SPM messages should be clear enough to stand alone). My suggestion would be to simply replace 2017/18 by 2017 (which seems to be the case now we have the 2017 value) or by in the last five years 2013-2017 (if correct). The idea is to cite a period which can be easily appropriated. [Jean Jouzel, France]	Taken into account - text revised. As the definitions now make clear, when referring to a time-period shorter than 30 years, warming in a particular year refers to the 30-year average centred on that year, after accounting for any trend or short-term variability within that 30-year period.
8984	4	14	4	15	the current wording is extremely prone to misinterpretation, since it suggests that one or two years are taken to describe the warming until today. A better wording might be: "The global mean temperature trend is estimated to have reached 1°C warming relative to pre-industrial levels in 2017/18." [Urs Neu, Switzerland]	Taken into account - text revised. As the definitions now make clear, when referring to a time-period shorter than 30 years, warming in a particular year refers to the 30-year average centred on that year, after accounting for any trend or short-term variability within that 30-year period.
18838	4	14	4	16	According to footnote 3, this statement refers to a 30 year period centred on today, whereas the text in red suggests it refers to the two years 2017/18 only. Please reformulate for improved clarity. [Andrea TILCHE, Belgium]	Taken into account - text revised. As the definitions now make clear, when referring to a time-period shorter than 30 years, warming in a particular year refers to the 30-year average centred on that year, after accounting for any trend or short-term variability within that 30-year period.
18840	4	14	4	16	We propose to revise the statement from its third line as: "The global mean temperature is estimated to be already more than 1°C higher relative to pre-industrial levels. At current emission rates, global mean temperature would steadily reach 1.5°C by the 2040s." [Andrea TILCHE, Belgium]	Accepted - text revised. We have revised to almost exactly this formulation.
21602	4	14	4	14	Chapter 1 uses both "2017" and "2017/2018" in this context. Please check. [Sweden]	Taken into account - text revised. As the definitions now make clear, when referring to a time-period shorter than 30 years, warming in a particular year refers to the 30-year average centred on that year, after accounting for any trend or short-term variability within that 30-year period.

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29040	4	14	4	14	The footnote "3" should already added in this line after "2017/18". [Germany]	Taken into account - text revised. As the definitions now make clear, when referring to a time-period shorter than 30 years, warming in a particular year refers to the 30-year average centred on that year, after accounting for any trend or short-term variability within that 30-year period.
29576	4	14	4	14	The reference is to years 2017/2018. The definition of this notation is "hidden" in the footnote 3. This information may be understandable for climatologists but it is challenging for others. What is the message? [Finland]	Taken into account - text revised. As the definitions now make clear, when referring to a time-period shorter than 30 years, warming in a particular year refers to the 30-year average centred on that year, after accounting for any trend or short-term variability within that 30-year period.
29936	4	14	4	14	Even with the definition of SPM Box 1, it is very risky in terms of scientific integrity to refer to the temperature of year 2018 which will not be achieved at the time of the SR1.5 adoption. We suggest to mention 2016/2017 or 2017 instead. [France]	Taken into account - text revised. As the definitions now make clear, when referring to a time-period shorter than 30 years, warming in a particular year refers to the 30-year average centred on that year, after accounting for any trend or short-term variability within that 30-year period.
50372	4	14	4	14	Do not mention 2018 as the yer is not yet finished. [Switzerland]	Taken into account - text revised. As the definitions now make clear, when referring to a time-period shorter than 30 years, warming in a particular year refers to the 30-year average centred on that year, after accounting for any trend or short-term variability within that 30-year period.
53630	4	14	4	14	It will be better to exclude 2017 as we already have observed data of that year and therefore it may possible to say "to be 2017" [AKM SAIFUL ISLAM, Bangladesh]	Taken into account - text revised. As the definitions now make clear, when referring to a time-period shorter than 30 years, warming in a particular year refers to the 30-year average centred on that year, after accounting for any trend or short-term variability within that 30-year period.
63034	4	14	4	14	The global mean temperature in 2017/18 is estimated to is not sufficiently clear. The sentence from bullet one below is much clearer. We would suggest using that wording, and avoid repeating it : "The global mean temperature reached approximately 1°C above pre-industrial levels around 2017/2018"... [Belgium]	Accepted - text revised
1520	4	15	4	16	Replace "… global mean temperature would reach…" with "… global mean temperature RISE would reach …" [David Wratt, New Zealand]	Taken into account - text revised. Noting that it is redundant to say "human-induced warming above pre-industrial"
6858	4	15	4	15	It is suggested to be more precise with respect to the level of current warming as 1oC could be anything between 0.6 to 1.4oC. Should it read 1.0oC? [Klaus Radunsky, Austria]	Accepted. Current text now states current level of warming of 1.0C ±0.2C
9128	4	15	4	16	This sentence conflicts with the material in Chapter 2 -15 on carbon budgets. There it states that at the current rates of CO2 emissions, the mid-range carbon budget of about 470 (590-120) from the beginning of 2019 will be exhausted in about 12 years, or by the end of 2030, not "the 2040s"..This is for the 50% chance of limiting warming to 1.5 degrees C. You need to get this basic storyline straight, for the various pathways. Even for limiting warming to 2.0 degrees C with a 50% likelihood, at present rates of CO2 emissions, the carbon budget will be exhausted at 960-120=840 divided by 40 Gtons per year or about 21 years. This is 2040. [Richard Rosen, Germany]	Taken into account - text revised. Correct observation. Carbon budget statements are now harmonised with current rates of warming and the available literature.
14200	4	15	4	16	To enhance Clarity, we suggest to add "Above pre-industrial levels" after 1.5C [United Republic of Tanzania]	Taken into account - text revised. Noting that it is redundant to say "human-induced warming above pre-industrial"
17866	4	15	4	16	why in the 2040s? In chp. 2 it is stated that at current emission levels the budget would be exhaused by 2030. This seems to be inconsistent [Brigitte Knopf, Germany]	Taken into account - text revised. Correct observation. Carbon budget statements are now harmonised with current rates of warming and the available literature.
29042	4	15	4	16	At current rates of warming, HUMAN INDUCED/ANTHROPOGENIC global mean temperature RISE would reach 1.5°C by the 2040s [Germany]	Taken into account - text revised. Noting that it is redundant to say "human-induced warming above pre-industrial"
33722	4	15	4	16	This type of information is very important and we wish to see the "current rate" as updated as possible. However, in underlying bullet point (line 24-26) and its references it a reference to data from AR5. We hope that also this information can be updated. [Norway]	Accepted. The current rate of warming of 0.2C per decade is based on multiple lines of evidence, including post-AR5 literature.
36248	4	15	4	15	Replace - "global mean temperature"with "global mean surface temperature" in the boxes [India]	Accepted - text revised
39026	4	15	4	15	I suggest inserting "observed" after "current". (It is important to stress that this statement has a different backgrund and meaning than those coming from modelling of scenarois. Obvious to authors, bu may create confusion in outreach). [Jan Fuglestvedt, Norway]	Accepted. Revised text clarifies this refers to observed warming.
46116	4	15	4	16	This statement ('at current rates … 2040s') suggests there is time to reach the 1.5 degree goal. We recommend a statement somewhere in this section what the warming commitment will be in case the radiative forcing is kept constant from tomorrow onwards. That will emphasize the urgency to mitigate. [Netherlands]	Accepted - text revised. See A2.1 in revised SPM
51312	4	15			add "increase in" [Anand Patwardhan, United States of America]	Accepted - text revised
52908	4	15	4	16	Could a clearer statement of the timing for reaching 1.5C be provided? [Ireland]	Taken into account - text revised. Not really - this timing is too uncertain for a precise range to be given.
58894	4	15	4	15	Reads clearer and links to the previous sentence better if rewritten as "at this current rate of warming". Also, wording here and in the second bullet under this header (lines 24-26) could be more consistent. [United States of America]	Accepted - text revised
58896	4	15	4	15	This needs to say "At the current rate of warming, the increase in global mean temperature above preindustrial would be expected to reach ... " 'rate' needs to be singular. Readers need to know that it is the increase in temperature being discussed, not the temperature itself. [United States of America]	Accepted - text revised

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58898	4	15	4	16	The statement that ""At current rates of warming, global mean temperature would reach 1.5°C by the 2040s"" does not appear to match Figure SPM-1. [United States of America]	Taken into account - text revised. Revised text uses "around 2040" which is appropriate precision
10358	4	16	4	16	It is not clear whether it would reach 1.5 °C by the 2040s through following RCP scenarios (which ones in this case?) or by simple extrapolation (like it was done for 2017/2018). Should be clarified. [Hungary]	Taken into account - text revised. Revised text clarifies this assumes if current emission rates continue.
11040	4	16			Should be 'during the 2040s', otherwise the numbers don't add up (1.0+2.2*.17=1.374) [Wilfried Maas, Netherlands]	Accepted. It is now clarified that a continued warming at the current rate will reach 1.5C around 2040 - see A2.2
11228	4	16	4	16	…by the 2040s. Check consistency. Based on the numbers given in the text, this is approximately 2047. In the text below (l.25), it says in the 2040s. [United Kingdom (of Great Britain and Northern Ireland)]	Taken into account - text revised. Revised text uses "around 2040" which is appropriate precision
15436	4	16	4	16	Suggest replace "reach 1.5 C" with "be 1.5 C higher". [Australia]	Noted. Noting that it is redundant to say "human-induced warming above pre-industrial"
18842	4	16	4	16	66% likelihood …out of reach: does this statement refer to all scenarios considered, or to the set of strongest mitigation scenarios? [Andrea TILCHE, Belgium]	Not Applicable - no longer included in the chapter. Not clear what this comment refers to.
19204	4	16	4	16	begin with increase [Spain]	Taken into account - text revised. Text has been clarified.
32902	4	16	4	16	The use of the term "by the 2040s" still likely feels far away. To help communicate the speed with which action is required, suggest using something like "within the next 20-30 years." [Thomas Damassa, United States of America]	Rejected - outside the scope of the chapter. Adapting language to convey urgency might be seen a prescriptive.
34334	4	16			Insert 'above pre-industrial levels' after '1.5 C'. As written the statement refers to the absolute global mean temperature, which is much warmer than 1.5C. [Nathan Gillett, Canada]	Accepted. We have added relative to pre-industrial where there is scope for confusion.
50374	4	16	4	16	According to the definition of mean temperature in this report, some assumptions should be done about the temperatures in 2025 and 2050 in oder to estimate the increase of temperature by the 2040s. Therefore, it would be useful to write: "… by the 2040s according to the models used in this report." [Switzerland]	Rejected - not supported by the peer-reviewed published literature. No, the statement is conditional only on the current rate of warming, not on model results.
58900	4	16	4	16	There are a couple of factors built into this statement. First is that the increase in temperature being considered is the 30-year running average (or maybe it is 20-year, and dated based on the most recent date in the data set), so not the value reached in any particular year. Indeed, the 1.5°C value has been virtually reached for several months already, etc. So, it is very likely that the readers of this report are going to hear about the global average temperature being above 1.5°C well before 2040; it just won't be the 30-year average of the rate that reaches this value. Second, it might be useful to have a qualifier that indicates that natural variability due to, for example, a major volcanic eruption or series of lower intensity ones could delay the reaching of the 1.5°C level by a bit. Not something to count on, but not impossible, and one does not want to have what seems like a definitive statement turn out to be wrong. [United States of America]	Accepted. Definition of warming has been clarified in the FGD
52910	4	17	4	18	This statement is problematic for a number of reasons including or mixing observed with projected data [Ireland]	Noted
8986	4	18	4	19	Same remark as for the preceding headline paragraph. Nobody will understand the corresponding footnote or at least will be confused by the statement, that predictions are used to describe the measured warming (although it is scientifically correct ...) [Urs Neu, Switzerland]	Accepted - text revised
9028	4	18	4	19	We appreciate the efforts to provide as recent data on temperature increases as possible. The underlying chapter also describes how this is possible despite the year 2018 not yet being over. However we would recommend to drop the reference to 2018 in the text as this is prone to create unnecessary discussions. Also please write 1,0°C as it has another meaning than 1°C [Luxembourg]	Accepted - text revised
10360	4	18	4	19	Instead of "reached" we should use "is reaching" as the year is not clear here and we are not sure if it has happened. Also, within footnote 3, it should be unraveled whether the method was using an extrapolation or near-term predictions, try to avoid using "or" in the footnote. An the other hand, for policymakers near-term predictions should be explained briefly. [Hungary]	Accepted - text revised
11230	4	18	4	18	global mean temperature. In the report, you define a 1.5°C global mean temperature rise to be that over a 30-year period. How does this relate to a global mean temperature rise in a single year? [United Kingdom (of Great Britain and Northern Ireland)]	Taken into account - text revised. As the definitions now make clear, when referring to a time-period shorter than 30 years, warming in a particular year refers to the 30-year average centred on that year, after accounting for any trend or short-term variability within that 30-year period.
29938	4	18	4	18	« Approximately 1°C » : Could you add the uncertainty range? [France]	Accepted - text revised
34336	4	18		19	The extrapolation approach used to estimate the current level of warming is unconventional. A decadal mean ending in the last year would be more easily defensible. Or if the current approach is retained, describing the temperature inferred as the present-day temperature based on a linear fit to temperatures over the past 15 years might be preferable. Describing it as a 30-year average centred on the present pre-supposes that the past trend rate will continue into the future. [Nathan Gillett, Canada]	Rejected. A decadal mean ending with the current year would be, at the current rate of warming, systematically 0.1C biased low. This is significant in the context of a 0.5C additional warming to 1.5C. A linear fit over 15 years would be one way of estimating the 30-year average GMST centred on the current year, but there are other, lower variance, methods.
36250	4	18	4	22	The annual mean temperatures in northern hemisphere have exceed 1.5 degree C but are still within the natural inter-annual variation of temperatures in these latitude [India]	Noted
45062	4	18	4	22	need to mention faster rising pace of land surface than ocean surface. The surface change has additional ~ 0.1 degree than ocean. [Iman Babaeian, Iran]	Accepted - text revised
46118	4	18	4	19	This is concerning but it seems to be a prediction; should this be in the report? Isn't there an existing number for current warming (2016, 2015 figure)? [Netherlands]	Accepted - text revised

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46120	4	18	4	26	These paragraphs, first one about regional temperatures already reaching 1.5-degree in some seaons, and the second regarding average global mean temperatures reaching 1.5-degree in 2040 is a bit confusing [Netherlands]	Accepted - text revised. Point is now in a separate bullet
52912	4	18	4	23	Use temperature throughout the section rather than switching to warming. It could also be shortened [Ireland]	Accepted. Warming is used for brevity to refer to temperature increase relative to pre-industrial levels.
54346	4	18	4	19	This is an important message and also belongs to the highlevel messages. We would like to see a confidence level added to this statement. [Estonia]	Accepted - text revised
58902	4	18	4	19	Indicate that what is meant here is the 30-year running average warming. What is really confusing, given the footnote, is that it is said that 1°C was reached in 2017/18, but then also that this is somehow the center of a 30-year average. What needs to be said is that the 30-year period is being labeled by its most recent year, so that it is the period 1987 to 2017 that shows an average warming of roughly 1°C. Current framing creates confusion with respect to recent indications of the warming since preindustrial already being a good bit over 1°C. [United States of America]	Taken into account - text revised. As the definitions now make clear, when referring to a time-period shorter than 30 years, warming in a particular year refers to the 30-year average centred on that year, after accounting for any trend or short-term variability within that 30-year period.
6072	4	19	4	19	I suspect this extrapolation method could be controversial, as it makes a statement about present-day climate that relies on climate trends not yet observed. It might be circumspect to include the observed value at the latest possible 30-year mid-point observed (2002/2003, perhaps) before sliding forward to this value. [Timothy Carter, Finland]	Accepted. Meaning of current level of warming is now clarified.
9458	4	19	4	21	'Over one quarter of the global population lives in regions that already experience greater warming than the global average, with annual mean temperatures exceeding 1.5oC in at least one season.' The statement is misleading. The global temperature increase is just a marker. Its rise may be: - dangerous itself; - due to warming amplification in some regions or locations: - due to other associated climate effects (e.g., extremes). What is meant in this phrase is unclear. [Russian Federation]	Accepted. Statement has been deleted from the SPM.
18844	4	19	4	22	This statement is rather confusing as it mixes many different aspects of regional and seasonal warming in an apparently incorrect way. First, considering that land areas generally warm faster than ocean areas, one would assume that most of the global population live in regions that currently experience greater warming than the global average. The text, however, suggests that three quarters of the population currenty lives in regions with smaller warming than the global average. Second, it is not clear what 'annual mean tempeatures exceeding 1.5 °C in at least one season' means. Does this sentence refer to annual or to seasonal warming? Third, it seems unnecessary and confusing to combine regional and seasonal warming in one sentence. Finaly, the reference to figure SPM1 seems wrong, because this figure refers neither to regional warming nor to population distribution nor to seasonal warming. Please re-cosider and re-phrase accordingly. [Andrea TILCHE, Belgium]	Accepted. Statement has been deleted from the SPM.
29940	4	19	4	19	Even with the definition of SPM Box 1, it is very risky in terms of scientific integrity to refer to the temperature of year 2018 which will not be achieved at the time of the SR1.5 adoption. We suggest to mention 2016/2017 or 2017 instead. [France]	Accepted. Meaning of current level of warming is now clarified.
34338	4	19		2	Is 'regions that already experience greater than the global average warming' required here? As written the sentence is referring to regions that have warmed by more than global average (presumably in the annual mean), and have warmed by more than 1.5C in at least one season. Can this be simplified by simply focussing on those regions that have warmed by more than 1.5C in at least one season? There may be some regions that have warmed by more than 1.5C in one season, but have warmed by less than the global mean in the annual average. [Nathan Gillett, Canada]	Accepted. Point is now in a separate bullet
45880	4	19	4	2	Please clarify or give examples to which regions you refer to in the sentence. [Deger Saygin, Turkey]	Accepted. Point that land has warmed more than global average is now made clear.
57132	4	19	4	21	over one quarter (...) greater than the global average (...). As written, this statement would not be useful : by definition of an average, there are areas that warms more than the average; the sentence may suggest that human settlements are placed in rather "safe" locations wrt global warming, as we might expect about 50% of people more exposed (in the absence of correlation). The use of "over one quarter" just makes the statement valid but uninformative. The sentence is different in chapter 1 and seems way more consistent and useful : "Over one quarter of the global population live in regions that have already experienced more than 1.5°C of warming in at least one season" (see also figure 1.1). There are many problems in this sentence, please rewrite entirely. [Philippe Marbaix, Belgium]	Accepted. Statement has been deleted from the SPM.
14202	4	2	4	2	we suggest to delete the words "than the global average" [United Republic of Tanzania]	Accepted. Statement has been deleted from the SPM.
18846	4	2	4	2	temperature increments (not temperatures). [Andrea TILCHE, Belgium]	Accepted. Statement has been deleted from the SPM.
19206	4	2	4	21	Reference to "at least one season" not consistent with "annual" term in the same sentence. [Spain]	Accepted. Statement has been deleted from the SPM.
29044	4	2	4	21	annual mean temperatures exceeding 1.5°C WARMING in at least one season. Also, either it's annual mean warming, or it's seasonal mean warming. Please revise the sentence in order to be clear. [Germany]	Accepted. Statement has been deleted from the SPM.
37424	4	2	4	2	Wrong statement; it's the 'annual mean temperature difference' not "annual mean temperatures exceeding 1.5oC". [Matthias Honegger, Germany]	Accepted. Statement has been deleted from the SPM.
49288	4	2			This information about regional and seasonal warming is irrelevant at best. In any case, it weakens the definitional clarity on how the 1.5°C long term temperature goal should be understood. Suggest deletion [Bill Hare, Germany]	Accepted. Point is now in a separate bullet
51314	4	2			add "increase in" [Anand Patwardhan, United States of America]	Accepted. We have added relative to pre-industrial where there is scope for confusion.
33480	4	21			needs to refer to "temperature rise" not just "temperature" [Stephen Cornelius, United Kingdom (of Great Britain and Northern Ireland)]	Accepted. We have added relative to pre-industrial where there is scope for confusion.

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33724	4	21	4	22	Please consider to add latitudes in order to clarify where these regions are. [Norway]	Accepted. Point that land has warmed more than global average is now made clear. More detailed breakdown lies outside scope.
335	4	24	4	26	also give the time projected by multi-CMIP5? [Zong-Ci Zhao, China]	Rejected - outside the scope of the chapter. Discussion of CMIP5 versus current observed trends is too much material for SPM.
5442	4	24	4	24	suggest removing "greenhouse gas emissions and" since only the rate of temperature increase is actually the basis for this conclusion. [Haroon KHESHGI, United States of America]	Accepted. In addition, the fact that the current warming rate will continue over coming decades if emissions continue at current rate is now clarified.
33726	4	24	4	26	This decadal trend refers to findings from the AR5. In a summary for policymakers we expect new findings to be presented. We would appreciate if you could calculate this decadal trend with updated data related to observation after AR5. Alternatively it should be explained if the new observations are consistent with the trend used in AR5. [Norway]	Accepted. Current rate of warming of 0.2±0.1C per decade is clarified and based on multiple lines of evidence.
52914	4	24	4	26	Current would be better than present. Is it in, or by, the 2040? [Ireland]	Accepted - text revised
58904	4	24	4	26	This is a good point. [United States of America]	Noted
58906	4	24	4	26	This is referring to the 'annual average increase in the global mean temperature' (so singular, and about increase, and over the year). Greater care needs to be taken in writing down the terms. [United States of America]	Noted
1522	4	25			Replace " … global mean temperatures would reach 1.5°C…" with "… global mean temperature INCREASES would reach 1.5°C …" [David Wratt, New Zealand]	Accepted. We have added relative to pre-industrial where there is scope for confusion.
50376	4	25	4	25	According to the definition of mean temperature in this report, some assumptions should be done about the temperatures in 2025 and 2050 in oder to estimate the increase of temperature by the 2040s. Therefore, it would be useful to write: "… by the 2040s according to the models used in this report." [Switzerland]	Accepted. Extrapolation of current rate requires only definition of GMST as running 30-year average, not any specific models (except insofar that a 30-year running mean is a kind of statistical model).
51316	4	25			add "increase in" [Anand Patwardhan, United States of America]	Accepted. We have added relative to pre-industrial where there is scope for confusion.
45	4	28	4	31	While I understand the focus on CO2, I think this is a bit misleading, particularly with respect to the impact of getting methane concentrations down. The more general point is that while CO2 concentrations are clearly contributing the most to climate change at the moment, any increase of any GHG concerntration is problematic, and any reduction of any GHG is critical. [Meinhard Doelle, Canada]	Accepted. Now clarified in bullet A2.3
5444	4	28	4	28	Suggest removing this sentence ("Future...."). It is clear from figure SPM4 that the role of non-CO2 forcers is more important than cumulative carbon emissions WHEN cumulative additional carbon emissions are very low as in 1.5 pathways, and this contradicts this sentence. [Haroon KHESHGI, United States of America]	Taken into account - text revised. Statement has been clarified.
8276	4	28	4	29	This conclusion is inconsistent with that in AR5 WGI SPM. (AR5 WGI SPM P27: Cumulative emissions of CO2 largely determine global mean surface warming by the late 21st century and beyond (see Figure SPM.10). Most aspects of climate change will persist for many centuries even if emissions of CO2 are stopped. This represents a substantial multi-century climate change commitment created by past, present and future emissions of CO2. {12.5}? [China]	Accepted - text revised. Text has been clarified to be clear FUTURE warming depends on FUTURE emissions, with considerable literature support.
14152	4	28	4	31	It is very unconving due to few evidences to support this conclusion and still deep uncertainty. [Rongshuo Cai, China]	Accepted. Text has been clarified to be clear FUTURE warming depends on FUTURE emissions, with considerable literature support.
14204	4	28	4	31	It is not clear what is the objective or necessity of this box. It does make sense. I suggest it be clarified or deleted. [United Republic of Tanzania]	Accepted. Key statements are now clarified.
18848	4	28	4	28	CO2 emissions to be replaced by "GHG emissions". This is both accurate and consistent with line 40 below. [Andrea TILCHE, Belgium]	Accepted - text revised
18850	4	28	4	31	The emissions are not yet removed and the policies to realise the scenarios not yet in place. Therfore the wording should be adopted to this. [Andrea TILCHE, Belgium]	Accepted. This section is providing context only, not commenting on policies.
18852	4	28	4	31	The headline box comments on the importance of non-CO2 reductions, but the underlying text does not say anything about this. [Andrea TILCHE, Belgium]	Accepted. Revised text clarifies roles of CO2 and other agents.
29046	4	28	4	44	The relationship between subsection (box) 1.2 and the two bullet points underneath is unclear. After reading subsection 1.2 we would expect selected details i.e. about "other climate warming agents" such as SLCF. [Germany]	Accepted. Text now clarifies relative roles of future CO2 and non-CO2 forcing, without listing components.
32904	4	28	4	31	This is an important opportunity in the SPM to highlight how reducing non-CO2 climate drivers/short-lived climate pollutants can reduce the rate of global warming in the near-term (e.g., work by Ramanathan, Shindell and others). A separate bullet on the role of SLCPs in the paragraphs that follow this box should also be incorporated highlighting the linkages between SLCP mitigation and development/achievement of the SDGs. [Thomas Damassa, United States of America]	Accepted. Now clarified in bullet A2.3
35454	4	28	4	28	While the statement is true in and of itself, it only captures part of the truth because past emissions are what have led to the 1 deg C warming already seen. If that hadn't happened, there would be greater room now to achieve the 1.5 target. Therefore, consider rephrasing this sentence as "Global warming primarily depends on cumulative CO2 emissions. Past emissions have led to 1 deg C warming and future warming dependent on future emissions". [Ashok Sreenivas, India]	Accepted. Now clarified in bullet A2.3

Comment No	From Page	From Line	To Page	To Line	Comment	Response
36252	4	28	4	31	SPM 1.2: The box should be removed. The formulation is very problematic. To say that future warming will depend on future emissions is also redundant as future warming would not be a problem unless some warming had already happened. For example, if we did not already have 1 degree C warming, then a 0.5 degree C warming in the future would be of less consequence. Such statements open the door further to a complete dismissal of historical responsiblitly as a valid argument in understanding differential mitigation burdens. Also, the statment is supposed to be supported by a reference to Solomon, 2009, which does not actually say this. There are several issues with Box 1.2 as written: 1) Future warming will depend on cumulative emissions - including historical - not just future emissions. 2) Cumulative CO2 emissions are not reduced, just CO2 emissions are reduced by mitigation. 3) Is the mitigation of non-CO2 agents not important now? What is the last part of this sentence trying to say? [India]	Accepted. Text has been clarified to focus on warming commitment from past emissions, as appropriate to the background and context section of an SPM.
42842	4	28	4	31	Box 1.2 should clarify that mitigation of non-CO2 warming agents is essential to stay below 2ºC. ("Temperatures pass 2°C in nearly all scenarios in which non-CO2 warming continues to grow, and there is a high risk that temperatures will pass 1.5°C even with the most stringent CO2 mitigation considered in 1.5°C scenarios if non-CO2 warming agents are not strongly reduced (medium confidence; see also Section 2.3.1.2.2)." [2-20, L7–10].) SLCPs can avoid 0.6ºC of warming by mid-century and 1.2ºC of warming by 2100; comparatively, avoided warming of CO2 at 2100 is 1.6ºC if CO2 emissions peak at 2030 and 1.9ºC if CO2 emissions peak at 2020. Xu and Ramanathan (2017) "Well below 2 °C: Mitigation strategies for avoiding dangerous to catastrophic climate changes", Supporting information, Table S1. [Kristin Campbell, United States of America]	Rejected - not supported by the peer-reviewed published literature. Essential is not supported by the current literature.
42892	4	28	4	31	Box 1.2 should clarify that mitigation of non-CO2 warming agents is essential to stay below 2ºC. ("Temperatures pass 2°C in nearly all scenarios in which non-CO2 warming continues to grow, and there is a high risk that temperatures will pass 1.5°C even with the most stringent CO2 mitigation considered in 1.5°C scenarios if non-CO2 warming agents are not strongly reduced (medium confidence; see also Section 2.3.1.2.2)." [2-20, L7–10].) SLCPs can avoid 0.6ºC of warming by mid-century and 1.2ºC of warming by 2100; comparatively, avoided warming of CO2 at 2100 is 1.6ºC if CO2 emissions peak at 2030 and 1.9ºC if CO2 emissions peak at 2020. Xu and Ramanathan (2017) "Well below 2 °C: Mitigation strategies for avoiding dangerous to catastrophic climate changes", Supporting information, Table S1. [Durwood Zaelke, United States of America]	Rejected - not supported by the peer-reviewed published literature. Essential is not supported by the current literature.
43744	4	28	4	31	1.2 Future global warming will depend primarily on future cumulative CO2 emissions [with emissions of methane and black carbon soot contributing substantially]. As cumulative CO2 emissions are reduced under ambitious [ethical] mitigation scenarios, the mitigation of emissions of other climate warming agents becomes progressively more important, [though for 1.5C emissions of CO2 equivalent decline immediately (this report Figure 1.5 and IPCC RCP2.6 mean and higher probability and UN climate Secretariat May 2016 update INDCs Figure 2, footnote 4). Future global warming also depends on how early peek emissions are. In its assessments the IPCC only uses CO2 equivalent in its mitigation calculations and this should apply for this report. As shown by Figure 1.5 CO2 emissions for limiting to 1.5°C (more definitely for 1.5°C equilibrium) immediately (in fact from 2015)]. [Peter Carter, Canada]	Accepted. Text now clarifies relative roles of future CO2 and non-CO2 forcing, without listing components.
46122	4	28	4	31	Unclear what the underlying assumptions are. Reducing CO2 by phasing out coal power plants implies a reduction of sulphate aerosols as well, which will cause additional warming. Thus, it is not only a matter of geophysical warming commitment compensated by a decrease of CO2 due to uptake by the oceans and land. The report should make that clear [Netherlands]	Rejected - outside the scope of the chapter. Too much detail for an SPM - this is addressed in Chapter 1, Section 1.2.6
51318	4	28	4	31	There are several issues with 1.2 as written: 1) Future warming will depend on cumulative emissions - including historical - not just future emissions. 2) Cumulative CO2 emissions are not reduced, just CO2 emissions are reduced by mitigation. 3) Is the mitigation of non-CO2 agents not important now? What is the last part of this sentence trying to say? [Anand Patwardhan, United States of America]	Taken into account - text revised. Text has been clarified to focus on warming commitment from past emissions, as appropriate to the background and context section of an SPM.
52916	4	28	4	31	This a key statement but could be more quantitative. [Ireland]	Taken into account - text revised. Text has been clarified to focus on warming commitment from past emissions, as appropriate to the background and context section of an SPM.
54738	4	28	4	28	Future global warming makes this more ambiguous. If we achieve 1.5C, then the waming contribution from 2016 onwards may be not so linearly related to CO2, because non-CO2 might dominate? I don't know the answer, but might be worth reflecting if that is true strictly for future warming. [Glen Peters, Norway]	Accepted - text revised
58908	4	28	4	31	This statement is true in the large, but not in detail. It is important to balance the gross generalization with the balancing observation that, as carbon emissions approach zero, cumulative emissions near their peak and that non-CO2 greenhouse gases and aerosols play an increasingly important role. One of the major findings of the AR5 was that difficulty in reducing non-CO2 greenhouse gases was the most important factor driving carbon emissions negative to compensate. [United States of America]	Taken into account - text revised. Text has been clarified to focus on warming commitment from past emissions, as appropriate to the background and context section of an SPM.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
58910	4	28	4	32	True, but it also needs to be said that the effects of changes in the emissions of non-CO2 gases can be important in the near-term. For example, switching away from coal to natural gas and from sulfur-laden bunker fuels to low-sulfur bunker fuels is going to reduce the offsetting cooling influence of sulfate aerosols, and this would happen soon after these changes occur. The additional sentence that is needed here is that "Sharp, near-term reductions in emissions of these other climate warming agents would also be particularly helpful in slowing the near-term rate of warming for a few decades if sharp reductions in CO2 emissions happen to be delayed and to offset reductions in the aerosol cooling offset that result from early reductions in SO2 emissions." [United States of America]	Taken into account - text revised. Text has been clarified to focus on warming commitment from past emissions, as appropriate to the background and context section of an SPM.
62242	4	28	4	31	Key Message 1.2 states that “As cumulative CO2 emissions are reduced under ambitious mitigation scenarios, the mitigation of emissions of other climate warming agents becomes progressively more important.” At present, there is no supporting information or subpoint explaining this key message, and this should be added. For example, how much do other warming agents need to be reduced under ambitious scenarios to meet a 1.5C target? [Shaye Wolf, United States of America]	Taken into account - text revised. Text has been clarified to focus on warming commitment from past emissions, as appropriate to the background and context section of an SPM.
402	4	29	4	31	It is not correct to state that future global warming depending on only future cumulative emissions. Given long residence times of CO2 in the atmosphere, future warming also depends on historical cumulative emissions [Harald Winkler, South Africa]	Taken into account - text revised. Text has been clarified to be clear FUTURE warming depends on FUTURE emissions, with considerable literature support.
440	4	29			logical mistake: cumulative emissions will not be reduced under ambitious mitigation unless there are NEGATIVE emissions. Is that what you mean? [Thomas Stocker, Switzerland]	Accepted - text revised
11232	4	29	4	29	ambitious. Suggest another word is chosen as "ambitious" is subject to interpretation. [United Kingdom (of Great Britain and Northern Ireland)]	Accepted - text revised
19392	4	29	4	29	Please acknowledge in the headline statement that CO2 is not just reduced but phased out. Or phase out of net CO2 achieved. [Jennifer Morgan, Netherlands]	Accepted - text revised
29048	4	29	4	31	The statement that other GHGs become more important once CO2 emissions have been reduced is trivial and unrelated to the following bullet points. It is neither supported by 1.2.6 (=Definitions of warming commitment) nor by 2.3 (which might be explicitly 2.3.1.2.1+2, p. 2-31+ p.2-35 ?) Reference to entire chapters, such as 2.2., does not help identifying the source of the statement either. 2.2.2.3 treats, for instance, the role of non-CO2 GHGs and aerosols stating that measures to reduce CO2 emissions from coal plants simultaneously (in contrast to Box 1.2) reduce non-CO2 GHG in those emissions (line 40-44). However, additional efforts are necessary to reduce non-CO2 GHG emissions, e.g. CH4-emissions (p. 2-35 l. 30-38); none of the distinction in „scattering“ and “absorbing” aerosols with their contrasting effects on GHG climate (line 30-32) has made it to the main message box (only reductions of the „absorbing“ aerosols would be climate friendly). It would be more informative if Box 1.2 specified the „other climate warming agents“ instead of referring to chapters which treat also other (namely cooling) “agents”. P. 2-20 l. 1-10 and following might be the source of the second sentence in Box 1.2, although it contains again information that CH4 and black carbon are already considered in most mitigation pathways, whereas „N2O, sulphur hexafluoride and other halogenated carbon gases“ are underrepresented in current mitigation scenarios (see p. 2-35 l. 1-17). [Germany]	Accepted. Text now clarifies relative roles of future CO2 and non-CO2 forcing, without listing components.
29942	4	29	4	31	This sentence is not clear, and one has to read it several times to understand the meaning, as it is a complex sentence refering to reduction, mitigation, and on the other side "being more important". We suggest to replace mitigation with reduction and to add at the end of the sentence "for achieving 1.5°C". [France]	Accepted - text revised
49010	4	29	4	31	The statement concerning the role of 'other climate warming agents' incorrectly implies that they are less important at higher levels of cumultative carbon emissions and does not adequately a) indicate appropriately that the warming effect of non-CO2 gases has a significant effect on the carbon budget, as noted in 2.2.2.3 and elsewhere in the SPM; and b) adequately address the implication of non-CO2 gases and pollutants on temperature by mid-century in particular, as noted in 2.2.2.3, and the key role they can play in addressing temperature change in the near-term, as noted in 4.3.7. [David Waskow, United States of America]	Accepted. Text now clarifies relative roles of future CO2 and non-CO2 forcing, without listing components.
54740	4	29	4	29	As cumulative CO2 emissions are reduced would only be true if their were negative emissions? Perhaps you mean "limited" or "limited or reduced"? [Glen Peters, Norway]	Accepted. Reduced was the wrong word to use here. "Limited" is correct.
45750	4	3			Climate warming agents' ? I won't make any more editorial comments - there are too many corrections needed. This reflects the very early stage the SPM is at. [Mark Howden, Australia]	Accepted - text revised

Comment No	From Page	From Line	To Page	To Line	Comment	Response
46130	4	3	4	35	Incoherent names for non-CO2 drivers. In line 30 agents, in line 35 forcers. All thru the SPM. Suggestion to clearly define which non-CO2 drivers there are (direct climate Swarming gasses like methane, indirect forcers such as black carbon, coolers such as aerosols) and consequent use of one name for all and names for the different groups. See for instance also SPM-15 line 10 and SPM-17 line 4. Consistent categorization is needed. Note that underlying chapters 2 and 4 are also chaotic in this respect. In particular chapter 4. Also note that there is a very fundamental problem with lumping many species together under "SLCF" (Short-Liver Climate Forcers), or even the more neutral term non-CO2 warming agents. The SPM should make clear that (1) CH4 reductions in 1.5°C need to be accelerated compared to less stringent temperature limits (Figure 2.9: near-term mitigaion contributions from CH4 are larger for 1.5°C scenarios compared to less stringent scenarios, while the difference in the longer term seems to diminish), and that (2) BC shows no (statistically significant) difference between warming limits, not in the near term, nor in the long term, and therefore no useful contribution from BC is demonstrated for 1.5°C. Also no (additional) contribution will come from HFC reductions, given the fact that the "most feasible reductions" in Figure 2.9 are comparable to the levels for all temperature limits in 2030 and 2050. To stay close to evidence provided in the chapter, the authors should make the point in the SPM and Chapter 2 ES that even for scenarios that DO NOT OVERSHOOT 1.5°C, the peaking level of warming is reduced by CO2 measures, plus a bit from CH4, and NOT from other SLCFs, compared to higher limits of peak/return warming. This is confirmed by e.g. Chapter 2 SOD P31L23-24, P35L20-28 and other evidence elsewhere in the chapter. [Netherlands]	Accepted. Text now clarifies relative roles of future CO2 and non-CO2 forcing, without listing components.
46420	4	3	4	35	Incoherent names for non-CO2 drivers. In line 30 agents, in line 35 forcers. All thru the SPM. Suggestion to clearly define which non-CO2 drivers there are (direct climate Swarming gasses like methane, indirect forcers such as black carbon, coolers such as aerosols) and consequent use of one name for all and names for the different groups. See for instance also SPM-15 line 10 and SPM-17 line 4. Consistent categorization is needed. Note that underlying chapters 2 and 4 are also chaotic in this respect. In particular chapter 4. Also note that there is a very fundamental problem with lumping many species together under "SLCF" (Short-Liver Climate Forcers), or even the more neutral term non-CO2 warming agents. The SPM should make clear that (1) CH4 reductions in 1.5°C need to be accelerated compared to less stringent temperature limits (Figure 2.9: near-term mitigation contributions from CH4 are larger for 1.5°C scenarios compared to less stringent scenarios, while the difference in the longer term seems to diminish), and that (2) BC shows no (statistically significant) difference between warming limits, not in the near term, nor in the long term, and therefore no useful contribution from BC is demonstrated for 1.5°C. Also no (additional) contribution will come from HFC reductions, given the fact that the "most feasible reductions" in Figure 2.9 are comparable to the levels for all temperature limits in 2030 and 2050. To stay close to evidence provided in the chapter, the authors should make the point in the SPM and Chapter 2 ES that even for scenarios that DO NOT OVERSHOOT 1.5°C, the peaking level of warming is reduced by CO2 measures, plus a bit from CH4, and NOT from other SLCFs, compared to higher limits of peak/return warming. This is confirmed by e.g. Chapter 2 SOD P31L23-24, P35L20-28 and other evidence elsewhere in the chapter. [Netherlands]	Accepted. Text now clarifies relative roles of future CO2 and non-CO2 forcing, without listing components.
50378	4	3	4	3	Write: " … warming agents such as methane, halogenated gases, ozone precursors and aerosols, become ...". [Switzerland]	Accepted. Text now clarifies relative roles of future CO2 and non-CO2 forcing, without listing components.
52672	4	3	4	3	Consider changing "agents" to "drivers" or define agents [Iulain Florin VLADU, Germany]	Accepted. Text now clarifies relative roles of future CO2 and non-CO2 forcing, without listing components.
392	4	33	4	33	clarification is neede: {more than 0.2°C} is this 0.2° C per decade or what? [Nedal KATBEHBADER, Switzerland]	Accepted - text revised
1524	4	33	4	35	Is it really feasible to limit global mean warming to less than 0.2°C above present temperatures? (I doubt so). And is "more than 0.2°C" truly a definition of "substantial" warming? I suggest you reconsider this sentence. [David Wratt, New Zealand]	Accepted. Text now clarifies this refers to the entirely hypothetical scenario of a complete cessation of all emissions.
5446	4	33	4	37	The meaning of the hypothetical limit of geophysical posibility by only reducing emissions I expect will not be either clear or useful to the SPM reader. Suggest deleting this paragraph. [Haroon KHESHGI, United States of America]	Accepted. Text now clarifies this refers to the entirely hypothetical scenario of a complete cessation of all emissions. Role of past emissions committing to future warming is an important issue for many readers.
8988	4	33	4	33	Where do the 0.2°C come from? As mentioned two paragraphs earlier, until now we have experienced 1°C of global warming. 0.2°C beyond that would be 1.2°C. Why is such a limit discussed here? The topic is a limit of 1.5°C, isn't it? [Urs Neu, Switzerland]	Accepted - text revised. Discussion and references now provided in section 1.2.6
9166	4	33			Please change "0.2oC" to "0.2°C" [Marco Turco, Spain]	Accepted - text revised
9460	4	33	4	37	Why 0.2C warming is discussed? Is it a very newly proposed global goal? Editorial: 'global mean temperature' cannot WARM. [Russian Federation]	Accepted. Text now clarifies this refers to the entirely hypothetical scenario of a complete cessation of all emissions. Role of past emissions committing to future warming is an important issue for many readers.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
9540	4	33	4	34	Isn't it technically more accurate to say "may" be geophysically possible? Zeroing emissions today presumably includes zeroing our tropospheric aerosols that add 0.3C or more of cooling right now. So I thought from chapter 1 (page 21 line 13) that our best estimate was that this isn't actually geophysically possible. (Note, now looking at Richard's plot in Fig 1.6 and realizing that the distinction is whether one zeros CO2 and aerosols, or also the rest of the SLCF too; nonetheless, given the uncertainty on aerosol forcing, it would still strike me as more accurate to say "may" be possible.) [Douglas MacMartin, United States of America]	Accepted. Text now clarifies relative roles of future CO2 and non-CO2 forcing, without listing components.
10362	4	33	4	33	It is not clear with what respect to the "more than 0.2 °C" is concluded. More than the current 1 °C? [Hungary]	Accepted - text revised. Discussion and references now provided in section 1.2.6
11234	4	33	4	37	A much simpler formulation and phrasing could be used in this paragraph. Suggest turning it around: "it is geophysically [as opposed to?] possible to avoid further substantial warming but this depend on rates of...". Also, clarify "regional adjustment". What climate forcers are you referring to? Everything? GHGs? GHGs + aerosols? etc. It would also be useful to qualify 'beyond what is already experienced'? Does this imply 0.2 above the 1ºC stated in Line 18? [United Kingdom (of Great Britain and Northern Ireland)]	Accepted. Text now clarifies this refers to the entirely hypothetical scenario of a complete cessation of all emissions. Role of past emissions committing to future warming is an important issue for many readers.
14206	4	33	4	33	What is the meaning and threshold of "substancial global mean warming"? and why 0.2C [United Republic of Tanzania]	Accepted - text revised. Discussion and references now provided in section 1.2.6 - word "substantial" has been removed.
15438	4	33	4	35	Suggest replace first sentace with "The rate of global warming depends on the rate of emission reductions" [Australia]	Taken into account - text revised. Text has been deleted.
15440	4	33	4	37	This paragraph very unclear. 'Reductions of emissions' is then followed by 'cessation', which is different. Furthermore not clear where the 0.2C threshold for defining 'substantial warming' is obtained from. Should it be 2.0C? [Australia]	Accepted. Text now clarifies this refers to the entirely hypothetical scenario of a complete cessation of all emissions. Role of past emissions committing to future warming is an important issue for many readers.
18854	4	33	4	37	This paragraph, and in particular the reference to 'regional adjustment', is not clear. Please reformulate. [Andrea TILCHE, Belgium]	Accepted. Reference to regional adjustment has been deleted.
18856	4	33	4	37	The bullet states that some regions would warm more than others, even in a scenario that avoids substantial global mean warming, but does not provide indications as to which regions/why. [Andrea TILCHE, Belgium]	Accepted. Reference to regional adjustment has been deleted.
21604	4	33	4	34	This statement could be more coherent. It would seem to say that avoiding a further warming in excess of 0.2 degrees could come from "rates of reductions". This suggests that also decisively less complete emission reductions than a total cessation might keep the future warming under 0.2 degrees. [Sweden]	Accepted. Text now clarifies relative roles of future CO2 and non-CO2 forcing, without listing components.
29050	4	33	4	37	Language needs to be improved in order to be more comprehensible for decision-makers. [Germany]	Noted
36254	4	33	4	35	Obviously avoiding *any* further warming will depend on the rate of reduction of emissions - so what more is this statement trying to say? [India]	Taken into account - text revised. Text has been deleted.
40532	4	33	4	35	This statement is ambiguous and obscure. It needs clarification and rewriting. Also, the font and temperature unit have the wrong format. For instance, on Line 33, the text actually refers to "warming rate", not "warming". Therefore, it should read "(warming rate of more than 0.2 ºC per decade)". In addition, the passage "beyond what is already experienced" is rather confusing and needs clarification/rewriting. [Sergio Henrique Faria, Spain]	Taken into account - text revised. Text has been deleted.
42844	4	33	4	37	It is unclear what is meant by “avoiding substantial global mean warming (more than 0.2ºC) beyond what is already experienced is geophysically possible…”. Where does the 0.2ºC come from? What is it in relation to? Figure 1.6 suggests that holding warming under 0.2ºC above 2020 temperatures would require zero CO2 emissions and constant non-CO2 forcing or zero emissions. [Kristin Campbell, United States of America]	Accepted. Text now clarifies this refers to the entirely hypothetical scenario of a complete cessation of all emissions. Role of past emissions committing to future warming is an important issue for many readers.
42894	4	33	4	37	It is unclear what is meant by “avoiding substantial global mean warming (more than 0.2ºC) beyond what is already experienced is geophysically possible…”. Where does the 0.2ºC come from? What is it in relation to? Figure 1.6 suggests that holding warming under 0.2ºC above 2020 temperatures would require zero CO2 emissions and constant non-CO2 forcing or zero emissions. [Durwood Zaelke, United States of America]	Accepted. Text now clarifies this refers to the entirely hypothetical scenario of a complete cessation of all emissions. Role of past emissions committing to future warming is an important issue for many readers.
43746	4	33	4	37	Avoiding substantial global mean warming [with a very high probability] (more than 0.2°C) beyond what is already experienced is geophysically possible, but depends on [immediate peaking to decline] rates of reductions in emissions of climate forcers. There would be a regional adjustment following a cessation of emissions [(yes the must be cessation of fossil fuel emissions)], such that some regions would warm even if the global mean temperature does not (high 37 confidence). (Figure SPM1) {1.2.6, 2.2, 2.3} 38 39 [Peter Carter, Canada]	Accepted. Text now clarifies this refers to the entirely hypothetical scenario of a complete cessation of all emissions. Role of past emissions committing to future warming is an important issue for many readers.
44640	4	33	4	33	Does this mean global mean warming above pre-industrial levels of 1.2C? Could be stated more clearly. [Penny Urquhart, South Africa]	Accepted - text revised. Discussion and references now provided in section 1.2.6
45748	4	33			Is 'substantial global warming' (especially with 0.2C more than current temperatures) a defined term ? [Mark Howden, Australia]	Accepted - text revised. Substantial is no longer used here.
45882	4	33	4	33	It is not clear what 0.2oC refers to, based on what exactly? [Deger Saygin, Turkey]	Accepted - text revised. Discussion and references now provided in section 1.2.6
46124	4	33	4	35	(and/or editorial?). This sentence is unclear, as it does not lay out what reductions in (emissions of?) climate forcers would do the job of not exceeding 1.2C. Given inertia of the climate system this seems highly unlikely and also assessemnt of so-called 'committed climarte change' suggest this does not look convincing. [Netherlands]	Taken into account - text revised. Text has been deleted.
51320	4	33	4	35	Obviously avoiding *any* further warming will depend on the rate of reduction of emissions - so what more is this statement trying to say??? [Anand Patwardhan, United States of America]	Taken into account - text revised. Text has been deleted.
52686	4	33	4	33	Not clear how 0.2 degree is defined as "substantive" global warming. [Iulain Florin VLADU, Germany]	Accepted - text revised. Discussion and references now provided in section 1.2.6 - word "substantial" has been removed.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
52918	4	33	4	37	Rework for clarity [Ireland]	Accepted - text revised
53194	4	33	4	33	Substitute 0.2oC by 0.2ºC [Maria-Carmen Llasat, Spain]	Editorial - copyedit to be completed prior to publication
54240	4	33	4	33	First sentence has something missing: Should it be 0.2C per decade? [David Warrilow, United Kingdom (of Great Britain and Northern Ireland)]	Taken into account - text revised. Clarified
56928	4	33	4	35	This sentence reads as if all "climate forcers" lead to warming; it should be redrafted to reflect the fact that some "climate forcers" are cooling, eg sulphate particles. Alternatively the phrase used lower down,"non CO2 warming agents", might do as a clearer equivalent. [Oliver Morton, United Kingdom (of Great Britain and Northern Ireland)]	Accepted. Text now clarifies relative roles of future CO2 and NET non-CO2 forcing, without listing components.
58234	4	33	4	33	Is "0.2 C" correct? [Peter Marcotullio, United States of America]	Accepted - text revised. Discussion and references now provided in section 1.2.6
58912	4	33	4	37	Where did the 0.2°C come from? It is clearly not 1.5°C, so do not bring it up in SPM. [United States of America]	Accepted. Text now clarifies this refers to the entirely hypothetical scenario of a complete cessation of all emissions. Role of past emissions committing to future warming is an important issue for many readers.
62238	4	33	4	37	The statement that “Avoiding substantial global mean warming (more than 0.2C) beyond what is already experienced is geophysically possible, but depends on rates of reductions in emissions of climate forcers” must be qualified by providing the scale of the “rates of reduction” needed, to adequately inform policy-makers. [Shaye Wolf, United States of America]	Accepted. Text now clarifies this refers to the entirely hypothetical scenario of a complete cessation of all emissions. Role of past emissions committing to future warming is an important issue for many readers.
6860	4	34	4	34	It is suggested to insert "now" after "experienced". It is noted that the 0.2oC is significantly lower than the 0.4oC communicated in earlier assessment reports of the IPCC. It is suggested to highlight this change and provide some explanation also in the SPM. [Klaus Radunsky, Austria]	Accepted. Text now clarifies this refers to the entirely hypothetical scenario of a complete cessation of all emissions. Figure of 0.2C has now been deleted. Role of past emissions committing to future warming is an important issue for many readers.
9030	4	34	4	34	The figure of 0,2°C is insignificantly different from the 0,4°C in the IPCC AR5. Please add a short explanation into the SPM why this figure has changed. [Luxembourg]	Accepted. Text now clarifies this refers to the entirely hypothetical scenario of a complete cessation of all emissions. Figure of 0.2C has now been deleted. Role of past emissions committing to future warming is an important issue for many readers.
15442	4	34			Suggest you may want to indicate that we have already committed certain amount warming, but that is different from the high level message of this point as written now. [Australia]	Taken into account - text revised. Commitment is clarified in A2 and sub-bullets
63036	4	34	4	34	Please clarify the meaning of "geophysically possible" [Belgium]	Accepted - text revised
393	4	35	4	35	to replace: "climate forcers" by "Green House Gases", this will be more clear and undersatndable. [Nedal KATBEHBADER, Switzerland]	Rejected - not supported by the peer-reviewed published literature. Statement includes impact of aerosols.
394	4	35	4	35	to replace: "cessation" by " reduction". [Nedal KATBEHBADER, Switzerland]	Rejected - not supported by the peer-reviewed published literature. Ending global warming requires a cessation of CO2 emissions, not just a reduction.
8990	4	35	4	37	A) The message of Figure SPM 1 is not clear. The information given in this figure does not or only partly correspond to the text in the paragraphs that refer to this figure. B) SPM Figures should be much easier to read and understand. Although it is tempting to pack as much information into a figure as possible, however, the message should be understood by non-expert readers. Figure SPM 1 is much too complicated. Recommendations: 1) Omit different climate responses and corresponding legend box and just show the range of sensitivities (no legend needed); 2) Show either emissions or radiative forcing for both CO2 and non-CO2 (the addition of emissions and forcing is very difficult to understand). Furthermore it is not clear at all, why the CO2 emission path E2060, which is more or less constantly above the emissions of the 'Representative "below 2°C" scenarios would lead to a warming of 1.5°C only. [Urs Neu, Switzerland]	Accepted - text revised. Figure has been clarified.
29944	4	35	4	35	Harmonizing wording between "climate forcers" and "climate warming agents" would make the reading easier. [France]	Accepted - text revised
36814	4	35	4	36	The statement needs further clarification. [CHI KEUNG TAM, Singapore]	Accepted - text revised
44788	4	35	4	37	I could not find the part in the text (Sections 1.2.6, 2.2, 2.3) correponding to the sentence "There would be a regional adjustment following a cessation of emissions, such that some regions would warm even if the global mean temperature does not (high confidence)." [Hiroaki Kondo, Japan]	Accepted. Comment on regional warming has now been deleted. Statement is clearly supported by the literature.
58914	4	35	4	36	does not what? It would seem that the phrase "change significantly" needs to be inserted at the end of the sentence. If some regions are going to warm, the global average temperature increase is going to increase unless there are also some regions experiencing less change. [United States of America]	Accepted. Comment on regional warming has now been deleted.
15444	4	39	4	44	Please assign a confidence level to this paragraph (as is done in other papragraphs in this section). [Australia]	Accepted - text revised. Reference to NDCs now made in Section C. Revised bullet refers simply to the hypothetical scenario of emissions continuing at their current rate.
18858	4	39	4	44	The bullet should give some quantified indication as to the incompatibility of the NDCs with both 1,5°C and 2°C pathways [Andrea TILCHE, Belgium]	Accepted - text revised. Reference to NDCs now made in Section C. Revised bullet refers simply to the hypothetical scenario of emissions continuing at their current rate.
19394	4	39	4	39	It's not just "deep reductions" that are needed, but phasing out emissions to net zero. "Cessation of emissions" is a term used in the previous para, and could perhaps be used here too. [Jennifer Morgan, Netherlands]	Taken into account - text revised. Cessation only required for cumulative pollutants.
29052	4	39	4	44	The statement is very vague ("higher"). Is it possible to be more precise about the relationship between current aggregate NDCs and necessary reductions, and add a confidence statement to that finding? In addition, please also state how the current NDCs relate to a 2C trajectory, as this is important in the context of "background". Such material can be found in chapter 2 and in CC Box 4.1 [Germany]	Accepted - text revised. Reference to NDCs now made in Section C. Revised bullet refers simply to the hypothetical scenario of emissions continuing at their current rate.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
33728	4	39	4	41	Please consider to explain in the SPM, either as a footnote or in Box SPM.1, the terms related to overshoot and its temporality. The terms "overshoot", "temperature overshoot", "Threshold return budget" and "temporary overshoot" are currently used in the SPM in a similar manner, in the glossary overshoot covers not only temperature, but also emissions and concentrations. This may lead to misunderstandings and please consider to use one easy understandable term more consistently e.g. "temperature overshoot" or "temporary overshoot" both in the report and the glossary. [Norway]	Accepted - text revised. Meaning of overshoot and 1.5C consistent pathways is now clarified in definitions box.
37422	4	39	4	41	Introducing the notion of overshoot and return, without stating what this requires physically is inadequate: Suggest to at least insert a half-sentence: "...even with a temporary overshoot and later return to 1.5°C warming, which would require greenhouse gas removals to exceeded residual emissions in the second half of the century." [Matthias Honegger, Germany]	Accepted - text revised. Meaning of overshoot and 1.5C consistent pathways is now clarified in definitions box.
38450	4	39	4	44	The term "over shoot" is used for the first time without any prior reference. I would introduce the term in Box 1 since it plays a major role in conveying the urgency of the subject matter through the complete report. [Linah Ababneh, United States of America]	Accepted - text revised. Meaning of overshoot and 1.5C consistent pathways is now clarified in definitions box.
43740	4	39	4	44	• Limiting global mean warming to 1.5°C would require rapid [(immediate time-frame)] and deep reductions in greenhouse gas emissions, even with [accidental] temporary overshoot and later return to 1.5°C warming. The Nationally Determined Contributions (NDCs) submitted under the Paris Agreement will result, in aggregate, in global greenhouse gas emissions in 2030 that are [substantially] higher than those in scenarios compatible with limiting global warming to 1.5oC by 2100 [and equilibrium (Climate Action Tracker and UN climate Secretariat update of INDCs May 2016 just up to 2100). They are projected to lead to a surface warming of over 3°C by 2100, which would most likely increase further after 2100. Climate Action Tracker] [Peter Carter, Canada]	Accepted - text revised. Reference to NDCs now made in Section C. Revised bullet refers simply to the hypothetical scenario of emissions continuing at their current rate.
44050	4	39		4	As comment 5, change to "rapid and deep reductions towards net-zero by latest mid century....." [Stephan Singer, Belgium]	Taken into account - text revised. Timing of net-zero emissions addressed in Section C of SPM
43748	4	39	4	44	• Limiting global mean warming to 1.5°C would require [immediate] rapid and deep reductions in greenhouse gas emissions, even with a temporary [accidental] overshoot and later return to 1.5°C warming. The Nationally Determined Contributions (NDCs) submitted under the Paris Agreement will result, in aggregate, in global greenhouse gas emissions in 2030 that are [substantially (UN climate Secretariat May 2016 update of INDCs)] higher than those in scenarios compatible with limiting global warming to 1.5oC by 2100 [and a projected to lead to a warming by 2100 of over 3° C (which would be much higher to equilibrium after 2100]. [Peter Carter, Canada]	Accepted - text revised. Reference to NDCs now made in Section C. Revised bullet refers simply to the hypothetical scenario of emissions continuing at their current rate.
46126	4	39	4	4	rapid and deep reductions is very qualitative; need for quantification [Netherlands]	Rejected - outside the scope of the chapter. Quantitative goals addressed in section C
46128	4	39	4	44	Maybe this could be moved up to the introduction? [Netherlands]	Accepted - text revised. Reference to NDCs now made in Section C. Revised bullet refers simply to the hypothetical scenario of emissions continuing at their current rate.
52920	4	39	4	44	Rework for clarity, what is the level of overshoot? [Ireland]	Accepted - text revised. Meaning of overshoot and 1.5C consistent pathways is now clarified in definitions box. Level of overshoot is addressed in section C.
54242	4	39	4	39	Would be useful to say quantitiatively what the deep reduction envisaged is - eg 50% by 20XX [David Warrilow, United Kingdom (of Great Britain and Northern Ireland)]	Rejected - outside the scope of the chapter. Quantitative goals addressed in section C
56930	4	39	3	41	On the same basis as discussed for previous changes (eg page 3 line 16) there needs to be a caveat here because of the possibility of albedo modification. I would suggest inserting "…warming to 1.5C without recourse to large-scale albedo modification would require…" [Oliver Morton, United Kingdom (of Great Britain and Northern Ireland)]	Taken into account - text revised. Role of albedo modification is clarified in Section C of SPM.
58916	4	39	4	41	Reverse sentences to state: "Even allowing for a temporary overshoot and eventual return to 1.5°C, limiting the average increase in the global average temperature to 1.5°C over the 21st century is going to require rapid and deep reductions in greenhouse gas emissions." [United States of America]	Accepted - text revised. Meaning of overshoot and 1.5C consistent pathways is now clarified in definitions box.
6862	4	4	4	4	Lack of clarity. The following wording is suggested: .., even when allowing for a temporary overshoot and …. [Klaus Radunsky, Austria]	Accepted - text revised. Meaning of overshoot and 1.5C consistent pathways is now clarified in definitions box.
18860	4	4	4	44	Also mention what trajectories the DNCs are mostly compatable with- to give an indication of the distance to 1.5 degree. [Andrea TILCHE, Belgium]	Accepted - text revised. Reference to NDCs now made in Section C. Revised bullet refers simply to the hypothetical scenario of emissions continuing at their current rate.
36816	4	4	4	4	Was there any study or simulation to show the value of this overshoot and its projected impact? [CHI KEUNG TAM, Singapore]	Accepted - text revised. Meaning of overshoot and 1.5C consistent pathways is now clarified in definitions box. Implications of overshoot are addressed in section B.
50380	4	4	4	4	Write: "… even with a temporary (e.g. 10 or 20 years) overshoot …". [Switzerland]	Accepted - text revised. Meaning of overshoot and 1.5C consistent pathways is now clarified in definitions box.
442	4	41	4	43	This policy-relevant statement would deserve to be elevated to a Headline Statement [Thomas Stocker, Switzerland]	Noted
5448	4	41	4	44	This is an important topic to cover in the SPM but: No confidence level is given for this conclusion, and no probability of meeting 1.5 is specified. And it is difficult finding comparitive numbers for NDCs through 2010-2030 (given in chaper 4) that can be compared to budget 2010-2100 in the underlying text (and in the SPM table1). Suggest that this be clearly traceable and that confidence and probability be given (50 Vs 66%). It would seem that this should be drawing from the interchapter box 4.1 moreso than the sections referenced and it would be good to harmonize this statement with that box. [Haroon KHESHGI, United States of America]	Accepted - text revised. Reference to NDCs now made in Section C. Revised bullet refers simply to the hypothetical scenario of emissions continuing at their current rate.

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9080	4	41	4	43	This phrasing is very vague. It would be better to indicate that the NDCs would result in a temperature rise of around 3°C. And the risks of such an increase should be indicated. [Frédéric Durand, France]	Rejected - not supported by the peer-reviewed published literature. NDCs only refer to emissions to 2030, so do not themselves determine peak warming.
15446	4	41	4	44	This is a critical sentence but is very hard to understand. Why is the 2030 date highlighted for emissions in particular? Does this mean that cumulative emissions between now and 2030 will preclude 1.5C being achievable? Nowhere is there given an estimate on the size of the cuts beyond the Paris Agreement that would be needed to achieve 1.5C, only that they are 'insufficient'. [Australia]	Accepted - text revised. Reference to NDCs now made in Section C. Revised bullet refers simply to the hypothetical scenario of emissions continuing at their current rate.
17868	4	41	4	43	which level of warming would the NDCs lead to? Or which budget is associated with the NDCs? UNFCCC has done some analysis of that [Brigitte Knopf, Germany]	Rejected - not supported by the peer-reviewed published literature. NDCs only refer to emissions to 2030, so do not themselves determine peak warming.
18862	4	41	4	43	The current text is very vague. Please be more specific how much a global emissions scenarios compatible with the NDC contributions under the Paris Agreement would exceed a 1.5 °C warming. For example, are we talking about 1.6 °C or 3.6 °C warming ? [Andrea TILCHE, Belgium]	Rejected - not supported by the peer-reviewed published literature. NDCs only refer to emissions to 2030, so do not themselves determine peak warming.
19396	4	41	4	43	Please use a much more understandable and clear expression here, when assessing the adequacy of the NDC against the 1.5°C goal and 2°C. The UNEP Emission Gap Report 2017 (Executive summary) contains the following conclusion: "Looking beyond 2030, it is clear that if the emissions gap is not closed by 2030, it is extremely unlikely that the goal of holding global warming to well below 2°C can still be reached. Even if the current NDCs are fully implemented, the carbon budget for limiting global warming to below 2°C will be about 80 percent depleted by 2030. Given currently available carbon budget estimates, the available global carbon budget for 1.5°C will already be well depleted by 2030." The clarity of the statement in the SPM needs to be, at least, on this level, to be relevant for policymakers. [Jennifer Morgan, Netherlands]	Accepted - text revised. Reference to NDCs now made in Section C. Revised bullet refers simply to the hypothetical scenario of emissions continuing at their current rate.
29946	4	41	4	43	This statement is weak and not so easily understandable. We would suggest using the sentence from 1.2 (Chapter 1, p9) instead and add "even if fully implemented", as the implementation of NDC is key to limiting global warming. The sentence would read as : "The current NDCs, even if fully implemented, are not ambitious enough to secure the 1.5°C warmer world and are instead tracking toward a warming of 3–4°C above preindustrial temperatures by 2100" [France]	Rejected - not supported by the peer-reviewed published literature. NDCs only refer to emissions to 2030, so do not themselves determine peak warming.
32794	4	41	4	43	The Nationally Determined Contributions (NDCs) submitted under the Paris Agreement will result, in aggregate, in global greenhouse gas emissions in 2030 that are higher than those in scenarios compatible with limiting global warming to 1.5oC by 2100. This is vitally important, and raises questions that underlie the whole of the report,There needs to be mention that the challenge is addressed in the later sections of the Report. [Philip Lloyd, South Africa]	Accepted - text revised. Reference to NDCs now made in Section C. Revised bullet refers simply to the hypothetical scenario of emissions continuing at their current rate.
33730	4	41	4	43	Please be precise about what NDCs this refers to, e.g. NDCs from a specific year in orther to separate them from upcoming NDCs. [Norway]	Accepted - text revised. Reference to NDCs now made in Section C. Revised bullet refers simply to the hypothetical scenario of emissions continuing at their current rate.
33732	4	41	4	44	Please consider to quantify how large GHG emissions are in 2030 from the the current NDCs, and specify which NDCs you refer to in order to prevent misunderstandings when new NDCs emerge. Information regarding the NDCs is explained in Ch. 2 Executive Summary, page 5, line 19-20, and also in Ch. 2 FAQ, page 116, line 18-22. We propose that this information are to be coupled toghether with appropriate findings for 1.5°C and 2°C from Ch 2 e.g. in Section SPM 3.3. [Norway]	Accepted - text revised. Reference to NDCs now made in Section C. Revised bullet refers simply to the hypothetical scenario of emissions continuing at their current rate.
34798	4	41	4	43	Where it says 'Nationally Determined Contributions (NDCs) submitted under the Paris Agreement will result, in aggregate, in global greenhouse gas emissions in 2030 that are higher' - this is not very specific or informative as it does not describe the trajectory we are on now. It would be more informative to policy makers to cite the research from Section 1.1.1. (Rogelj et al., 2016; UNFCCC, 2016) which states that we are 'tracking toward a warming of 3–4°C above preindustrial temperatures by 2100' [Helena Wright, United Kingdom (of Great Britain and Northern Ireland)]	Accepted - text revised. Reference to NDCs now made in Section C. Revised bullet refers simply to the hypothetical scenario of emissions continuing at their current rate.
36256	4	41	4	43	How much higher? That makes it more policy relevant - otherwise this is not very helpful. The extent of gap between target and aggregated estimates of NDCs may also be added. [India]	Accepted - text revised. Reference to NDCs now made in Section C. Revised bullet refers simply to the hypothetical scenario of emissions continuing at their current rate.
46132	4	41	4	41	Add 'currently' after '…Contributions (NDCs) [currently] submitted…' [Netherlands]	Accepted - text revised. Reference to NDCs now made in Section C. Revised bullet refers simply to the hypothetical scenario of emissions continuing at their current rate.
51322	4	41	4	43	How much higher? That makes is more policy relevant - otherwise this is not very helpful. [Anand Patwardhan, United States of America]	Accepted - text revised. Reference to NDCs now made in Section C. Revised bullet refers simply to the hypothetical scenario of emissions continuing at their current rate.
58634	4	41	4	43	The NDCs submitted under the Paris Agreement will result in … --> "The initial NDCs currently submitted under the Paris Agreement WOULD result in..." [New Zealand]	Accepted - text revised. Reference to NDCs now made in Section C. Revised bullet refers simply to the hypothetical scenario of emissions continuing at their current rate.

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58918	4	41	4	43	This sentence needs a qualifying phrase up front then a few revisions to read: "Unless a suitable combination of as yet unproven Carbon Dioxide Removal and Solar Radiation Management technologies can be suitably scaled up over the next few decades, the Nationally Determined Contributions (NDCs) submitted under the Paris Agreement will result, in aggregate, in global greenhouse gas emissions by 2030 that are higher than those in scenarios compatible with limiting average global warming over the 21st century to 1.5 C." Note that this revision makes clearer that it is cumulative emissions by 2030 (not emissions in 2030) that commit the world to the inevitable warming – and that, given the warming calculation in this report considers the 30-year running mean, one might as well focus the discussion on the average global warming over the century rather than the warming in what is said to be a particular year (2100) which really means the last couple of decades of the century. [United States of America]	Accepted - text revised. Reference to NDCs now made in Section C. Revised bullet refers simply to the hypothetical scenario of emissions continuing at their current rate.
62240	4	41	4	44	The SPM states that the NDCs will result in GHG emissions incompatible with limiting warming to 1.5C by 2100: “The Nationally Determined Contributions (NDCs) submitted under the Paris Agreement will result, in aggregate, in global greenhouse gas emissions in 2030 that are higher than those in scenarios compatible with limiting global warming to 1.5oC by 2100.” The SPM, and SOD more generally, should specify that current NDC pledges and current climate policy would greatly exceed a 1.5C target. For example, Climate Action Tracker estimates that NDC pledges would lead to 3.2°C on average of warming, while current policies would lead to 3.4°C of warming. See http://climateactiontracker.org/ [Shaye Wolf, United States of America]	Accepted - text revised. Reference to NDCs now made in Section C. Revised bullet refers simply to the hypothetical scenario of emissions continuing at their current rate. Note that Climate Action Tracker estimates contain a high level of post-2030 extrapolation.
395	4	42	4	42	to add after agreement: " by the end of 2017" [Nedal KATBEHBADER, Switzerland]	Not Applicable - no longer included in the chapter. Comment misplaced?
5422	4	42			The carbon budget for any (50%? 66? unclear) chance of staying below 1.5C is, at current emission rates, used up in year 2030. Earlier (line 16) it is said that 1.5C will, at current warming rates, be reached in the 2040s. Different timings have to be explained, considering that according to page 9, line 24, there is no substantial committed warming. [Andreas Oschlies, Germany]	Taken into account - text revised. Timing of net-zero emissions addressed in Section C of SPM, which also emphasises uncertainties in the carbon budget.
18864	4	43	4	43	It is an understatement and may be also misleading. Pledges are far from sufficient even for 2 degrees. [Andrea TILCHE, Belgium]	Accepted - text revised. Reference to NDCs now made in Section C. Revised bullet refers simply to the hypothetical scenario of emissions continuing at their current rate. Note that Climate Action Tracker estimates contain a high level of post-2030 extrapolation.
32906	4	43	4	43	Can "higher than those scenarios" be quantified? It would be helpful for readers to understand how large the difference is between NDC pledged levels and a 1.5°C trajectory. [Thomas Damassa, United States of America]	Accepted - text revised. Reference to NDCs now made in Section C. Revised bullet refers simply to the hypothetical scenario of emissions continuing at their current rate. Note that Climate Action Tracker estimates contain a high level of post-2030 extrapolation.
52688	4	43	4	43	Scenarios with NDCs being higher than those compatable with 1.5 degrees is kind of weak statemement as they are compatable with scenarios with much higher level of warming than 1.5 and 2 degrees. Suggest to explain this here. [Iulain Florin VLADU, Germany]	Accepted - text revised. Reference to NDCs now made in Section C. Revised bullet refers simply to the hypothetical scenario of emissions continuing at their current rate. Note that Climate Action Tracker estimates contain a high level of post-2030 extrapolation.
4256	4	44	4	44	...higher than those in scenarios an effort should be made to be more quantitative: how much higher? [Abanades Carlos, Spain]	Accepted - text revised. Reference to NDCs now made in Section C. Revised bullet refers simply to the hypothetical scenario of emissions continuing at their current rate. Note that Climate Action Tracker estimates contain a high level of post-2030 extrapolation.
43730	4	44	4	44	Add: [Instead of declining or stabilizing essential assessment data shows acceleration of global surface warming, atmospheric carbon dioxide, ocean acidification, ocean heat content, with the rapid increase in atmospheric methane and increase in ocean deoxygenation.The essential background also includes evidence for failing terrestrial carbon sinks from tropical rainforests being a carbon source, and Arctic tundra switched from carbon sink to carbon source. (Data from NASA GISS, NOAA, Stateofourclimate.com] [Peter Carter, Canada]	Taken into account - text revised. Context included to the extent consistent with overall length requirements
36270	5				There are no key messages regarding costs and feasibility of adaptation under 1.5 degree C vs 2 degree C, or regarding implications for loss & damage? [India]	Taken into account. Text revised to provide this information, but most of this information is contained in B6.3
51332	5				There are no key messages regarding costs and feasibility of adaptation under 1.5 vs 2 C, or regarding implications for loss & damage? [Anand Patwardhan, United States of America]	Taken into account. Text revised to provide this information, but most of this information is contained in B6.3
55804	5		5		1.3 mentions mitigation and adaptation options, but there is no reference in the bullets to 4.3, where these are listed by system transitions. [Debora Ley, Guatemala]	Taken into account - text revised. Bullet rewritten and split into multiple bullets, with attribution to specific sections
58920	5	1	5	25	Some words need replacing. What is the "mortality" of species and ecosystems? Do you mean extinction? Which applies only to the former. [United States of America]	Taken into account - text revised. Mortality removed
79	5	2	5	6	Highlight that these risks are lower when compared to the 2-degree warming. In an effort to streamline the main messages of the report, you can highlight here who wins and who loses from adopting a 1.5-degree objective. [Guillermo Montt, Switzerland]	Taken into account - text revised. New text contrasts 1.5 vs. 2 degrees, and therefore considers this point.
147	5	2	5	2	This headline says everything and thus nothing. It needs to be much more pointed. The subsequent bullets are also too general but the theme of overshoot could be a focus in those as well as the headline. [Michael Oppenheimer, United States of America]	Taken into account - text revised. Bullet rewritten and split into multiple bullets, some of which focus more on overshoot

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444	5	2	5	3	The most important point is not mentioned upfront: global mean +1.5°C means regionally different warming. This is an example of an unwieldy sentence for what should be a crisp Headline Statement. You could start, e.g., by saying: "At 1.5°C global warming, many regions will be exposed to much stronger warming and associated climate change impacts.", and then go on with the other points you wish to make. [Thomas Stocker, Switzerland]	Taken into account - text revised. Text revised to indicate the dependence of the impacts, risks and vulnerability depend on many things.
6074	5	2	5	6	This is a very good contextual statement. Such a statement is lacking in the ES of Chapter 3, and very much needed there too. [Timothy Carter, Finland]	Taken into account - text revised. Chapter 3 text substantially revised to include background.
11236	5	2	5	6	How much of this box is specific to 1.5°C? It looks as though much of this could be applicable to 2°C. [United Kingdom (of Great Britain and Northern Ireland)]	Taken into account - text revised. New text contrasts 1.5 vs. 2 degrees, and therefore considers this point.
18866	5	2	5	6	The box mentions that impacts at 1,5°C depend on adaptation and mitigation options. However, it fails to mention that limiting warming (and its impacts) to 1,5°C in the first place depends on mitigation actions. Mitigation influences impacts not only through the choice of techniques, but also by avoiding marginal warming in the first place. [Andrea TILCHE, Belgium]	Taken into account - text revised. New text contrasts 1.5 vs. 2 degrees, and therefore considers this point.
18868	5	2	5	6	The message of the box needs to be clarified. At present it reads that risks at 1.5°C warming depend (inter alia) on the choice of mitigation options. While true, this misses the point that the temperature outcome itself depends on mitigation options. As with the high-level statement (p3 29-34), the box is also misleading by mentioning the sustainable development risks of climate action that is poorly chosen/implemented and skipping over the important point that action has to be undertaken to mitigate the impacts of climate change. [Andrea TILCHE, Belgium]	Taken into account - text revised. New text contrasts 1.5 vs. 2 degrees, and therefore considers this point.
29054	5	2	5	6	Headline Statement 1.3 is very generic and would, as such, be true for all levels of warming. For a headline statement in this context (Background), we'd rather expect a statement along the lines of AR5WGII's central finding: "In recent decades, changes in climate have caused impacts on natural and human systems on all continents and across the oceans.", followed by a clear statement that impacts will worsen with 1.5C warming, followed then by the current text about risks depending on a range of different factors. In addition, please specify "development pathway" (socio-economic development pathway?) [Germany]	Taken into account - text revised. New text contrasts 1.5 vs. 2 degrees, and therefore considers this point.
36258	5	2	5	6	SPM 1:Remove the words 'development pathways'. Choice of development pathways is dynamic. While some inertia to change can be expected in each case, the understanding of development pathways (even if multiple pathways are considered) as internally static and consistent may be a problem. (Reference is difficult to find) [India]	Taken into account - text revised. The development pathways language was heavily modified in the new text, as the bullet points are expanded. But we continue to use the term in the SPM, and we hope that the revised text clarifies what is meant by this term.
36260	5	2	5	5	Risks depend on these factors for *any* level of warming - so what is the policy relevant message from this statement? The central question (which is not answered) in the headline statement is some (quantified) assessment of risk at 1.5 degree C relative to 2 degree C. [India]	Taken into account - text revised. New text contrasts 1.5 vs. 2 degrees, and therefore considers this point.
43750	5	2	5	6	At 1.5°C global warming, the risks to natural, managed and human systems [are very high depending] on development pathways, levels of vulnerability, on the choices of adaptation and mitigation options, on the occurrence of overshoot above 1.5°C, and their different implications at regional scales. Adaptation and mitigation measures also have consequences for sustainable development [if BECCS is used]. [Peter Carter, Canada]	Taken into account - text revised. Bullet rewritten and split into multiple bullets
46134	5	2	5	6	a comparison with impacts of 2 degrees is missing [Netherlands]	Taken into account - text revised. New text contrasts 1.5 vs. 2 degrees, and therefore considers this point.
51324	5	2	5	5	Risks depend on these factors for *any* level of warming - so what is the policy relevant message from this statement? The central question (which is not answered) in the headline statement is some (quantified) assessment of risk at 1.5 C relative to 2 C. [Anand Patwardhan, United States of America]	Taken into account - text revised. New text contrasts 1.5 vs. 2 degrees, and therefore considers this point.
54568	5	2	5	6	1.3 not clear- the statements are general and hold true for other levels of warming-reword or take 1.5 out? [Reinhard Mechler, Austria]	Taken into account - text revised. New text contrasts 1.5 vs. 2 degrees, and therefore considers this point.
55518	5	2	5	6	This paragraph is not very informative. The same could be said on 2D global warming. Might be good to reinforce the differences between 1.5 and 2D. [Maryse Labriet, Spain]	Taken into account - text revised. New text contrasts 1.5 vs. 2 degrees, and therefore considers this point.
56486	5	2	5	5	this highlight is far too long and difficult to understand. [Eleanor Johnston, United States of America]	Taken into account - text revised. Bullet rewritten and split into multiple bullets.
58922	5	2	5	5	This sentence construction can be read to say "the risks to natural, managed, and human systems depend on their different implications at regional scales." This doesn't make sense. Please be more precise. [United States of America]	Taken into account - text revised. Bullet rewritten and split into multiple bullets.
58924	5	2	5	2	The phrasing of this sentence implies that all risks to natural, managed, and human systems are related to climate change. It could be reformulated to "The risks of 1.5°C of global warming to natural, managed, and human systems depend..." to avoid misinterpretation. [United States of America]	Taken into account - text revised. New text contrasts 1.5 vs. 2 degrees, and therefore considers this point.
62244	5	2	5	6	Key Message 1.3 is too vague to be informative. The important "high confidence" subpoint on lines 11-15, which flags the higher risk of irreversible impacts in an overshoot scenario, should be added into the text of Key Message 1.3: "Many impacts are different in a world where global warming is limited to 1.5°C compared to a world in which global mean temperature temporarily overshoots 1.5°C. As some impacts are irreversible, such as mortality of species and ecosystems, even brief periods of overshoot can have long-lasting impacts on natural systems, especially if the peak in global mean temperature is high (high confidence)." [Shaye Wolf, United States of America]	Taken into account - text revised. Bullet rewritten and split into multiple bullets.

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58926	5	3	5	3	After "levels of vulnerability" suggest adding "and exposure" to make this sentence more accurate. There is currently sufficient literature and significant evidence, including the IPCC Special Report on Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation (SREX), pointing to not only vulnerability but exposure as important determinants for the degree of risk associated with the impacts of climate change. [United States of America]	Taken into account - text revised. Bullet rewritten and split into multiple bullets, however the word exposure it not used outside the definition as part of risk, due to space limitations.
6864	5	4	5	4	Lack of clarity: The following wording is suggested: .., on the occurrence of temperature overshoot above 1.5oC, … [Klaus Radunsky, Austria]	Taken into account - text revised. New text contrasts 1.5 vs. 2 degrees, and therefore considers this point.
11076	5	5	5	6	Reconsider wording in the sentence starting with 'Adaptation and mitigation measures (…) to better reflect wording in line 21-24, same page. [Denmark]	Taken into account - text revised. New text includes overshoot in sub bullet points.
36912	5	5	5	6	Adaptation and mitigation measures also have consequences for sustainable development. To be exact, sustainable development largely depend on the degree of adaptation and mitigation. Need to be quantitative dicussions. [Keigo Akimoto, Japan]	Taken into account - text revised. New text includes options, as considered more clear.
46136	5	6	5	21	There seems an inconsistency between the consequences in line 6 and the potential in line 21, and the different implications in SPM-3 line 46. Inconsistency may be resolved if 'consequences' are replaced by 'positive and negative implications'. [Netherlands]	Taken into account - text revised. Bullet rewritten and split into multiple bullets and inconsistent language is removed.
446	5	8	5	9	this is purely definitional. Does not merit a bullet. Move to footnote. [Thomas Stocker, Switzerland]	Taken into account - text revised. Bullet rewritten and split into multiple bullets and inconsistent language is removed.
6866	5	8	5	8	Impacts at 1.5oC in this report refer to the … [Klaus Radunsky, Austria]	Taken into account - text revised. Bullet rewritten and split into multiple bullets to allow more clarity.
9462	5	8	5	9	Thus, in this report '1.5C warming' refers to anthropogenic warming (Page SPM-3 Lines 1-10), but 'Impacts at 1.5°C' refers to any types of warming, both natural and anthropogenic. It is essential inconsistency, has serious implications for the rest of the report. For example, warming caused by some natural factors cannot be avoided through the same measures as human-induced warming. [Russian Federation]	Taken into account - text revised. Bullet rewritten and split into multiple bullets and inconsistent language is removed.
15448	5	8	5	9	Sentence is unnecessary given the context and definitions above [Australia]	Taken into account - text revised. Sentence included in definitions
16572	5	8	5	9	Delete the two lines since the context is already provided in Box SPM1 [Valentin Foltescu, France]	Taken into account - text revised. Sentence included in definitions
21606	5	8	5	8	Unclear what "when" refers to. At the time of 1.5? At long-term 1.5? [Sweden]	Taken into account - text revised. Bullet rewritten and split into multiple bullets to allow more clarity.
29056	5	8	5	8	In this background section, it is extremely important for the transparency and hence the credibility of the SR1.5 to inform about approaches and challenges to the assessments of impacts of 1.5°C warming drawing on information from Ch1 and Ch3 in a consistent way with regard to: - definition of impacts and risks (see our general comment on this issue) - definition of 1.5 °C - carbon budgets - pathway dependency of impacts (transient, w/o overshoot, equilibrium, and NET) - information available: climate simulations and observations (challenges due to non-linear and lag effects) - detection and attribution - equity, justice, fairness - robustness of findings: what do we know and what is less certain. [Germany]	Taken into account - text revised. Bullet rewritten and split into multiple bullets to allow more clarity.
37426	5	8	5	9	This is a definitorial clarification which should figure in the respective chapters in which the term is used and does not represent a summary statement; therefore this should be removed from the SPM. [Matthias Honegger, Germany]	Taken into account - text revised. Sentence included in definitions (as seen in other comments, this definition is needed in the SPM)
40534	5	8	5	9	Sloppy sentence or wrong conjugation. As it is, the verb conjugation is wrong: it should be "refer", not "refers". However, I guess that the author actually means something different, namely: "The term 'impacts at 1.5°C' is used in this report in reference to the projected impacts when global mean temperature is 1.5°C above pre-industrial levels." With this sense, it becomes a repetition of Box SPM 1 (Page 3, Lines 8-9). [Sergio Henrique Faria, Spain]	Taken into account - text revised. Sentence revised and included in definitions
41278	5	8	5	9	This sentence is just a definition, not a result of the assessment. It should be a footnote. [Michio Kawamiya, Japan]	Taken into account - text revised. Sentence revised and included in definitions
46138	5	8	5	8	Needs more explanation: does this include or exclude temporary overshoot? If so, by how much and in which decade(s). Confusing in comparison with next bullet. [Netherlands]	Taken into account - text revised. New text includes overshoot in sub bullet points.
53196	5	8	5	9	I think that this is not necessary to repeat this definition. It is the key and departure definition on this report and it has been already defined 4 pages before [Maria-Carmen Llasat, Spain]	Taken into account - text revised. Sentence revised and included in definitions
58928	5	8	5	9	It would be helpful to include a time dimension in this statement – i.e., a single year overshoot of 1.5°C warming would not have the same impacts as an equilibrium temperature of 1.5°C warming. [United States of America]	Taken into account - text revised. Sentence revised and included in definitions
58930	5	8	5	9	This sentence is a definition, and should be brought up earlier. Consider incorporating this sentence into Box SPM 1. [United States of America]	Taken into account - text revised. Sentence revised and included in definitions

Comment No	From Page	From Line	To Page	To Line	Comment	Response
58932	5	8	5	9	Define "impacts". Traditionally, changes in climate variables have been called "effects" and the consequences of the changes in climate are called "impacts". Is "impacts" really singular, as the verb form suggests, so an encompassing description of all the consequences for society and the environment? Or is it plural and a synonym for all of the consequences? It would be helpful to indicate that the impacts are not just what is happening at a particular moment, but includes the commitment to future impacts as the system adjusts to the forcings from emissions to that date, etc. [United States of America]	Taken into account - text revised. Sentence revised and included in definitions
58934	5	8	5	9	State how the impacts at 1.5°C will be greater in a number of ways than the impacts at 1°C, where we are now. It would also be useful to indicate that the commitments to loss from the Greenland and Antarctic ice sheets will likely be (based on paleoclimatic behavior) quite a bit greater at 1.5 than at 1°C given an equilibrium sea level sensitivity from paleoclimatic data of 15 to 20 meters of sea level rise per degree C change in the global average temperature. [United States of America]	Taken into account - text revised. Bullet points expanded to contrast 1.5vs. 2 degrees.
52690	5	9	5	9	Suggest an explanation of what "is" means as compared to "limited to" [Iulain Florin VLADU, Germany]	Taken into account - text revised. Sentence revised and included in definitions
9464	5	11	5	15	A. The statement gives a wrong impression that +1.5C is a genuine ecological threshold, but it is not. The same is true for +1.6C or +1.7C, etc. It is just a target value proposed by humans. B. Height of a peak and duration of overshooting are not independent because of the climate system inertia. [Russian Federation]	Taken into account - text revised. Sentence revised and included in definitions
19450	5	11	5	15	“Many impacts are different in a world where global warming is limited to 1.5°C compared to a world in which global mean temperature temporarily overshoots 1.5°C. As some impacts are irreversible, such as mortality of species and ecosystems, even brief periods of overshoot can have long-lasting impacts on natural systems, especially if the peak in global mean temperature is high (high confidence). {Cross-Chapter Box 3.2}” The SPM would benefit for more details of the (irreversible) impacts from temporary overshoot periods vis-a-vis impacts from non-overshoot 1.5C scenarios. These are important as overshoot period can last for many decades as shown on page 24 in Chapter 2. Decision makers who read mostly only the SPM would need to understand the additional risks from temporary overshoot in a wide range of domains. [Jennifer Morgan, Netherlands]	Taken into account - text revised. New text includes overshoot in sub bullet points.
58936	5	11	5	15	This is a very important point, but it needs to be generalized to apply to any target temperature, so exceeding 1°C before coming back to it will be different than not exceeding 1°C. There also needs to be a companion statement made that coming back to lower temperature increases can at least in some ways be helpful and will very likely make it easier to be addressing the SDGs. So, coming back to 1°C or even 0.5°C (with both of these situations very likely requiring significant CDR to be achieved) would lead to more favorable conditions than staying up at 1.5°C, as for some reason is considered what the phrase limiting warming to 1.5 C is taken to mean even when it would be technologically possible to go to lower levels. [United States of America]	Taken into account - text revised. New text includes overshoot in sub bullet points.
33734	5	12	5	13	Please reconsider the term "mortality of species and ecosystems". This can be read as it also means "mortality of ecosystems". Species have mortality, not ecosystems. Please consider to rephrase to "extinction of species and irreversible damage to ecosystems". [Norway]	Taken into account - text revised. Mortality removed
36262	5	12	5	12	It should be "global mean warming temporarily overshoots ..", not "global mean temperature …." [India]	Taken into account - text revised. Sentence revised and included in definitions
38418	5	12	5	12	Suggest using "effects" instead of "impacts" [Volodymyr Demkine, Kenya]	Taken into account - text revised. Sentence revised and included in definitions
396	5	13	5	13	to add after and: "degradation of ecosystems". [Nedal KATBEHBADER, Switzerland]	Taken into account - text revised. Ecosystem impacts moved to later sections, and described in more detail.
3746	5	13	5	13	mortality of species and destruction of ecosystems [Castor Muñoz Sobrino, Spain]	Taken into account - text revised. Ecosystem impacts moved to later sections, and described in more detail.
29058	5	13	5	13	Please add glacier decay and committed sea level rise to the list of irreversible change. [Germany]	Taken into account. Text on specific impacts moved to later sections (c and d)
29060	5	13	5	13	Does this mean that impacts refer to a period of 30 years, in accordance with the definition of the global mean temperature? Please refer to Box SPM 1. [Germany]	Taken into account - text revised. Sentence revised and included in definitions
36264	5	13			Is it "extinction" of species, or mortality? [India]	Taken into account - text revised. Mortality removed
36266	5	13	5	15	How brief? How high? [India]	Taken into account. Text on specific impacts moved to later sections (c and d)
50382	5	13	5	13	Write: " … such as human mortality, mortality of species and ecosystesm …". [Switzerland]	Taken into account. Text on specific impacts moved to later sections (c and d)
51326	5	13			I assume you mean "extinction" of species, not mortality. [Anand Patwardhan, United States of America]	Taken into account - text revised. Mortality removed
51328	5	13	5	15	How brief? How high? [Anand Patwardhan, United States of America]	Taken into account. Text on specific impacts moved to later sections (c and d)
6868	5	14	5	15	.., especially if the peak in global mean temperature is high above 1.5oC …. [Klaus Radunsky, Austria]	Taken into account. Text on specific impacts moved to later sections (c and d)
19210	5	14	5	14	add and related human systems after natural systems [Spain]	Taken into account. Text on specific impacts moved to later sections (c and d)
38420	5	14	5	14	Suggest using "consequences for" instead of "impacts on". The definition of "impacts" in the glossary allowes to do so. (Rational: "effects" and "cosequences" may be better translated into other languages) [Volodymyr Demkine, Kenya]	Taken into account. Text on specific impacts moved to later sections (c and d)
11238	5	15	5	15	how is "high" defined? [United Kingdom (of Great Britain and Northern Ireland)]	Taken into account. Text on specific impacts moved to later sections (c and d)
403	5	17	5	2	This statement is confusingly written. Impacts in the first instance depend on temperature increase. It is the ability to adapt that depends on vulnerabiliyt, develpoment and other factors. The intention seems to be to communicate the final impact 'felt', but in doing so, the dependence on temperature increase is elided [Harald Winkler, South Africa]	Taken into account - text revised. Bullet rewritten and split into multiple bullets and suggested points are made

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29062	5	17	5	19	According to the glossary, "In this report, the term impacts is used primarily to refer to the effects on natural and human systems of extreme weather and climate events and of climate change. Impacts generally refer to effects on lives, livelihoods, health, ecosystems, economies, societies, cultures, services and infrastructure due to the interaction of climate changes or hazardous climate events occurring within a specific time period and the vulnerability of an exposed society or system." This sentence is not consistent with this definition and in addition, it is conceptually unclear. Capacity to adapt is a part of vulnerability ("Vulnerability: The propensity or predisposition to be adversely affected. Vulnerability encompasses a variety of concepts and elements including sensitivity or susceptibility to harm and lack of capacity to cope and adapt."). Vulnerability (of human societies) is governed, e.g.., by factors that are directly related to the level of development. But the meaning of "differential national development trajectories" here is not clear. Please revise and use a consistent definition of "impact" across the report. [Germany]	Taken into account - text revised. New text includes eliminates problematic language
38514	5	17	5	18	capacity to adapt to changing conditions, and the stage of differential national development trajectories should be substituted by "capacity and actual implementation of effective adaptation, and the stage of differential national development trajectories, and on strengthened cooperation on enhanced action". The art. 7 of the Paris Agreement, that establishes the global adaptation goal, is coupling capability with actual "action". Having the capacity but not using it is worthless. Planning adaptation but not funding its measures is worthless. [Valentino Piana, Italy]	Taken into account - text revised. New text includes eliminates problematic language
39028	5	17	5	19	This is quite general and not specific about 1.5/2. If you want to keep this I suggest you combine it with some spcific info. [Jan Fuglestvedt, Norway]	Taken into account - text revised. New text contrasts 1.5 vs. 2 degrees, and therefore considers this point.
43752	5	17	5	19	• Impacts will depend on [time of peak CO2 and CO2 eq. emissions, rate of global CO2 and CO2eq emissions decline, termination of fossil fuel emissions,] the level of vulnerability of human and natural systems, their capacity to adapt to changing conditions, and the stage of differential national development trajectories. [Peter Carter, Canada]	Taken into account - text revised. Bullet rewritten and split into multiple bullets and suggested points are made
46140	5	17	5	18	Unclear how "impacts" are to be understood here and in previous bullets. This suggests that until p5/l15 impacts are changes in climatic conditions and from line 17 the net consequences for natural and human systems. This reads unbalanced and confusing [Netherlands]	Taken into account - text revised. New text includes eliminates problematic language
58938	5	17	5	17	After "levels of vulnerability" suggest adding "and exposure" to make this sentence more accurate. There is currently sufficient literature and significant evidence, including the IPCC Special Report on Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation (SREX), pointing to not only vulnerability but exposure as important determinants for the degree of risk associated with the impacts of climate change. [United States of America]	Taken into account. Exposure included in definition of risk in SPM box 1
58940	5	17	5	19	This point can be improved by (i) focusing on the "human systems" and removing the "natural systems" which is discussed in the previous point, and (ii) in addition to discussion of national-level development, expanding on the discussion of vulnerability by briefly discussing implications of economic, social, information, and political decisionmaking access for vulnerability among different groups/communities. [United States of America]	Taken into account - text revised. Bullet rewritten and split into multiple bullets and suggested points are made
58942	5	17	5	19	Perhaps too obvious for a special report that is supposed to be on the brief side. [United States of America]	Taken into account - text revised. New text includes eliminates problematic language
58944	5	17	5	19	True, but it needs to be pointed out that some types of impacts are going to likely be virtually impossible to adapt to. For example, it is just not going to be possible to protect all coastline area and retreat is simply going to be required. While that might officially be in the definition, most people will not consider the necessary abandonment of many coastal wetlands, communities, and even cities as adapting. So, a bit more clarity is needed here that more forthrightly indicates scale of the challenge. [United States of America]	Taken into account - text revised. Bullet rewritten and split into multiple bullets and suggested points are made
6870	5	18	5	18	The term "differential national development trajectories" is very technical and should be avoided in the SPM. If the language wants to express that there are differences in the levels of national development than it might be clearer to use a wording such as: .. and the respective stage of the national development trajectory. [Klaus Radunsky, Austria]	Taken into account - text revised. New text includes eliminates problematic language
58946	5	18	5	18	What is meant by "differential national development trajectories"? Could this term be simplified for the SPM? [United States of America]	Taken into account - text revised. New text includes eliminates problematic language
4430	5	21	5	24	Though I have seen Figure 5.5 cited here, I am not convinced with this paragraph. There is huge risk that policymakers cite this paragraph and proudly say we have climate resilient development pathways towards 1.5 degree target that are consistent with sustainable development and that take into consideration of equity and fairness. To avaid this kind of misleading message, this paragraph should be deleted. If this remains here as is, authors must explain immediately after the sentence what kind of conditions or assumptions should be met as well as cost. [Mitsutsune Yamaguchi, Japan]	Taken into account - text revised. New text includes eliminates problematic language: we indicate that climate resilient pathways are a framework,.
6872	5	21	5	21	The following wording might be clearer: Climate-resilient development pathways should have the objective to meet the goals of sustainable development, …. [Klaus Radunsky, Austria]	Taken into account - text revised. New text includes eliminates problematic language
10208	5	21	5	24	Global warming depends on cumulative GHGs emissions and not CO2 alone, especially when the emphasize is put on achieving deep emissions cut consistent with 1.5oC: CO2 to be replaced by GHG. [Saudi Arabia]	Noted. This sentence does not include CO2, but agree with the statement of the reviewers.
10210	5	21	5	24	This statement is aspirational and goes beyond the 1.5oC target. Focus should be on challenges and benefits of the 1.5oC global warming [Saudi Arabia]	Taken into account - text revised. New text includes eliminates problematic language.
10938	5	21	5	24	Global warming depends on cumulative GHGs emissions and not CO2 alone, especially when the emphasize is put on achieving deep emissions cut consistent with 1.5oC: CO2 to be replaced by GHG. [Nedal KATBEHBADER, Switzerland]	Noted. This sentence does not include CO2, but agree with the statement of the reviewers.

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10940	5	21	5	24	This statement is aspirational and goes beyond the 1.5oC target. Focus should be on challenges and benefits of the 1.5oC global warming [Nedal KATBEHBADER, Switzerland]	Taken into account - text revised. New text includes eliminates problematic language.
17870	5	21	5	24	this paragraph sounds overly optimistic and seems to be in contrast to the statement on p. 4 that 1.5°C is already out of reach [Brigitte Knopf, Germany]	Taken into account - text revised. New text includes eliminates problematic language.
18870	5	21	5	24	The goals of sustainable development should be specified, as SD is not scientifically defined. [Andrea TILCHE, Belgium]	Taken into account - text revised. New text includes eliminates problematic language.
18872	5	21	5	24	This bullet is vague and lacks substance. [Andrea TILCHE, Belgium]	Taken into account - text revised. New text includes eliminates problematic language
21610	5	21	5	21	The text could benefit from an explanation here of climate resilient development pathways. [Sweden]	Taken into account - text revised. New text includes eliminates problematic language
29064	5	21	5	21	For clarification: "Meet" cold be replaced with "support" or similar wording since climate-resilience development can help to meet the goals of sustainable development. [Germany]	Taken into account - text revised. New text includes eliminates problematic language
29066	5	21	5	24	This statement about CRDP is unclear and seems more like a key result than a background statement - it is not clear why it is listed in this section. [Germany]	Taken into account - text revised. New text includes eliminates problematic language: we indicate that climate resilient pathways are a framework,.
29948	5	21	5	24	This sentence is clear and encouraging. However, it seems in contradiction to the last bullet point of SPM1.2. saying that "Modelling suggests that having a 66% likelihood of holding warming below 1.5°C throughout 7 the 21st century without overshoot is already out of reach" Thus, we suggest to add a sentence emphasizing the difficuly to limit global warming to 1.5°C. [France]	Taken into account - text revised. New text includes eliminates problematic language
31172	5	21	5	24	The current formulation seems to focus excessively on 1.5°C in this context. This might be misleading as it could be read as if limiting the global warming to 1.5°C is the only way to achieve a desirable future. [Japan]	Taken into account - text revised. New text includes eliminates problematic language
31174	5	21	5	24	The meaning of the sentence after "while…" is not clear.?We would appreciate further explanation. [Japan]	Taken into account - text revised. New text includes eliminates problematic language
36268	5	21	5	24	SPM 1:Relationshtip between poverty eradicaton, climate resilient development pathways and sustainable development goals does not have strong research support. Especially research from the developing countries where there is acknowledgement that many variables have high uncertainties associated with them and feedbacks are difficult to estimate. This paragraph needs to reflect the uncertainty in making these connection. In its current form it is too definitive. Ref-Chapter 2 and 5 of the same report. [India]	Taken into account - text revised. New text includes eliminates problematic language
38516	5	21	5	24	Excellent sentence. [Valentino Piana, Italy]	Noted
38938	5	21	5	24	This is a very long and heavy sentence. I suggest splitting and start a new sentence at "while". E.g. something like "At the same time equitaty……, can be emphasized". [Jan Fuglestvedt, Norway]	Taken into account - text revised. New text includes eliminates problematic language
43754	5	21	5	24	• Climate-resilient development pathways [with immediate emissions decline termination of fossil fuel emissions] have the potential to meet the goals of sustainable development, including poverty eradication and reducing inequalities, while emphasising equity and fairness with respect to the deep societal transformation needed to limit global warming to 1.5°C [(equilibrium)] and to achieve desirable futures and well-being for all. [Peter Carter, Canada]	Taken into account - text revised. New text includes eliminates problematic language: we indicate that climate resilient pathways are a framework,.
44642	5	21	5	24	While the idea behind this is extremely important, the way it is formulated results in a fairly meaningless statement. Does the author team feel that the evidence supports making a stronger statement? For example, "CRDPs that emphasise equity and fairness and ..... have the potential to meet the goals etc". It might also be preferable to talk about 'emerging CRDPs' or 'early evidence from CRDPs'. [Penny Urquhart, South Africa]	Taken into account - text revised. New text includes eliminates problematic language: we indicate that climate resilient pathways are a framework,.
46142	5	21	5	24	Why not referring to the commonly used notion of vulnerability (IAV - Impacts, adaptation and vulnerability) [Netherlands]	Taken into account - text revised. New text includes eliminates problematic language
46144	5	21	5	24	As phrased here, this seems overly optimistic and incomplete. More justice to the complexity of the debate would be done by saying that such synergies between climate-resilience (what definition?) and other SD goals can be identified, but careful and comprehensive policy making will be required to draw then closer to viability and feasibility. [Netherlands]	Taken into account - text revised. New text includes eliminates problematic language: we indicate that climate resilient pathways are a framework,.
49502	5	21	5	21	climate-resilient dev. pathways are not defined yet, the definitions comes only on pg27. Should be solved [Karlheinz ERB, Austria]	Taken into account - text revised. New text defines climate resilient pathways.
50384	5	21	5	21	Introduce a piece of sentence at the begining: "Although there will be differences between countries, climate-resilient development pathways …" (cf. Chapter 5). [Switzerland]	Taken into account - text revised. New text includes eliminates problematic language
51330	5	21	5	24	I have no idea what this bullet is trying to say. if development pathways are meeting the SDG's they are obviously addressing questions of poverty, equity, well-being etc. So what is the point? [Anand Patwardhan, United States of America]	Taken into account - text revised. New text includes eliminates problematic language: we indicate that climate resilient pathways are a framework,.
52692	5	21	5	21	Climate-resilient pathways cannot "meet the goal of sustainable development". Perhaps more precise is to state that they are compatable with such goals. [Iulain Florin VLADU, Germany]	Taken into account - text revised. New text includes eliminates problematic language
58948	5	21	5	24	This is a very important statement, yet seems a bit hidden. Might help to state that pathways are well documented before referring to the specific place in the text and figures as is done here. [United States of America]	Taken into account - text revised. New text includes eliminates problematic language: we indicate that climate resilient pathways are a framework,.
58950	5	21	5	24	This seems a little unbalanced. Isn't there a large literature showing that there will, in fact, be a range of negative implications from climate mitigation. Perhaps the authors are saying that, on balance, and taking climate impacts into account, 1.5°C pathways are more sustainable than 2°C pathways? But that, also would be hard to justify. [United States of America]	Taken into account - text revised. New text includes eliminates problematic language: we indicate that climate resilient pathways are a framework,.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
58952	5	21	5	24	Current formulation is overly optimistic. The text is focused on the most ideal outcomes and decisions possible; with little accomplished in the 33 years since the Villach Conference, this just is not plausible. With the Greenland and Antarctic Ice Sheets losing mass at an increasing rate – so not yet in equilibrium with a 1°C warming, much less a higher level – and with paleoclimate evidence suggesting a sea level sensitivity of 15-20 meters of sea level per degree C, how can the authors be optimistic about humanity having to abandon so many coastal megacities and other coastal infrastructure yet still meet SDGs? Keeping the ocean from rapidly inundating significant low-lying islands and land areas is going to have hugely disruptive impacts and there will be many people significantly affected. They will not be able to manage their way through forced relocations and increasingly intense extremes and come out the better for it. It was great that so many countries came together in Paris to recognize the problem and that emissions of fossil fuels must be totally phased out over several decades, but the countries are nowhere near to being on a path to do so this century, much less in the decade or so needed to keep the global average temperature increase to below 1.5°C. [United States of America]	Taken into account - text revised. New text includes eliminates problematic language: we indicate that climate resilient pathways are a framework,. Potential negatives from poorly designed climate mitigation strategies are included in their own bullet point.
58954	5	22	5	23	Is there sufficient literature and evidence to support inclusion of the clause, "while emphasizing equity and fairness with respect to deep societal transformations"? How might this premise be tested? If evidence exists in the underlying chapter text in support of its inclusion, reference it. [United States of America]	Taken into account - text revised. New text includes eliminates problematic language
36820	5	24	5	24	The statement stated "to achieve desirable futures and well-being for all". Is it referring to human-systems only or both human and natural systems? [CHI KEUNG TAM, Singapore]	Taken into account - text revised. New text includes eliminates problematic language
46146	5	24	5	24	desirable futures and well-being for all are such ill-defined, ambiguous and socio-culturally sensitive terms that they should not appear in IPCC reports. Desirable for who, for example? [Netherlands]	Taken into account - text revised. New text includes eliminates problematic language
430	6				FIGURE SPM-1: too much information. The policy-relevant information is in the time window 2000-2050, but the resolution there is insufficient. Do you really need information prior to 1950? [Thomas Stocker, Switzerland]	Accepted. Figure SPM1 has been substantially revised and clarified. The aim is to clarify the implications of different major drivers of risk and timing of 1.5C warming, not to provide a comprehensive scenario analysis. Hence only the impact of varying key drivers is addressed. Key points are now highlighted by text in the figure.
4432	6		6	2	Please explain what equilibrium climate sensitivity was used to draw Figure SPM.1. In the column "Climate Response" in Figure SPM.1, median of Equilibrium Climate Sensitivity seems to be 2.6 degree C. Does this mean ECS of 2.6 degree was used? In AR5, experts could not agree of the best estimate of ECS. However for caululation purpose, 3 degree C (same as AR4) was used (ex. AR5/WG3 Table SPM 1 and 6.3). To compare with AR5, same climate sensitivity should be used unless there is good logical reason to use different one. [Mitsutsune Yamaguchi, Japan]	Accepted. Revised figure shows central tercile and likely range assuming a symmetric distribution for the climate response. TCR is the main determinant of response on these timescales.
5632	6		6		Many policymakers will not understand what 'radiative forcing' is. Is there a simpler way to talk about it? It is used quite frequently in the SPM [Marion Grau, Norway]	Accepted - text revised. SR1.5 builds on previous IPCC Assessments, and this is a very standard term.
5634	6		7		The top part of the Figure SPM 1 is clear, but the bottom two graphs seem to potentially contradict the urgency of the text of the previous pages. To this reader, the extensive drop in the bottom two scenarios, which seems to be for reference, is confusing, as it may be read as representing an actual drop in emissions rather than a 'possible', but as the previous texts says, highly unlikely scenario. I am not sure therefore the bottom two graphs there are fitting here. This reader was perplexed enough to have to read the text below the figure SMP 1 three times to figure out the relationship between the three parts of the figure. Since this is a policymaker summary, i recommend making it less puzzling by separating out the graphs in different figures and commenting appropriately. Or just leaving the two bottom graphs out. [Marion Grau, Norway]	Accepted. Figure SPM1 has been substantially revised and clarified. The aim is to clarify the implications of different major drivers of risk and timing of 1.5C warming, not to provide a comprehensive scenario analysis. Hence only the impact of varying key drivers is addressed. Key points are now highlighted by text in the figure.
9082	6		6		The legend of the sub-figure "Global CO2 emission" is occulting the line showing the increase of CO2 emission between 1850 and 1950, while it's a very important information to realize the importance of the reduction to be undertaken. The legend should be put elsewhere. [Frédéric Durand, France]	Accepted - text revised
9466	6		6		Figure SPM-1. The yellow line denotes 'human-induced temperature change' since 1850-1900? No natural contribution? Is it really true? A reference to IPCC ARs is needed. [Russian Federation]	Accepted. This is the best-estimate anthropogenic warming. Natural factors contribute to the uncertainty, not to the most likely level of warming to date, since they are as likely to have caused cooling as warming.
11078	6		6		Figure SPM1 is difficult to understand - it is unclear what the main message is. Especially the lower parts of the figure re. the development in global CO2 emissions and non-CO2 radiative forcing add to the confusion. Consider splitting figure up in several parts. Also somewhat inadequate explanation of what the F-, F0 and F+ scenarios mean. [Denmark]	Accepted. Figure SPM1 has been substantially revised and clarified. The aim is to clarify the implications of different major drivers of risk and timing of 1.5C warming, not to provide a comprehensive scenario analysis. Hence only the impact of varying key drivers is addressed. Key points are now highlighted by text in the figure.
18880	6		6		Fig SPM1. There are several issues with this figure. - most seriously, in the second panel (global CO2 emissions) the CO2 emissions for representative below 2°C scenarios are below those of the E2060 trajectory which (according to the upper panel) is consistent with peak warming of around 1.5°C. How can this be? This needs to be explained (are the below 2°C scenarios associated with higher non-CO2 emissions?) - what is the probability associated with the temperature outcomes in the upper panel? (presumably 50%). This needs to be stated. - this figure does not appear in the body of the report. The relationship between these findings and the more detailed explanatory material in Ch2 needs to be signalled more precisely. [Andrea TILCHE, Belgium]	Accepted. Revised figure shows central tercile and likely range assuming a symmetric distribution for the climate response.

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19398	6				Fig SPM1 Why is there no E2045 & F- option in the figure? [Jennifer Morgan, Netherlands]	Accepted. Figure SPM1 has been substantially revised and clarified. The aim is to clarify the implications of different major drivers of risk and timing of 1.5C warming, not to provide a comprehensive scenario analysis. Hence only the impact of varying key drivers is addressed. Key points are now highlighted by text in the figure.
21608	6		6		Figure SPM 1 could benefit from being streamlined or split into several figures, to make it easier for the reader. Also, "F-" and "F+" should be explained better. [Sweden]	Accepted. Figure SPM1 has been substantially revised and clarified. The aim is to clarify the implications of different major drivers of risk and timing of 1.5C warming, not to provide a comprehensive scenario analysis. Hence only the impact of varying key drivers is addressed. Key points are now highlighted by text in the figure.
29578	6				Figure SPM 1. The subject matter of the figure is important. However, there is too much to digest. The first suggestion is to make it visually clearer that there are three separate figures. That done, the space will become a problem and the second suggestion is that the third figure (Non-CO2 radiative forcing) be deleted. The issue of non CO2 factors will come up strong in other sections. The caption is very thorough. Please try to either remove some of the details or to place them into footnotes. This would facilitate picking the main messages out of the important figure. The figure on carbon budgets contains some of the same information as figure SPM1 but the two figures are not easily interpreted mutually (e.g. non-CO2 issues) [Finland]	Accepted. Figure SPM1 has been substantially revised and clarified. The aim is to clarify the implications of different major drivers of risk and timing of 1.5C warming, not to provide a comprehensive scenario analysis. Hence only the impact of varying key drivers is addressed. Key points are now highlighted by text in the figure.
31182	6		6		In SPM1, TCR and ECS seems to have one-to-one relationship. The estimated relationships between TCR and ECS varies depending on GCM. Uncertain range should be indicated. [Japan]	Accepted. Revised figure shows central tercile and likely range assuming a symmetric distribution for the climate response. TCR is the main determinant of response on these timescales.
36272	6				How do these emission pathways relate to the RCP's or the SSP's? Where are we with the Paris pledges? Can that be shown in the Figure for comparison? [India]	Accepted. Figure SPM1 has been substantially revised and clarified. The aim is to clarify the implications of different major drivers of risk and timing of 1.5C warming, not to provide a comprehensive scenario analysis. Hence only the impact of varying key drivers is addressed. Key points are now highlighted by text in the figure.
38518	6		6	17	Excellent figure, which is, however, too small to convey messages in the most importat yearly range 2000-2050, for which a new page with a zoom is necessary. The box on "climatic response" is in the wrong place, making reading the figure more difficult. It should be brought in the upper left corner, below the current box on AR5 observation range". [Valentino Piana, Italy]	Accepted. Figure SPM1 has been substantially revised and clarified. The aim is to clarify the implications of different major drivers of risk and timing of 1.5C warming, not to provide a comprehensive scenario analysis. Hence only the impact of varying key drivers is addressed. Key points are now highlighted by text in the figure.
49696	6		6	17	SPM figure 1: This is the ONLY time / temperature-emission-forcing graph in SPM: "Global average warming. Observed global warming, and estimation of human-induced temperature change for a range of possible climate response magnitudes." This "range" is falsely re-assuring and misses context required for policy makers, it is as if there are no scenarios that will reach 2°C and more by 2100. For context, it is very important to add the current pathway (NDCs) and what temperature rise will likely be human induced by 2100 (3.4°C). [Michael Wadleigh, United States of America]	Rejected - outside the scope of the chapter. Providing BaU scenario information would simply repeat material in AR5
51334	6				How do these stylized emission pathways relate to the RCP's or the SSP's? Where are we with the Paris pledges? Can that be shown in the Figure for comparison? [Anand Patwardhan, United States of America]	Accepted. Figure SPM1 has been substantially revised and clarified. The aim is to clarify the implications of different major drivers of risk and timing of 1.5C warming, not to provide a comprehensive scenario analysis. Hence only the impact of varying key drivers is addressed. Key points are now highlighted by text in the figure.
55350	6		6		Very complex figure. The are scientific concepts that are not easily understood at a glance. Try to reduce the amount of information and focus on the most relevant. [ELISA BERDALET, Spain]	Accepted. Figure SPM1 has been substantially revised and clarified. The aim is to clarify the implications of different major drivers of risk and timing of 1.5C warming, not to provide a comprehensive scenario analysis. Hence only the impact of varying key drivers is addressed. Key points are now highlighted by text in the figure.
55352	6		6		Inside box, first pannel: Which is the information in this box? What is the aim of this box? Not easy to follow [ELISA BERDALET, Spain]	Accepted. Figure SPM1 has been substantially revised and clarified. The aim is to clarify the implications of different major drivers of risk and timing of 1.5C warming, not to provide a comprehensive scenario analysis. Hence only the impact of varying key drivers is addressed. Key points are now highlighted by text in the figure.
345	6	1	6	17	Figure 1 upper Y-axis should give "temperature anomalies" [Zong-Ci Zhao, China]	Accepted - text revised
346	6	1	7	6	Figure 1 F+ and F-? [Zong-Ci Zhao, China]	Accepted. Figure SPM1 has been substantially revised and clarified. The aim is to clarify the implications of different major drivers of risk and timing of 1.5C warming, not to provide a comprehensive scenario analysis. Hence only the impact of varying key drivers is addressed. Key points are now highlighted by text in the figure.
347	6	1	7	6	Figure should separate the observations or projections. Not only using AR5. [Zong-Ci Zhao, China]	Rejected. Important for context to contrast / compare observations of recent emissions and warming with idealised scenarios indicating the challenge of limiting warming to 1.5C

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4456	6	1	6	1	Article 2 of the UNFCCC describes that such a level (stabilization of GHG at a level not dangerous) "should be achieved within a time-frame sufficient to allow ecosystems to adapt naturally to climate change, to ensure that food production is not threatened and to enable economic development to proceed in a sustainable manner". IPCC/AR4/WG3/Ch.1 explains this as "The choice of a stabilization level implies the balancing of the risks of climate change (risks of gradual change and of extreme events, risk of irreversible change of the climate, including risks for food security, ecosystems and sustainable development) against the risk of response measures that may threaten economic sustainability" P.97). In the SPM of SR1.5, risk of food security and ecosystems are well evaluated. Looking to Figure SPM.1, it is clear that drastic CO2 emissions reduction is necessary if we are to achieve 1.5 target. This SPM should evaluate whether this drastic reduction of CO2 emissions may threaten economic sustainability or not. The description on this point is quite thin. Of course for this purpose, cost analysis is absolutely necessary that is lacking in this report. [Mitsutsune Yamaguchi, Japan]	Noted. Not clear how this relates to any revisions required for this figure.
11042	6	1			The chart showing emissions dropping immediately is unrealistic. While sharp drops are feasible, some capacity building is required to trigger this (e.g. implementing carbon pricing across the world). [Wilfried Maas, Netherlands]	Accepted. Revised figure makes clear this is an entirely hypothetical scenario to make clear the roles of different drivers.
5906	6	1			Figure SPM 1 is very busy such that it is hard to distill a single key point. Some suggestions: i) in the top panel remove the observations. Ii) incorporate the recognised and quantified uncertainty in the human-induced temperature change by replacing the current deterministic line which falsely implies we know this quantity perfectly with, instead a cone that encapsulates the known and quantified uncertainty in this metric as discussed in e.g. Haustein et al., 2017. iii) I'm not sure what value the two ways of looking at the future in the top-panel add. Its really complicating of a clean interpretation and the four labels on the box-whiskers are incomprehensible to the vast majority. iv) The two bottom panels could be simplified as representing a CO2 emissions and non-CO2 consistent with 1.5. But I think current NDCs should be added to show the offset in ambition? [Peter Thorne, Ireland]	Accepted. Figure SPM1 has been substantially revised and clarified. The aim is to clarify the implications of different major drivers of risk and timing of 1.5C warming, not to provide a comprehensive scenario analysis. Hence only the impact of varying key drivers is addressed. Key points are now highlighted by text in the figure.
11240	6	1	6	17	figure SPM.1 is far too complicated. It takes a considerable amount of time to understand the different elements, even for readers familiar with the science. There are far too many labels, including some that need to be more clearly explained. The caption is too long and complicated. It's not clear what value this is adding to the text. Suggest the authors pick 1 or 2 key points to make and simplify this figure. Suggest that the individual elements are split into separate figures and that they focus on 1 or 2 key messages. [United Kingdom (of Great Britain and Northern Ireland)]	Accepted. Figure SPM1 has been substantially revised and clarified. The aim is to clarify the implications of different major drivers of risk and timing of 1.5C warming, not to provide a comprehensive scenario analysis. Hence only the impact of varying key drivers is addressed. Key points are now highlighted by text in the figure.
18874	6	1	6	17	The summary Figure 1 is interesting and informative, but too complicated for a SPM. [Andrea TILCHE, Belgium]	Accepted. Figure SPM1 has been substantially revised and clarified. The aim is to clarify the implications of different major drivers of risk and timing of 1.5C warming, not to provide a comprehensive scenario analysis. Hence only the impact of varying key drivers is addressed. Key points are now highlighted by text in the figure.
29294	6	1	6	17	Colors in legend mismatches colors in the Figure. For example, "yellow vertical bar (Line 11)" looks orange in Figure [Yuanyuan Huang, France]	Accepted. Care has been taken to use a colour scheme that is colour-blind-friendly
29950	6	1			Figure SPM1 : We appreciate very much a clear representation of the effects of a range of climate sensitivity values on temperature trajectories. However, the climate sensitivity color range in the "climate response" box should be drawn linearly, which would better show that 1.6°C and 2.6°C are below the median of the likely range of transient climate response values and equilibrium climate sensitivity values respectively. [France]	Accepted. Revised figure shows central tercile and likely range assuming a symmetric distribution for the climate response.
29952	6	1			Figure SPM1 : Explain, in the legend of the bottom plot, what F+, F0 and F- mean. [France]	Accepted. Figure SPM1 has been substantially revised and clarified. The aim is to clarify the implications of different major drivers of risk and timing of 1.5C warming, not to provide a comprehensive scenario analysis. Hence only the impact of varying key drivers is addressed. Key points are now highlighted by text in the figure.
31176	6	1	7	8	Regarding the Figure SPM 1, please explain in this figure's caption why the particular values 2.6°C and 1.6°C are adopted as representative values of equilibrium climate sensitivity and the transient climate response, respectively. [Japan]	Accepted. Revised figure shows central tercile and likely range assuming a symmetric distribution for the climate response. TCR is the main determinant of response on these timescales.
31178	6	1	7	8	Since Figure SPM 1 contains a large volume of information, this figure should be explained further in the main text. [Japan]	Accepted. Figure SPM1 has been substantially revised and clarified. The aim is to clarify the implications of different major drivers of risk and timing of 1.5C warming, not to provide a comprehensive scenario analysis. Hence only the impact of varying key drivers is addressed. Key points are now highlighted by text in the figure.
31180	6	1	7	8	Regarding the "Climate Response" box in the Figure SPM 1, it might be misleading to show the scale bar with equal size of several green gradations because the scale of [1.5, 2.0, 2.6, 3.3, 4.5] do not have the same range between each scale values. [Japan]	Accepted. Revised figure shows central tercile and likely range assuming a symmetric distribution for the climate response, removing the need for a legend.
33738	6	1			Legend boxes in Figure SPM 1: Please consider to combine the two legend boxes in the upper panel into one box. In addition please consider to simplify the climate response colour bar. In our view it now contains too much information for the SPM readers. Perhaps you could only write "high" on the top, "best estimate"/"most likely" in the middle and "low" on the bottom, and add "climate sensitivity" to the right. Finally, please ensure that no legend boxes in the figure cover the graphs. [Norway]	Accepted. Revised figure shows central tercile and likely range assuming a symmetric distribution for the climate response.

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33740	6	1			Figure SPM 1: Please consider to remove the grey line and shading (that represents median and 17-83 percentiles of the scenario ensembles) in the two lowermost panels. Rationale: The way we understand them, they are only included for reference reasons. However, it can easily confuse the readers into thinking that they are actual input for the green shaded global temperature response in the upper panel or have any other purpose. [Norway]	Rejected. We believe it is important to retain this uncertainty information. We believe the information about the timing of net zero CO2 emissions required to maintain temperatures likely below 1.5C is important.
33742	6	1			Top right vertical bars in Figure SPM 1: As we see it, there are currently six possible ways to combine the two CO2 scenarios and three non-CO2 scenarios. Please consider to present either all six or perhaps better only the ones for E2060. Rationale for removing E2045: Article 4 from the Paris Agreement describes a "... balance between anthropogenic emissions by sources and removals by sinks of greenhouse gases in the second half of this century, ...". Removing E2045 from the entire figure would also improve the readability, which is crucial for the SPM. [Norway]	Rejected. We believe the information about the timing of net zero CO2 emissions required to maintain temperatures likely below 1.5C is important.
33736	6	1			Figure SPM 1: General comment: We think this is a very important figure which contains a lot of important information. However its complexity level is more suitable for a technical summary than for the SPM. Simplifying the SPM version of the figure would greatly improve its readability and possibility for being reused later in presentations etc. Title: Please consider to insert a short but descriptive title; e.g. "Observed and estimated human-induced temperature change and GHG emissions". [Norway]	Accepted. Figure SPM1 has been substantially revised and clarified. The aim is to clarify the implications of different major drivers of risk and timing of 1.5C warming, not to provide a comprehensive scenario analysis. Hence only the impact of varying key drivers is addressed. Key points are now highlighted by text in the figure.
33744	6	1			Two bottom panels Figure SPM 1: It may be challenging for some readers of the SPM to understand the relative importance between non-CO2 and CO2 emissions due to the different units on the y-axes. By quickly looking at the figure one can misinterpret that the effect of non-CO2 and CO2 are almost equal. If their relative importance is a message that you would like to convey, please consider different options for communicating this better to readers. [Norway]	Accepted. Revised figure makes clear a 15-year acceleration in the timing of net zero CO2 emissions has a similar impact on peak warming as a failure to reduce non-CO2 warming after 2030.
33746	6	1	6	17	Figure SPM 1: Many policymakers will not understand what 'radiative forcing' is. Is there a simpler way to talk about it? It is used quite frequently in the SPM. Please consider to use simpler wording. [Norway]	Taken into account - text revised. Radiative forcing is a standard IPCC concept
33748	6	1	7	6	Figure SPM 1: Please consider splitting this information into three separate panels/illustrations to make it easier for non-scientists to digest the information. Also consider applying the following principles from the Guidance for data visuals (J. Harold. et.al., Tyndall Centre, 2017): Guideline 7: Add a descriptive heading and sub-heading, where the latter should articulate a clear message. Integrate the text in the visual to support comprehension. The technical details in the caption can provide important additional context, but the information to comprehend the main message should be included in the visual. Guideline 8: Avoid jargon and explain acronyms. Finally, please consider to avoid vertical text for increased readability, if possible. [Norway]	Accepted. Figure SPM1 has been substantially revised and clarified. The aim is to clarify the implications of different major drivers of risk and timing of 1.5C warming, not to provide a comprehensive scenario analysis. Hence only the impact of varying key drivers is addressed. Key points are now highlighted by text in the figure.
41652	6	1			Figure SPM 1: The grey color belong to line, no area or column. Change grey legend to line. [Czech Republic]	Accepted - text revised
43968	6	1			In Figure SPM 1, it looks like ECS=2.6 degree C is treated as a central estimate in some sense (i.e., thick green line for the future temperature trajectory). The best estimate of ECS was 3 degree C in AR4 and AR5 didn't provide the number. As discussed in Chapter 2, recent studies suggest somewhat higher estimates of ECS than the AR5 range. I wonder why 2.6 is adopted in this figure and how it is justified. [Seita Emori, Japan]	Accepted. Revised figure shows central tercile and likely range assuming a symmetric distribution for the climate response.
46148	6	1	7	8	Unclear what 'etremely stylized' emsssion trajectores add to estimating the outcome of the representative forcing scenarios. Suggest to add that range to the CS bands to the rght of the upper panel. [Netherlands]	Rejected. Adding scenario outcome information would further complicate the figure, and many comments request simplification.
42846	6	1	6	1	The caption needs to fully explain the assumptions presented in the panels of the figure, especially for F+, F0, and F–; must also include role and impact of non-CO2 forcers interact, including how warming and cooling aerosols are incorporated and represented in those curves. As it stands, the figure seems to suggest that no change in non-CO2 forcing (F0) is compatible with 1.5°C pathways. This confounds the different forcing directions of aerosol unmasking from other SLCPs, and obscures the relative importance of reducing forcing from mitigation of BC, CH4 and HFC emissions. Recommend including pathway where BC, CH4, HFC reductions are considered separately from aerosol emissions reductions. [Kristin Campbell, United States of America]	Accepted. Figure SPM1 has been substantially revised and clarified. The aim is to clarify the implications of different major drivers of risk and timing of 1.5C warming, not to provide a comprehensive scenario analysis. Hence only the impact of varying key drivers is addressed. Key points are now highlighted by text in the figure.
42896	6	1	6	1	The caption needs to fully explain the assumptions presented in the panels of the figure, especially for F+, F0, and F–; must also include role and impact of non-CO2 forcers interact, including how warming and cooling aerosols are incorporated and represented in those curves. As it stands, the figure seems to suggest that no change in non-CO2 forcing (F0) is compatible with 1.5°C pathways. This confounds the different forcing directions of aerosol unmasking from other SLCPs, and obscures the relative importance of reducing forcing from mitigation of BC, CH4 and HFC emissions. Recommend including pathway where BC, CH4, HFC reductions are considered separately from aerosol emissions reductions. [Durwood Zaelke, United States of America]	Accepted. Figure SPM1 has been substantially revised and clarified. The aim is to clarify the implications of different major drivers of risk and timing of 1.5C warming, not to provide a comprehensive scenario analysis. Hence only the impact of varying key drivers is addressed. Key points are now highlighted by text in the figure.

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43756	6	1	6	17	[Figure SPM 1: Observed global warming, and estimation of human-induced temperature change for a range of possible climate response magnitudes is more policy misleading than informative. It shows the best case for minimizing impacts and risks is E2045 in which CO2 actual emissions peak at 2015 and decline from 2020 which minimizes CO2 removal. E 2060 peaks at 2022 which carries more risk for unfeasible amounts of CO2 removal. A similar more important figure should be included for CO2 eq emissions. The projected warming is only to 2100 and has to show equilibrium warming, otherwise it is more policy misleading than informative. The equilibrium climate sensitivity use in figure SPM 1 of 2.6°C introduces an intolerably high source of error and risk of exceeding 2.6° C by 2100 and higher after 2100 and so risks multiple and irreversible catastrophes . Equilibrium climate sensitivity in IPCC 2014 AR5 3° C but noted that 'best estimate for equilibrium climate sensitivity can now be given because of a lack of agreement on values across assessed lines of evidence and studies' (IPCC WG1 SPM p. 16. 3C carries intolerably high risk . AR5 recorded 10 sources for climate sensitivity Above the mean 3C are of 3 out of 10, above mean of 4°C are 2 out of 10, above an upper limit of 6°C are 4 out of 10 and above an upper limit of 8°C are 4 out of 10. In many studies in the past few years found that climate sensitivity to the high range of the IPCC. For any consideration of risk climate sensitivity of at least 4.5° C is required as was the case in the first IPCC 1990 assessment. The report acknowledges the possibility from paleoclimatic system models of climate sensitivity being double i.e. 6° C. 'This analysis shows that current models that do not include these long-term feedbacks may underestimate the equilibrium warming response of the Earth System to CO2 climate forcing by up to a factor of 2'. (Ch.'3 p.63) which would be 6°C. Therefore for the long term future of the human race and our common future survival the research dictates the use of the equilibrium warming of 4.5° C climate sensitivity may be too low. As the climate sensitivity determines all future projections it is imperative of the climate sensitivity of 4.5° C is applied. Furthermore taking the median projection for 1.5° C is also an unacceptable high risk level - the 90% probability should be clearly indicated for policy making.] [Peter Carter, Canada]	Rejected - not supported by the peer-reviewed published literature. Extensive literature indicates that adjustment to equilibrium following zero CO2 emissions and stabilized non-CO2 forcing is limited.
46150	6	1	6	7	Suggestion to insert something from which to relate the CO2-scenario's to the Non-CO2 forcing to see the relative impact of each. For example including the radiative forcing effect Wm-2 effect of CO2 emissions, or % of influence of the temperature. Data should be available from largfe scenario library underlying chapter 2 [Netherlands]	Rejected. Interesting idea, but this would over-complicate the figure.
46422	6	1	7	8	Unclear what 'extremely stylized' emission trajectores add to estimating the outcome of the representative forcing scenarios. Suggest to add that range to the CS bands to the rght of the upper panel. [Netherlands]	Rejected. Adding scenario outcome information would further complicate the figure, and many comments request simplification.
49338	6	1	6	1	Description of F+ and F- is needed. [Kaoru Tachiiri, Japan]	Accepted. Figure SPM1 has been substantially revised and clarified. The aim is to clarify the implications of different major drivers of risk and timing of 1.5C warming, not to provide a comprehensive scenario analysis. Hence only the impact of varying key drivers is addressed. Key points are now highlighted by text in the figure.
49340	6	1	6	1	Explanation of how the relationship between TCR and ECS was got is needed. [Kaoru Tachiiri, Japan]	Accepted. Revised figure shows central tercile and likely range assuming a symmetric distribution for the climate response. TCR is the main determinant of response on these timescales.
50386	6	1	7	6	Figure SPM 1 is very informative but not so easy to read. Consider (an) alternative(s) figure(s) with all this information. [Switzerland]	Accepted. Figure SPM1 has been substantially revised and clarified. The aim is to clarify the implications of different major drivers of risk and timing of 1.5C warming, not to provide a comprehensive scenario analysis. Hence only the impact of varying key drivers is addressed. Key points are now highlighted by text in the figure.
54742	6	1	6	1	I love a good figure, but I suspect this is too complex for 99% of the readers. At least split it into two figure, a and b. There is too much going on in the figure. [Glen Peters, Norway]	Accepted. Figure SPM1 has been substantially revised and clarified. The aim is to clarify the implications of different major drivers of risk and timing of 1.5C warming, not to provide a comprehensive scenario analysis. Hence only the impact of varying key drivers is addressed. Key points are now highlighted by text in the figure.
54832	6	1	6	1	Figure SPM1: As this composite figure is made up of three parts, it may be more easily understood if segmented into three parts by including spacing between each segment of the figure, i.e. horizontal spacing between the three panels. [Jordan Harold, United Kingdom (of Great Britain and Northern Ireland)]	Accepted. Figure SPM1 has been substantially revised and clarified. The aim is to clarify the implications of different major drivers of risk and timing of 1.5C warming, not to provide a comprehensive scenario analysis. Hence only the impact of varying key drivers is addressed. Key points are now highlighted by text in the figure.
54834	6	1	6	1	Figure SPM1: Use consistent placing of panel headings within each panel - i.e. move 'Global average warming' heading to top of panel. [Jordan Harold, United Kingdom (of Great Britain and Northern Ireland)]	Accepted. Figure SPM1 has been substantially revised and clarified. The aim is to clarify the implications of different major drivers of risk and timing of 1.5C warming, not to provide a comprehensive scenario analysis. Hence only the impact of varying key drivers is addressed. Key points are now highlighted by text in the figure.
54836	6	1	6	1	Figure SPM1: For F+, F0 and F- labels to the right of third panel, consider including a brief description of what the labels represent, e.g. F0 stabilisation. [Jordan Harold, United Kingdom (of Great Britain and Northern Ireland)]	Accepted. Figure SPM1 has been substantially revised and clarified. The aim is to clarify the implications of different major drivers of risk and timing of 1.5C warming, not to provide a comprehensive scenario analysis. Hence only the impact of varying key drivers is addressed. Key points are now highlighted by text in the figure.
54838	6	1	6	1	Figure SPM1: Unclear why F+ is coloured blue and F- red. Blue may be associated with cooling, red with warming, but here colour mapping appears to be counter-intuitive. [Jordan Harold, United Kingdom (of Great Britain and Northern Ireland)]	Accepted. Figure SPM1 has been substantially revised and clarified. The aim is to clarify the implications of different major drivers of risk and timing of 1.5C warming, not to provide a comprehensive scenario analysis. Hence only the impact of varying key drivers is addressed. Key points are now highlighted by text in the figure.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
56488	6	1	6	1	This is a difficult graph to interpret, since it is the first in the SPM it should be as clear as possible. Would be better to have a graph of CO2 equivalent emissions instead of the two for CO and radiative forcing to simplify. The choice of the E2045 and E2060 scenarios seems arbitrary, would suggest using the scenario database and showing the bands representative of all scenarios consistent with 1.5. [Eleanor Johnston, United States of America]	Accepted. Figure SPM1 has been substantially revised and clarified. The aim is to clarify the implications of different major drivers of risk and timing of 1.5C warming, not to provide a comprehensive scenario analysis. Hence only the impact of varying key drivers is addressed. Key points are now highlighted by text in the figure.
58956	6	1	6	1	One of the curves is labeled "human-induced temperature change" in the figure legend. This is misleading because it does not make clear the assumption that certain sources of reconstructed radiative forcings are entirely human-caused. This may be a reasonable assumption, but confidently labeling the curve is an oversimplification. [United States of America]	Accepted. Figure now provides a range of uncertainty in human-induced warming, accounting for these uncertainties.
59084	6	1	6	17	Figure SPM.1 is misleading in separating out and summing the radiative forcing from non-CO2 sources. Because of the cancellation of aerosols, it makes the total RF from CH4, O3, N2O, strat H2O look small. Notice that CO2 is separated and the reader does not see the RF from CO2 + aerosols? The authors should avoid a CO2-centric view. [United States of America]	Accepted. Figure SPM1 has been substantially revised and clarified. The aim is to clarify the implications of different major drivers of risk and timing of 1.5C warming, not to provide a comprehensive scenario analysis. Hence only the impact of varying key drivers is addressed. Key points are now highlighted by text in the figure. Further disaggregation of non-CO2 forcers is not consistent with a simple summary figure.
6076	6	3	6	3	Figure SPM 1: The global mean temperature curve in yellow is presumably a 30-year running mean, if the end-point temperature is 1 degC above pre-industrial at 2017/2018, as described on P4, L19. Would it be useful to show the 30-years around the current year with a horizontal line? Atleast, the averaging shoud be mentioned. [Timothy Carter, Finland]	Rejected - outside the scope of the chapter. Interesting idea, but this would over-complicate the figure.
6078	6	3	6	3	Figure SPM 1: The bars at the right of the figure are not properly explained and are rather cryptic. What are the horizontal lines - are they medians? What model runs are these based on? [Timothy Carter, Finland]	Accepted. Figure SPM1 has been substantially revised and clarified. The aim is to clarify the implications of different major drivers of risk and timing of 1.5C warming, not to provide a comprehensive scenario analysis. Hence only the impact of varying key drivers is addressed. Key points are now highlighted by text in the figure.
15450	6	3	6	3	Diagram too technical for an SPM, but OK for a Technical Summary. Consider simplifying or delete [Australia]	Accepted. Figure SPM1 has been substantially revised and clarified. The aim is to clarify the implications of different major drivers of risk and timing of 1.5C warming, not to provide a comprehensive scenario analysis. Hence only the impact of varying key drivers is addressed. Key points are now highlighted by text in the figure.
19212	6	3	7	6	It would be useful to specify a reference year for the "near term projection" (2030?). The table "Climate response" in the figure is not explained (it should be removed?). [Spain]	Not Applicable - no longer included in the chapter. Near-term projection no longer included.
29068	6	3	7	6	It is not obvious how Figure SPM 1 illustrates and supports the main message of the SPM, and it is difficult to understand because it contains a lot of detail. Please simplify the figure keeping in mind the audience of the SPM are non-experts. It is not apparent why you are showing a decadal mean when before, 30 yrs.-average is defined as the relevant variable for climate change. What is the" SR1.5 near-term reference period"? The Caption of the figure should be clarified and accessible for non-experts (i.e. (a) observed global temperature; (b) possible global temperature responses to net-zero emissions in 2045 resp. 2060; (c) non-CO2 forcing) incl. its description underneath. We miss the description of the grey line. In line 15 it would be helpful to explain "net zero". The third panel is not explained in caption. Please clarify what F0, F+ and F- refer to. [Germany]	Accepted. Figure SPM1 has been substantially revised and clarified. The aim is to clarify the implications of different major drivers of risk and timing of 1.5C warming, not to provide a comprehensive scenario analysis. Hence only the impact of varying key drivers is addressed. Key points are now highlighted by text in the figure.
53200	6	3	7	6	SPM1 is a relevant figure in the report (and it will be also important in the SYR), but the explantion text of this figure is not enough self-explicative. Attending to the fact that the focus target of the SPM are policymakers and non necessary experts in the matter, and that figures are a good mean to synthetize the results, it is difficult to follow it. The SPM is usually translated and used by the governments, technicians and experts to divulgate the main conclusions of the report. Besides this, there is some mislead information, what is F+, F0 and F-? ; the green line is horizontal, not vertical; Figure 1 is cited but not included in the SPM [Maria-Carmen Llasat, Spain]	Accepted. Figure SPM1 has been substantially revised and clarified. The aim is to clarify the implications of different major drivers of risk and timing of 1.5C warming, not to provide a comprehensive scenario analysis. Hence only the impact of varying key drivers is addressed. Key points are now highlighted by text in the figure.
54900	6	3	6	3	Figure SPM 1: A relatively fast reduction of the global emissions within two years from now is not realistic. It would be informative to add a delay scenario with the start of reduction at later years. [Bram Bregman, Netherlands]	Accepted. Figure SPM1 has been substantially revised and clarified. The aim is to clarify the implications of different major drivers of risk and timing of 1.5C warming, not to provide a comprehensive scenario analysis. Hence only the impact of varying key drivers is addressed. Key points are now highlighted by text in the figure.
58958	6	3	6	6	It needs to be pointed out right in the first sentence that this calculated outcome involves global CO2 emissions going to zero between 2045 and 2060. This is shown in one of the charts, but this really needs to be mentioned boldly in the caption. There is presently no indication that this is going to happen – or even near to happening – making this graph, in practical terms, the extreme best case. Fossil fuels today provide something like 80% of the world's energy; getting that to zero in, say 30 years, would seem to be virtually impossible, despite the rapid improvements in technology. Also, the climate sensitivity of the curve that achieves the 1.5°C level and then declines slightly is about 2.5°C, which is pretty clearly at the lower end of the most plausible estimates, especially if one allows equilibrium to occur. Overall, this just seems to me to be a very, very optimistic case to have as the featured graphic for the front of the report. [United States of America]	Accepted. Figure SPM1 has been substantially revised and clarified. The aim is to clarify the implications of different major drivers of risk and timing of 1.5C warming, not to provide a comprehensive scenario analysis. Hence only the impact of varying key drivers is addressed. Key points are now highlighted by text in the figure.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
63038	6	3	6	3	Figure SPM1 is informative but we suggest simplifying it (while keeping the complete form in the technical summary and chapter). Please consider removing any feature that is not essential to provide the main messages. in particular, is the IPCC-AR5 near-term projection needed ? Is the 2006-2015 average needed, considering that it might take time to understand the meaning of the horizontal + vertical lines ? Removing those elements would help shortening the caption and making the figure easier to understand. Try to simplify all elements as much as possible. [Belgium]	Accepted. Figure SPM1 has been substantially revised and clarified. The aim is to clarify the implications of different major drivers of risk and timing of 1.5C warming, not to provide a comprehensive scenario analysis. Hence only the impact of varying key drivers is addressed. Key points are now highlighted by text in the figure.
63040	6	3	6	3	Figure SPM1 (cont.): Discussing changes in non-CO2 emissions would require explanations in the text with references to the figure. The shape of the "F-" curve suggest that it is based on short-lived forcers, but we missed an explanation in the SPM that for the same climate effect, a reduction of some amount of CO2 in a given year is equivalent to a reduction in emission of a short-lived forcer every year until almost forever, not just during one year, hence action on short-lived forcers can only take the form of long-term commitments. [Belgium]	Accepted. These are good points, but not consistent with a summary figure.
29290	6	4	6	4	change "Illustration of futrue warmign response to" to "Ilustration of futrue warming in response to" [Yuanyuan Huang, France]	Accepted - text revised
33750	6	4	6	6	Please consider to be consistent when describing the lines for linear decline of CO2. We believe the use of "scenarios" are not appropriate for these very simplified descriptions and can create confusion. Perhaps "linear decline of CO2 emissions" is sufficient for a SPM reader. [Norway]	Taken into account - text revised. Idealised used in revised version to highlight these are not detailed scenarios.
397	6	5	6	6	to define: non-CO2 forcing [Nedal KATBEHBADER, Switzerland]	Accepted. Revised figure clarifies this refers to all other climate drivers
29292	6	5	6	5	CO2 [Yuanyuan Huang, France]	Editorial - copyedit to be completed prior to publication
33482	6	5			CO2 needs subscript 2 [Stephen Cornelius, United Kingdom (of Great Britain and Northern Ireland)]	Accepted - text revised
38452	6	5	6	5	CO2 -- 2 should be subtitled [Linah Ababneh, United States of America]	Editorial - copyedit to be completed prior to publication
38520	6	5	6	5	For clarity: "with differential" may become "with three differential". [Valentino Piana, Italy]	Accepted - text revised
40536	6	5	6	5	CO2, not "CO2". [Sergio Henrique Faria, Spain]	Editorial - copyedit to be completed prior to publication
40746	6	5	6	5	Where the term 'non-CO2' is used, the subscript two is inconsistently applied across the document, as seen in this text anf Figure example. This may be due to bulk corrections confounded by the hyphen before the C. [Liese Coulter, Australia]	Editorial - copyedit to be completed prior to publication
44096	6	5	6	5	the 2 in CO2 should be subscript as in line 15 [Moshe Kinn, United Kingdom (of Great Britain and Northern Ireland)]	Editorial - copyedit to be completed prior to publication
44790	6	5	6	5	CO2-->CO2 [Hiroaki Kondo, Japan]	Editorial - copyedit to be completed prior to publication
58960	6	5	6	5	Subscripts needed for "2" in the two occurences of CO2. [United States of America]	Editorial - copyedit to be completed prior to publication
58962	6	5	6	6	With different hypothetical non-CO2 forcing, stabilization should include the "F's" denoted on this figure. [United States of America]	Taken into account - text revised. Revised clarifies role of non-CO2 drivers
58964	6	6	6	6	Consistency in spelling of stabilization vs. stabilisation in figure caption. [United States of America]	Editorial - copyedit to be completed prior to publication
340	6	7	6	13	How many observed stations for 1850-1900 and 2006-2015? [Zong-Ci Zhao, China]	Rejected - outside the scope of the chapter. The full assessment of the observed GMST record is beyond the scope of SR1.5
41654	6	7	6	8	Change "shaded band" to "grey line" [Czech Republic]	Accepted - text revised
53198	6	7	6	8	updated AR5 observational datasets (grey shaded 8 band) updated until end of 2016. The term "updated" is repeated [Maria-Carmen Llasat, Spain]	Editorial - copyedit to be completed prior to publication
58966	6	8	6	8	Updated until end of 2016 reads better as "updated until the end of 2016" [United States of America]	Accepted - text revised
15452	6	9	6	1	It is confusing what is meant by the 'SR1.5 near-term reference period (2006-2015)' -- near term normally implies future, whereas this is a recent period. [Australia]	Accepted - text revised
40538	6	9	6	9	Correct is "level", not "levels". [Sergio Henrique Faria, Spain]	Accepted - text revised
41656	6	1			Change "vertical" to "horizontal" [Czech Republic]	Accepted - text revised
1526	6	11			I think the "yellow" vertical bar is actually ORANGE ? [David Wratt, New Zealand]	Accepted - text revised
19214	6	11	6	11	figure 1.1 doesn't seem to be the right reference, it should be "upper panel". [Spain]	Accepted - text revised
29954	6	11	6	11	orange' rather than 'yellow' [France]	Taken into account - text revised. Meaning is clear - colour appears different on different displays
39926	6	12	6	12	Suggeste to eliminate "0.5 degree" ….every increase of global mean surface tempareture…. [Hamidreza Solaymani Osbooei, Iran]	Not Applicable - no longer included in the chapter. Misplaced comment?
48272	6	12	6	12	Suggeste to eliminate "0.5 degree" ….every increase of global mean surface tempareture…. [Iran]	Not Applicable - no longer included in the chapter. Misplaced comment?
18876	6	14	6	14	black bar-spell out what is meant with near term; eyeballing probably 2025? [Andrea TILCHE, Belgium]	Accepted. Reference to AR5 near-term projection has been deleted.
40540	6	16	6	16	Correct is "are shown", not "is shown". [Sergio Henrique Faria, Spain]	Editorial - copyedit to be completed prior to publication
18878	6	17	6	17	The 'inset' in upper panel of figure seems describe climate properties, but needs to be explained better in the text. Is it needed here? [Andrea TILCHE, Belgium]	Accepted - text revised. Agreed. Figure revised.

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5770	7		11		In these pages, we see excellent discussions of how the impacts could be very different between 1.5 deg climate change and 2 deg climate change. This discussion is very important to show that the risks associated with a 2 deg warming are substantially reduced under a 1.5 deg warming. We see that the discussion covers extreme events, intensity of tropical cyclones, natural ecosystems, agriculture and marine life. Commendable job by the author team! However, there is a lack of quantification of the increased risks (in terms of percentage) between a 1.5 deg and 2 deg global mean warming. [Govindasamy Bala, India]	Taken into account - issue covered in the new SPM (section B).
9710	7				SPM 2 on "Impacts of 1.5c global warming and associated risks" should inform on three types of impacts: 1- impacts avoided by remaining below 1.5c, 2-impacts associated with responses to achieve 1.5c,and 3- residual impacts of 1.5c that require adaptation. The focus is mainly on 3 whereas 1 adn 2 are largely missing. [Mustafa BABIKER, Sudan]	Not Applicable - no longer included in the chapter. Not clear how this relates to any revisions required for this figure. Misplaced comment?
15478	7		8		Suggest adding point about precipitation from Ch3, p65, lines 45-47: "Several regions display statistically significant differences in heavy precipitation at 1.5°C vs 2° warming (with stronger increases at 2°), and there is a global tendency towards increases in heavy precipitation on land between 1.5°C and 2°C". If this is not included, precipitation is very obviously missing here. [Australia]	Taken into account - issue covered in the new SPM(section B).
17782	7		7		Structure of the 2.1 section should be re-organized. The 2.1 section provides an overview on increase in global mean surface temperature and risk. However, bullets could not explain main topic enough. Although main sentences mentioned several phenomena like precipitation, extreme events, storms, and sea level rise, bullets explained only a few subjects and are even focused on extreme temperature. 1. It would be better to erase the third sentence (The rise in extreme temperatures in some regions can be more than three times larger than the change in global mean surface temperature) in the 2.1 box because it is redundant. If third sentence removed, topic of 2.1 section will become clearer. 2. Phenomena of extreme temperature are explained from second to fourth bullets. As these are one of extreme event due to extreme temperature, we suggest to summarize three bullets in one bullet. 3. The "sea level rise" is one of phenomenon of global warming and is already noted in 2.1 box. We suggest to reconfigure the 2.5 section into the bullet of the 2.1 section. [Republic of Korea]	Not Applicable - no longer included in the chapter. Not clear how this relates to any revisions required for this figure. Misplaced comment?
36274	7		11		Quantification of the increased risks (in terms of percentage) between a 1.5 degree C and 2 degree C global mean warming may be added here. [India]	Taken into account - issue covered in the new SPM (section B).
58150	7				Here and on the following pages the differential impacts should be qualified with some confidence levels. [Nico Bauer, Germany]	Not Applicable - no longer included in the chapter. Not clear how this relates to any revisions required for this figure. Misplaced comment?
58152	7				Section SPM2: it is crucial to know if at 1.5°C or 2°C there is reason for concern that nation states (small island states) will run the risk of becoming inhabitable due to, for example, sea level rise. Chapter 3 has to detail the information and assess the available knowledge and data regarding this criterion..The statements need to be qualified regarding their liikelyhood. [Nico Bauer, Germany]	Not Applicable - no longer included in the chapter. Not clear how this relates to any revisions required for this figure. Misplaced comment?
58154	7				Section SPM2: it is crucial to know whether at 1.5°C serious losses property (e.g. real estate) are to be expected and how this changes with 2°C. Chapter 3 has to detail this information and assess the available knowledge and data regarding this crieterion. The statements need to be qualified regarding their liikelyhood. [Nico Bauer, Germany]	Not Applicable - no longer included in the chapter. Not clear how this relates to any revisions required for this figure. Misplaced comment?
58156	7				Section SPM2: it is crucial to know whether at 1.5°C serous losses of life expecation are to be expected and how this changes with 2°C. Chapter 3 has to detail this information and assess the available knowledge and data regarding this crieterion. The statements need to be qualified regarding their liikelyhood. [Nico Bauer, Germany]	Not Applicable - no longer included in the chapter. Not clear how this relates to any revisions required for this figure. Misplaced comment?
50392	7	1	7	45	There is (almost) no expression of a level of confidence in the statements of this page. Please insert a level of confidence for these statements. [Switzerland]	Taken into account - issue covered in the new SPM(section A3).
46152	7	2	7	6	Hard to follow. In general we find this figure with highly stylized scenario variants not extremely helpful [Netherlands]	Accepted - text revised. Stylized scenarios are helpful to clarify physical drivers of risks and timing of 1.5C
4434	7	5	7	5	2040 (E2045) should be ameded as 2045 (E2045). [Mitsutsune Yamaguchi, Japan]	Accepted - text revised. Should be 2040
15454	7	5	7	6	A) why choose 17-83% percentiles rather than 10 to 90, or 20 to 80?. B) clarify that the ensembles being presented are emissions scenarios which would limit warming to 1.5C. Currently not clear what these are. [Australia]	Accepted. Figure shows central tercile and central two terciles (i.e. likely range). Further precision is unwarranted.
29956	7	5	7	5	2045 instead of 2040 ? [France]	Accepted - text revised. Should be 2040
33484	7	5			do you mean "2040" or in the 2040s? [Stephen Cornelius, United Kingdom (of Great Britain and Northern Ireland)]	Accepted - text revised. Revised figure shows emissions declining to zero in 2040.
38522	7	5	7	5	The name E2045 should become E2040 (here and in the graph", since it refers to "a more rapid stylized decline in CO2 emissions to reach net-zero in 2040" - as the text explains. [Valentino Piana, Italy]	Accepted - text revised. Should be 2040
40574	7	5	7	5	2040 should read 2045 here I think? [Jonny Williams, New Zealand]	Accepted - text revised. Should be 2040
45064	7	5	7	5	2045 is correct [Iman Babaeian, Iran]	Accepted - text revised. Should be 2040
46156	7	5	7	5	2040 or 2045? [Netherlands]	Accepted - text revised. Should be 2040

Comment No	From Page	From Line	To Page	To Line	Comment	Response
8996	7	9	7	9	Amend the title: "Impacts of 1.5°C global warming and associated risks compared to 2°C"" (because that's what it is about) [Urs Neu, Switzerland]	Not Applicable - section no longer included
17872	7	9	11	15	The whole section on impacts needs a clearer structure, .e.g. along i) bio-physical impacts, ii) socio-economic impacts iii) adaptation needs. Currently it is a strange mix. [Brigitte Knopf, Germany]	Accepted. The structure has been revised.
17874	7	9	11	15	the whole section is very weak on content. The standard phrase in the section and also of the red boxes is "Impact X is stronger for 1.5C compared to 2C" (what is somehow clear, or is there any impact that would not apply to this statement?). The more important information would be to give quantitative numbers here: is the risk increasing by 1% or by 10%? How many more people are being effected? Alternatively, it would be important to identify the 3-5 most important impacts. It seems that one of them is sea-level rise. Which other impacts are so strong? [Brigitte Knopf, Germany]	Accepted. More quantitative information, where literature is available, was added in the new draft.
18882	7	9	11	15	Findings from the impact section (SPM 2) are rather unspecific except for Figure SPM3 (the text merely lists impact categories that are greater at +2° than at +1.5°). To make it read better, it would help to include concrete examples of differences between 1.5 and 2° impacts throughout the text. [Andrea TILCHE, Belgium]	Accepted. More quantitative information and examples have been added in the new draft.
18884	7	9	12	12	Comments on section 2: This section makes a lot of claims related to how specific impacts are higher at 1.5°C than today, and even higher at 2°C. This is good. However, there needs to be more quantification. There also needs to be better coordination with Ch3, where the discussion often wanders far away from the contribution of climate change and into a discussion of broader drivers, omitting the contribution of climate change. [Andrea TILCHE, Belgium]	We have attempted to quantify the differences where possible between 1°C and 1.5°C, as well as 1.5°C and 2°C. While larger changes are credible under many circumstances, quantifying the exact amount is difficult. In the FDG draft, we have increased the number of examples where quantification was possible. Large gaps, however, remain.
29070	7	9	14	6	Most comparisons between 1.5 and 2 degree global warming merely indicated that there is a "greater risk" for 2 degree warming. A more quantitative approach would be appreciated. [Germany]	Accepted. Statements have been revised to present more quantitive information (when available) about the risks of 1.5ºC and 2ºC.
29072	7	9	7	45	Please consider adding the important finding on regional increases in heavy precipitation to the SPM: from Chapter 3, p40, ln 25-34: "Regions that display statistically significant changes in heavy precipitation between 1.5°C and 2°C global warming are found in high-latitude (Alaska/Western Canada, Eastern Canada/Greenland/Iceland, Northern Europe, Northern Asia) and high-altitude (Tibetan Plateau) regions, as well as in Eastern Asia (including China and Japan) and in Eastern North America. Southern Asia is a hot spot for increases in heavy precipitation between these two global temperature levels", and make sure this finding gets elevated to the ES of Ch 3. [Germany]	Accepted - text revised. Assessments on changes in heavy precipitation has been included, including some regional aspects.
29384	7	9	7	1	The header does not fit the content of the following paragraphs and statements [Susanne Droege, Germany]	Not Applicable - section no longer included
29958	7	9			Overall comment on SPM2 : some boxes present the increase in risks at 2°C, others (as 2.4.) present lower risks at 1.5°C. For the sake of readability, it would be better to harmonize the presentation and always use the same one. Even though it could seem repetitive, it would clarify some key aspects of this report. [France]	Taken into account - issue covered in the new SPM
31184	7	9	14	6	Please add the information about the cost of adaptation at 1.5°C and 2.0°C, respectively, if the related studies are available. The information is very useful for policy making. [Japan]	Taken into account - text revised. Chapter 4 identifies a knowledge gap with adaptation costs at 1.5°C and 2.0°C.
32600	7	9	14	4	there are repeated boxes and bullets in section 2 saying x is bad at 1.5 and worse at 2. Is it worth compiling examples (if any) pointing to where things are not worse at 2.0 than 1.5? [Jonathan Lynn, Switzerland]	Accepted. More quantitivative information and examples have been added in the new draft.
32626	7	9	31	48	seems SPM section 2 corresponds to Ch 3, section 3 to Ch 2, and section 4 to both Ch 4 and 5. Raises question whether chapters 2 and 3 are in the right order and whether 4 and 5 should be merged (not looking at boxes etc) [Jonathan Lynn, Switzerland]	Taken into account - the FGD SPM has been restructured.
33752	7	9			To SPM 2: In general we think that this section would improve with more quantification of results. When we read the executive summary from chapter 3 we find more significant numbers that we think is important to include at the SPM level. In our view this will contribute to making an SPM that can be used more directly by policy makers. We believe that in most cases the findings are easier to understand and communicate with quantification. For the sake of saving space, several more general statements e.g. about impacts being less at 1.5 C than at 2C, could be stated a condensed way in the SPM 1.2 and not being repeated here. [Norway]	Taken into account - issue covered in the new SPM(section A2).
33754	7	9			SPM 2: We miss more information on the impacts on terrestrial systems. Please consider to include this. [Norway]	Taken into account - issue covered in the new SPM(section B).
33756	7	9			SPM 3: Consider including results about tipping points in this section, e.g. following statement from Ch. 3, box 3.5: "Existing studies have proposed that limiting global warming to 1.5°C could significantly reduce the risk of passing some damaging tipping points, especially terrestrial biome loss." [Norway]	Not Applicable - section no longer included
33758	7	9			SPM 3: Consider including some substantial information about impacts on ecosystem services in terrestrial and freshwater systems, as ecosystem services are of importance and interest for a wider range of policy makers. [Norway]	Taken into account - issue covered in the new SPM(section B).
40934	7	9	11	13	This section compares 1.5C and 2C impacts in almost every bullet. The general tone is the 2C impacts are going to worse than 1.5C but the summary report doesn't emphasise in unambiguous terms that even though 2C impacts are worse than 1.5C, 1.5C impacts are quite severe on their own. Without that, the report can falsely suggest that somehow 1.5C is safer. This notion is clearly disspelled in Ch 1 (lines 3-6, p36) but not here. Also, while the pathways and policy responses discussed (in SPM 3, Ch 1 and 2) are compatible with 1.5C warming, why are impacts being discussed for both 1.5C and 2C warming? [Neelam Singh, United States of America]	Noted. The text now also discusses briefly changes at 1.5°C global warming compared to today. The comparison of changes at 1.5°C vs higher levels of warming (in particular with respect to 2°C) was the scope given to the report by IPCC.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
42848	7	9	7	48	The Arctic is also particularly threatened by greater-than-average warming due to Arctic amplification. Because the Arctic is warming at twice the rate as the global average and because Arctic sea ice is susceptible to this increased temperature, Arctic sea ice will be reduced, which contributes to a positive feedback within the climate system that can further amplify warming. Note, Arctic amplification is discussed on the next page, but could also use a mention here, for example in bullet L27–31; as shown by Pistone et al 2014 (“Observational determination of albedo decrease caused by vanishing Arctic sea ice”), reduced albedo from loss of Arctic sea ice contributed 6.4 W/m2 through 2011. [Kristin Campbell, United States of America]	Noted. The high rate of warming in the Arctic is now mention in the SPM: "A.1.2 Warming greater than the global annual average is being experienced in many land regions and seasons, including two to three times higher in the Arctic."
42898	7	9	7	48	The Arctic is also particularly threatened by greater-than-average warming due to Arctic amplification. Because the Arctic is warming at twice the rate as the global average and because Arctic sea ice is susceptible to this increased temperature, Arctic sea ice will be reduced, which contributes to a positive feedback within the climate system that can further amplify warming. Note, Arctic amplification is discussed on the next page, but could also use a mention here, for example in bullet L27–31; as shown by Pistone et al 2014 (“Observational determination of albedo decrease caused by vanishing Arctic sea ice”), reduced albedo from loss of Arctic sea ice contributed 6.4 W/m2 through 2011. [Durwood Zaelke, United States of America]	Noted. The high rate of warming in the Arctic is now mention in the SPM: "A.1.2 Warming greater than the global annual average is being experienced in many land regions and seasons, including two to three times higher in the Arctic."
49398	7	9	11	15	Three major concerns here: a) Many conclusions on impacts and risks are made for total warming (anthropogenic + natural), not for ‘human-inducing warming’ only. Thus, there is a mismatch between described risks/impacts and the definition of ‘1.5ºC global warming’. This should be clearly explained and taken into account when confidence statements will be made. b) Items in the SPM2 section are not uniform. Some of them are too broad and do not contain any values, another are more specific. c) The title of the section does not fully represent the content of the section. In particular, some items deal with only comparison of 1.5ºC and 2ºC warming (and present the risk of 2ºC warming compare with 1.5ºC warming, but not the risk of 1.5ºC warming itself) [Alexander Chernokulsky, Russian Federation]	Accepted. Structure and titles has been revised to show the information included in the section. More quantitative information has been added.
55578	7	9	12	11	Section SPM2 (Impacts) should include a discussion on rate of global warming (lower for 1.5C without overshoot, than 1.5C with overshoot, or 2C) and its impacts on eg species and habitats (slower change allowing for more adoptaion, inlcuding by evolutionary change). [David Cooper, Canada]	We recognise that the rate of change is important, but respectfully point out that differences don't eventuate until mid to late century. To recognise the importance of rate, however, we have included a sentence in B2 at line 38: ‘The rate of change is lower at 1.5°C than 2°C, with potential benefits for added time to enable systems time to adapt.’
58968	7	9	7	48	Box 2.1 says that every 0.5°C warming increases the risk of climate change impacts. What does this tell me? Isn't this obvious? What impacts? How large a risk increase? Also in this section, it's ambiguous. The increase in global land surface temperature IS larger OR WILL BE LARGER. [United States of America]	Taken into account. Text was substantially revised and made more specific.
58970	7	9	14	4	In general, the presumption is that any risk would be greater at 2 than at 1.5°C. Condense this section dramatically by making that general statement then concentrating on those outcomes where available modeling or literature allows for actual quantitative comparisons between the two futures. A good example: "Climate-induced range losses in plants, vertebrates, and insects increase by approximately 50% with 2°C global warming compared to 1.5°C." A bad example: "Impacts on natural systems are likely to be less at 1.5 than at 2°C based on knowledge of past impacts." [United States of America]	Accepted. Statements have been revised to present more quantitive information (when available) about the risks of 1.5ºC and 2ºC.
18886	7	1	7	1	The confidence statements would be needed to adequately assess this part of the SPM. This section does not adequately differentiate in the impacts deriving from different temperature paths (overshoot vs no overshoot). [Andrea TILCHE, Belgium]	Taken into account - issue covered in the new SPM(section B).
18888	7	11	12	13	It may be that over 90% of disaster-related displacement relates to climate and weather. But the whole point of this report is to try and isolate the contribution of climate change to this type of phenomenon, in order to inform readers on how it might change in a warming world, and how climate action could help. [Andrea TILCHE, Belgium]	Rejected. Available literature does not allow to present the requested information. This can be further developed in AR6.
6080	7	12	7	13	Yes, this is broadly true, but actually there are certainly counter-examples, where an increase of 0.5 deg C could decrease risk (potential adverse impact) or not have any significiant effect on the level of risk (however defined). [Timothy Carter, Finland]	Not Applicable - no longer included in the chapter. The text no longer mentions this statement, because of several reviewers' comments highlighting that it was too unspecific in the context of a report on 1.5 global warming. Hence the revised text refers to the specific difference between extremes at 1°C vs 1.5°C global warming, and at 1.5°C vs 2°C of global warming ("Climate models project robust differences in regional climate characteristics between present-day and global warming of 1.5°C, and between 1.5°C and 2°C."). The SPM also clarifies that there are detectable differences in impacts in the observational record for differences in 0.5°C of global warming. This notion is now covered elsewhere in the SPM (e.g. "A1.3: Trends in intensity and frequency of some climate and weather extremes have been detected over time spans during which about 0.5°C of global warming occurred (medium confidence). This assessment is based on several lines of evidence, including attribution studies for changes in extremes since 1950. {3.3.1, 3.3.2, 3.3.3}").

Comment No	From Page	From Line	To Page	To Line	Comment	Response
8992	7	12	7	12	Why 0.5°C? Does an increase of e.g. 0.3°C not increase the risks of climate change impacts? Better just omit 'of0.5°C' [Urs Neu, Switzerland]	Taken into account - text revised. The text no longer mentions this statement, because of several reviewers' comments highlighting that it was too unspecific in the context of a report on 1.5 global warming. Hence the revised text refers to the specific difference between extremes at 1°C vs 1.5°C global warming, and at 1.5°C vs 2°C of global warming ("Climate models project robust differences in regional climate characteristics between present-day and global warming of 1.5°C, and between 1.5°C and 2°C."). The SPM also clarifies that there are detectable differences in impacts in the observational record for differences in 0.5°C of global warming. This notion is now covered elsewhere in the SPM (e.g. "A1.3: Trends in intensity and frequency of some climate and weather extremes have been detected over time spans during which about 0.5°C of global warming occurred (medium confidence). This assessment is based on several lines of evidence, including attribution studies for changes in extremes since 1950. {3.3.1, 3.3.2, 3.3.3}").
9468	7	12	7	13	'Every increase of 0.5°C of global mean surface temperature increases the risks of climate change impacts'. It depends on particular location. For example, some warming does not create impacts at the center of Greenland (or at the South Pole). There are no additional risks. Moreover, some warming creates certain advantages for crop production, say, in Sweden. The statement is unclear. [Russian Federation]	Not Applicable - no longer included in the chapter. The text no longer mentions this statement, because of several reviewers' comments highlighting that it was too unspecific in the context of a report on 1.5 global warming. Hence the revised text refers to the specific difference between extremes at 1°C vs 1.5°C global warming, and at 1.5°C vs 2°C of global warming ("Climate models project robust differences in regional climate characteristics between present-day and global warming of 1.5°C, and between 1.5°C and 2°C."). The SPM also clarifies that there are detectable differences in impacts in the observational record for differences in 0.5°C of global warming. This notion is now covered elsewhere in the SPM (e.g. "A1.3: Trends in intensity and frequency of some climate and weather extremes have been detected over time spans during which about 0.5°C of global warming occurred (medium confidence). This assessment is based on several lines of evidence, including attribution studies for changes in extremes since 1950. {3.3.1, 3.3.2, 3.3.3}").
10202	7	12	7	17	The AR5 and the Coupled Model Inter-comparison Project (CMIP5) have not considered the impacts of 1.5°C vs 2°C global warming above pre-industrial levels. The Special Report 1.5 rely on a peer review scientific papers or experiments developed after IPCC/AR5 to quantify the impacts of 1.5°C vs 2°C. This approach should not be considered as systematic as the methodology used during the IPCC/AR5 report, since the derived conclusions from all the papers or experiments are based on different assumptions or inherited uncertainties of the methodologies used (i.e. spatial resolution, linear climate response etc.). Thus, the confidence level pertaining to the impacts of 1.5°C vs 2°C global warming is extremely challenging to be clearly quantified. [Saudi Arabia]	Rejected - not supported by the peer-reviewed published literature. The assessment of confidence levels reflects the methodologies employed and the fact that it was found that projections for changes in climate at 1.5°C and 2°C are robust when derived from transient simulations, and do also not differ substantially from output from simulations which stabilize toward 2°C at the end of the century, or some computed from time slices at either 1.5°C or 2°C. The assessment relies on multiple lines of evidence, including a range of climate models, different methodologies, and a large number of publications, and it is also supported by observed changes in impacts for an increase in global warming of ca. 0.5°C over the recent decades.
11104	7	12	7	13	Every increase of 0.5C ... increases the risks .... I would think also an increase of 0.2C will increase the risks. So it strikes me as a strange formulation. [Denmark]	Taken into account - text revised. The text no longer mentions this statement, because of several reviewers' comments highlighting that it was too unspecific in the context of a report on 1.5 global warming. Hence the revised text refers to the specific difference between extremes at 1°C vs 1.5°C global warming, and at 1.5°C vs 2°C of global warming ("Climate models project robust differences in regional climate characteristics between present-day and global warming of 1.5°C, and between 1.5°C and 2°C."). The SPM also clarifies that there are detectable differences in impacts in the observational record for differences in 0.5°C of global warming. This notion is now covered elsewhere in the SPM (e.g. "A1.3: Trends in intensity and frequency of some climate and weather extremes have been detected over time spans during which about 0.5°C of global warming occurred (medium confidence). This assessment is based on several lines of evidence, including attribution studies for changes in extremes since 1950. {3.3.1, 3.3.2, 3.3.3}").
11242	7	12	7	13	Is this a new finding since the AR5 which was less definitive on the size of temperature increments for distinguishing increasing risk.? [United Kingdom (of Great Britain and Northern Ireland)]	Noted. This is certainly a new finding, at least centered around 1-1.5, 1.5-2 and for the observational record (0.5°C warming in the recent past). However, because the previous statement was too vague, we have revised the text to make it more specific.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
14208	7	12	7	12	The first sentence might be confusing to a leader, since it may be interpreted as if increase of temperature of less than 0.5 may not increase risk to climate change Impacts. Why have we singled out 0.50C [United Republic of Tanzania]	Taken into account - text revised. The text no longer mentions this statement, because of several reviewers' comments highlighting that it was too unspecific in the context of a report on 1.5 global warming. Hence the revised text refers to the specific difference between extremes at 1°C vs 1.5°C global warming, and at 1.5°C vs 2°C of global warming ("Climate models project robust differences in regional climate characteristics between present-day and global warming of 1.5°C, and between 1.5°C and 2°C."). The SPM also clarifies that there are detectable differences in impacts in the observational record for differences in 0.5°C of global warming. This notion is now covered elsewhere in the SPM (e.g. "A1.3: Trends in intensity and frequency of some climate and weather extremes have been detected over time spans during which about 0.5°C of global warming occurred (medium confidence). This assessment is based on several lines of evidence, including attribution studies for changes in extremes since 1950. {3.3.1, 3.3.2, 3.3.3}").
15456	7	12	7	17	The terms are ambiguous here. How does the reader differentiate between "global land surface" and "global average"? And between "global land surface" and "global mean surface"? [Australia]	Taken into account - text revised. Text was removed and point was made more clearly elsewhere. Also in response to other comments, the SPM no longer refers to average global land temperatures. The differential warming between land and ocean is mentioned elsewhere: "A1.2. Warming greater than the global annual average is being experienced in many land regions and seasons, including two to three times higher in the Arctic. Warming is generally higher over land than over the ocean. (high confidence) {1.2.1, 1.2.2, Figure 1.1, Figure 1.3, 3.3.1, 3.3.2}"
18890	7	12	7	48	Not clear why 'every 0.5 increase' is brought out here, every increase in temperature is increasing the impact risk, but the question is how much, and is it non-linear? The statements on this page to do not address the question if there is a disprotional increase in risk going from 1.5 to 2 degree. [Andrea TILCHE, Belgium]	Taken into account - text revised. The text no longer mentions this statement, because of several reviewers' comments highlighting that it was too unspecific in the context of a report on 1.5 global warming. Hence the revised text refers to the specific difference between extremes at 1°C vs 1.5°C global warming, and at 1.5°C vs 2°C of global warming ("Climate models project robust differences in regional climate characteristics between present-day and global warming of 1.5°C, and between 1.5°C and 2°C."). The SPM also clarifies that there are detectable differences in impacts in the observational record for differences in 0.5°C of global warming. This notion is now covered elsewhere in the SPM (e.g. "A1.3: Trends in intensity and frequency of some climate and weather extremes have been detected over time spans during which about 0.5°C of global warming occurred (medium confidence). This assessment is based on several lines of evidence, including attribution studies for changes in extremes since 1950. {3.3.1, 3.3.2, 3.3.3}").
21612	7	12	7	12	Every increase of 0.5oC is misleading, as it is more about "every increase" that applies (such as 0.4…). Is the meaning here that there is a noticeable difference between 1.5 and 2? Reword? [Sweden]	Taken into account - text revised. The text no longer mentions this statement, because of several reviewers' comments highlighting that it was too unspecific in the context of a report on 1.5 global warming. Hence the revised text refers to the specific difference between extremes at 1°C vs 1.5°C global warming, and at 1.5°C vs 2°C of global warming ("Climate models project robust differences in regional climate characteristics between present-day and global warming of 1.5°C, and between 1.5°C and 2°C."). The SPM also clarifies that there are detectable differences in impacts in the observational record for differences in 0.5°C of global warming. This notion is now covered elsewhere in the SPM (e.g. "A1.3: Trends in intensity and frequency of some climate and weather extremes have been detected over time spans during which about 0.5°C of global warming occurred (medium confidence). This assessment is based on several lines of evidence, including attribution studies for changes in extremes since 1950. {3.3.1, 3.3.2, 3.3.3}").
29074	7	12	7	13	Every increase of 0.5° increases the risk of CC - this statement is very generic, and misleading in two ways: 1) it could be misread as saying that increases of less than 0.5° won't increase the risk of CC; and 2) that every 0.5°T- increase has the same effect on the risks of CC; One of the rationales for having a SR1.5 is to highlight which thresholds for risks and impacts (aka dangerous CC) are crossed/may be avoided between 1.5 and 2 (Cf. e.g. Box 3.5 on tipping points), therefore, the generic statement here is neither correct nor helpful. Please revise. [Germany]	Taken into account - text revised. The text no longer mentions this statement, because of several reviewers' comments highlighting that it was too unspecific in the context of a report on 1.5 global warming. Hence the revised text refers to the specific difference between extremes at 1°C vs 1.5°C global warming, and at 1.5°C vs 2°C of global warming ("Climate models project robust differences in regional climate characteristics between present-day and global warming of 1.5°C, and between 1.5°C and 2°C."). The SPM also clarifies that there are detectable differences in impacts in the observational record for differences in 0.5°C of global warming. This notion is now covered elsewhere in the SPM (e.g. "A1.3: Trends in intensity and frequency of some climate and weather extremes have been detected over time spans during which about 0.5°C of global warming occurred (medium confidence). This assessment is based on several lines of evidence, including attribution studies for changes in extremes since 1950. {3.3.1, 3.3.2, 3.3.3}").

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29528	7	12	7	17	This para seems to contain issues re observations (2 first sentences) and issues re projections. This may be confusing to the reader. Please reformulate. [Finland]	Taken into account - text revised. The headline statement does no longer entail information on observations. The main evidence on observations has been moved to section A.1. Some of the material previously under B1 was moved to subbullets A1.2 and A1.3. The relevance of this observed evidence for projections is summarized in the new subbullet B1.1.
29580	7	12	1	45	Please consider the number and order of boxes in section 2 [Finland]	Accepted. The number and order of boxes has been revised.
29386	7	12	7	13	What is the message here? Is this a hidden reference to comparing 1.5 to 2 degrees C? The header is speaking of 1.5C warming, the box talks about warming in 0.5C steps. [Susanne Droege, Germany]	Taken into account - text revised. The text no longer mentions this statement, because of several reviewers' comments highlighting that it was too unspecific in the context of a report on 1.5 global warming. Hence the revised text refers to the specific difference between extremes at 1°C vs 1.5°C global warming, and at 1.5°C vs 2°C of global warming ("Climate models project robust differences in regional climate characteristics between present-day and global warming of 1.5°C, and between 1.5°C and 2°C."). The SPM also clarifies that there are detectable differences in impacts in the observational record for differences in 0.5°C of global warming. This notion is now covered elsewhere in the SPM (e.g. "A1.3: Trends in intensity and frequency of some climate and weather extremes have been detected over time spans during which about 0.5°C of global warming occurred (medium confidence). This assessment is based on several lines of evidence, including attribution studies for changes in extremes since 1950. {3.3.1, 3.3.2, 3.3.3}").
29960	7	12	7	13	It is quite difficult to understand how this 0.5°C is justified. We suggest to rephrase this first sentence as "An increase from 1.5 to 2°C of global mean surface temperature significantly increases the risks of climate change impacts." [France]	Taken into account - text revised. The text no longer mentions this statement, because of several reviewers' comments highlighting that it was too unspecific in the context of a report on 1.5 global warming. Hence the revised text refers to the specific difference between extremes at 1°C vs 1.5°C global warming, and at 1.5°C vs 2°C of global warming ("Climate models project robust differences in regional climate characteristics between present-day and global warming of 1.5°C, and between 1.5°C and 2°C."). The SPM also clarifies that there are detectable differences in impacts in the observational record for differences in 0.5°C of global warming. This notion is now covered elsewhere in the SPM (e.g. "A1.3: Trends in intensity and frequency of some climate and weather extremes have been detected over time spans during which about 0.5°C of global warming occurred (medium confidence). This assessment is based on several lines of evidence, including attribution studies for changes in extremes since 1950. {3.3.1, 3.3.2, 3.3.3}").
31186	7	12	7	13	It says "Every increase of 0.5°C of global mean surface temperature increases the risks of climate change impacts."; however, the explanation seems to be too simplified as impacts vary across regions and sectors. Every temperature change, even temperature decrease, has the risk of climate change impacts to some extent. This statement could be understood that every temperature change within 0.5°C would have no significant risk of climate change impacts. To avoid misunderstanding, we would request more specific or accurate statement. [Japan]	Taken into account - text revised. The text no longer mentions this statement, because of several reviewers' comments highlighting that it was too unspecific in the context of a report on 1.5 global warming. Hence the revised text refers to the specific difference between extremes at 1°C vs 1.5°C global warming, and at 1.5°C vs 2°C of global warming ("Climate models project robust differences in regional climate characteristics between present-day and global warming of 1.5°C, and between 1.5°C and 2°C."). The SPM also clarifies that there are detectable differences in impacts in the observational record for differences in 0.5°C of global warming. This notion is now covered elsewhere in the SPM (e.g. "A1.3: Trends in intensity and frequency of some climate and weather extremes have been detected over time spans during which about 0.5°C of global warming occurred (medium confidence). This assessment is based on several lines of evidence, including attribution studies for changes in extremes since 1950. {3.3.1, 3.3.2, 3.3.3}").
32602	7	12	7	21	Every increase of 0.5ºC… raises question what about every increase of 0.2 or 0.3? Better to the number and just have "Every increase of global mean surface temperature…"? Or adding something to include smaller increases if you want to emphasize the difference here between 1.5 and 2.0 (first bullet immediately following says changes (plural) are detectable with 0.5) [Jonathan Lynn, Switzerland]	Taken into account - text revised. The text no longer mentions this statement, because of several reviewers' comments highlighting that it was too unspecific in the context of a report on 1.5 global warming. Hence the revised text refers to the specific difference between extremes at 1°C vs 1.5°C global warming, and at 1.5°C vs 2°C of global warming ("Climate models project robust differences in regional climate characteristics between present-day and global warming of 1.5°C, and between 1.5°C and 2°C."). The SPM also clarifies that there are detectable differences in impacts in the observational record for differences in 0.5°C of global warming. This notion is now covered elsewhere in the SPM (e.g. "A1.3: Trends in intensity and frequency of some climate and weather extremes have been detected over time spans during which about 0.5°C of global warming occurred (medium confidence). This assessment is based on several lines of evidence, including attribution studies for changes in extremes since 1950. {3.3.1, 3.3.2, 3.3.3}").
33760	7	12	8	16	SPM 2.1 - SPM 2.3: Please consider and compare the level of specification in wording between boxes 2.1, 2.2 that are less specific and somewhat unclear about the impacts reported on, as compared to 2.3 where the reader immediately understands the box is informing about oceans. Please consider shortening and/or combining the information contained on pages 7 and 8. [Norway]	Taken into account. Information reorganised with specific details provided.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
32916	7	12	7	13	The phrasing of "Every increase of 0.5°C…" sounds like risks operate in step functions. Wouldn't every increment of warming increase risk no matter how small? Suggest rewrite to clarify. [Thomas Damassa, United States of America]	Taken into account - text revised. The text no longer mentions this statement, because of several reviewers' comments highlighting that it was too unspecific in the context of a report on 1.5 global warming. Hence the revised text refers to the specific difference between extremes at 1°C vs 1.5°C global warming, and at 1.5°C vs 2°C of global warming ("Climate models project robust differences in regional climate characteristics between present-day and global warming of 1.5°C, and between 1.5°C and 2°C."). The SPM also clarifies that there are detectable differences in impacts in the observational record for differences in 0.5°C of global warming. This notion is now covered elsewhere in the SPM (e.g. "A1.3: Trends in intensity and frequency of some climate and weather extremes have been detected over time spans during which about 0.5°C of global warming occurred (medium confidence). This assessment is based on several lines of evidence, including attribution studies for changes in extremes since 1950. {3.3.1, 3.3.2, 3.3.3}").
36276	7	12	7	14	Oddly phrased - do risks increase only in increments of 0.5C? Need a statement on overall risks for 1.5 vs 2 C. [India]	Taken into account - text revised. The text no longer mentions this statement, because of several reviewers' comments highlighting that it was too unspecific in the context of a report on 1.5 global warming. Hence the revised text refers to the specific difference between extremes at 1°C vs 1.5°C global warming, and at 1.5°C vs 2°C of global warming ("Climate models project robust differences in regional climate characteristics between present-day and global warming of 1.5°C, and between 1.5°C and 2°C."). The SPM also clarifies that there are detectable differences in impacts in the observational record for differences in 0.5°C of global warming. This notion is now covered elsewhere in the SPM (e.g. "A1.3: Trends in intensity and frequency of some climate and weather extremes have been detected over time spans during which about 0.5°C of global warming occurred (medium confidence). This assessment is based on several lines of evidence, including attribution studies for changes in extremes since 1950. {3.3.1, 3.3.2, 3.3.3}").
36914	7	12	7	13	It says "Every increase of 0.5 C of global mean surface temperature increases the risks of climate change impacts.", but impacts vary across regions and sectors. Every temperature change, even temperature decrease, has the risk of climate change impacts to some extent. This statement can also be understood that every temperature change within 0.5 C has no significant risk of climate change impacts. More specific or accurate statement would be needed. [Keigo Akimoto, Japan]	Taken into account - text revised. The text no longer mentions this statement, because of several reviewers' comments highlighting that it was too unspecific in the context of a report on 1.5 global warming. Hence the revised text refers to the specific difference between extremes at 1°C vs 1.5°C global warming, and at 1.5°C vs 2°C of global warming ("Climate models project robust differences in regional climate characteristics between present-day and global warming of 1.5°C, and between 1.5°C and 2°C."). The SPM also clarifies that there are detectable differences in impacts in the observational record for differences in 0.5°C of global warming. This notion is now covered elsewhere in the SPM (e.g. "A1.3: Trends in intensity and frequency of some climate and weather extremes have been detected over time spans during which about 0.5°C of global warming occurred (medium confidence). This assessment is based on several lines of evidence, including attribution studies for changes in extremes since 1950. {3.3.1, 3.3.2, 3.3.3}").
37242	7	12	1	41	The report describes the type and probability of impacts on human and natural systems, but doesn't describe the implications of these impacts. More quantitative and financial information on the implications of these impacts would make this section more useful to the business reader. For example, describing the potential cost of impacts on tourism (in particular regions) would help illustrate the severity of the risk - would this reduce revenue by 1-2% or 20-40% or more? The report would be more useful to a business reader if it describes impacts of climate change on GDP growth in different countries. [Jonathan Grant, United Kingdom (of Great Britain and Northern Ireland)]	We agree that quantifying the economic impacts of climate change across different sectors is most important, and that differentiating between such impacts under 1.5 vs 2 degrees C of global warming may help to demonstrate the benefits to be obtained from more stringent mitigation targets. We have in the latest draft of the chapter considerably expanded in Section 3.5 on the global aggregated economic impacts of climate change, and regional economic impacts are also discussed. In Section 3.4 economic impacts on different sectors (including tourism) are discussed in more detail than before. However, at the time of the FGD the number of studies describing such impacts under 1.5 vs 2 degrees C of warming remain limited. In the revised SPM we have thus focused on expanding on the number of statements made regarding the global aggregated economic impacts of climate change under different levels of global warming.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
38940	7	12	7	12	Every increase of 0.5… sounds strange and not clear to all why this step is used. You may simply delete "of 0.5 deg C" but then we are left with a quite general statement. So I think you could just remove the first sentence. [Jan Fuglestvedt, Norway]	Taken into account - text revised. The text no longer mentions this statement, because of several reviewers' comments highlighting that it was too unspecific in the context of a report on 1.5 global warming. Hence the revised text refers to the specific difference between extremes at 1°C vs 1.5°C global warming, and at 1.5°C vs 2°C of global warming ("Climate models project robust differences in regional climate characteristics between present-day and global warming of 1.5°C, and between 1.5°C and 2°C."). The SPM also clarifies that there are detectable differences in impacts in the observational record for differences in 0.5°C of global warming. This notion is now covered elsewhere in the SPM (e.g. "A1.3: Trends in intensity and frequency of some climate and weather extremes have been detected over time spans during which about 0.5°C of global warming occurred (medium confidence). This assessment is based on several lines of evidence, including attribution studies for changes in extremes since 1950. {3.3.1, 3.3.2, 3.3.3}").
41658	7	12			Every increase of 0.5°C? Why not 0.4 or 0.6? The sentence is not logical - "Every increase of global mean surface temperature increases the risks of climate change impacts" is better. [Czech Republic]	Taken into account - text revised. The text no longer mentions this statement, because of several reviewers' comments highlighting that it was too unspecific in the context of a report on 1.5 global warming. Hence the revised text refers to the specific difference between extremes at 1°C vs 1.5°C global warming, and at 1.5°C vs 2°C of global warming ("Climate models project robust differences in regional climate characteristics between present-day and global warming of 1.5°C, and between 1.5°C and 2°C."). The SPM also clarifies that there are detectable differences in impacts in the observational record for differences in 0.5°C of global warming. This notion is now covered elsewhere in the SPM (e.g. "A1.3: Trends in intensity and frequency of some climate and weather extremes have been detected over time spans during which about 0.5°C of global warming occurred (medium confidence). This assessment is based on several lines of evidence, including attribution studies for changes in extremes since 1950. {3.3.1, 3.3.2, 3.3.3}").
45884	7	12	7	14	The second sentence in the box is not clear. [Deger Saygin, Turkey]	Noted. Text was removed and point was made more clearly elsewhere. Also in response to other comments, the SPM no longer refers to average global land temperatures. The differential warming between land and ocean is mentioned elsewhere: "A1.2. Warming greater than the global annual average is being experienced in many land regions and seasons, including two to three times higher in the Arctic. Warming is generally higher over land than over the ocean. (high confidence) {1.2.1, 1.2.2, Figure 1.1, Figure 1.3, 3.3.1, 3.3.2}"
46154	7	12	7	17	the information in the headline message is very general and does focus little on the difference between 1,5 and 2 degrees; the message should indicate where significant or qualitative different impacts of 1,5 vs 2 degrees are expected (and where they are gradually lower or unclear) [Netherlands]	Taken into account - text revised. The text has been substantially revised, taking into account this comment as well as several other comments on related points. The revised text refers to the specific difference between extremes at 1°C vs 1.5°C global warming, and at 1.5°C vs 2°C of global warming ("Climate models project robust differences in regional climate characteristics between present-day and global warming of 1.5°C, and between 1.5°C and 2°C.").
46158	7	12	7	12	Every increase of 0.5C? [Netherlands]	Taken into account - text revised. The text no longer mentions this statement, because of several reviewers' comments highlighting that it was too unspecific in the context of a report on 1.5 global warming. Hence the revised text refers to the specific difference between extremes at 1°C vs 1.5°C global warming, and at 1.5°C vs 2°C of global warming ("Climate models project robust differences in regional climate characteristics between present-day and global warming of 1.5°C, and between 1.5°C and 2°C."). The SPM also clarifies that there are detectable differences in impacts in the observational record for differences in 0.5°C of global warming. This notion is now covered elsewhere in the SPM (e.g. "A1.3: Trends in intensity and frequency of some climate and weather extremes have been detected over time spans during which about 0.5°C of global warming occurred (medium confidence). This assessment is based on several lines of evidence, including attribution studies for changes in extremes since 1950. {3.3.1, 3.3.2, 3.3.3}").

Comment No	From Page	From Line	To Page	To Line	Comment	Response
46360	7	12	7	12	Why every 0.5 ? Why not every 0.4 or 0.6 ? I would suggest to remove the 0.5 altogether "Every increase of global mean …." [Etienne Piguet, Switzerland]	Taken into account - text revised. The text no longer mentions this statement, because of several reviewers' comments highlighting that it was too unspecific in the context of a report on 1.5 global warming. Hence the revised text refers to the specific difference between extremes at 1°C vs 1.5°C global warming, and at 1.5°C vs 2°C of global warming ("Climate models project robust differences in regional climate characteristics between present-day and global warming of 1.5°C, and between 1.5°C and 2°C."). The SPM also clarifies that there are detectable differences in impacts in the observational record for differences in 0.5°C of global warming. This notion is now covered elsewhere in the SPM (e.g. "A1.3: Trends in intensity and frequency of some climate and weather extremes have been detected over time spans during which about 0.5°C of global warming occurred (medium confidence). This assessment is based on several lines of evidence, including attribution studies for changes in extremes since 1950. {3.3.1, 3.3.2, 3.3.3}").
50388	7	12	7	12	Why is 0.5 degrees mentionned in this statement? Would it not be better to simply write: "Every increase of global mean surface temperature increases …". [Switzerland]	Taken into account - text revised. The text no longer mentions this statement, because of several reviewers' comments highlighting that it was too unspecific in the context of a report on 1.5 global warming. Hence the revised text refers to the specific difference between extremes at 1°C vs 1.5°C global warming, and at 1.5°C vs 2°C of global warming ("Climate models project robust differences in regional climate characteristics between present-day and global warming of 1.5°C, and between 1.5°C and 2°C."). The SPM also clarifies that there are detectable differences in impacts in the observational record for differences in 0.5°C of global warming. This notion is now covered elsewhere in the SPM (e.g. "A1.3: Trends in intensity and frequency of some climate and weather extremes have been detected over time spans during which about 0.5°C of global warming occurred (medium confidence). This assessment is based on several lines of evidence, including attribution studies for changes in extremes since 1950. {3.3.1, 3.3.2, 3.3.3}").
51336	7	12	7	14	Oddly phrased - do risks increase only in increments of 0.5C? Need a statement on overall risks for 1.5 vs 2 C. [Anand Patwardhan, United States of America]	Taken into account - text revised. The text no longer mentions this statement, because of several reviewers' comments highlighting that it was too unspecific in the context of a report on 1.5 global warming. Hence the revised text refers to the specific difference between extremes at 1°C vs 1.5°C global warming, and at 1.5°C vs 2°C of global warming ("Climate models project robust differences in regional climate characteristics between present-day and global warming of 1.5°C, and between 1.5°C and 2°C."). The SPM also clarifies that there are detectable differences in impacts in the observational record for differences in 0.5°C of global warming. This notion is now covered elsewhere in the SPM (e.g. "A1.3: Trends in intensity and frequency of some climate and weather extremes have been detected over time spans during which about 0.5°C of global warming occurred (medium confidence). This assessment is based on several lines of evidence, including attribution studies for changes in extremes since 1950. {3.3.1, 3.3.2, 3.3.3}").
54244	7	12	7	13	It would be better to say that impacts are generally greater at a warming of 2C compared to 1.5, and also often greater relatively than the impact of moving from from 1 to 1.5. [David Warrilow, United Kingdom (of Great Britain and Northern Ireland)]	Taken into account - text revised. The text no longer mentions this statement, because of several reviewers' comments highlighting that it was too unspecific in the context of a report on 1.5 global warming. Hence the revised text refers to the specific difference between extremes at 1°C vs 1.5°C global warming, and at 1.5°C vs 2°C of global warming ("Climate models project robust differences in regional climate characteristics between present-day and global warming of 1.5°C, and between 1.5°C and 2°C."). The SPM also clarifies that there are detectable differences in impacts in the observational record for differences in 0.5°C of global warming. This notion is now covered elsewhere in the SPM (e.g. "A1.3: Trends in intensity and frequency of some climate and weather extremes have been detected over time spans during which about 0.5°C of global warming occurred (medium confidence). This assessment is based on several lines of evidence, including attribution studies for changes in extremes since 1950. {3.3.1, 3.3.2, 3.3.3}").

Comment No	From Page	From Line	To Page	To Line	Comment	Response
54744	7	12	7	12	Why was 0.5C chosen here? I guess 2-1.5=0.5? I would imagine this is meant to be more "marginal" in thinking, like "every marginal increase of global warming…increases risk"? I am afraid some may interpret the only options are 1.5, 2, 2.5, 3, 3.5C, etc… Surely 1.75 is better than 2? [Glen Peters, Norway]	Taken into account - text revised. The text no longer mentions this statement, because of several reviewers' comments highlighting that it was too unspecific in the context of a report on 1.5 global warming. Hence the revised text refers to the specific difference between extremes at 1°C vs 1.5°C global warming, and at 1.5°C vs 2°C of global warming ("Climate models project robust differences in regional climate characteristics between present-day and global warming of 1.5°C, and between 1.5°C and 2°C."). The SPM also clarifies that there are detectable differences in impacts in the observational record for differences in 0.5°C of global warming. This notion is now covered elsewhere in the SPM (e.g. "A1.3: Trends in intensity and frequency of some climate and weather extremes have been detected over time spans during which about 0.5°C of global warming occurred (medium confidence). This assessment is based on several lines of evidence, including attribution studies for changes in extremes since 1950. {3.3.1, 3.3.2, 3.3.3}").
55572	7	12	7	12	of 0.5degC is superfluous. [David Cooper, Canada]	Taken into account - text revised. The text no longer mentions this statement, because of several reviewers' comments highlighting that it was too unspecific in the context of a report on 1.5 global warming. Hence the revised text refers to the specific difference between extremes at 1°C vs 1.5°C global warming, and at 1.5°C vs 2°C of global warming ("Climate models project robust differences in regional climate characteristics between present-day and global warming of 1.5°C, and between 1.5°C and 2°C."). The SPM also clarifies that there are detectable differences in impacts in the observational record for differences in 0.5°C of global warming. This notion is now covered elsewhere in the SPM (e.g. "A1.3: Trends in intensity and frequency of some climate and weather extremes have been detected over time spans during which about 0.5°C of global warming occurred (medium confidence). This assessment is based on several lines of evidence, including attribution studies for changes in extremes since 1950. {3.3.1, 3.3.2, 3.3.3}").
56490	7	12	7	13	0.5°C seems arbitrary. Risks increase with any increase in temp (e.g. 0.4°C) [Eleanor Johnston, United States of America]	Taken into account - text revised. The text no longer mentions this statement, because of several reviewers' comments highlighting that it was too unspecific in the context of a report on 1.5 global warming. Hence the revised text refers to the specific difference between extremes at 1°C vs 1.5°C global warming, and at 1.5°C vs 2°C of global warming ("Climate models project robust differences in regional climate characteristics between present-day and global warming of 1.5°C, and between 1.5°C and 2°C."). The SPM also clarifies that there are detectable differences in impacts in the observational record for differences in 0.5°C of global warming. This notion is now covered elsewhere in the SPM (e.g. "A1.3: Trends in intensity and frequency of some climate and weather extremes have been detected over time spans during which about 0.5°C of global warming occurred (medium confidence). This assessment is based on several lines of evidence, including attribution studies for changes in extremes since 1950. {3.3.1, 3.3.2, 3.3.3}").
57134	7	12	7	13	Every increase of 0.5°C increases the risks of impacts ? What about 0.1°C or 1°C ? Do you mean that every increase in GMT increases the risk of impacts? Or perhaps do you mean specifically the 0.5°C which is between 1.5 and 2.0, not "every" increase? The statement should be as concrete and precise as possible. [Philippe Marbaix, Belgium]	Taken into account - text revised. The text no longer mentions this statement, because of several reviewers' comments highlighting that it was too unspecific in the context of a report on 1.5 global warming. Hence the revised text refers to the specific difference between extremes at 1°C vs 1.5°C global warming, and at 1.5°C vs 2°C of global warming ("Climate models project robust differences in regional climate characteristics between present-day and global warming of 1.5°C, and between 1.5°C and 2°C."). The SPM also clarifies that there are detectable differences in impacts in the observational record for differences in 0.5°C of global warming. This notion is now covered elsewhere in the SPM (e.g. "A1.3: Trends in intensity and frequency of some climate and weather extremes have been detected over time spans during which about 0.5°C of global warming occurred (medium confidence). This assessment is based on several lines of evidence, including attribution studies for changes in extremes since 1950. {3.3.1, 3.3.2, 3.3.3}").

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58972	7	12	7	13	This quantification seems arbitrary. For example, the 0.5°C could be 1.0°C or even 0.25°C. Can this be changed to make a better, yet still general, statement? [United States of America]	Taken into account - text revised. The text no longer mentions this statement, because of several reviewers' comments highlighting that it was too unspecific in the context of a report on 1.5 global warming. Hence the revised text refers to the specific difference between extremes at 1°C vs 1.5°C global warming, and at 1.5°C vs 2°C of global warming ("Climate models project robust differences in regional climate characteristics between present-day and global warming of 1.5°C, and between 1.5°C and 2°C."). The SPM also clarifies that there are detectable differences in impacts in the observational record for differences in 0.5°C of global warming. This notion is now covered elsewhere in the SPM (e.g. "A1.3: Trends in intensity and frequency of some climate and weather extremes have been detected over time spans during which about 0.5°C of global warming occurred (medium confidence). This assessment is based on several lines of evidence, including attribution studies for changes in extremes since 1950. {3.3.1, 3.3.2, 3.3.3}").
58974	7	12	7	17	The last sentence (lines 15-17) is a statement that might benefit from a level of confidence. The phrase "can be" is vague. Does this mean that already warming in some terrestrial regions is more than three times larger than the global mean temperature? Or does this refer to a prediction in the future? [United States of America]	Noted. This specific statement is no longer in the headline statement. Related information on projections is provided in the subbullet B1.2, including confidence assessments and quantitative information: "Temperature extremes on land are projected to warm more than GMST (high confidence): extreme hot days in mid-latitudes warm by up to about 3°C at global warming of 1.5°C and about 4°C at 2°C, and extreme cold nights in high latitudes warm by up to about 4.5°C at 1.5°C and about 6°C at 2°C (high confidence)." Respective information based on observation is found in subbullet A1.2: "Warming greater than the global annual average is being experienced in many land regions and seasons, including two to three times higher in the Arctic. Warming is generally higher over land than over the ocean. (high confidence) {1.2.1, 1.2.2, Figure 1.1, Figure 1.3, 3.3.1, 3.3.2}"
58976	7	12	7	13	Interesting that the authors have chosen 0.5°C as their increment here. Why not 0.1°C or 0.31415°C? [United States of America]	Not Applicable - no longer included in the chapter. The text no longer mentions this statement, because of several reviewers' comments highlighting that it was too unspecific in the context of a report on 1.5 global warming. Hence the revised text refers to the specific difference between extremes at 1°C vs 1.5°C global warming, and at 1.5°C vs 2°C of global warming ("Climate models project robust differences in regional climate characteristics between present-day and global warming of 1.5°C, and between 1.5°C and 2°C."). The SPM also clarifies that there are detectable differences in impacts in the observational record for differences in 0.5°C of global warming. This notion is now covered elsewhere in the SPM (e.g. "A1.3: Trends in intensity and frequency of some climate and weather extremes have been detected over time spans during which about 0.5°C of global warming occurred (medium confidence). This assessment is based on several lines of evidence, including attribution studies for changes in extremes since 1950. {3.3.1, 3.3.2, 3.3.3}").
62246	7	12	7	17	It is unclear what is meant in Key Message 2.1 by “The increase in global land surface temperatures is larger than the global average.” This should be explained in the subpoints. [Shaye Wolf, United States of America]	Noted. This text was removed from the headline statement. On the other hand the respective information was clarified in the subbullet B1.2("Temperature extremes on land are projected to warm more than GMST (high confidence): extreme hot days in mid-latitudes warm by up to about 3°C at global warming of 1.5°C and about 4°C at 2°C, and extreme cold nights in high latitudes warm by up to about 4.5°C at 1.5°C and about 6°C at 2°C (high confidence).")
11244	7	13	7	14	This statement could be clearer. Is it suggesting that land surface temperature rises on average exceed those for the oceans? [United Kingdom (of Great Britain and Northern Ireland)]	Noted. Yes, indeed this is the case. But it seems that this statement was unclear for many readers, so we removed it from the headline statement. Related information on projections is now provided in the subbullet B1.2, including confidence assessments and quantitative information: "Temperature extremes on land are projected to warm more than GMST (high confidence): extreme hot days in mid-latitudes warm by up to about 3°C at global warming of 1.5°C and about 4°C at 2°C, and extreme cold nights in high latitudes warm by up to about 4.5°C at 1.5°C and about 6°C at 2°C (high confidence)." Respective information based on observation is found in subbullet A1.2: "Warming greater than the global annual average is being experienced in many land regions and seasons, including two to three times higher in the Arctic. Warming is generally higher over land than over the ocean. (high confidence) {1.2.1, 1.2.2, Figure 1.1, Figure 1.3, 3.3.1, 3.3.2}"

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29076	7	13	7	14	For additional clarity please consider to add "... is larger than the global average of the overall global mean surface temperature (land+ ocean)". [Germany]	Noted. It seems that this statement was unclear for many readers, so we removed it from the headline statement. Related information on projections is now provided in the subbullet B1.2, including confidence assessments and quantitative information: "Temperature extremes on land are projected to warm more than GMST (high confidence): extreme hot days in mid-latitudes warm by up to about 3°C at global warming of 1.5°C and about 4°C at 2°C, and extreme cold nights in high latitudes warm by up to about 4.5°C at 1.5°C and about 6°C at 2°C (high confidence)." Respective information based on observation is found in subbullet A1.2: "Warming greater than the global annual average is being experienced in many land regions and seasons, including two to three times higher in the Arctic. Warming is generally higher over land than over the ocean. (high confidence) {1.2.1, 1.2.2, Figure 1.1, Figure 1.3, 3.3.1, 3.3.2}"
34340	7	13		14	It is not clear what the purpose of including the sentence about the rise in global land temperature is. If the first sentence quanitified changes in risk with local temperature, then it would make sense to quantify how changes in land temperature vary with global mean temperature. But the first sentence describes changes in risk with global mean temperature. [Nathan Gillett, Canada]	Not Applicable - no longer included in the chapter. The SPM no longer refers to average global land temperatures. The differential warming between land and ocean is mentioned elsewhere: "A1.2. Warming greater than the global annual average is being experienced in many land regions and seasons, including two to three times higher in the Arctic. Warming is generally higher over land than over the ocean. (high confidence) {1.2.1, 1.2.2, Figure 1.1, Figure 1.3, 3.3.1, 3.3.2}"
34342	7	13			Insert 'average' after 'global land'. [Nathan Gillett, Canada]	Not Applicable - no longer included in the chapter. The SPM no longer refers to average global land temperatures. The differential warming between land and ocean is mentioned elsewhere: "A1.2. Warming greater than the global annual average is being experienced in many land regions and seasons, including two to three times higher in the Arctic. Warming is generally higher over land than over the ocean. (high confidence) {1.2.1, 1.2.2, Figure 1.1, Figure 1.3, 3.3.1, 3.3.2}"
49504	7	13	7	14	the sentence "The increase in global land surface temperatures is larger than the global average" is mishappen, needs reforumulation. Global average of what? [Karlheinz ERB, Austria]	Noted. It seems that this statement was unclear for many readers, so we removed it from the headline statement. Related information on projections is now provided in the subbullet B1.2, including confidence assessments and quantitative information: "Temperature extremes on land are projected to warm more than GMST (high confidence): extreme hot days in mid-latitudes warm by up to about 3°C at global warming of 1.5°C and about 4°C at 2°C, and extreme cold nights in high latitudes warm by up to about 4.5°C at 1.5°C and about 6°C at 2°C (high confidence)." Respective information based on observation is found in subbullet A1.2: "Warming greater than the global annual average is being experienced in many land regions and seasons, including two to three times higher in the Arctic. Warming is generally higher over land than over the ocean. (high confidence) {1.2.1, 1.2.2, Figure 1.1, Figure 1.3, 3.3.1, 3.3.2}"
50390	7	13	7	14	It is confusing (or at least not so informative) to refer only to "land" in this statement. What is the intention here? To say that continents warm up more than oceans? All continents? Are the poles "land"? Please clarify with a better statement. [Switzerland]	Noted. It seems that this statement was unclear for many readers, so we removed it from the headline statement. Related information on projections is now provided in the subbullet B1.2, including confidence assessments and quantitative information: "Temperature extremes on land are projected to warm more than GMST (high confidence): extreme hot days in mid-latitudes warm by up to about 3°C at global warming of 1.5°C and about 4°C at 2°C, and extreme cold nights in high latitudes warm by up to about 4.5°C at 1.5°C and about 6°C at 2°C (high confidence)." Respective information based on observation is found in subbullet A1.2: "Warming greater than the global annual average is being experienced in many land regions and seasons, including two to three times higher in the Arctic. Warming is generally higher over land than over the ocean. (high confidence) {1.2.1, 1.2.2, Figure 1.1, Figure 1.3, 3.3.1, 3.3.2}"
448	7	14	7	15	unprecise language: are storms different from extreme events? What is meant by "changes in": would be helpful and more policy-relevant to be more specific. [Thomas Stocker, Switzerland]	Taken into account - text revised. The revised text is now more specific and addresses different types of extreme events separately.
14210	7	14	7	15	Insert the word "Will or are likely" in line 15, after sea level rise [United Republic of Tanzania]	Not applicable, this specific sentence was removed.
18892	7	14	7	15	It is not clear compared to what the risks of extreme events etc. are higher. Does this sentence meant that the risks associated with all the impacts listed is higher with 0.5C of global mean surface temperature increase? Is this for all impacts, and all regions? [Andrea TILCHE, Belgium]	Not applicable, this specific sentence was removed. The revised text is now more specific and addresses different types of extreme events separately.
29962	7	14	7	15	To make it easier to read, we suggest to rephrase it as "There is an increase in the risks associated with changes in precipitations patterns and some extreme events and storms." [France]	Not applicable, this specific sentence was removed. The revised text is now more specific and addresses different types of extreme events separately.
34344	7	14		15	Because this sentence is separated from the first sentence in the paragraph, it is not immediately apparent that it is referring to how the risks of these events change with each additional 0.5C of global warming. Recommend deleteing the second sentence in the paragraph, or if not insert 'with each 0.5C of global warming' at the end of this sentence. [Nathan Gillett, Canada]	Accepted. The text was revised to explicitly mention that the highlighted differences refer to changes associated with a difference in global warming of 0.5°C, either between 1° and 1.5°C, as well as between 1.5°C and 2°C.

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38456	7	14	7	45	Geographic regions are sometimes specified while not in other instances; I would be persistant by providing specific examples [Linah Ababneh, United States of America]	Noted. The revised text provides more regional detail, in a consistent way.
58978	7	14	7	17	The distribution of typical variables is bell-shaped; even a slight shift in the mean can cause a very large change in the occurrence of what have in the past been viewed as extremes. The PNAS paper of Hansen and colleagues that analyzed the decadal shifts in Northern Hemisphere land observed summertime surface temperature anomalies showed that what were 1-in-1000 likelihood extremes in the 1951-80 period were occurring 1 in 10 times in the 1981-2010 period (or something similar to this very nonlinear change). Their data even showed a five standard deviation occurrence, and the curve of observations (!) is still shifting warmer. A colleague who has plotted the data slightly differently shows that the likelihood of exceeding some of the very unlikely mid-20th century occurrences is now increasing exponentially and there will soon be deviations that would have been five to six standard deviations. The phrasing here simply does not indicate the increasing risks of what were once considered the design extremes that were used in building much of the post World War II infrastructure and the damage that is occurring when such extremes actually have occurred (e.g., in tropical cyclones striking Texas, the Caribbean, and the Philippines) has been catastrophic. Virtually distributions of variables have something like a bell-shaped occurrence and the design extremes drawn from such curves in the past are becoming seriously outdated – putting society at much, much greater risk. [United States of America]	Noted. This is too detailed for the headline statement. Changes in different types of extremes are now addressed specifically.
6008	7	15			here the "high confidence" is mentioned, but it was not mentioned before. Why only for this statement? [Sara Budinis, United Kingdom (of Great Britain and Northern Ireland)]	Taken into account - text revised. Each sentence (and in some case subsentence) of this headline statement is now characterized with a confidence assessment.
5450	7	15	7	17	This statement appears to only point to polar amplification of temerature rise (where it is discussed in the CH3 ES) which occurs in ALL OF the average, high and low extreme temperature although only increase in low extremes is given as an example in the ES. This statement points only to extreme temperature which the reader would assume means only high temperature extremes. Suggest removing "extreme" to make this more representative of the finding and more general. [Haroon KHESHGI, United States of America]	Noted. This is incorrect. The statement referred to mean land temperature, as well as to changes in extreme (hot and cold) temperature, not only in the Arctic, but also in mid latitudes. However, since the text was unclear to several readers, it was removed from the headline statement. This point is clarified in several subbullets. Related information on projections is now provided in the subbullet B1.2, including confidence assessments and quantitative information: "Temperature extremes on land are projected to warm more than GMST (high confidence): extreme hot days in mid-latitudes warm by up to about 3°C at global warming of 1.5°C and about 4°C at 2°C, and extreme cold nights in high latitudes warm by up to about 4.5°C at 1.5°C and about 6°C at 2°C (high confidence)." Respective information based on observation is found in subbullet A1.2: "Warming greater than the global annual average is being experienced in many land regions and seasons, including two to three times higher in the Arctic. Warming is generally higher over land than over the ocean. (high confidence) {1.2.1, 1.2.2, Figure 1.1, Figure 1.3, 3.3.1, 3.3.2}"
29964	7	15	7	15	The issue of sea level rise is critical, but we don't see any bullet on sea level rise in this section [France]	Rejected. This specific headline statement is not about sea level rise. Sea level rise is addressed in section B2 of the revised SPM.
33762	7	15	7	17	Please consider adding where these regions are. Would be informative to know if the polar regions are included in this statement. [Norway]	Noted. Yes, polar regions are also included. Since the text was unclear to several readers, it was removed from the headline statement. This point is clarified in several subbullets. Related information on projections is now provided in the subbullet B1.2, including confidence assessments and quantitative information: "Temperature extremes on land are projected to warm more than GMST (high confidence): extreme hot days in mid-latitudes warm by up to about 3°C at global warming of 1.5°C and about 4°C at 2°C, and extreme cold nights in high latitudes warm by up to about 4.5°C at 1.5°C and about 6°C at 2°C (high confidence)." Respective information based on observation is found in subbullet A1.2: "Warming greater than the global annual average is being experienced in many land regions and seasons, including two to three times higher in the Arctic. Warming is generally higher over land than over the ocean. (high confidence) {1.2.1, 1.2.2, Figure 1.1, Figure 1.3, 3.3.1, 3.3.2}"
38454	7	15	7	15	Some extreme events seems to be too broad -- maybe an example will decifier the ambiguity and reconveys the point more clearly. See Chapter 1: 1-5:41-53 which I believe this paragraph was based on the information from that page and others listed. [Linah Ababneh, United States of America]	Noted. The revised text is now more specific and addresses different types of extreme events separately.
52922	7	15	7	16	Some more specific statements of impacts/risks would be useful here [Ireland]	Noted. The revised text is now more specific and addresses different types of extreme events separately.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
63042	7	15	7	17	This headline statement is not sufficiently clear and concrete. Does this apply to 1.5°C specifically, meaning a warming of 4.5°C/pre-ind in some regions ? Does it refer to the NH high latitudes or more than that ? It would be nice if the headline statement could give an idea of how large those regions are, but if that is too long, the minimum is that this information is provided in a bullet point, without repeating the statement itself in the bullet point. [Belgium]	Noted. We have removed this text from the headline statement and made it more explicit in the subbullets. Related information on projections is now provided in the subbullet B1.2, including confidence assessments and quantitative information: "Temperature extremes on land are projected to warm more than GMST (high confidence): extreme hot days in mid-latitudes warm by up to about 3°C at global warming of 1.5°C and about 4°C at 2°C, and extreme cold nights in high latitudes warm by up to about 4.5°C at 1.5°C and about 6°C at 2°C (high confidence)." Respective information based on observation is found in subbullet A1.2: "Warming greater than the global annual average is being experienced in many land regions and seasons, including two to three times higher in the Arctic. Warming is generally higher over land than over the ocean. (high confidence) {1.2.1, 1.2.2, Figure 1.1, Figure 1.3, 3.3.1, 3.3.2}"
336	7	16	7	16	some regions? Where? [Zong-Ci Zhao, China]	Noted. We have removed this text from the headline statement and made it more explicit in the subbullets. Related information on projections is now provided in the subbullet B1.2, including confidence assessments and quantitative information: "Temperature extremes on land are projected to warm more than GMST (high confidence): extreme hot days in mid-latitudes warm by up to about 3°C at global warming of 1.5°C and about 4°C at 2°C, and extreme cold nights in high latitudes warm by up to about 4.5°C at 1.5°C and about 6°C at 2°C (high confidence)." Respective information based on observation is found in subbullet A1.2: "Warming greater than the global annual average is being experienced in many land regions and seasons, including two to three times higher in the Arctic. Warming is generally higher over land than over the ocean. (high confidence) {1.2.1, 1.2.2, Figure 1.1, Figure 1.3, 3.3.1, 3.3.2}"
58980	7	17	7	17	Please supply a confidence qualifier. [United States of America]	Noted. We have removed this text from the headline statement and made it more explicit in the subbullets, including confidence assessments. Related information on projections is now provided in the subbullet B1.2, including confidence assessments and quantitative information: "Temperature extremes on land are projected to warm more than GMST (high confidence): extreme hot days in mid-latitudes warm by up to about 3°C at global warming of 1.5°C and about 4°C at 2°C, and extreme cold nights in high latitudes warm by up to about 4.5°C at 1.5°C and about 6°C at 2°C (high confidence)." Respective information based on observation is found in subbullet A1.2: "Warming greater than the global annual average is being experienced in many land regions and seasons, including two to three times higher in the Arctic. Warming is generally higher over land than over the ocean. (high confidence) {1.2.1, 1.2.2, Figure 1.1, Figure 1.3, 3.3.1, 3.3.2}"
672	7	19	7	19	Changes in temperature and preciptation should be "Changes in temperature and precipitation" [Francisco Molero, Spain]	Editorial - copyedit to be completed prior to publication. Sentence was revised, this specific text is no longer included.
9168	7	19			Please change "preciptation" to "precipitation" [Marco Turco, Spain]	Accepted - text revised. Corrected
9470	7	19	7	21	'Changes in temperature and precipitation extreme indices are detectable in observations for the 1991-2010 period compared with 1960-1979, during which time an approximate 0.5°C global warming occurred.' Yes, during this time an approximate 0.5°C global warming occurred. However, a cause of the changes in the extremes can be natural fluctuations, not this global +0.5°C! [Russian Federation]	Rejected - not supported by the peer-reviewed published literature. Peer-reviewed literature show that these reported trends have been attributed to anthropogenic forcing (see IPCC AR5). We have made this point more explicit in new text under A1.3: "Trends in intensity and frequency of some climate and weather extremes have been detected over time spans during which about 0.5°C of global warming occurred (medium confidence). This assessment is based on several lines of evidence, including attribution studies for changes in extremes since 1950. {3.3.1, 3.3.2, 3.3.3}"
10664	7	19	7	19	ortographic error: preciptation instead precipitation [luca lombroso, Italy]	Editorial - copyedit to be completed prior to publication. Sentence was revised, this specific text is no longer included.
11246	7	19	7	19	Changes and clear trends would be more impactful [United Kingdom (of Great Britain and Northern Ireland)]	Noted. Sentence was revised, this specific text is no longer included. Revised sentence is now under A1.3:" Trends in intensity and frequency of some climate and weather extremes have been detected over time spans during which about 0.5°C of global warming occurred (medium confidence). This assessment is based on several lines of evidence, including attribution studies for changes in extremes since 1950. {3.3.1, 3.3.2, 3.3.3}"
11248	7	19	11	13	Better quantification of the difference between impacts at 1.5°C and 2°C is needed. There's not enough information provided here to get a sense of whether there are substantial differences or not. E.g. p.8, l.9, what is "greater risk"? [United Kingdom (of Great Britain and Northern Ireland)]	Taken into account - text revised. The revised text now provides more specific information on differences in climate at 1.5°C vs 2°C global warming.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
15458	7	19	7	19	Replace "changes" with "increases" and delete "indices" [Australia]	Noted. Revised sentence is now under A1.3: "Trends in intensity and frequency of some climate and weather extremes have been detected over time spans during which about 0.5°C of global warming occurred (medium confidence). This assessment is based on several lines of evidence, including attribution studies for changes in extremes since 1950. {3.3.1, 3.3.2, 3.3.3}"
15460	7	19	8	21	We query the baselines and periods used to define this 0.5°C warming between periods. Because of the periods used, it's unclear whether there has in fact been 0.5°C warming between these periods. [Australia]	The 0.5C warming comes from the Schleussner et al. (2017) paper, computed used GISTEMP. It is unclear as to what the commenter finds problematic with their computation method.
18894	7	19	7	21	Past patterns are not necessarily good predictors of future changes. [Andrea TILCHE, Belgium]	Noted. This is correct, but can be used as a first benchmark under the assumption that in first order the system reacts linearly.
21614	7	19	7	19	Changes in… extreme indices -> "Changes in... extremes". [Sweden]	Noted. Revised sentence is now under A1.3, mentions "extremes" not "extreme indices": "Trends in intensity and frequency of some climate and weather extremes have been detected over time spans during which about 0.5°C of global warming occurred (medium confidence). This assessment is based on several lines of evidence, including attribution studies for changes in extremes since 1950. {3.3.1, 3.3.2, 3.3.3}"
32796	7	19	7	21	Changes in temperature and preciptation extreme indices are detectable in observations This is cross-referenced to 3.1.1. but I can find nothing definite there regarding observations of changes in precipitation extremes. I note the comment in SREX "• “It is likely that the frequency of heavy precipitation or the proportion of total rainfall from heavy rainfalls will increase in the 21st century over many areas of the globe.” .(p113) but SREX likewise presented no observational data in support. Indeed, the SREX comment on flooding "• “There is limited to medium evidence available to assess climate-driven observed changes in the magnitude and frequency of floods. Furthermore, there is low agreement in this evidence, and thus overall low confidence at the global scale regarding even the sign of these changes.” (p112) would tend to indicate that extreme precipitation, which is the primary source of flooding, is not significantly increasing. [Philip Lloyd, South Africa]	Noted. The text has been better substantiated in the revision. The new text is under A1.3: ""Trends in intensity and frequency of some climate and weather extremes have been detected over time spans during which about 0.5°C of global warming occurred (medium confidence). This assessment is based on several lines of evidence, including attribution studies for changes in extremes since 1950. {3.3.1, 3.3.2, 3.3.3}". The underlying evidence is from the SREX and AR5 and now mentioned in Chapter 3.
33486	7	19	7	21	why are twenty-year and not thirty-year time periods used here? Are these considered long enough to filter out any noise? [Stephen Cornelius, United Kingdom (of Great Britain and Northern Ireland)]	Taken into account - text revised. This text was substantially revised to also account for detected changes over other periods characterized by a ca. 0.5°C increase in global warming. (A1.3: "Trends in intensity and frequency of some climate and weather extremes have been detected over time spans during which about 0.5°C of global warming occurred (medium confidence). This assessment is based on several lines of evidence, including attribution studies for changes in extremes since 1950. {3.3.1, 3.3.2, 3.3.3}"; B1.1. "Evidence from attributed changes in some climate and weather extremes for a global warming of about 0.5°C supports the assessment that an additional 0.5°C of warming compared to present is associated with further detectable changes in these extremes (medium confidence).”).
34346	7	19			This statement is lacking in specificity. Presumably the sentence refers to a global analysis. It is not true for all extreme indices. [Nathan Gillett, Canada]	Accepted. The text has been made much more explicit, with separate summary assessments for different type of climate characteristics (mean climate, different types of extreme events).
40398	7	19			it should be indicated that they are induced changes because the climate changes naturally and could be misinterpreted [Jonathan Gómez Cantero, Spain]	Rejected. Natural climate variability is mentioned in the report (e.g. in the cross-chapter box 8 on 1.5°C warmer worlds). The explicit mandate of the IPCC is to identify signals that can be detected beyond natural variability. This is what is summarized here.
38942	7	19	7	21	This bullet is important, but I think this is based on one paper only. If this is the case, then I am not so sure that it should be so prominent in the SPM. Please reconsider, also if there are more studies on this published now that can help assess this point. [Jan Fuglestvedt, Norway]	Taken into account - text revised. This text was substantially revised to also account for detected changes over other periods characterized by a ca. 0.5°C increase in global warming. (A1.3: "Trends in intensity and frequency of some climate and weather extremes have been detected over time spans during which about 0.5°C of global warming occurred (medium confidence). This assessment is based on several lines of evidence, including attribution studies for changes in extremes since 1950. {3.3.1, 3.3.2, 3.3.3}"; B1.1. "Evidence from attributed changes in some climate and weather extremes for a global warming of about 0.5°C supports the assessment that an additional 0.5°C of warming compared to present is associated with further detectable changes in these extremes (medium confidence).”).
40542	7	19	7	21	Ambiguous and confusing statement.In particular, the expression "during which time" needs clarification and rewriting. [Sergio Henrique Faria, Spain]	Taken into account - text revised
41460	7	19	7	19	precipitation (not preciptation) [Maria Pia Carazo Ortiz, Germany]	Editorial - copyedit to be completed prior to publication. Sentence was revised, this specific text is no longer included.
53202	7	19	7	19	preciptation [Maria-Carmen Llasat, Spain]	Editorial - copyedit to be completed prior to publication. Sentence was revised, this specific text is no longer included.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
52924	7	19	7	45	Can more details be provided as well as confidence statements? [Ireland]	Taken into account - text revised. This text was substantially revised to also account for detected changes over other periods characterized by a ca. 0.5°C increase in global warming. (A1.3: "Trends in intensity and frequency of some climate and weather extremes have been detected over time spans during which about 0.5°C of global warming occurred (medium confidence). This assessment is based on several lines of evidence, including attribution studies for changes in extremes since 1950. {3.3.1, 3.3.2, 3.3.3}"; B1.1. "Evidence from attributed changes in some climate and weather extremes for a global warming of about 0.5°C supports the assessment that an additional 0.5°C of warming compared to present is associated with further detectable changes in these extremes (medium confidence)..").
57138	7	19	7	45	All those statements relate to the difference in physical drivers of risk (hazard) between 1.5 and 2°C, and all say that there is more risk at 2°C. Could this be summarized in a way that says that many (?) or all (?) physical hazards present at 1.5°C further increases at 2°C, and then list the most important aspects in a compact form, also highlighting those factors that increase more than proportionally ? [Philippe Marbaix, Belgium]	Taken into account - text revised. This text was substantially revised to provide more specific information.
58982	7	19	7	19	Having "indices" seems to weaken this statement. It would be better understood to a wider audience if you replace "extreme indices" with "extremes". Also here, as in line 27, be more precise and say "high temperature". Otherwise, it leaves the reader wondering which extremes – even low T extremes? [United States of America]	Noted. Revised sentence is now under A1.3, mentions "extremes" not "extreme indices": "Trends in intensity and frequency of some climate and weather extremes have been detected over time spans during which about 0.5°C of global warming occurred (medium confidence). This assessment is based on several lines of evidence, including attribution studies for changes in extremes since 1950. {3.3.1, 3.3.2, 3.3.3}"
58984	7	19	7	21	This statement is relevant to demonstrate that some impacts at different temperatures are detectable. It would be helpful to note that each increase in 0.5°C has different impacts that may not scale linearly. [United States of America]	Noted. The fact that the impacts may not scale linearly is mentioned in Chapter 3. However, it is considered an acceptable approximation to detect possible effects of 0.5°C of global warming.
11112	7	2	7	2	It's confusing that the reference period is not 30 years as in box SPM1 [Denmark]	Taken into account - text revised. This text was substantially revised to also account for detected changes over other periods characterized by a ca. 0.5°C increase in global warming. (A1.3: "Trends in intensity and frequency of some climate and weather extremes have been detected over time spans during which about 0.5°C of global warming occurred (medium confidence). This assessment is based on several lines of evidence, including attribution studies for changes in extremes since 1950. {3.3.1, 3.3.2, 3.3.3}"; B1.1. "Evidence from attributed changes in some climate and weather extremes for a global warming of about 0.5°C supports the assessment that an additional 0.5°C of warming compared to present is associated with further detectable changes in these extremes (medium confidence)..").
36278	7	2			Which time? 1960 - 79 or 1991-2010 or the whole period? [India]	Taken into account - text revised. The text referred to the difference in the occurrence of extremes between these two time periods. This text was substantially revised to also account for detected changes over other periods characterized by a ca. 0.5°C increase in global warming. (A1.3: "Trends in intensity and frequency of some climate and weather extremes have been detected over time spans during which about 0.5°C of global warming occurred (medium confidence). This assessment is based on several lines of evidence, including attribution studies for changes in extremes since 1950. {3.3.1, 3.3.2, 3.3.3}"; B1.1. "Evidence from attributed changes in some climate and weather extremes for a global warming of about 0.5°C supports the assessment that an additional 0.5°C of warming compared to present is associated with further detectable changes in these extremes (medium confidence)..").
51338	7	2			Which time? 1960 - 79 or 1991-2010 or the whole period? [Anand Patwardhan, United States of America]	Taken into account - text revised. The text referred to the difference in the occurrence of extremes between these two time periods. This text was substantially revised to also account for detected changes over other periods characterized by a ca. 0.5°C increase in global warming. (A1.3: "Trends in intensity and frequency of some climate and weather extremes have been detected over time spans during which about 0.5°C of global warming occurred (medium confidence). This assessment is based on several lines of evidence, including attribution studies for changes in extremes since 1950. {3.3.1, 3.3.2, 3.3.3}"; B1.1. "Evidence from attributed changes in some climate and weather extremes for a global warming of about 0.5°C supports the assessment that an additional 0.5°C of warming compared to present is associated with further detectable changes in these extremes (medium confidence)..").
4258	7	23	7	24	In some regions… please specify the major regions, as in other paragraphs [Abanades Carlos, Spain]	Taken into account - text revised. The revised text provides more regional detail.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
5452	7	23	7	25	This statement appears to only point to polar amplification of temerature rise (where it is discussed in the CH3 ES) which occurs in ALL OF the average, high and low extreme temperature although only increase in low extremes is given as an example in the ES. This statement points only to extreme temperature which the reader would assume means only high temperature extremes. Suggest removing "extreme" to make this more representative of the finding and more general. [Haroon KHESHGI, United States of America]	Rejected - not supported by the peer-reviewed published literature. The reviewers' comment is incorrect. This statement applies both to extreme cold temperatures in the Arctic (coldest night temperature) as well as to extreme hot temperatures in mid-latitudes. The revised text makes this point clearer.
10666	7	23	7	23	I suggest to add more detail regarding "in some region": which will be afffected by "extreme temperatures is projected to be more than three times…" for a policy maker, this is very important [luca lombroso, Italy]	Taken into account - text revised. The revised text provides more regional detail.
11250	7	23	7	25	Need to define what you mean by extreme temperatures in this context - e.g. average surface temp annually for the region is 3x the global average or maximum daily temperature on the hottest day of the year is 3x global average, or maybe average temp on the hottest day or season is 3x global average. Does this statement relate to the time periods stated in lines 19-21 above? Could this be made more explicit if so? [United Kingdom (of Great Britain and Northern Ireland)]	Noted. Text has been revised and made more explicit.
18896	7	23	7	25	in some regions: which regions? The location of extreme temperatures matter in terms of their ultimate impacts on society and ecosystems. It may be irrelevant/have limited consequences in some areas of the world. [Andrea TILCHE, Belgium]	Taken into account - text revised. The revised text provides more regional detail.
29078	7	23	7	23	Please differentiate between rise in extreme temperatures and rise in mean temperature in single regions in comparison to global mean temperature rise or to difference in global mean temperature. Please be consistent: In chapter 3 (p:25;l:9-10) is written ..These differences are larger than 2–2.5°C in some locations (Figure 3.5) and thus four or five times larger than the differences in global mean temperature.… whereas in ES of Ch. 3 and SPM: is written: ..more than three times…..Also please note that the statement (three times larger) can be found in Ch 3 Ex. Summary (line 43-48, p. 8) and in FAQ only (line 25, p. 188) but not in 3.3.1, 3.3.2 or Cross-Chapter Box 3.2 as mentioned. Please make sure the statement is backed by the chapter text, and the cross-referencing is correct. In addition, please avoid duplication with the headline statement 2.1 above, and with the headline statement in the Box 2.1, [Germany]	Taken into account - text revised. The revised text is consistent with the underlying chapter material.
29966	7	23	7	24	Is it necessary to repeat this sentence already mentionned in the box above ? [France]	Noted. Text has been substantially revised, does not apply anymore.
39990	7	23	7	23	Some regions: be specific about which regions. [Kornelis Blok, Netherlands]	Taken into account - text revised. The revised text provides more regional detail.
40400	7	23			it could be added that in some areas the temperature has already increased more than 1.5ºC [Jonathan Gómez Cantero, Spain]	Noted. This point is explicit in the revised text elsewhere in the SPM: "Warming greater than the global annual average is being experienced in many land regions and seasons, including two to three times higher in the Arctic. Warming is generally higher over land than over the ocean. (high confidence) {1.2.1, 1.2.2, Figure 1.1, Figure 1.3, 3.3.1, 3.3.2}"
46160	7	23	7	25	Wich regions in particular? [Netherlands]	Taken into account - text revised. The revised text provides more regional detail.
46424	7	23	7	25	Which regions in particular? [Netherlands]	Taken into account - text revised. The revised text provides more regional detail.
53204	7	23	7	23	Would be it possible to include the name of these regions or they approximate location? [Maria-Carmen Llasat, Spain]	Taken into account - text revised. The revised text provides more regional detail.
58986	7	23	7	25	Should clarify that you mean extreme heat since extremes could be on either side (cold or hot) of the temperature distribution. [United States of America]	Noted. Applies both to extreme cold temperature (i.e. to the temperature of cold extremes, which is increasing very strongly in the Arctic) and to extreme hot temperature (i.e. to the temperature of hot extremes, which is increasing in mid latitudes). The revised text is more explicit is distinguishing these changes.
58988	7	23	7	23	Make this statement more specific by indicating a timeframe and/or increase in global average temperature. Also supply a confidence qualifier. [United States of America]	Taken into account - text revised. The revised text now mentions explicitly what are the implied changes in regional extreme temperature projected for given levels of global warming.
5778	7	27	7	45	Quantitative increase in risk in % (based on ensemble mean) between 1.5 and 2 deg warming would provide useful guidance to policymakers. [Govindasamy Bala, India]	Rejected - no scientific evidence/publication provided to support changes suggested by the reviewer. Information in % would not be accurate enough. The SPM is focussing on the sign of projected changes, and for temperature also in quantitative changes in the absolute temperature of (cold and hot) extremes.
8994	7	27	7	45	Is it really necessary to explain in every paragraph that an increase of temperature increases the risk of a certain impact? This seems rather self-evident. Or is there an example where this isn't the case? It might be more efficient and informative to reduce the information to cases, where the difference between 1.5 and 2°C can be quantified. [Urs Neu, Switzerland]	Noted. Text has been substantially revised. Now this first subsection focuses only on changes in climate, while changes in impacts are summarized further in the section. Note that it is important to distinguish between changes in climate and changes in impacts, since the impacts do not only depend on climate, but also on vulnerability and exposure (as highlighted in the IPCC SREX report).
6084	7	27	7	31	The likelihood of certain hazardous temperatures does indeed increase (usually at the high end), but for certain others (e.g. low temperatures) it falls. Here we are confronted with a typical climate science vs. impact science dilemma of terminology and also of context. The terminology being used is that of risk, but the events being described are climate events, not impacts. Extreme impacts don't necessarily occur due to extremes in weather. This is the climate hazard that is being described and the risk would need to be determined with respect to some impact and accounting for exposure and vulnerability. I really think that climate scientists need to cede the ground here to the IAV community and use strict IPCC risk terminology that was argued at length in the AR5. It isn't perfect, but it has a logic, and regardless of the "tradition" of use in climate science, it is risk frameworks that policy makers commonly make use of. [Timothy Carter, Finland]	Noted. The risk framework includes the probability of occurrence of hazards, hence changes in their occurrence probability is modifying risk.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
11252	7	27	7	31	Include numbers - globally, heatwave durations are longer (1.5 vs. 1.1 months) for 2°C compared to 1.5°C (3.4.8.2) [United Kingdom (of Great Britain and Northern Ireland)]	Noted. The revised text provides more detail, e.g. on the absolute changes in the temperature of hot or cold extremes. However, it was considered that there was not enough space to discuss changes in the length of heatwaves. Note that changes in heat waves are integrated in the reason for concern 2 displayed in Fig. SPM.2.
14154	7	27	7	31	Based on chapter 3, it seems that Southern East Asia should be included. This is because figure 3.8 and 3.9 show sbustantial cahnges in hot extremesin Southern East Asia, which is comparable to Eastern North America. [Rongshuo Cai, China]	Noted. The revised text mentions Eastern Asia and further regional information. Southern Eastern Asia also shows consistent signals but a bit weaker than Eastern Asia (see Fig. 3.11 in chapter 3). It is thus not explicitly mentioned here, but could be considered in later reports.
15462	7	27	7	3	Does this include Southern Hemisphere continents, i.e. Australia, Africa and South America. What's the difference between southern Europe and the Mediterranean? [Australia]	Noted. The revised text provides more regional detail.
31188	7	27	7	45	There is a greater risk in many aspects with 2°C of global warming compared to 1.5°C, but it is necessary to present how much difference there is from 1.5°C of global warming to 2°C of global warming exactly? [Japan]	Rejected. One main specific mandate of the IPCC SR15 is to present the main aspects of changes in climate at 1.5°C global warming, and differences to changes happening at 2°C or higher levels of global warming.
36280	7	27			Likelihood of not risks [India]	Noted. For a general public, it was felt that "risk" is better understandable. Risk includes the probability of occurrence of hazards.
36916	7	27	7	45	There is greater risk in many aspects with 2°C of global warming compared to 1.5°C, but it is necessary to present how much difference is there from 1.5°C of global warming to 2°C of global warming exactly? [Keigo Akimoto, Japan]	Rejected. One main specific mandate of the IPCC SR15 is to present the main aspects of changes in climate at 1.5°C global warming, and differences to changes happening at 2°C or higher levels of global warming.
37244	7	27	7	45	The report describes the increase in likelihood in extreme weather events in this section, but would be more useful for a if it quantified the implications of these events in financial terms (cost or impact on GDP) as this would help illustrate the severity of the risk. It would be helpful if the cost of impacts could be described over time, e.g. in 2030 or 2050, and compared to costs of similar extreme weather events today. [Jonathan Grant, United Kingdom (of Great Britain and Northern Ireland)]	Noted. This revised subsection only addresses changes in climate. Economic and other impacts are summarized later in Section B.
40546	7	27	7	46	Noun-preposition confusion: multiple uses of "risk from" instead of "risk of". [Sergio Henrique Faria, Spain]	Noted. There are different uses in the IPCC working groups. The chapter text mentions "risks of" while the SPM mentions "risks from". What is meant in this section are changes in occurrence probability or given hazards or impacts.
49402	7	27	7	31	It is necessary to add information on reduction of cold spell risk under 1.5ºC warming. [Alexander Chernokulsky, Russian Federation]	Noted. Considered too detailed for SPM. However, the revised SPM mentions the warming of the coldest temperatures.
51340	7	27			likelihood of not risks [Anand Patwardhan, United States of America]	Noted. For a general public, it was felt that "risk" is better understandable. Risk includes the probability of occurrence of hazards.
57136	7	27	7	35	Please consider summarizing those 2 statements in layman language. What is "rate of increase of temperature extremes" ? is "land-based" (heatwave) a needed qualifier in a SPM ? [Philippe Marbaix, Belgium]	Noted. The text was revised to make statement clearer.
58148	7	27		45	I recommend to reorganize the text in sub-bullets. This avoids repetitions. [Nico Bauer, Germany]	Rejected. This would not reflect the usual structure of IPCC SPMs. The structure is considered clear enough as is.
15464	7	28	7	29	Strange to talk about 'rate of increase' in extremes, when we are talking about 1.5 versus 2 (quasi equilibriated changes). Instead need to talk about 'greater increase in' [Australia]	Noted. Language was simplified.
29080	7	28	7	31	„There is a faster rate of increase of temperature extremes in most land regions at 2°C compared to 1.5°C, in particular in Central and Eastern North America, Central and Southern Europe, the Mediterranean, Western and Central Asia, and Southern Africa“: This statement is incomprehensible and confusing if compared to figures, text and data shown in Chapter 3. Which data would support the chosen formulation “faster rate of increase”? Please specify the reference for this conclusion in the underlying chapters. (If it refers to Figures 3.8 or 3.9 showing maximum daytime and minimum night-time temperatures, respectively, then the “rates” (median of regional increase divided by global increase) are practically similar for the 1.5 and 2.0°C scenarios, respectively.) [Germany]	Noted. Language was simplified.
33764	7	28	7	31	Please consider explaining why in particular there is a faster rate of increase of temperature extremes in the land regions mentioned at 2°C compared to 1.5°C. [Norway]	Taken into account - text revised. The revised text provides more regional detail.
34348	7	28		29	It is not clear what is meant by 'a faster rate of increase of temperature extremes in most land regions at 2C compared to 1.5C'. If the sentence is just comparing changes in extremes at 2C compared to 1.5C, then replace 'a faster rate of increase' with 'a larger increase'. [Nathan Gillett, Canada]	Taken into account - text revised. Text was clarified and made more explicit (B1.2: "Temperature extremes on land are projected to warm more than GMST (high confidence): extreme hot days in mid-latitudes warm by up to about 3°C at global warming of 1.5°C and about 4°C at 2°C, and extreme cold nights in high latitudes warm by up to about 4.5°C at 1.5°C and about 6°C at 2°C (high confidence)."
38524	7	28	7	45	This report is about 1.5°C. So the subject of the sentence should be the case of 1.5°C. You should reverse the order of the comparison putting first the 1.5°C case and then the 2 degrees / higher temperatures cases. The advantages of limiting warming to 1.5°C will be more communicable. E.g. in l. 28-29 "Limiting warming to 1.5°C reduces the rate of increase of temperature extremes in most land regions with respect to 2°C and higher temperature scenarios". [Valentino Piana, Italy]	Noted. Changes at 1.5°C are now generally mentioned first in the revised text, but not considered critical for understanding.
38526	7	28	9	16	The text should be clear about what is going to be worse passing from now to 1.5°C and what from 1.5°C up. At the moment, the message seems to be that 1.5°C is very bad and not a worthwhile objective. [Valentino Piana, Italy]	Noted. The text now also discusses briefly changes at 1.5°C global warming compared to today.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
38528	7	28	9	16	The higher temperature to which 1.5°C scenarios are to be compared is the temperature implied by current NDCs, because the key choice this report is called to clarify is about the benefits and the costs of increasing ambition in the next wave of NDCs, [Valentino Piana, Italy]	Rejected - outside the scope of the chapter. The chapter has focused on changes at 1.5°C vs 2°C global warming, following the scope received from the IPCC.
49290	7	28			Check logic: 'faster rate of increase of temperature -extremes at 2°C' [Bill Hare, Germany]	Taken into account - text revised. Text was clarified and made more explicit (B1.2: "Temperature extremes on land are projected to warm more than GMST (high confidence): extreme hot days in mid-latitudes warm by up to about 3°C at global warming of 1.5°C and about 4°C at 2°C, and extreme cold nights in high latitudes warm by up to about 4.5°C at 1.5°C and about 6°C at 2°C (high confidence)."
53206	7	28	7	48	All these paragraphs compare the worst conditions when an increase of 2ºC is produced in comparison with an increase of 1,5ºC, but they do not say anything about the impact of an increase of 1,5ºC in comparison with the present situation. This question, that seems obvious, is repeated along different parts of the report. On the contrary, there are some paragraphs with new information (quantitative data, more affected regions, etc.) that will be useful for the policymakers. [Maria-Carmen Llasat, Spain]	Taken into account - text revised. The text now also discusses briefly changes at 1.5°C global warming compared to today.
40544	7	29	7	29	Add "warming" after "at 2°C". [Sergio Henrique Faria, Spain]	Noted. Revised text generally always write "global warming" after 1.5°C or 2°C.
11254	7	33	7	33	Need to be more specific about these risks. E.g 'an increased risk to human health and labour productivity from hot days..'? [United Kingdom (of Great Britain and Northern Ireland)]	Text changed to: Limiting global warming to 1.5°C compared to 2°C would approximately halve the proportion of the world population expected to suffer water scarcity, although there is considerable variability between regions (medium confidence).
15466	7	33	7	34	Delete or replace with an example for a specific city to quantify the magnitude of change. Note impacts associated with extreme temperatures, such as heat-related deaths, energy-load-shedding and black-outs, fires, delays/damage to transport/energy infrastructure, etc. [Australia]	The projections are not specific to a city. The projected impacts of extreme heat on human and natural systems at 1.5C and 2C are discussed in section B5
15468	7	33	7	33	10% of warmest days should be "warmest 10% of days". [Australia]	Noted. Now mentions "Number of hot days". Definition is found in the underlying chapter.
19216	7	33	7	35	Hot days increase in the tropics it's due to the lower interannual temperature variability in those areas. It should be put into context. [Spain]	Noted. This information is provided in the underlying chapter but is too detailed for the SPM.
19400	7	33	7	34	The sentence here is difficult to understand. [Jennifer Morgan, Netherlands]	Noted. Text has been simplified.
29082	7	33	7	34	“An increased risk from hot days (10% of warmest days) occurs with the additional 0.5°C from 1.5°C to 2°C global warming. The increase in risk is most pronounced in the tropics. (Figure SPM3).” The first sentence is poorly formulated, it could imply that increased risk from higher number of hot days occurs only at or above 1.5°C scenarios, and none below 1.5°C. Overall, a reader would eventually prefer statements which are formulated in a different way. That is, for example “The risk of occurrence of hot days declines by a factor of xxx when shifting the global warming limit from 2°C to 1.5°C.” Good examples can be found e.g. in the chapters on biome shifts, species extinction, sea level rise, etc. Then, the reference Fig. SPM3 is not supporting statements on differences between 1.5 und 2°C scenarios, there is only a 2° scenario, no 1.5°C. In addition, it the use of the word "risk" is unclear, probably it should be "occurrence" because the text does not refer to the consequences of hot days on human or natural systems. [Germany]	Noted. Too detailed for SPM. Information can be found in chapter 3.
29968	7	33	7	34	This sentence is quite difficult to read and would deserve to be clearer. We suggest to rephrase it as "An additional 0.5°C from 1.5°C to 2°C global warming increases risks from hot days (10% of warmest days). [France]	Noted. Text has been simplified.
36282	7	33			Can the increase in likelihood of hot days be quantified? This comment is also for all the subsequent statements about other climate impacts. [India]	Noted. Too detailed for SPM. Information can be inferred from chapter 3.
39992	7	33	7	33	How much increased? [Kornelis Blok, Netherlands]	Noted. Too detailed for SPM. Information can be found in chapter 3.
39994	7	33	7	33	The increase is now self referenced, but in many regions it will not be so problematic if there are more warm days. It would be more helpful to indicate here how much more often days with temperatures above (e.g.) 40 degree C will occur. [Kornelis Blok, Netherlands]	Rejected. Too detailed for SPM. Information can be found in chapter 3 (Fig. 3.8)
40402	7	33			And in subtropical and temperate climates (Mediterranean) [Jonathan Gómez Cantero, Spain]	Rejected - not supported by the peer-reviewed published literature. The highest increase in terms of the number of hot days is found in the tropics.
51342	7	33			Can the increase in likelihood of hot days be quantified? This comment is also for all the subsequent statements about other climate impacts. [Anand Patwardhan, United States of America]	Noted. Too detailed for SPM. Information can be inferred from chapter 3.
58990	7	33	7	33	Quantify the "increased risk". Otherwise the 0.5°C is not meaningful. It would be just as meaningful to say "An increased risk from hot days occurs with global warming." [United States of America]	Noted. The revised heading of subsection B1 mentions that reported changes are robust, i.e. found across models and statistically significant over large regions: "Climate models project robust7 differences in regional climate characteristics between present-day and global warming of 1.5°C and between 1.5°C and 2°C." (footnote #7: "Robust is here used to mean that at least two thirds of climate models show the same sign of changes at the grid point scale, and that differences in large regions are statistically significant.")

Comment No	From Page	From Line	To Page	To Line	Comment	Response
58992	7	33	7	35	This discussion seems to focus just on the increase in temperature, when what matters on very hot days is really the combination of temperature and absolute humidity, both of which are typically increasing and that together make the increase in the discomfort index even more than the temperature increase. As to the location of greatest increase in risk, it involves not just the actual increase but how well people are adapted to this. For the tropics where the temperature is so constant, there would be greater adaptation to the ongoing heat than in the mid-latitudes where the seasonal range of temperature does not really allow the body to get adjusted to the peak heat indexes that can occur. [United States of America]	Humidity is more difficult to project than temperature. There is a strong correlation between temperature and measures of temperature and humidity (e.g. humidex). There is not strong evidence that people in the tropics will adapt more easily than people in temperate regions to higher temperatures and more extreme hot days.
29970	7	34	7	34	« The increase in risk is most pronounced in the tropics » We suggest to add at the end of the sentence", mainly because of a lower annual amplitude of the daily temperature" [France]	Noted. This information is provided in the underlying chapter but is too detailed for the SPM.
29084	7	36	7	36	Please add an extra point based on Chapter 3, Page 40, Line 25-34: "Regions that display statistically significant changes in heavy precipitation between 1.5°C and 2°C global warming are found in high-latitude (Alaska/Western Canada, Eastern Canada/Greenland/Iceland, Northern Europe, Northern Asia) and high-altitude (Tibetan Plateau) regions, as well as in Eastern Asia (including China and Japan) and in Eastern North America. Southern Asia is a hot spot for increases in heavy precipitation between these two global temperature levels" [Germany]	Noted. More regional information has been added.
6082	7	37	14	4	The whole of section 2 on risk is mixing terminology. I don't think it is sufficient to acknowledge this as being inevitable. Risks are being used to mean likelihoods of hazard in many places; in others they are used to imply potential impacts. Is it really too difficult to adopt the IPCC risk framework, introduced in SREX but then refined in AR5? It's a workable framework, but only if everyone uses the terminology consistently. In a document like this, especially the SPM but preferably throughout the SRs and full assessment report, it is imperative that the terminology be consistent. Perhaps authors need some training sessions at the start of an assessment. As with the uncertainty language, which is nowadays pretty well adhered to after a very long discussion, IPCC cannot afford to allow disciplinary bias to undermine a common terminology. The risk framework can be criticised (e.g. for only using terms associated with adverse effects), but at least it has a certain logic. [Timothy Carter, Finland]	Accepted. The statements have been revised and uncertainty language added to all of them.
10198	7	37	7	37	This statement with respect to floods and droughts is not consistent with Chapter 3 Paragraph 3.4.2.2 where it is stated that there is a low confidence due to limited evidence that anthropogenic climate change has effected the frequency and magnitude of floods [Saudi Arabia]	Rejected - not supported by the peer-reviewed published literature. This text is referring to projected changes not observed changes.
10668	7	37	7	39	if possible, should be indicate how greater is the water stress and flood risk at 2°C compared with 1.5°C [luca lombroso, Italy]	Text edited, we have quantified change in water stress as requested. Owing to the low confidence in heavy precipitation projections, the literature cannot justify a more precise estimate for flood.
10930	7	37	7	37	This statement with respect to floods and droughts is not consistent with Chapter 3 Paragraph 3.4.2.2 where it is stated that there is a low confidence due to limited evidence that anthropogenic climate change has effected the frequency and magnitude of floods [Nedal KATBEHBADER, Switzerland]	Rejected - not supported by the peer-reviewed published literature. This text is referring to projected changes not observed changes.
11256	7	37	7	4	Strengthen - Globally, the population exposed to extreme drought increases by up to 50% for 2°C compared to 1.5° (3.4.2.2) (subject to confidence level). [United Kingdom (of Great Britain and Northern Ireland)]	Confidence in the quantifications was sufficiently good for these to be included in the underlying chapter, but was not sufficient for them to be elevated to the level of the SPM.
11258	7	37	7	4	Strengthen -For SIDS, constraining temperature to 1.5°C reduces risk of coastal flooding by 20-80% and limits reductions in freshwater availability (box 3.7) [United Kingdom (of Great Britain and Northern Ireland)]	All SPM bullet points including the one referenced will be reviewed for the second draft of the SPM. Supporting results (e.g. those noted for SIDS) will be considered where appropriate to bolster the redrafted/reviewed SPM statements.
11260	7	37	7	4	Strengthen -.. where a drying trend is already detectable. (3.3.4.2) [United Kingdom (of Great Britain and Northern Ireland)]	Rejected - not supported by the peer-reviewed published literature. This is incorrect. Some risks are projected to emerge above 1.5°C in some areas where these have not yet emerged in the observed record, i.e. for lower levels of warming.
15470	7	37	7	4	Projected risks from water scarcity, flood and drought are great at 2 C .. This is a bit simplistic as a global statement as some places are likely to experience less water scarcity. Perhaps more accurate to say "risks from redistribution of water resources" or "risks from water availability". [Australia]	Noted. Text has been substantially revised, does not apply anymore.
36284	7	37	7	4	Statistical significance needs to be tested for the difference in the projected risk in water scarcity, flood, and droughts. [India]	Noted. Text on climatic changes in extremes only refers to robust changes (i.e. across at least 2/3 of models and where changes are found to be statistically significant over large regions)
39996	7	37	7	37	How much greaters? How much more area under threat? [Kornelis Blok, Netherlands]	The text has been edited to make quantifications as far as the literature allows, and since there are large uncertainties in these estimates only in a few cases are quantifications made, for example in the case of water stress. The range of projections is evident in the Supplementary Tables.
58996	7	37	7	38	Be more specific in describing in what ways water scarcity, flood, and drought are greater and distinguish between these three impacts. Are they greater in severity? Or frequency? Or both? [United States of America]	In the underlying chapter, there is detailed information about the nature of the changes, which is too detailed to be reflected in the SPM.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
58998	7	37	7	4	This report is about 1.5°C global warming yet, in some places, results are presented for 2°C warming and it is not always clear whether results are valid for 1.5°C warming. There are a lot of references to 2°C in the text, and policymakers may be confused by including this so much in the SPM. Could you not just eliminate references to 2°C warming in the SPM, and in the text, make it clear what the motivation is for including 2°C at all, or eliminate text referring to 2°C (or most of them?). [United States of America]	Rejected. A specific mandate of the IPCC SR15 report is to assess changes in extremes and impacts at 1.5°C global warming vs 2°C and higher levels of global warming.
58994	7	37	7	4	Because risk of water scarcity, flood, and drought will vary by region, a qualifier should be added here that signifies how the arithmetic of this statement leads to this conclusion. On balance, are the risks detailed here greater because the number of people globally that will experience increased risk is higher than the number of people globally that will experience decreased risk? The text provides a bit more detail in the next sentence by detailing broad regions where flood risks and water stress increases most, but this does not provide a quantitative way to evaluate the first sentence. [United States of America]	Taken into account - text revised. Text was indeed too general. More specific assessments are now provided, mentioning that some changes (e.g. for droughts) are limited to some regions.
59000	7	37	7	38	Add that greater at 1.5 than at 1°C. It really does need to be made clearer how seriously impactful 1.5°C will be. On line 38, also need to change "increase" to "increases". [United States of America]	Taken into account - text revised. The text now also discusses briefly changes at 1.5°C global warming compared to today.
29972	7	38	7	4	If available, give number (e.g. increase of number of floods at 2°C global warming compared to 1,5°C global warming; increase of floods impacted populations; increase of the number of days with water stress...). [France]	Noted. For changes in extremes, this information would be too detailed.
15472	7	39	7	4	Many other regions will experience water stress, what about southern Australia, South Africa and Argentina? [Australia]	Noted. The clearest signal is in the Mediterranean region and in Southern Africa. There are increased risks in some other regions. Because of space limitation, this level of detail cannot be provided.
33766	7	39	7	4	Please consider explaining why the greatest increase in water stress is projected for the Mediterranean region. [Norway]	Noted. Too detailed for SPM. Information can be found in chapter 3.
59002	7	39	7	4	Is the difference in the increase in risk really large enough in the Mediterranean than these other regions to justify a separate sentence? Some regions across the subtropics (Mediterranean, Middle East, etc.) are projected to be so warm that they will essentially not be habitable outdoors. If the impacts are even roughly comparable, separating out one region as the worst is not really appropriate. Also, check the cross-chapter box cross-referencing. [United States of America]	Noted. The clearest signal is in the Mediterranean region and in Southern Africa. There are increased risks in some other regions. Because of space limitation, this level of detail cannot be provided, and also the drought assessment has been made less specific. More detailed regional information, also on changes in hot extremes in the middle East, is available in the chapter text.
10200	7	42	7	45	This statement with respect to tropical cyclones attributes is not consistent with Chapter 3 Paragraph 3.3.7 Page 3-54 from line 17 to page 22 where stated that Current climate models currently have difficulty projecting how cyclone attributes are likely to vary under 1.5°C vs. 2°C of global warming. [Saudi Arabia]	Noted. The revised text has been made consistent between the chapter text and the SPM. The FGD version of the SPM does not include a statement around very intense tropical cyclones becoming more frequent under 2 vs 1.5 degrees C of global warming, although the text did point this out as a finding made limited evidence and thus limited confidence.
10932	7	42	7	45	This statement with respect to tropical cyclones attributes is not consistent with Chapter 3 Paragraph 3.3.7 Page 3-54 from line 17 to page 22 where stated that Current climate models currently have difficulty projecting how cyclone attributes are likely to vary under 1.5°C vs. 2°C of global warming. [Nedal KATBEHBADER, Switzerland]	Noted. The revised text has been made consistent between the chapter text and the SPM. The FGD version of the SPM does not include a statement around very intense tropical cyclones becoming more frequent under 2 vs 1.5 degrees C of global warming, although the text did point this out as a finding made limited evidence and thus limited confidence.
13386	7	42	7	46	Statement is contradictory and a qualifier is needed to indicate confidence in the statement [Grenada]	Noted. The revised text has been made consistent between the chapter text and the SPM. The FGD version of the SPM does not include a statement around very intense tropical cyclones becoming more frequent under 2 vs 1.5 degrees C of global warming, given that there is limited evidence for and thus low confidence in these findings. The Chapter text does reflect these statements, however, with the relevant confidence levels also indicated.
29086	7	42	7	45	The statement ("There is greater risk from the most intense tropical cyclones with 2°C of global warming compared to 1.5°C") is currently not in line with the underlying analysis is Chapter 3. The Chapter 3 Ex. Summary (line 30-34, p. 9) as well as Section 3.3.7 (line17-22, p. 54) state that only very few studies find small differences between 1.5 and 2 degree. Please revise. [Germany]	Noted. The revised text has been made consistent between the chapter text and the SPM. We have removed this statement from the FGD version of the SPM, but with the Chapter text indicating that this is a finding made based on limited evidence and thus limited confidence.
29088	7	42	7	45	Please add these sentences to SPM 2.1, bullet 6 , coming from chapter 3, page 66, line 48-49 (see also 3-54, line 45-47): "There is also an indication that the frequency of large storm surges may be reduced at 1.5ºC compared to 2ºC, in particular it may be halved in the eastern US and Europe." [Germany]	Rejected. We have not added these specific statements to the FGD version of the SPM, given that there is limited evidence for and thus low confidence in these findings. However, these findings are reflected in the underlying text of chapter 3.
31192	7	42	7	45	The indicator of typhoon or tropical cyclones are different from country to country. It would be better to put additional information with a more common indicator such as central pressure or maximum wind speed. [Japan]	Rejected. The SPM unfortunately do not allow for this level of detail to be reflected. However, we have extended the text to refer to both very intense cyclones and category 4 and 5 hurricanes.
32236	7	42	7	46	Statement is contradictory and a qualifier is needed to indicate confidence in the statement [Jamaica]	Noted. The revised text has been made consistent between the chapter text and the SPM. The FGD version of the SPM does not include a statement around very intense tropical cyclones becoming more frequent under 2 vs 1.5 degrees C of global warming, given that there is limited evidence for and thus low confidence in these findings. The Chapter text does reflect these statements, however, with the relevant confidence levels also indicated.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
31190	7	42	7	46	In Section 3.3.7, it says that "Only two studies have to date directly explored the changing attributes of tropical cyclone attributes under 1.5°C vs 2°C of global warming". From this perspective, it might be premature to write as "There is greater risk from the most intense tropical cyclones with 2°C of global warming compared to 1.5°C" in this section and should be revised accordingly. [Japan]	Noted. The revised text has been made consistent between the chapter text and the SPM. The FGD version of the SPM does not include a statement around very intense tropical cyclones becoming more frequent under 2 vs 1.5 degrees C of global warming, given that there is limited evidence for and thus low confidence in these findings. The Chapter text does reflect these statements, however, with the relevant confidence levels also indicated.
32798	7	42	7	45	Again, this is at variance with SREX "There is low confidence that any observed long-term increases in tropical cyclone activity are robust"(p111) [Philip Lloyd, South Africa]	Noted. The revised text has been made consistent between the chapter text and the SPM. Note that there is substantial new literature relating e.g. the precipitation associated with tropical cyclones to global warming that has been published since the IPCC SREX report.
36638	7	42	7	46	Statement is contradictory and a qualifier is needed to indicate confidence in the statement [Snaliah Mahal, Saint Lucia]	Noted. The revised text has been made consistent between the chapter text and the SPM. The FGD version of the SPM does not include a statement around very intense tropical cyclones becoming more frequent under 2 vs 1.5 degrees C of global warming, given that there is limited evidence for and thus low confidence in these findings. The Chapter text does reflect these statements, however, with the relevant confidence levels also indicated.
43758	7	42	7	45	There is greater risk from the most intense tropical cyclones with 2°C of global warming compared to 1.5°C, [while at 1.5C the risk is substantial] . The most intense (category 4 and 5) tropical cyclones are projected to occur more frequently, with higher peak wind speeds and lower central pressures at 2°C compared to 1.5°C of global warming. [Peter Carter, Canada]	Noted. The revised text has been made consistent between the chapter text and the SPM. The FGD version of the SPM does not include a statement around very intense tropical cyclones becoming more frequent under 2 vs 1.5 degrees C of global warming, given that there is limited evidence for and thus low confidence in these findings. The Chapter text does reflect these statements, however, with the relevant confidence levels also indicated.
59004	7	42	7	43	Specify what risk is increased, and if there are possible compounding factors, such as higher asset valuation and demographic shifts. [United States of America]	We are referring here specifically to the risk of an increase in category 4 and 5 hurricanes and associated impacts through heavy precipitation, extreme winds and storm surges. Note that this section of the SPM (2.1) deals specifically with changes in the physical climate system, whilst section 2.6 deals with impacts on human systems, including infrastructure. Also note that, in the FGD version of the SPM, we are describing risks associated with heavy precipitation and flooding in general, without explicitly mentioning the risks associated with an increase in intense cyclones
59006	7	42	7	45	This bullet emphasizes 2 vs 1.5°C warming. Can the presentation of these relative results be reversed to emphasize 1.5°C? [United States of America]	Noted. Changes at 1.5°C are now generally mentioned first in the revised text, but not considered critical for understanding.
15474	7	43	8	45	We query the idea of a higher number of high intensity tropical cyclones; when we think the science shows a higher proportion of the overall number of tropical cyclones will be more intense, rather than a higher number of tropical cyclones per se. [Australia]	Noted. The FGD version of the SPM does not include a statement around very intense tropical cyclones becoming more frequent under 2 vs 1.5 degrees C of global warming, given that there is limited evidence for and thus low confidence in these findings. The Chapter text does reflect these statements, however, with the relevant confidence levels also indicated. We have taken note of this comment, that it is rather the ratio of intense cyclones that is increasing, relative to the total amount. However, our assessment remains that there is evidence of the total global number of category 4 and 5 cyclones increasing.
36286	7	43	7	45	It is not clear that this statement is actually supported by the evidence presented in 3.3.7. Much of the text in 3.3.7 is about the observational record - which suggests a slight decrease in the total number of cyclones, but a slight increase in the number of the most intense cyclones. There are only two studies of future risks. Wehner et al (2017) concluded that the differences in tropical cyclone statistics under 1.5°C vs. 2°C stabilization scenarios are small. The Mavhungu study seems to come to an opposite conclusion - and in fact this reference cannot be traced. It is based on a single study, and seems to be a generalization without a proper foundation. [India]	Noted. The revised text has been made consistent between the chapter text and the SPM. The FGD version of the SPM does not include a statement around very intense tropical cyclones becoming more frequent under 2 vs 1.5 degrees C of global warming, given that there is limited evidence for and thus low confidence in these findings. The Chapter text does reflect these statements, however, with the relevant confidence levels also indicated.
51344	7	43	7	45	It is not clear that this statement is actually supported by the evidence presented in 3.3.7. Much of the text in 3.3.7 is about the observational record - which suggests a slight decrease in the total number of cyclones, but a slight increase in the number of the most intense cyclones. There are only two studies of future risks. Wehner et al (2017) concluded that the differences in tropical cyclone statistics under 1.5°C vs. 2°C stabilization scenarios are small. The Mavhungu study seems to come to an opposite conclusion - and in fact this reference cannot be traced. It is troubling that the SPM has a conclusion that is based on a single study, and seems to be a generalization without a proper foundation. [Anand Patwardhan, United States of America]	Noted. The revised text has been made consistent between the chapter text and the SPM. The FGD version of the SPM does not include a statement around very intense tropical cyclones becoming more frequent under 2 vs 1.5 degrees C of global warming, given that there is limited evidence for and thus low confidence in these findings. The Chapter text does reflect these statements, however, with the relevant confidence levels also indicated.
59008	7	43	7	43	Add a phrase at end of the sentence to read: "... to 1.5°C, just as there will be greater risk at 1.5 than at 1°C, and there is at 1 compared to 0.5°C." All increases are/will be worsening the situation. [United States of America]	The FGD version of the SPM does not include a statement around very intense tropical cyclones becoming more frequent under 2 vs 1.5 degrees C of global warming, given that there is limited evidence for and thus low confidence in these findings. We similarly did not indicate a statement around tropical cyclones at 1.5 vs 1 degrees C of global warming in the revised SPM. The text of the chapter, however, deals with the current evidence around tropical cyclones at 1 vs 1.5 vs 2 degrees C of global warming.

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39998	7	44	7	44	How much more frequently? [Kornelis Blok, Netherlands]	Noted. The FGD version of the SPM does not include a statement around very intense tropical cyclones becoming more frequent under 2 vs 1.5 degrees C of global warming, given that there is limited evidence for and thus low confidence in these findings. The Chapter text does reflect these statements, however, with the relevant confidence levels also indicated.
15476	7	46	7	46	What about fire, frost, hail, snow and sea level rise? [Australia]	Limited studies available on fire, frost, hail and snow impacts at 1.5C. Sea level risks are documented in the revised SPM.
29090	7	47	7	47	Please add content of the para on Ch4 p 32 ln 19 -24 to the SPM section 2.1 as an additional [7th] bullet point to highlight the interlinkages between extreme events and their impacts, adaptation needs and disaster prevention - and the need for an integrated view. [Germany]	Taken into account. Disaster risk management is referenced in the revised SPM in B6.4 as an 'overarching adaptation option'.
80	8				For some policy makers these physical changes are not necessarily "bad". You can outline some of the human and social effects relative to each physical change so that it is clear to policy makers that these changes merit attention. [Guillermo Montt, Switzerland]	It was not possible to identify to which statement the comment refers to. In FGD of SPM, more emphasis was made in the relation of projected changes and impacts on natural and human systems.
5458	8		8		Is this effect limited to the tropics and if so then say why it does not apply elsewhere; if not then remove tropics. [Haroon KHESHGI, United States of America]	Section 2.2 does not refers to Tropics
14212	8	1	8	2	We suggest to improve the sequence and flow of the first sentence to improve readability as follows: "Climate Change impacts all ecosystems including terrestrial, wetland and freshwater, marine and coastal ecosystems, and their servicess on all continents and in the ocean" [United Republic of Tanzania]	Accepted. Text has been revised.
29092	8	1	8	2	It is obvious that "all ecosystems" include terrestrial, wetland and freshwater, marine and coastal ecosystems. [Germany]	Not Applicable - The section has been rewritten
32218	8	1	8	4	should be "…across all continients, islands, oceans…" Islands are recognized as separate geographic entities than continents [Jamaica]	Accepted. Reference to continents has been deleted and the statement is more related to land and the different ecosystems.
33488	8	1			more messages relating to impacts on ecosystems [Stephen Cornelius, United Kingdom (of Great Britain and Northern Ireland)]	Accepted. This has been improved in FGD-SPM
36620	8	1	8	4	should be "…across all continients, islands, oceans…" Islands are recognized as separate geographic entities than continents [Snaliah Mahal, Saint Lucia]	Accepted. Reference to continents has been deleted and the statement is more related to land and the different ecosystems.
45066	8	1	8	1	substitute word "services" with "relevant components" [Iman Babaeian, Iran]	Rejected. The word services is the one used in the chapter and widely used in scientific literature.
46164	8	1	8	16	Can you relate this to the statement in 1.3 (page 5 line 11-15) that a temporary overshoot over 1,5 degree can have irreversible impacts? [Netherlands]	Accepted. Statement has been revised and reference to overshoot and irreversible impacts is made.
50394	8	1	8	1	Include "biodiversity" in this statement: "2.2.Climate change impacts biodiversity, all ecosystems and nature's contribution to people …". The rationale is that: 1) ecosystems consist also of living organisms and therefore impacting ecosystems is also impacting biodiversity 2) According to IPBES, the concept of ecosystems's services has to be replaced advantageosly by nature's contributions to people (NCP). Furthermore, according to IPBES, NCP are underpinned by biodiversity. [Switzerland]	Accepted. Text has been revised.
59010	8	1	8	2	Here it would be more accurate to state "... all ecosystems examined in this report and their services, ..." [United States of America]	Accepted. Text has been revised
59012	8	1	8	4	Excellent framing – just the way to put it. Only comment might be to wonder if there needs to be an indication that overshooting 2°C (as seems quite plausible given actions to date) would make the situation even worse. [United States of America]	Thanks. Accepted. Reference to overshoot has been added to the statement.
62930	8	1			Box 2.2 should not be only about all continents but include 'all islands' [Michelle Mycoo, Trinidad and Tobago]	Accepted. Text was modified and now refers to the different ecosystems.
338	8	1	1	46	The risk of 1.5? should be presented. [Zong-Ci Zhao, China]	Accepted. Statements have been revised and information related to 1.5°C warming were added.
17784	8	1	9	16	Main sentences of the 2.3 and the 2.4 section are just part of ecosystem mentioned in the 2.2 section. It would be better to combine 2.2, 2.3, and 2.4 boxes to be suitable for topic. We suggest that contents in 2.3-2.4 boxes & bullets would be summarized a couple of bullets under 2.2 section. [Republic of Korea]	Accepted. The headline statements have been restructured and revised.
450	8	3			Risks increase...: This is a frequently used, rather sloppy formulation using the term risk without specification: risk of what? In an SPM one has the opportunity to be specific, e.g., "The risk of flooding is projected to increase in the mid- to high latitudes of the northern hemisphere", or "The risk of reaching the limits of adaptation becomes more widespread". etc. [Thomas Stocker, Switzerland]	Accepted. FGD-SPM refers to different risks covered in the report (CH3)
9472	8	3	8	4	'Risks increase between today and global warming of 1.5°C, as well as between 1.5°C and 2°C global warming' A. If the effect is monotonous (higher temperature ? higher risk), the statement is trivial. If the effect is not monotonous, the statement is wrong. B. The use of 'risk' implies some damage (by definition, risk = damage x probability). Does damage emerge everywhere along with warming? Or just in some regions/locations? The scale should be specified [Russian Federation]	Accepted. Statements have been revised according to information presented in CH3.

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11262	8	3	8	3	today' should be given a year - otherwise too easy to misread in years to come. [United Kingdom (of Great Britain and Northern Ireland)]	Noted. Definition has been included in section A.
14214	8	3	8	3	to enahance clarity and readability add the word "will likely" between Risks and Increase [United Republic of Tanzania]	Not Applicable - The section has been rewritten
19402	8	3			risks AND IMPACTS increase, not just risks [Jennifer Morgan, Netherlands]	Not Applicable - The section has been rewritten
29388	8	3	8	3	is it possible to add to "today" a temperature (we are around 1C warming currently). [Susanne Droege, Germany]	Please see section A.
59014	8	3	8	3	Can the word "today" be expressed in any other term that makes the time and temperature comparison more useful? [United States of America]	Not Applicable - The section has been rewritten
63044	8	3	8	4	As it stands, this sentence does not provide a substantial message: of course risks do increase (especially considering that risk = limited to negative aspects). Please provide some information on the magnitude of this increase, in a quantitative way if that is possible. Are there potential tipping points related to ecosystems that could be triggered or avoided by keeping global warming below 1.5 or 2°C ? [Belgium]	Accepted. Statements have been revised according to information presented in CH3.
29974	8	4	8	4	Add the references : - {IPCC SR15_SOD_Chapter3 3.4.4.2.3 / Key ecosystem services} in the sentence "[...] Risks increase between today and global warming of 1.5°C, as well as between 1.5°C and 2°C global warming {3.3.1, 3.3.2, 3.3.3., 3.3.4, 3.4.9, 3.5.6, Box 3.5}. (e.g. carbon uptake, coastal protection, and coral reef recreation) - {IPCC SR15_SOD_Chapter3 Box 3.6 / Coral reefs in a 1.5ºC warmer world} in the sentence "[...] based on knowledge of past impacts. {3.3.1, 3.3.2}. [France]	Not Applicable - The section has been rewritten
29094	8	5	8	11	Please add information from chapter 3, page 151, line 32-40: Some impacted sectors/systems display a non-linear relationship between the magnitude of the risks and the extent of global warming, in which impacts increase rapidly during lower levels of warming, slowing at higher global warming, as most of the sector has already been impacted. ... This means that the benefits of constraining warming to 1.5°C are projected to be disproportionately large for coral reefs, water availability, and cropland stability. [Germany]	Accepted. More statements related to impacts on natural and human systems have been added.
4260	8	6		8	Delete/rewrite?. It would be extraordinary if the impacts were lower with 2º thant with 1.5 º ¡ [Abanades Carlos, Spain]	Accepted. Text has been changed.
5908	8	6			Likely seems a bit of a weak assessment for this. Surely the assessed likelihood is higher? [Peter Thorne, Ireland]	Accepted. Confidence has been revised according to information presented in CH3
6086	8	6	8	11	The first statement says nothing about the types of impacts or,equally important, the sign of impacts. Are all of these adverse - I doubt it. Then the second statement describes enhanced risk in the Arctic, but risk of what? Sectors are mentioned, but such statements are so generalised as to be rendered almost meaningless [Timothy Carter, Finland]	Accepted. Statements have been revised according to information presented in CH3.
11264	8	6	8	6	Just 'likely'? Can we more clearly define the level of difference in impact between 1.5 and 2, rather than just saying more or less. Moreover, the use of likely seems somewhat at odds with subsequent discussions which, albeit qualitatively, suggest that 2C worse than 1.5C. Overall this feels a bit unclear. [United Kingdom (of Great Britain and Northern Ireland)]	Accepted. Confidence has been revised according to information presented in CH3
15480	8	6	8	7	Impacts on natural systems are likely to be less at 1.5°C than at 2°C': two things are wrong with this statement i) the referenced sections ({3.3.1, 3.3.2}) are not to do with impacts on natural systems, but rather on the changes in physical aspects, temperature etc ii) Evidence throughout the report supports a much higher level of likelihood than 'likely' (i.e. >66%) of impacts being higher at 2 than 1.5 (e.g. permafrost, arctic ecosystems, coral reefs; in fact the very next dot point makes just such a statement for the Arctic). Suggest change wording in line 6 to 'will be higher', or it is 'virtually certain that...'. [Australia]	Accepted. Reference to sections have been revised. Confidence of the statement has been revised.
18898	8	6	8	6	This statement is probably based on statistical analysis- can 1.5 be discerned from 2 degrees- but without this context the statement is somewhat a no-brainer. [Andrea TILCHE, Belgium]	Accepted. Statements have been revised according to information presented in CH3.
18900	8	6	8	7	Past patterns are not necessarily good predictors of future changes. [Andrea TILCHE, Belgium]	Accepted. Statement has been revised.
31194	8	6	8	8	Please explain why the word "likely" is used here despite the lack of projected results in the SPM and the relevant chapter. [Japan]	Accepted. Confidence has been revised according to information presented in CH3
34350	8	6			Is it only assessed as 'likely' that impacts on natural systems will be less at 1.5C versus 2C? For this not to be the case, impacts would have to stay the same or reduce with the additional 0.5C warming from 1.5C to 2C. [Nathan Gillett, Canada]	Accepted. Confidence has been revised according to information presented in CH3
40000	8	6	8	6	How much less? [Kornelis Blok, Netherlands]	Accepted. Statement has been revised and information on specific ecosystems has been added.
40548	8	6	8	6	Add "warming," after "at 2°C". [Sergio Henrique Faria, Spain]	Not Applicable - The section has been rewritten
50396	8	6	8	6	Write: "Impacts on biodiversity and natural systems …". [Switzerland]	Accepted. Statement has been improved and now is more detailed.
52926	8	6	8	7	Some quantification would enhance this statement [Ireland]	Accepted. Statement has been revised and quantifications were added where possible.
55372	8	6	8	6	I'm "virtually certain" that the use of the word "likely" here is not correct as it would imply a quantified probabilistic assessment. [Andy Reisinger, New Zealand]	Accepted. Confidence has been revised according to information presented in CH3

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59016	8	6	8	7	List out in the sentence (or in parentheses) examples of the "natural systems" being talked about. While they are mentioned on line 2 above, there they are called "ecosystems" rather than "natural systems" so there might be confusion. [United States of America]	Not Applicable - The section has been rewritten
62702	8	6	8	7	There are many bullet points of this form in the current draft of the SPM. They are so obvious as to be almost trivial -- it is hard to imagine an instance of an impact at 2 degrees that is not less at 1.5. All such points could be summarized into a single overarching statement. [Greg FLATO, Canada]	Accepted. Statements have been revised according to information presented in CH3.
452	8	9			Again on risk: Name these risks. Scientific assessment should be, and can be, more specific. The more these risks are explicitly named, the more policy relevant the document becomes. [Thomas Stocker, Switzerland]	Accepted. FGD-SPM refers to different risks covered in the report (CH3)
11114	8	9	8	11	1st sentence mentions "Arctic". Second sentence mentions "such regions", plural. It is not clear what is emcompassed beyond the Arctic in "such regions" [Denmark]	Not Applicable - The section has been rewritten
11266	8	9	8	12	Strengthen -Loss of snow is 75% higher, and there is 4 x 10^6 km2 less permafrost under 2°C compared to 1.5°C (3.3.6). [United Kingdom (of Great Britain and Northern Ireland)]	Accepted. Statements have been revised according to information presented in CH3 and quantitative information about permafrost were added.
15482	8	9	8	16	The last bullet point for headline 2.2 repeats text in headline 2.3. Also, why is the Arctic a focus here and not also reefs (looking at Fig SPM2)? [Australia]	Accepted. Statements have been revised according to information presented in CH3. Corals and permafrost were taken into account where appropriate under the different headlines.
18902	8	9	8	9	Greater than what? global average? [Andrea TILCHE, Belgium]	Not Applicable - The section has been rewritten
19218	8	9	8	1	There's no reference in chapter 3 about a greater (comparative) risk in the Artic region. [Spain]	Accepted. Statements have been revised according to information presented in CH3.
29096	8	9	8	9	The use of the term "risk" is not consistent, please check and see our general comment related to this issue. [Germany]	Accepted. A risk definition was provided in the SPM in consistency with the chapter.
33768	8	9	8	1	Please consider explaining what the greater risk is? [Norway]	Accepted. Statements have been revised according to information presented in CH3.
40550	8	9	8	11	Ambiguous and confusing statement.It should be rewritten. [Sergio Henrique Faria, Spain]	Accepted. Text has been revised according to information presented in CH3.
41280	8	9	8	11	This item has no mentioning to 1.5degC and 2.0degC worlds, which is not quite appropriate in view of the mission of this Special Report. [Michio Kawamiya, Japan]	Accepted. Statements have been revised and information related to 1.5°C warming were added.
42850	8	9	8	11	Include that both the declining Arctic sea ice and thawing permafrost contribute to positive feedbacks that will further affect the climate—the sea ice through reduced albedo and the permafrost through released terrestrially stored carbon. These feedbacks can further amplify warming that risks overshooting the goal of staying well below 2C. [Kristin Campbell, United States of America]	Accepted. Statements have been revised according to information presented in CH3.
42900	8	9	8	11	Include that both the declining Arctic sea ice and thawing permafrost contribute to positive feedbacks that will further affect the climate—the sea ice through reduced albedo and the permafrost through released terrestrially stored carbon. These feedbacks can further amplify warming that risks overshooting the goal of staying well below 2C. [Durwood Zaelke, United States of America]	Accepted. Statements have been revised according to information presented in CH3.
46002	8	9	6	9	Line 18-19 state ice free condition, but Chap.3.(3.6.4.1, 3-159-24) introduces possible ice recovery in the Arctic sea ice if succeeded in CO2 reduction in the future. As even sea ice condition recover, there still exist ecological risks and irreversible.SPM could states these points. [Hiroyuki ENOMOTO, Japan]	Accepted. Text has been revised and is more explicit
59018	8	9	8	9	Clarify whether you mean "greater risk" than experienced in other regions. If you just mean a greater risk with greater warming, that is exactly what it says so no change would be required. [United States of America]	Not Applicable - The section has been rewritten
59020	8	9	8	11	Add some kind of qualifier that makes it clear you're referring to ecosystems as currently constituted in the Arctic, since the form, function, and makeup of ecosystems in a place will change over time. So defining 'risk' for an ecosystem is a bit dicey. Maybe, a more precise formulation would be risk of extinction of existing ecosystems? [United States of America]	Accepted. Statements have been revised according to information presented in CH3.
59022	8	9	8	11	This is not specific to 1.5 or 2°C scenarios and should be removed. [United States of America]	Accepted. Statements have been revised and information related to 1.5°C warming were added.
59024	8	9	8	11	The word "risk" here is the wrong choice, as it is talking about something for which there is a chance it could occur. The Arctic is and will actually experience the changes, so authors should consider recasting to read: "Because the Arctic [and perhaps add Antarctic] are experiencing warming rates roughly double the global average, the impacts in polar regions (e.g., for ecosystems, permafrost, and human systems) will increase considerably faster than for the rest of the world." [United States of America]	Accepted. The statement has been revised.
33770	8	1	8	11	In the recently published SWIPA report it is projected that Arctic is in fact warming faster than previously models have predicted: "Arctic Ocean may be ice-free sooner than expected. Extrapolations of recent observed data suggest a largely ice-free summer ocean by the late 2030s, which is earlier than projected by most climate models. Natural variability and model limitations make precise predictions impossible." Please consider to add this important statement. [Norway]	Thank you. The statement about the Arctic has been revised more detailed information could be found in CH3. Additional information which are not directly related to 1.5°C warming are going to be considered in the AR6.
50398	8	1	8	1	Write: "… for biodiversity, ecosystems, permafrost …". [Switzerland]	Accepted. The statement has been revised.
11268	8	11	8	11	It would be useful here to give an indication of by how many times more the Arctic region has warmed compared to the global average since 1960-79, based on obs - and any indication of how likely it is that this trend continues. [United Kingdom (of Great Britain and Northern Ireland)]	The statement about the arctic has been revised. This statement is about future changes. More detailed information about the Arctic are presented in CH3. Additional information not directly related to 1.5/2°C warming will be considered in AR6.
337	8	13	8	16	The risk of 1.5? should be presented. [Zong-Ci Zhao, China]	Accepted and re-written (see B3.4)
8614	8	13	8	13	In an SPM, you may want to use "oxygen deficiency" in place of "hypoxia" to enhance readability [Pauline Midgley, Germany]	Term replaced for "decreases in ocean oxygen levels"

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9358	8	13	8	41	In this section about oceans the fact that oceans reach critical thresholds at 1.5ºC could be better empasized, as in the Executive Summary of Chapter 3. [Anna Sörenaaon, Argentina]	Accepted and text modified - impacts on key systems at 1.5oC strengthened. See B3.2 and elsewhere
15484	8	13	8	13	Please define "hypoxia". [Australia]	Noted
18904	8	13	8	13	Replace “hypoxia” by “lack of oxygen”. Reason: better readability for non-experts [Andrea TILCHE, Belgium]	Hypoxia is not simply 'a lack of oxygen' - in this case is 'oxygen deficiency in a biotic environment.'
19404	8	13	8	15	The headline statement on oceans should be much stronger, in light of the underlying paras and chapters. [Jennifer Morgan, Netherlands]	Accepted - text modified
32604	8	13	8	13	hypoxia may not be understood. No problem in the report but in an SPM headline statement maybe an alternative wording? [Jonathan Lynn, Switzerland]	Term replaced for "decreases in ocean oxygen levels"
39310	8	13	8	16	Does this include studies from Potsdam papers previously noted in this list? Very important. [Lindsey Cook, Germany]	Unclear what is meant by 'Potsdam papers'
40576	8	13	8	13	The word hypoxia should be defined here since this is a summary for policy makers who may not be familiar with this term. [Jonny Williams, New Zealand]	Term replaced for "decreases in ocean oxygen levels"
46162	8	13	8	16	Plants, vertebrates and insects have a 50% larger range loss at 2 degrees (by the way: all plants or only higher plants?). Why these groups? Are they the only ones we have data on? Or is the effect on other evertebrates, fungi (bacteria, virusses?) different? (and then again: how?) [Netherlands]	The original source for this statement is Warren et al., Science 360, 791–795 (2018). Plants here are defined as organisms belonging to 'Plantae' - includes single/multicellular chlorophyll containing organisms.
59026	8	13	8	16	Don't shift emphasis to 2°C when the report is about 1.5°C. [United States of America]	Accepted and text modified
59028	8	13	8	41	The discussion of ocean impacts is rather understated, given the dramatic implications of temperature increases on corals and other marine life. Suggest being more explicit here. Chapter 4 also makes an important point (see p. 4-12, lines 33-37) about the limits of adaptation to address these impacts. [United States of America]	Accepted and ocean related issues are given greater prominence in FDG (see B3 ad B4)
31196	8	14	8	16	Coral reef ecosystems are at high risk even at 1.5°C according to 3.4.4.2.1. Therefore, in the headline statement of SPM2.3, the loss of coral reefs should be referred separately from that of other ecosystems which is significantly larger at 2°C than at 1.5°C.. [Japan]	The text highlights the risks to coral reefs. This report is about 1.5oC and hence adapted focus.
33772	8	14	8	15	Please consider to break up the sentence into two where you separate arctic sea ice and coral reefs. We appreciate if both these statements can be quantified in the highlighted para. PLease consider to write that a 2C warming actually almost eliminates tropical coral reefs (99% loss), as this is a very powerful and important message. Equally important is the mentioning of 90% loss of tropical coral reefs at 1.5C warming. See box 3.6, page 101 line 18-24. [Norway]	Accepted and text modified - see B3.1 and B3.2
40552	8	15	8	15	Please end the sentence with "global warming". [Sergio Henrique Faria, Spain]	Accepted - sentence finished
59030	8	15	8	15	Supply a confidence qualifier and insert the words "projected to be" after "tropical coral reefs are" [United States of America]	Text re-written.
59032	8	15	8	15	It would be helpful to add a phrase at the end of sentence saying: "... and significantly larger at 1.5°C than the already significant changes occurring at 1°C." It really needs to be made clear that the changes now in the Arctic are already significant. [United States of America]	Accepted - text now includes 'projected differences' in the B3 headline, which is the right spot given repetition.
148	8	18	8	18	This bullet on ice free Arctic, like the subsequent bullet, should have a line or two about consequences of this change. [Michael Oppenheimer, United States of America]	Add sentence after 'sea-ice cover (high confidence)' … These changes are already having impacts on human and natural systems are likely to become greater as summer sea-ice extent contracts."
6088	8	18	8	18	This statement is again highly context specific. Is the opening of the Arctic sea ice universally regarded as an increasing risk? I suspect not by those who would wish to use the opening sea routes or improved access to natural resources. This is really a statement of probability or likelihood, not risk. The risks that cascade from this physical change can only be considered on a case by case basis and depend on context and on other trends (e.g. in society and technology). Then it also follows that whatever the sign of the change in risk (or potential impact). it is likely to require or to trigger some kind of adaptive response (ameliorating adverse impacts; exploiting opportunities) [Timothy Carter, Finland]	Accepted and text modified
6874	8	18	8	19	The following wording might be clearer for non-native speaker: Increased warming increases the risk of the Arctic Ocean being nearly ice free in September; at 1.5oC global warming an ice free Arctic in September might become reality. [Klaus Radunsky, Austria]	Accepted and text modified
8626	8	18	8	18	many would see the Arctic Ocean being ice-free as an opportunity so perhaps it would be better to use the word "chance" or "likelihood" rather than "risk" here [Pauline Midgley, Germany]	Accepted and text modified
15486	8	18			Use the certainty and probabilistic language of the IPCC, also adopted in this SPM. [Australia]	Accepted - text modified here and elsewhere to include calibrated certainty language.
57642	8	18		18	Do not use the word "risk" exclusively in the sense of likelihood, as this confuses the use of the term in the risk framework. Replace by "chance", "likelihood" or the like, or say "risk from". [WGII TSU, Germany]	We have adopted this where appropriate in the FDG draft of the IPCC SPM.
59036	8	18	8	18	Provide context for why it is noteworthy for the Arctic Ocean to be nearly ice free in September. What is the baseline or other comparable measure? [United States of America]	Accepted and text modified
5910	8	18	9	5	Lack of use of either confidence or likelihood language (unless intended as statements of fact) is problematic for this set of key findings. Effort should be made to recast the assessment interms of confidence and / or likelihood here. [Peter Thorne, Ireland]	Accepted and text modified throughout.

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9356	8	18	8	19	This finding is important and it is important that it is well understood by policy makers. As it is written now it is difficult to understand. In the executive summary of chapter 3 it sais (page 10, line 8): “Sea ice may persist in a 1.5ºC world but not at global temperatures of 2ºC or higher.” and “There is a very real possibility that year-round sea ice in the Arctic will persist in a 1.5°C world (such it likely persisted during the previous interglacial periods) and appreciably probability that late-summer ice cover will disappear in warmer worlds., written this way is it easier to understand and have more impact on the reader. [Anna Sörenaaon, Argentina]	Accepted and text modified
9474	8	18	8	19	‘Increased warming increases the risk of the Arctic Ocean being nearly ice free in September, with it being possible at 1.5°C global warming. {3.4.4.1.6}’ Risk = damage x probability by definition. What kind of damage emerge due to no ice ocean? [Russian Federation]	Accepted and text modified
11080	8	18	8	19	Difficult to understand. Could be: "At 1.5 oC there is a risk that Arctic summer sea ice will vanish in the 21st century, at 2oC it is virtually certain". [Denmark]	Accepted and text modified
11270	8	18	8	19	over what time period? [United Kingdom (of Great Britain and Northern Ireland)]	This is largely dependent on the stabilisation of temperatures at 1.5oC and 2oC and not a specific time, per se. In keeping with the discussion elsewhere in the SPM timescales are not explicitly mentioned. The FGD partially addressees this comment by also mentioning reversibility.
15488	8	18	8	19	What is meant by 'it being possible at 1.5C warming' -- does this mean but not possible at 2? (surely not) [Australia]	Accepted and text modified
29098	8	18	8	19	Increased warming increases the risk of the Arctic Ocean being nearly ice free in September, with it being possible at 1.5°C global warming. {3.4.4.1.6} Not clear what the last sequence means: being possible at 1.5°C as well as at 2.0°C? Possible already at 1.5°C global warming?? (see Annex 3.4.4.1.6: with it being possible at 1.5°C in the 21st century (Sanderson et al., 2017) and ‘virtually certain’(Niederdrenk and Notz)) with 2°C of warming). Please provide more quantitative information. In addition, the term "risk" does not seem appropriate here: shouldn't this read "increases the likelihood/probability of the Arctic Ocean being nearly ice free in September"? [Germany]	Accepted - Text now reads "There is high confidence that the probability of a sea-ice-free Arctic Ocean during summer is substantially higher at global warming of 2°C when compared to 1.5°C. With 2°C global warming, at least one sea ice-free Arctic summer is projected per decade. This likelihood is reduced to one per century with 1.5°C of global warming. Effects of a temperature overshoot are reversible for Arctic sea ice cover on decadal time scales (high confidence)."
29390	8	18	8	19	Consider to rewrite the sentence. Risk? Or Possibility? [Susanne Droege, Germany]	Accepted - Text now reads "There is high confidence that the probability of a sea-ice-free Arctic Ocean during summer is substantially higher at global warming of 2°C when compared to 1.5°C. With 2°C global warming, at least one sea ice-free Arctic summer is projected per decade. This likelihood is reduced to one per century with 1.5°C of global warming. Effects of a temperature overshoot are reversible for Arctic sea ice cover on decadal time scales (high confidence)."
33774	8	18	8	19	Please consider adding within which timeframe the Arctic Ocean being nearly ice free in September. [Norway]	This is largely dependent on the stabilisation of temperatures at 1.5oC and 2oC and not a specific time, per se.
33776	8	18	8	19	Suggestion for re-phrasing: "At 1.5°C global warming the Arctic Ocean may be nearly ice free in September. Increased warming increases the risk for ice free summers in the Arctic Ocean. {3.4.4.1.6}" [Norway]	Accepted - Text now reads "There is high confidence that the probability of a sea-ice-free Arctic Ocean during summer is substantially higher at global warming of 2°C when compared to 1.5°C. With 2°C global warming, at least one sea ice-free Arctic summer is projected per decade. This likelihood is reduced to one per century with 1.5°C of global warming. Effects of a temperature overshoot are reversible for Arctic sea ice cover on decadal time scales (high confidence)."
33778	8	18	8	19	Please check the consistency of the use of the terminology “(nearly) ice-free Arctic (Ocean)” here and throughout the report. Perhaps this formulation needs an initial definition, (often one speaks of ice-free in this context if ice extent is less than 1 million square kilometres). Perhaps that is meant in the cases when “nearly” is used? If one simply writes "ice-free Arctic", it can also be misunderstood to extend to land-ice. By using terms such as "sea ice" or "ocean" after Arctic, it is more clear that it is mainly sea ice one addresses. Here we would recommend to use the term “sea ice”, since the message is in line with the sections on sea ice. [Norway]	Accepted and text modified
36288	8	18	8	19	May be rewritten to have a single statement expressing the likelihood of an ice-free Arctic in September under 1.5 degree C [India]	Accepted and text modified
38458	8	18	8	19	ice free in september: is this seasonal reference -- likely it is. Maybe clarify by stating annually. [Linah Ababneh, United States of America]	Accepted - Text now reads "There is high confidence that the probability of a sea-ice-free Arctic Ocean during summer is substantially higher at global warming of 2°C when compared to 1.5°C. With 2°C global warming, at least one sea ice-free Arctic summer is projected per decade. This likelihood is reduced to one per century with 1.5°C of global warming. Effects of a temperature overshoot are reversible for Arctic sea ice cover on decadal time scales (high confidence)."
40002	8	18	11	15	Same comment all over: be quantitative about the difference between 1.5 and 2 degree C [Kornelis Blok, Netherlands]	Accepted and text changed - now quantified
40578	8	18	8	19	The word 'nearly' here is inexact and should be replaced. The opening clause of this sentence could be removed entirely leaving the main point at the end of the sentence as the main point. [Jonny Williams, New Zealand]	Accepted and text changed

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41462	8	18	8	19	Sentence is not clear. Perhaps: "Increased warming rises the risk of the Artic Ocean being nearly ice free in September at 1.5°C global warming" ? [Maria Pia Carazo Ortiz, Germany]	Accepted - Text now reads "There is high confidence that the probability of a sea-ice-free Arctic Ocean during summer is substantially higher at global warming of 2°C when compared to 1.5°C. With 2°C global warming, at least one sea ice-free Arctic summer is projected per decade. This likelihood is reduced to one per century with 1.5°C of global warming. Effects of a temporary overshoot are reversible for Arctic sea ice cover on decadal time scales (high confidence)."
42852	8	18	8	19	With current rates of warming, this could happen within a few decades, with some studies suggesting the Arctic could become ice-free in the summer as early as 2030 (Overland and Wang (2013) “When will the summer Arctic be nearly sea ice free?”. [Kristin Campbell, United States of America]	Accepted and text modified
42902	8	18	8	19	With current rates of warming, this could happen within a few decades, with some studies suggesting the Arctic could become ice-free in the summer as early as 2030 (Overland and Wang (2013) “When will the summer Arctic be nearly sea ice free?”. [Durwood Zaelke, United States of America]	Accepted and text modified
51346	8	18	8	19	Confusing as written. Rewrite to have a single statement expressing the likelihood of an ice-free Arctic in September under 1.5 C [Anand Patwardhan, United States of America]	Accepted and text modified
54246	8	18	8	19	In Chapter 2 summary page 3.10, L8 it says: "Sea ice may persist in a 1.5 world but not at global temperatures of 2C or higher." which seems stronger and more relevant. [David Warrilow, United Kingdom (of Great Britain and Northern Ireland)]	Accepted and text modified
56492	8	18	8	19	As written could be interpreted as meaning THIS september. Edit to make more clear that the reference is to Septembers (and not necessarily attributed to the next September) [Eleanor Johnston, United States of America]	Accepted and text modified
59034	8	18	8	19	Consider adding timescale here. [United States of America]	This is largely dependent on the stabilisation of temperatures at 1.5oC and 2oC and not a specific time, per se. In keeping with the discussion elsewhere in the SPM timescales are not explicitly mentioned. The FGD partially addressees this comment by also mentioning reversibility.
59038	8	18	8	19	Add a likelhood level for this statement ("it being possible at 1.5 C"). [United States of America]	Accepted and text modified
59040	8	18	8	19	Many would say that the Arctic Ocean is approaching nearly ice free in September right now (ice quality is much poorer) and the wintertime maximum ice cover is dropping significantly each decade. Focusing on just the September minimum area is not the right metric. Suggest revising this point to say: "With the wintertime and summertime Arctic Ocean sea ice extents and thicknesses already declining rapidly with 1°C global warming, and with these changes seriously stressing marine mammals, ongoing global warming, even to just 1.5°C, will amplify these trends, leading to a fundamentally different Arctic environment in coming decades." [United States of America]	Accepted and text modified
62932	8	2			Box 2.5 include human population. Infrastructure would not cover people [Michelle Mycoo, Trinidad and Tobago]	Accepted. Need to replace "and damage to infrastructure" with ", increased risks to people and damage to infrastructure".
34352	8	21		22	As written, this text implies that ocean acidification is driven by global warming, whereas it is actually directly driven by the increase in atmoispheric CO2. [Nathan Gillett, Canada]	Accepted and text rewritten.
11272	8	21	8	23	As written, this text risks confusing the non-expert on the cause of ocean acidifcation. It gives the impression that it is the warming that causes OA, rather than the CO2 emissions. [United Kingdom (of Great Britain and Northern Ireland)]	Accepted and text modified
18906	8	21	8	21	Replace "Global warming of 1.5°C" with "An increase of CO2 concentrations consistent with a global warming of 1.5°C" or similar. Important to emphasize that the changes in chemistry is driven mostly by CO2 concentrations, and not by temperature. Awareness of policy makers is insufficient, and the distinction is crucial in the context of geoengineering (SRM). [Andrea TILCHE, Belgium]	Accepted and text modified to be less confusing
18908	8	21	8	27	This statement will apply to any scenario. It doesnot allow to understand to understand the benefit of 1.5 compared to 2 degree? [Andrea TILCHE, Belgium]	Accepted and text modified to be more specific.
29976	8	21	8	23	We read this sentence as 'ocean acidification is (...) amplifying the risks of temperature rise... We think what is meant here is that ocean acidification is a risk on top of the risk associated with temperature rise, this would deserved to be more clear. [France]	Accepted and text changed
33780	8	21	8	23	We think it should be clarified that it is the CO2-emissions, not global warming itself that leads to ocean acidification. Please consider to rewrite this sentence. Suggestion: "The level of CO2 in the atmosphere that correlates to 1,5 increase in global temperature, as well as the increased ocean temperature, will lead to fundamental changes in ocean chemistry from which it may take many millennia to recover. The following ocean acidification will most certainly lead to large-scale changes and amplify the risks of temperature rise for ocean biological systems." [Norway]	Modify 'B3.3. The level of ocean acidification' to 'B3.3. The level of ocean acidification (due to higher levels of carbon dioxide)'
51348	8	21	8	27	The conclusions in this paragraph - especially the point about "critical thresholds being reached at 1.5 C and above" do not appear to be supported by the actual line of sight text in 3.4.4.1.4 and 3.4.4.1.5. The chapter text has no mention of thresholds and conveys a different impression than the statement in the SPM. [Anand Patwardhan, United States of America]	Accepted and text modified
52928	8	21	8	22	Is it warming or the associated uptake of CO2 that is the driver? [Ireland]	Accepted and text modified

Comment No	From Page	From Line	To Page	To Line	Comment	Response
54248	8	21	8	27	this bullet uses the future present tense which jars with respect to previous paras. The style should be the same throughout. It would also be useful to say whether there are more critical thresholds between 1.5 and 2. [David Warrilow, United Kingdom (of Great Britain and Northern Ireland)]	Accepted and text changed
55574	8	21	8	21	suggest: "emissions associated with global warming ….." [David Cooper, Canada]	Accepted and text changed
59042	8	21	8	27	This is a better phrasing of risk to ecosystems compared to the phrasing on lines 9 through 12 on page SPM-8. [United States of America]	Accepted and text changed
59044	8	21	8	26	Suggest distinguishing those effects that are a function of warming, and those effects (like acidification) that are a direct function of CO2 emissions. [United States of America]	Accepted and text modified
59046	8	21	8	22	Saying "it may take" is not consistent with the IPCC lexicon. This needs to say "it will very likely take" – or perhaps just "it will take" as it is hard to see, other than by a very expensive and extensive intervention to try to increase the global pH level, any possibility of a quick reversal by natural processes. The IPCC lexicon needs to be used and if a qualifying phrase needs to be included, then add it, but using "may" is not useful and not good practice in assessments. [United States of America]	Accepted and text changed
34354	8	22		26	This text describes changes that would occur with 1.5C global in the present tense, as if they have already occurred. Warming relative to preindustrial has not yet exceeded 1.5C. [Nathan Gillett, Canada]	Accepted and text rewritten.
44644	8	22	8	22	Should this not be "will drive"? [Penny Urquhart, South Africa]	Accepted and text changed
59048	8	22	8	26	The tense in this section could be confusing for readers. It would be clearer if it reads "At global warming of 1.5°C, ocean acidification would drive large scale changes and amplify the risks of temperature rise for ocean biological systems. Unprecedented changes and thresholds would be reached at 1.5°C of warming and above..." [United States of America]	Accepted and text changed
59050	8	22	8	22	Change "is driving" to "will be driving" as it is not yet the situation. [United States of America]	Accepted and text changed
59052	8	22	8	23	Risks is not the right word as changes will actually be occurring, not just the threat of them. So, here it needs to say "ocean acidification and warming will be driving large-scale changes in ocean biological systems." [United States of America]	Accepted and text modified
14156	8	24	8	27	As a reader, I am wondering how novle ecosystems would play in ocean food webs, ecosystem structure and seservices. [Rongshuo Cai, China]	Accepted - no longer mention 'novel ecosystems' as is vague at this point.
18910	8	24	8	26	Range shifts in species are already occurring on land an in oceans due to past warming. Therefore, it is not clear why 'driving some species to relocate' is mentioned in connection with 'critical thresholds'. [Andrea TILCHE, Belgium]	Accepted and text modified
59054	8	24	8	25	The basis for suggesting there are critical thresholds at 1.5°C and above needs to be explained. What has been seen is that even small changes in ocean temperature have been leading to shifts in the ranges of fisheries; there does not seem to be a delay time. Pretty clearly the shifts occur as the fish search out the temperature of water to which they are most accustomed. There is indeed a problem as they keep moving poleward at the same time that the compensation level moves upward and equatorward due to acidification. So, if the suitable area for healthy fisheries is shrinking on both its poleward and equatorward sides, that is a critical threshold that merits explicit mention and explanation. [United States of America]	Accepted and text modified
15490	8	25	8	27	What is the ratio between species that can relocate versus those that can't (and are thus more likely to face mortality)? [Australia]	Accepted and text modified
29100	8	25	8	25	thresholds being reached at 1.5 and above - please specify/differentiate, to avoid that this statement is void of meaning. [Germany]	Accepted and text modified
29978	8	25	8	26	« for example driving some species to relocate and novel 26 ecosystems to appear. » This example is not so well chosen or not so well detailed in {3.4.4.1.4. and 3.4.4.1.5}. It's difficult to perfectly understand the environnemental impact. The critical risk could be better highlighted. [France]	Accepted - no longer mention 'novel ecosystems' as is vague at this point.
18912	8	26	8	27	Please provide examples of marine ecosystems that are relatively less able to move, in particular coral reefs. [Andrea TILCHE, Belgium]	Accepted and text modified to refer to distributional shifts in some cases.
18914	8	26	8	27	Saying that ecosystems "move" is inappropriate, because the term is used to indicate the progression of different states of maturity. In this context, it is more appropriate to replace "ecosystems" with "species". The sentence may be completed then as follows: "Species that are relatively less able to move are projected to experience high rates of mortality, sometimes causing the loss of entire ecosystems" [Andrea TILCHE, Belgium]	Accepted and text modified to refer to 'distributional shifts'.
29980	8	26	8	26	Replace "to move" by "to adapt" : the term "to move" shows that moving is the only way to survive for ecosystem. But ecoystem can also stay and modify some its ecological caracteristics before moving. The term "adapt" contains the two possibilities [France]	Accepted and text modified to refer to distributional shifts in some cases.
33782	8	26	8	27	Please consider rephrasing the sentence. Ecosystems that are "sensitive to physical and/or chemical change" are projected to experience… [Norway]	Accepted and text modified
55354	8	26	8	27	Ecosystems don't move nor die.. I guess the authors meant: "Organisms with limited capacity to move from their damaged ecosystems are projected to experience high rates of mortality and loss." [ELISA BERDALET, Spain]	Accepted and text modified to refer to 'distributional shifts'.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
59056	8	26	8	27	Is this statement specific to 1.5 or 2°C? If not, or there is insufficient literature to support the statement, please remove. [United States of America]	Accepted and text modified
39312	8	28	8	42	Important to clarify for policy makers, thank you. [Lindsey Cook, Germany]	Accepted
11274	8	29	8	36	Neither of these paras has % or absolute differences between 1.5 and 2. It stands to reason that most of the impacts will be greater at 2 than 1.5 deg C warming [United Kingdom (of Great Britain and Northern Ireland)]	Accepted and text modified
18916	8	29	8	29	In all examples try to be more quantative where possible- how much 'safer' is 1.5 compared to 2 degrees? [Andrea TILCHE, Belgium]	Accepted and text modified
29102	8	3	8	31	The risk of elevated local extinction rates in tropical regions is higher with 2°C of global warming compared to 1.5°C. No reference to higher latitudes - should it be noted, that confidence is low to medium, that Net Productivity in higher latitudes (Northern Hemisphere) may increase? [Germany]	Accepted and text modified
55374	8	3	8	3	the risk of elevated local extinction seems like an incorrect use of the concept of risk to me; what the authors are saying here is that the probability of local extinction increases. The consequence is always the same, extinction = extinction. [Andy Reisinger, New Zealand]	Accepted and text modified
59058	8	3	8	31	This seems so obvious that a comparison to what is happening at 1°C is needed – perhaps combining this point with the next regarding risks. So then summarize impacts already occurring (greater likelihood of bleaching events, less vigorous recovery, etc.) then indicate how much worse the situation would become, etc. [United States of America]	Accepted and text modified
59060	8	31	8	31	Reverse presentation of relative differences of 1.5 vs 2°C. [United States of America]	Accepted and text changed
6876	8	34	8	35	The following wording might be clearer for non-native speakers: Warm water coral reef ecosystems are already losing live coral cover at present. They are at high risk of such loss at 1.5oC and at a global warming of 2oC the reefs will no longer be dominated by corals. [Klaus Radunsky, Austria]	Accepted and text modified
11276	8	34	8	36	Strengthen -By 2100, 70% corals will be lost with 1.5°C of warming, but with 2°C of warming most reefs will be eliminated, undermining a range of ecosystem services vital to millions of people (box 3.6). [United Kingdom (of Great Britain and Northern Ireland)]	Agreed: At line 22 on page 9 change 'at 1.5oC global warming (very high confidence).' for 'at 1.5oC global warming (very high confidence); and 99% of current coral cover at 2.0oC global warming (very high confidence).'
15492	8	34	8	36	Please expand and update the paragraph on warm water corals to better reflect the robust evidence of climate change impacts and risks for coral reef ecosystems around the world. Please separate the risks at 1.5 and 2°C. See suggested updates to Chapter 3, p92. This wording also needs to reflect a risk, not a certainty, that the word "will" implies. [Australia]	Coral reefs already play a prominent role in B3.2 and B3.4 - which make the appropriate links to Chapter 3.
18918	8	34	8	35	This sentence suggests that coral reefs are equally at risk under 1.5 °C and under 2 °C global warming. Please provide information how the projected impacts for these two warming levels would differ. [Andrea TILCHE, Belgium]	Accepted and text modified
19220	8	34	8	35	A higher risk at 2ºC than at 1.5ºC should be mentioned, otherwise it seems equal. [Spain]	Accepted and text modified
29982	8	34	8	36	We would suggest reinforcing this message by precising the respective figures for impacts on coral at 1.5°C and 2°C respectively. [France]	Accepted and text changed
32606	8	34	8	35	Have to read twice. How about "There is a high risk that at 1.5 and at 2 [they][these ecosystems] will no longer be dominated by corals."? [Jonathan Lynn, Switzerland]	Accepted and text changed
33784	8	34	8	35	This whole sentence can be difficult to understand. They are at risk that at 1,5°C and at 2°C they will no longer be dominated by "live?" corals. Please consider rephrasing the sentence. [Norway]	Accepted and text modified
33786	8	34	8	36	The wording "no longer be dominated by corals" seems quite weak compared to the message in chapter 3.4.4.2.1. and box 3.6. Please also consider to distinguish between effects at 1.5 ºC and 2ºC. [Norway]	Coral reefs already play a prominent role in B3.2 and B3.4 - which make the appropriate links to Chapter 3.
33788	8	34	8	36	Please consider to quantify the high risk of losing live coral cover at 1.5C and 2C. These findings are generally more quantified in Chapter 3, and relevant information is also available in Box 3.6. Please also include reference to this box in this statement. [Norway]	Coral reefs already play a prominent role in B3.2 and B3.4 - which make the appropriate links to Chapter 3.
40554	8	34	8	35	Poor English. Please rewrite it. [Sergio Henrique Faria, Spain]	Accepted and text changed
52694	8	34	8	36	Consider differentiating between the impacts on warm water coral reefs for 1.5 and 2°C (Figure 3.21). The figure shows a recovery of coral reefs in 2100 for 1.5°C [Iulain Florin VLADU, Germany]	Coral reefs already play a prominent role in B3.2 and B3.4 - which make the appropriate links to Chapter 3.
54250	8	34	8	36	this bullet is unclear [David Warrilow, United Kingdom (of Great Britain and Northern Ireland)]	Accepted and text changed
55356	8	34	8	35	Check this sentence. I think it should be something like: "Corals are at high risk at 1.5C and may highly damaged at 2C." [ELISA BERDALET, Spain]	Accepted and text modified
56494	8	34	8	35	sentence unclear [Eleanor Johnston, United States of America]	Accepted and text changed
59062	8	34	8	34	Consider rewording for clarity to: "they are currently at high risk, and at 1.5 and 2°C they will no longer be dominated by corals." [United States of America]	Accepted and text modified
59064	8	34	8	35	Fix the wording of this sentence. Just delete "that"? A comma before the "and at 2°C" would be helpful. [United States of America]	Accepted and text changed
59066	8	34	8	35	Sentence should read "They are at high risk at 1.5 and at 2°C, they ...". Delete the word "that" in the current text. [United States of America]	Accepted and text changed
63046	8	34	8	35	Please clarify: no difference between 1.5 and 2.0°C ? What is the concrete meaning / what are the consequences from "coral reefs no longer dominated by corals"? What does it mean for biodiversity, for fisheries, for the local economy? [Belgium]	Accepted and text modified

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81	8	35	8	35	Typo: "that at 1.5" should read "at 1.5". [Guillermo Montt, Switzerland]	Accepted and text changed
32216	8	35	8	35	that should be deleted from …"that at 1.5.." [Jamaica]	Accepted and text changed
36618	8	35	8	35	that should be deleted from …"that at 1.5.." [Snaliah Mahal, Saint Lucia]	Accepted and text changed
34356	8	38		4	This bullet point is clearly written. A similar format could be applied to many of the other bullets describing changes in impacts. [Nathan Gillett, Canada]	Accepted
11278	8	38	8	4	Strengthen -The potential global catch for marine fisheries could decrease by 3 million metric tonnes for every °C of warming (3.4.6.4) [United Kingdom (of Great Britain and Northern Ireland)]	SPM intended to be higher level. This specific study is described in the chapter - and is captured by B3.4 for example
11280	8	38	8	41	Should this be taken as all regions globally will experience increased risk from warming? It might be useful to clarify that even with projected range shifts due to ocean warming fisheries and aquaculture are found to be at greater risk in all regions should this be the case. Policy readers may have an impression that some regions may benefit from range shifts. [United Kingdom (of Great Britain and Northern Ireland)]	SPM intended to be higher level. This specific study is described in the chapter - and is captured by B3.4 for example
18920	8	38	8	38	In all examples try to be more quantative where possible- how much 'safer' is 1.5 compared to 2 degrees? [Andrea TILCHE, Belgium]	Coral reefs already play a prominent role in B3.2 and B3.4 - which make the appropriate links to Chapter 3.
33790	8	38	8	41	Please consider explaining the risks mentioned here. They are at risk of what? Are they at risk of change? Or at risk of being lost? [Norway]	Accepted and text modified
37246	8	38	8	41	The description of impacts on fisheries is too general to be useful to a business reader. It would be more useful if the climate impacts on fisheries are described in a more quantitative and financial way - what are the implications for prices or diet or availability of fish stocks in different regions over different timescales [Jonathan Grant, United Kingdom (of Great Britain and Northern Ireland)]	Accepted and text changed - now quantified
45068	8	38	8	4	parts of this para is repeated in previous paragraphs. [Iman Babaeian, Iran]	Accepted and text changed
50400	8	38	8	38	Write: "Nature's contributions to people from marine ecosystems, fisheries …", consistent with IPBES. [Switzerland]	Text modified, statement no longer needed.
59068	8	38	8	41	Move the first part of bullet upward, so have a point about what the present situation is, then have points that indicate what lies ahead. [United States of America]	Accepted and text changed
5424	8	39			Ocean depxygenation should be mentioned as well. [Andreas Oschlies, Germany]	Accepted and text modified
21616	8	4	8	4	The framing changes here, from "1.5 and 2", to "1.5, 2, and higher". While true, it becomes confusing to compare the different statements (cf. lines 3-4). [Sweden]	Accepted and text changed
29104	8	43	8	43	Please add these sentences to SPM 2.3, as an extra bullet, coming from chapter 3, page 55, line 1-4: "Evidence that thermohaline circulation is slowing has been building over the past years, including the detection of the cooling of surface waters in the north Atlantic plus strong evidence that the Gulf Stream has slowed by 30% since the late 1950s. These changes have serious implications for the reduced movement of heat to many higher latitude countries." This robust and quantitative information is highly relevant. [Germany]	This level of detail more suited to the text of Chapter 3.
9476	9	1	9	2	'On land, risks of local and regional species extinction, range loss and shifts in biodiversity distribution are lower at 1.5°C than at 2°C. {3.3.2.2, 3.4.3.1, 3.4.3.5, 3.5.2.4.2, 3.5.5.10}' If a relationship '?temperature ? effect' is monotonous, the statement is trivial, if not monotonous it is wrong. [Russian Federation]	We do not understand what the reviewer means by the word monotonous. We think that perhaps the reviewer simply meant that the statement is trivial, in that the statement is very obvious to them. Headline statements are often 'obvious' and the more detailed qualified and quantified findings are given below.
11282	9	1	9	2	Again, this needs quantifiying. How much lower are we talking about? [United Kingdom (of Great Britain and Northern Ireland)]	Statements of quantification have been provided below this headline statements.
15494	9	1	9	1	Please define "range loss" [Australia]	Now defined in the bullet B3.1
18922	9	1	9	46	In all examples try to be more quantative where possible- how much 'safer' is 1.5 compared to 2 degrees? [Andrea TILCHE, Belgium]	Statements of quantification have been provided below this headline statements.
29984	9	1	9	17	What about soils? Knowing that the nature, the caracteristics, the properties and the evolution of soils depend among others, on climate and living organisms, it can be deducted that they will evolve with climate change (the repartition of the differents kinds of soil will be different around the world). As a consequence their fertility, their biology, their aptitude to regulate water flows, and all their other ecological functions / ecosystemic services could vary (or not?) dramatically under a 1,5°C or a 2°C global warming. Climate change could also accelerate (or not?) their degradation (organic matter loss, erosion, desertification...) in some regions and adaptation measures (e.g. irrigation) have the potential to have negative (salinization for ex.) or positive impacts on soils, depending on the region, the measures, etc. As soil is a very important issue (at a global level, more than 90% of our food production are supported by soil, 1/4 of all living organisms species live in soils, soils represent a hugh stock of carbon, the capacity of forest to resist to water stress will depend on the water holding capacity of soils, for ex.), it is important to include at least one paragraph on soils in section 2.4. [France]	Literature could not be found pertaining to information about 1.5/2C warming for soils. Owing to the limited space and lack of literature, we could not include this, it will be covered in detail in AR6.
31198	9	1	9	2	Since SPM2.4 discusses risks which are higher at 2°C compared to 1.5°C, we would feel more comfortable if the headline statement read "higher at 2°C than at 1.5°C" instead of "lower at 1.5°C than at 2°C." It is highly expected for the report to provide quantitative information on the difference as well. [Japan]	Statements of quantification have been provided below this headline statements.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
54252	9	1	9	2	Suggest saying "significantly" lower - as evidenced in the following bullets. On an editorial point it would be more consistent with the general style to say that impacts at 2 are significantly greater than at 1.5. [David Warrilow, United Kingdom (of Great Britain and Northern Ireland)]	We did not change this as we received many more requests to preserve 'lower at 1.5C than at 2C'
54904	9	1	9	2	This head statement is based on a conclusion with medium confidence, which is not a wise thing to do. Only apply head statements based on high confidence levels. [Bram Bregman, Netherlands]	We have high confidence in the statement - this was a typo
58238	9	1	9	1	Is it "extinction" of "extirpation"? Only local extinction is mentioned in the bullet points below [Peter Marcotullio, United States of America]	The text in the underlying chapter and here has been reworded to clarify that what is referred to is increased risks of extinction
59070	9	1	9	2	This statement is vague. Just stating that shifts in biodiversity distribution are lower at 1.5 than at 2°C is not informative. Can this be made more convincing? [United States of America]	Statements of quantification have been provided below this headline statements.
59072	9	1	9	2	This point needs to have a phrase similar to that done in point 2.2, indicating that there are consequences occurring now and that additional warming is going to make the situation worse. Using the word "risks" does not reflect that extinctions, range loss, and shifts in biodiversity distribution will actually be occurring. Ecosystems (like western North American forests) are dying due to the stress of warm winters not killing off pests, etc. The IPCC WGII assessments document all sorts of shifts and changes at (and even below) 1°C global warming, and the trend in the future is likely going to be at least somewhat exponential, so the statement really does not convey the seriousness of the situation being faced. [United States of America]	This is now captured in the headline statement of A3
63048	9	1	9	2	Please qualify or if possible quantify the level of risk avoided by keeping global warming below 1.5 as compared to 2°C and above. Would declining temperature (back to 1.5°C) following a peak above the target still provide a benefit in term of reduced biodiversity loss? [Belgium]	To the extent the literature allows, this point is addressed now in the statement A3.2
40556	9	2	9	2	Please end the sentence with "global warming". [Sergio Henrique Faria, Spain]	Text reworded
398	9	4	9	4	to add before Risks: " With 1.50C increase, risks…." [Nedal KATBEHBADER, Switzerland]	Text reworded
11284	9	4	9	5	This point needs more detail. [United Kingdom (of Great Britain and Northern Ireland)]	Statements of quantification have been provided below this headline statements.
29106	9	4	9	5	Please add this sentence to SPM 2.4, bullet 1, coming from chapter 3, page 11, line 12-13: "A possible tipping point exists in the Mediterranean between 1.5°C and 2°C warming, above which biome experiences changes that are unprecedented in the last 10,000 years (high confidence)." This robust and quantitative information is highly relevant. [Germany]	This is found in the Executive Summary of Chapter 3, but was not uplifted to the SPM owing to space issues. However the associated risks to agriculture in the Mediterranean are highlighted in statement B5.3
29986	9	4	9	5	This message is quite general. It would be useful to specify ecosystems at risk here. Aren't wetlands at risk too ? [France]	The headline statement now makes it clear that the risk includes risk to wetlands
29988	9	4	9	5	The distinction between dryland and humid lands needs to be better explained and placed in relation to concepts better identified by IPCC such as wetlands or FAO such as tropical dry forests or tropical wet forests. [France]	Text deleted
40404	9	4			...and semi-arid [Jonathan Gómez Cantero, Spain]	The relevant text has been deleted
54902	9	4	9	5	This conclusion is not true. Risks are also amplified on humid lands, such as peat lands. Peat land subsidence is a widespread amplified problem and is due to human management. [Bram Bregman, Netherlands]	Text deleted
59074	9	4	9	6	What kind of risks? This is too general of a phrasing. Risk of extinction? Loss of biodiversity? Loss of net primary productivity? [United States of America]	Text reworded
59076	9	4	9	4	In that the SPM is for general decisionmakers, give examples of natural and managed ecosystems. [United States of America]	Text reworded to avoid use of these confusing terms
11116	9	7	9	9	The word "biome" is not in standard policy maker vocabulatory. [Denmark]	Text reworded
18924	9	7	9	11	Correct the usage of "biome". "Biome" is generally understood to designate "major plant communities". The text incorrectly suggests that the communities would have "shifted" (migrated) with the changing temperature, more or less successfully (a major disruption of the community would result in a different biome). That is likely to be an exception. In fact, what will have shifted are the climatic zones associated with the different biomass. The biomes themselves may or may not be able to follow the shift of climatic zones, and even if/when they manage, it is likely to take much longer than that the change in the temperature and it will not be without major changes to the composition, structure and function of the biome. [Andrea TILCHE, Belgium]	Text reworded to explain that the systems are transformed, not migrated.
29108	9	7	8	9	Is the reference to observed impacts at 1°C warming justified given the definition of warming levels refer to periods of 30 years in this report (see Ch1: "This report adopts a working definition of global average temperature at any given time as the average of land surface air and sea surface temperatures over a 30-year period centred on that time." [Germany]	We agree, the reference to 1C warming has been deleted here
31200	9	7	9	11	Biome shifts depend on the pace of global warming. Please put more explanation on how the pace of global warming effects on the biome shifts [Japan]	This issue is too detailed for inclusion in the SPM, and there is no literature about this dynamics which relates to 1.5/2C warming levels, hence it will be discussed in full in AR6
32608	9	7	9	9	biome may no be understood by non-specialists [Jonathan Lynn, Switzerland]	Text reworded
38460	9	7	9	11	Change in geographic examples from region to country. Brings confusion. [Linah Ababneh, United States of America]	Text reworded
49506	9	7	9	11	It is rather the climate zone that is shifting. It is not clear of the biome (the ecological group of organisms) is able to keep pace with the climate zone shifts, and what kind of impacts this will have (e.g. impacts during the transition phase) is key. Paragraphs should be revised in this sense. [Karlheinz ERB, Austria]	This issue is too detailed for inclusion in the SPM, and there is no literature about this dynamics which relates to 1.5/2C warming levels, hence it will be discussed in full in AR6

Comment No	From Page	From Line	To Page	To Line	Comment	Response
59078	9	7	9	9	Emphasizes 2°C when the topic is 1.5°C. Restructure the sentence. [United States of America]	We received many comments on how to phrase this and the final phrasing reflects the overall requests received from governments.
11286	9	8	9	8	Global warming or regional warming? [United Kingdom (of Great Britain and Northern Ireland)]	Text reworded
41660	9	8			Add reference to {4.4.3} for "anthropogenic climate change" [Czech Republic]	Text reworded
8278	9	9	9	1	The juxtaposition of the Himalayas, Tibet and South African, Australia and others is open to different interpretations, which is suggested to be reformulated according to the standard geographical expression to reflect the geographical concepts, that is, Tibet is replaced by the Tibet Plateau. [China]	Text reworded and list of regions/countries deleted
29110	9	9	9	9	“Past emissions do not commit to substantial future surface warming” is a misleading and dangerous statement, and not relevant under the subheading “sea level rise” anyway: Long-lived atmospheric GHGs such as N2O have an atmospheric lifetime of some 120 years, and fluorides or long-lived hydrofluorocarbons have even lifetimes of several hundreds to several ten thousands of years. To avoid misunderstandings, please modify the statement: "Past emissions do not commit to ADDITIONAL substantial future surface warming”. Please adapt also the text in Ch 1. [Germany]	Sentence deleted
40748	9	9	4	9	Readability/concise. Suggest rewording from “ … can be a more cost-effective protection of coastal regions …” to “ … can more cost-effectively protect coastal regions …” [Liese Coulter, Australia]	Not applicable - sentence no longer included.
52930	9	9	9	1	can % ranges be provided as well as details on "more" [Ireland]	Text reworded
59080	9	9	9	1	Is the 25% about the number of biomes shifting (that would seem strange as virtualy all systems are already responding), or that the magnitude of the range shift changes by this amount (if so, much more helpful to give actual estimates of what the distances are ... 5 versus 4 km, or 500 versus 400 km, or whatever). Really hard to get a sense of what is meant given the description here. [United States of America]	Text reworded
399	9	13	9	13	to delete" (extirpation)". [Nedal KATBEHBADER, Switzerland]	Text reworded
4436	9	13	9	16	This information add no value. Anyone can imagine. Extinction risks are higher for what extent is the information policymakers need to know. Without those information, delete this paragraph to avoid redundancy. [Mitsutsune Yamaguchi, Japan]	Quantification of range losses has been added, but the literature does not provide exact quantifications of projected extinction risk levels.
6878	9	13	9	13	Local species extinction (extirpation) risks are significantly higher in a ….. [Klaus Radunsky, Austria]	Text reworded
11288	9	13	9	13	Extirpation. Jargon. [United Kingdom (of Great Britain and Northern Ireland)]	Text reworded
11290	9	13	9	16	Again, risks are higher by how much in a 2 degC warmer world, compared to 1.5 degC? [United Kingdom (of Great Britain and Northern Ireland)]	Statements of quantification have been provided below this headline statements.
15496	9	13	9	13	Remove the word "extirpation" as it is redundant and may not be understood by readers [Australia]	Text reworded
59082	9	13	9	16	This statement needs to have context added: What is the present expected loss of species (e.g., 5% at 1 C?), then what is the actual percentage loss at 1.5 and 2°C? Are we losing two species at 1.5°C and three species at 2°C, or 200 versus 300, or what? Are these key species (e.g., some mammals) or mainly mosquitoes, or what? [United States of America]	Statement reworded to address requested level of detail, as far as the literature permits
63050	9	13	9	14	Is the word "extirpation" really needed? Please consider deleting, it is not be relevant for most policymakers. [Belgium]	Text reworded
400	9	14	9	16	The sentence from: Climate induced to the end of the sentence is incorrect and needs to be rephrased. please refere to the text from the chapter wich reads: Warren et al. (2013) simulated climatic range loss for 50,000 terrestrial species and projected that with 4°C warming, and realistic dispersal rates, 34±7% of the animals, and 57±6% of the plants, would lose 50% or more of their climatic range by the 2080s. By comparison, these projected losses are reduced by 60% if warming is constrained to no more than 2°C. [Nedal KATBEHBADER, Switzerland]	Text reworded
11118	9	14	9	14	What is "range losses"? [Denmark]	Text reworded
44646	9	14	9	15	Massively important statement, could some of the implications be spelled out here? [Penny Urquhart, South Africa]	The headline statement now includes the implications for ecosystem services as far as the literature allows
7002	9	18	9	2	Box 2.5 says "Sea level rise will be greater with 2°C global warming compared to 1.5°C, increasing risks to coastal ecosystems, infrastructure, and freshwater ...". It's true but to say this here, can lead the perception that 1.5°C warming is harmless. [Serhat Sensoy, Turkey]	The revised FGD version of the SMP clearly states that sea-level rise is virtually certain to continue at 1.5 degrees C of global warming, and the associated risks are also discussed.
9032	9	18	9	43	Section 2.5: This section lacks the discussion of the long term effects of global warming of 1,5°C and 2°C on sea level rise. Even though the difference might be relatively small in 2100, even the thermal expand of oceans will be different in both scenarios in the long term, up to 2300 or beyond. This is a policy-relevant finding that needs to be included here. [Luxembourg]	We have elaborated in the FGD version of the SPM to provide specific estimates of sea-level rise and its impacts at 1.5 vs 2 degrees C of global warming, with confidence levels assigned to the statements made. Moreover, the FGD version of the SPM reflects the latest peer-reviewed literature, which indicate that the Greenland and/or Antarctic ice sheet instabilities may be triggered even if global warming is limited to 1.5°C by 2100, and that this could result in multi-metre rise in sea level on centennial to millennial time scales.
14216	9	18	9	18	The first sentence (" Sea level will continue to rise for centuries") is not clear. What is the main message? [United Republic of Tanzania]	We have elaborated on this point in the FGD version of the SPM. The main point of consideration, is that the Greenland and/or Antarctic ice sheet instabilities may be triggered even if global warming is limited to 1.5°C by 2100. This could result in multi-metre rise in sea level on centennial to millennial time scales.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
15498	9	18			In the entire section of sea level rise, there is no one estimate of the level of sea level rise expected at various time frames. Please add to make it more concrete. [Australia]	Rejected. The scope of SR1.5 is to provide estimates of sea-levels at 1.5 vs 2 degrees C stabilisation scenarios, with these stable levels of global warming to be present by 2100. It his thus not the objective of SR1.5 to provides estimates of sea-level rise for different future periods.
17674	9	18	9	22	Suggest adding a paragraph to emphasize that the polar ice sheets could become vulnerable to irreversible loss and the risk of multi-metre-scale sea level rise over multi-millennial timescales is greater for a 2oC warmer world compared to 1.5oC. [Sai Ming Lee, China]	Accepted. The FGD version of the SPM reflects the latest peer-reviewed literature, which indicate that the Greenland and/or Antarctic ice sheet instabilities may be triggered even if global warming is limited to 1.5°C by 2100, and that this could result in multi-metre rise in sea level on centennial to millennial time scales.
19458	9	18	9	22	"2.5 Sea level will continue to rise for centuries. Sea level rise will be greater with 2°C global warming compared to 1.5°C, increasing risks to coastal ecosystems, infrastructure, and freshwater supplies." It is not clear either in the SPM or in the underlying chapters 1 and 3 what the difference is in sea level rise (and consequences) between non-overshoot 1.5C scenarios and overshoot 1.5C scenarios. [Jennifer Morgan, Netherlands]	Indeed, the report's main focus is to discuss the differential impacts of climate change (including through sea-level rise) at stabilised 1.5 vs 2 degrees C worlds by 2100. There is not sufficient studies available to warrant statements in the SPM on the differential impacts of sea-level rise at 1.5 degrees C of global warming, vs the case where an overshoot precedes stabilization at this level of warming.
29112	9	18	9	22	Please provide more quantitative information, even if it there is a large range and provide uncertainty statements. [Germany]	We have elaborated in the FGD version of the SPM to provide specific estimates of sea-level rise and its impacts at 1.5 vs 2 degrees C of global warming, with confidence levels assigned to the statements made.
31202	9	18	9	42	Please add more quantitative information regarding sea level rise and sea surface temperature rise at 1.5°C and 2.0°C, respectively, if the related studies are available in each region. This information is very useful for impact assessment for policy making. [Japan]	Noted. We have elaborated in the FGD version of the SPM to provide specific estimates of sea-level rise and its impacts at 1.5 vs 2 degrees C of global warming, with confidence levels assigned to the statements made. However, in the SPM the focus is on global aggregated impacts, rather than on impacts on specific cities or regions (such a discussion would be too detailed to be incorporated in the SPM).
43760	9	18	9	22	Sea level will continue to rise for centuries. Sea level rise will be greater with 2°C global warming compared to 1.5°C, increasing risks to coastal ecosystems, infrastructure, and freshwater supplies [and food security for Small Island States and crop productivity in costal and estuarian regions] . High risk levels and adaptation limits are expected to be reached earlier at 2°C compared to 1.5°C in many locations. [Peter Carter, Canada]	We have elaborated in the FGD version of the SPM to provide specific estimates of sea-level rise and its impacts at 1.5 vs 2 degrees C of global warming, with confidence levels assigned to the statements made.
50112	9	18	9	26	The risks of long-term sea level rise need to be emphasised much more, as this risk is significantly lower under 1.5C than under 2C strategies, at least that is what the International Cryospkere Climate Initiative concluded in 2015 (this reference is missing in chapter 3.6.4.2 where long-term sea level rise is mentioned [Bert Metz, Netherlands]	We have elaborated in the FGD version of the SPM to provide specific estimates of sea-level rise and its impacts at 1.5 vs 2 degrees C of global warming, with confidence levels assigned to the statements made.
52932	9	18	9	18	This mixes sea-level rise and adaptation limits which is a wider topic; perhaps separate [Ireland]	Accepted - in the FGD version of the SPM, the physical climate science aspects of sea-level rise and adaptation options and limitations are discussed separately.
57162	9	18	9	18	sea level will continue to rise for centuries. Isn't it a lot different at 1.5 vs 2°C, and higher levels ? 1.5 (and perhaps also 2°C but to a less extent) is associated to scenarios of which some (many?) have further temperature decline after 2100. As a consequence : - This may halt SLR due to thermal expansion; it would not be halted in scenarios that do not have decline temperatures, so this is a key difference. Taking the RCPs as examples, only RCP2.6 results in 1) gradual slowing down of the thermal expansion from mid 21st century to 2300, and 2) sea-level decline after 2300. - This may also reduce, and perhaps remove entirely, the risks due to large-scale ice melt, because triggering melting is not just an issue of temperature but also an issue of duration. [Philippe Marbaix, Belgium]	Rejected. The latest peer-reviewed literature indicates that the Greenland and/or Antarctic ice sheet instabilities may be triggered even if global warming is limited to 1.5°C by 2100. This could result in multi-metre rise in sea level on centennial to millennial time scales.
59088	9	18	9	42	This discussion should attempt to quantify what range of sea level rise would be expected on a 1.5°C pathway. [United States of America]	We have elaborated in the FGD version of the SPM to provide specific estimates of sea-level rise and its impacts at 1.5 vs 2 degrees C of global warming, with confidence levels assigned to the statements made.
59086	9	18	9	22	It would be useful for the second sentence to talk about rates of sea level rise. Also in the second sentence, "risks" is the wrong word; there will be actual damage. And the types of damage needs to specifically list coastal cities and communities – consider Miami in US and equivalent low-lying cities. Also, it needs to be indicated that inundation of low-lying islands will also be sooner with the peak rise being 1.5 vs 2°C. Indeed, it also needs to be said that the rate of sea level rise is likely (due to inertia and feedbacks) to be primarily determined by peak warming if there is an overshoot than by the ultimate equilibrium temperature that is arrived at, unless the increase in global average temperature is brought back to 0°C or below (Wigley has a paper on this). Current framing of this finding understates the seriousness of the situation being faced. [United States of America]	The focused in the revised SPM remained on aggregated global impacts, rather than to describe risks for specific cities or communities. Impacts on small-islands states are prominent in the revised SPM, and note that there is also a Chapter Box dedicated to risks to the Small Island states in Chapter 3.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
63052	9	18	9	18	sea level will continue to rise for centuries. It is important to asses the difference between 1.5°C, 2°C, and higher levels. Many 1.5°C scenarios (and perhaps also 2°C but to a less extent) probably involve temperatures that are declining by 2100 (especially in case overshoot), and may further decline after 2100. As a consequence : - This may halt SLR due to thermal expansion; it would not be halted in scenarios that do not have decline temperatures, so this is a key difference. Taking the RCPs as examples, only RCP2.6 results in 1) gradual slowering of thermal expansion from mid 21st century to 2300, and 2) sea-level decline after 2300. - This may also reduce, and perhaps remove entirely, the risks of large-scale ice-sheet melting, because triggering melting is not just an issue of temperature but also an issue of duration. Thus we have the impression that 1.5°C, even after a peak that may be before 2100 or not, is very significantly safer than 2°C for sea-level rise. Please provide an assessment of this issue. [Belgium]	Rejected. The latest peer-reviewed literature indicates that the Greenland and/or Antarctic ice sheet instabilities may be triggered even if global warming is limited to 1.5°C by 2100. This could result in multi-metre rise in sea level on centennial to millennial time scales. We have, however, indicated in the FGD version of the SPM some benefits in terms of sea-level rise in restricting, by 2100, global warming to 1.5 degrees C in stead of 2 degrees C.
15500	9	2	9	21	High risk levels and adaptation limits are expected to reached earlier at 2C compared to 1.5C in many locations. What does this mean? Many locations will reach the 2C threshold *before* the 1.5 threshold? Rewrite to be understandable. [Australia]	This statement on the limits to adaptation, within the context of sea-level rise, has been removed from the FGD version of the SPM.
18926	9	2	26	11	“Adaptation limits” are mentioned several times in the SPM (SPM P9L20, SPM P11L15, SPM P26L7&11, etc.). This is problematic. Partly because the approved outline refers to "adaptation capacity", and partly because Ch3 & 4 contain very few insights in this area. It would be preferable to look into the different factors that affect adaptive capacity, and how to increase it. [Andrea TILCHE, Belgium]	Taken into account - text revised. Reference to the cross-chapter box will be added
33490	9	2	9	22	Second sentence of 2.5 is not clear as you need to pass through 1.5C to get to 2C. Perhaps it is meant that "High risk levels and adaptation limits are expected to be reached sooner for 2°C pathways compared to 1.5°C pathways in many locations."? [Stephen Cornelius, United Kingdom (of Great Britain and Northern Ireland)]	This statement on the limits to adaptation, within the context of sea-level rise, has been removed from the FGD version of the SPM.
33792	9	2	9	22	Please consider to add whether this is expected to be reached within this century. [Norway]	This statement on the limits to adaptation, within the context of sea-level rise, has been removed from the FGD version of the SPM.
49488	9	2	9	21	Regarding adaptation limits being reached at 2.0deg C and 1.5deg C. This largely depends on timeframe and needs to be acknowledged. Sea-level rise may be adaptable to 2.0degC in the 21st century, but it is the commitment to sea-level rise and the rate of change that is challenging for adaptation, particualrly of the built environment. Suggest the sentence is revised to say: 'High risk levels and adaptation limits are expected to be reached earlier at 2°C compared to 1.5°C in many locations particuarly over multi-centential timescales'. [Sally Brown, United Kingdom (of Great Britain and Northern Ireland)]	Agreed, however, this statement has been removed from the revised version of the SPM.
59090	9	2	9	21	This sentence is awkwardly phrased. [United States of America]	This statement on the limits to adaptation, within the context of sea-level rise, has been removed from the FGD version of the SPM.
15502	9	21	9	22	As written it is confusing, and assumes a linear trend in changes, which the different pathways make clear is not necessarily the case. [Australia]	This statement on the limits to adaptation, within the context of sea-level rise, has been removed from the FGD version of the SPM.
55376	9	21	9	21	to be reached earlier - the rate of warming under 2 degree scenarios isn't that much greater than under 1.5 degree scenarios, is the timing really such a major issue compared with the absolute level of warming that it deserves being called out here? Most 1.5 pathways have the same rate of warming but simply plateau earlier than 2 degree pathways. [Andy Reisinger, New Zealand]	This statement on the limits to adaptation, within the context of sea-level rise, has been removed from the FGD version of the SPM.
149	9	24	9	24	Past emissions do not commit… is unwise wording that can easily be misinterpreted in a number of ways. The dichotomy presented is also uninformative even if correct. I suggest rephrasing to drop the comparison and simply refer to sea level rise. [Michael Oppenheimer, United States of America]	We have rephrased this statement, to make clear the meaning that past emissions alone are unlikely to raise GMST to 1.5°C above pre-industrial levels, but do commit to further changes such as sea-level rise and associated impacts (high confidence).
11292	9	24	9	25	It would be good to include a few lines here to explain warming commitment as it's an issue that is frequently misunderstood, particularly in relation to whether warming continues or not in the case of immediate cessation of emissions. [United Kingdom (of Great Britain and Northern Ireland)]	We have rephrased this statement, to make clear the meaning that past emissions alone are unlikely to raise GMST to 1.5°C above pre-industrial levels, but do commit to further changes such as sea-level rise and associated impacts (high confidence).
15504	9	24	9	24	Suggest re-phrase to "Accumulated greenhouse gases from past emissions do not drive commitment to future surface air temperature increase …." The wording should reflect the atmosphere having little "memory", also "warming" in this report is sometimes used to refer to surface air temperature change specifically, and sometimes to other manifestations of warming such as ice and snow melt. [Australia]	We have rephrased this statement, to make clear the meaning that past emissions alone are unlikely to raise GMST to 1.5°C above pre-industrial levels, but do commit to further changes such as sea-level rise and associated impacts (high confidence).
15506	9	24	9	26	Suggest replace the term "warming" with the term "air temperature increase", which is what is meant here. 'Warming' is too broad a term. [Australia]	We have rephrased this statement, to make clear the meaning that past emissions alone are unlikely to raise GMST to 1.5°C above pre-industrial levels, but do commit to further changes such as sea-level rise and associated impacts (high confidence).
15508	9	24	9	25	This sentence implies that warming is not as major an issue compared to sea level rise. [Australia]	We have rephrased this statement, to make clear the meaning that past emissions alone are unlikely to raise GMST to 1.5°C above pre-industrial levels, but do commit to further changes such as sea-level rise and associated impacts (high confidence).
39030	9	24	9	25	The statement on commitment is important. I suggest that the authors consider lifting this up - or integrating this in a headline statement. Sea level is already there, but the point about temp commitment could be made more visible (since there is some confusion about this among users/readers). [Jan Fuglestvedt, Norway]	We have rephrased this statement, to make clear the meaning that past emissions alone are unlikely to raise GMST to 1.5°C above pre-industrial levels, but do commit to further changes such as sea-level rise and associated impacts (high confidence).

Comment No	From Page	From Line	To Page	To Line	Comment	Response
40558	9	24	9	24	This is a bold statement: "Past emissions do not commit to substantial future surface warming". A certainity level should be added to it. [Sergio Henrique Faria, Spain]	We have rephrased this statement, to make clear the meaning that past emissions alone are unlikely to raise GMST to 1.5°C above pre-industrial levels, but do commit to further changes such as sea-level rise and associated impacts (high confidence).
43762	9	24	9	26	• Past emissions [DO in practice for policy making] commit to substantial future surface warming due to unavoidable climate system and socioeconomic lags. [The IPCC AR5 working group 1 published in 2013 estimated that the global warming commitment from atmospheric greenhouse gas concentrations was about 2°C ('the commitment from constant greenhouse gas concentrations would correspond to approximately 2C warming' IPCC AR5 WG1 12.5.2) so the commitmtnt it is higher today], and does commit to future sea level rise. It is virtually certain that sea level will continue to rise in both 1.5°C and 2°C 26 worlds well beyond the end of the current century. These call for the immediate and rapid decline in global emissions. [Peter Carter, Canada]	We have rephrased this statement, to make clear the meaning that past emissions alone are unlikely to raise GMST to 1.5°C above pre-industrial levels, but do commit to further changes such as sea-level rise and associated impacts (high confidence).
46166	9	24	9	26	What is the confidence level of this statement? [Netherlands]	We have rephrased this statement, to make clear the meaning that past emissions alone are unlikely to raise GMST to 1.5°C above pre-industrial levels, but do commit to further changes such as sea-level rise and associated impacts (high confidence).
50402	9	24	9	24	Write: "Cumulative past emissions …". [Switzerland]	We have rephrased this statement, to make clear the meaning that past emissions alone are unlikely to raise GMST to 1.5°C above pre-industrial levels, but do commit to further changes such as sea-level rise and associated impacts (high confidence).
52934	9	24	9	26	This is a important issue and may be stated as a more direct impact of emissions on sea level rise [Ireland]	We have rephrased this statement, to make clear the meaning that past emissions alone are unlikely to raise GMST to 1.5°C above pre-industrial levels, but do commit to further changes such as sea-level rise and associated impacts (high confidence).
59092	9	24	9	26	This is a strange contrast in use of the confidence/likelihood lexicon. Suggest that the level of confidence of the first statement in the first sentence would more appropriately be "likely" rather than definitive, as stated here (it does not even merit a "virtually certain"), whereas the situation described in the second sentence is much more likely to be without doubt compared to the first half of the first sentence. Adjustment is needed. [United States of America]	We have rephrased this statement, to make clear the meaning that past emissions alone are unlikely to raise GMST to 1.5°C above pre-industrial levels, but do commit to further changes such as sea-level rise and associated impacts (high confidence).
674	9	25	9	25	The comment "It is virtually certain…" is rather confusing after assessing the confidence in other statements. A plain "It is certain…" would be clearer [Francisco Molero, Spain]	We have rephrased this statement, to make clear the meaning that past emissions alone are unlikely to raise GMST to 1.5°C above pre-industrial levels, but do commit to further changes such as sea-level rise and associated impacts (high confidence).
34796	9	25	9	26	This sentence states 'It is virtually certain that sea level will continue to rise in both 1.5°C and 2°C worlds well beyond the end of the current century'. However it does not say by how much this will rise. It would be more specific and informative to include the research from Chapter 3, e.g. on page 61, line 1 (section 3.3.10) which explains that models 'suggest that RCP2.6 is the only 1 RCP scenario leading to long-term contributions to GMSL of below 1.0 m' [Helena Wright, United Kingdom (of Great Britain and Northern Ireland)]	We have rephrased this statement, to make clear the meaning that past emissions alone are unlikely to raise GMST to 1.5°C above pre-industrial levels, but do commit to further changes such as sea-level rise and associated impacts (high confidence). Moreover, we have added more details on differential sea-level rise under 1.5 vs 2 degrees C of global warming.
1528	9	28			Replace "~0.1m" with "about 0.1m" [David Wratt, New Zealand]	Suggestion accepted and implemented.
9354	9	28	9	28	On page 9, line 41-42 (executive summary of Chapter 3) it sais "Current literature is insufficient to quantity the current difference in sea level between 1.5ºC and 2.0ºC worlds." If this is true, the statement on page 9, lines 28-29 of the SPM is quite strong to form part of the summary for policymakers Available studies suggest that global mean sea level rise by 2100 will be ~0.1m greater in a 2ºC world compared to 1.5ºC." . The first phrase cited comes from 3.3.10 and the second from 3.3.12.3 [Anna Sörenaaon, Argentina]	We have changed the ES to be consistent with the SPM in terms of indicating this differential level of sea-level rise, with clear indications in the ES to the supportive text in the Chapter that justifies this assessment being made.
11294	9	28	9	29	Can you include absolute values for each warming level? [United Kingdom (of Great Britain and Northern Ireland)]	We have decided to in the SPM state an estimation of differential sea-level rise between1.5 and 2 degrees C of global warming by 2100, with a more elaborate discussions and absolute estimates of sea-level rise (with uncertainty ranges) provided in the underlying chapter text.
11296	9	28	9	32	Could we be more precise and substantive than just irreversible loss "may occur" [United Kingdom (of Great Britain and Northern Ireland)]	The FGD version of the SPM reflects the latest peer-reviewed literature, which indicate that the Greenland and/or Antarctic ice sheet instabilities may be triggered even if global warming is limited to 1.5°C by 2100, and that this could result in multi-metre rise in sea level on centennial to millennial time scales.
18928	9	28	9	28	It would seem appropriate to give ranges for the absolute sea level rise, not just for the difference between the 1.5 and 2 degree worlds. There is a high risk of misunderstanding. [Andrea TILCHE, Belgium]	We have decided to in the SPM state an estimation of differential sea-level rise between1.5 and 2 degrees C of global warming by 2100, with a more elaborate discussions and absolute estimates of sea-level rise (with uncertainty ranges) provided in the underlying chapter text.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
29114	9	28	9	32	Contradiction: SPM says that there will be a difference of 0.1 m between a 1.5°C world compared to 2°C . Executive summary of chapter 3 (line 39-46 on page 3-9) states: "Current literature is insufficient to quantity the current difference in sea level between 1.5 °C and 2.0 °C worlds" and in Chapter 3 p.66 line 48 (3.3.12.3): "Available studies suggest that GMSL rise by 2100 will be ~0.1m greater in a 2ºC world than a 1.5ºC (Kopp et al., 2016; Nicholls et al.; Schleussner et al., 2015)." Please check and make sure this is consistent. Also, please revise the statement "may occur at 1.5°C or 2°C" - to be more specific or rephrase entirely. Lastly, “with long-term commitment to multi-metre-scale sea level rise” is neither stand-alone comprehensible nor meaningful. The mentioned reference (3.3.12.3.) names (inter alia) factors, which are related to, or consequences of, sea-level rise; insofar the abovementioned phrase should be complemented by the “with indirect effects on ecosystems and humans”. [Germany]	We have changed the ES to be consistent with the SPM in terms of indicating this differential level of sea-level rise, with clear indications in the ES to the supportive text in the Chapter that justifies this assessment being made.
29990	9	28	9	29	It would be useful to give the sea level increase under a global warming of 1.5 °C somewhere in the SPM. Should be around 0,3 m ? The AR5WG1 provided sea level rise of the different RCPs (not for given warming levels). [France]	We have decided to in the SPM state an estimation of differential sea-level rise between1.5 and 2 degrees C of global warming by 2100, with a more elaborate discussions and absolute estimates of sea-level rise (with uncertainty ranges) provided in the underlying chapter text.
38462	9	28	9	32	Missing confidence level [Linah Ababneh, United States of America]	This statement is made with medium confidence.
43764	9	28	9	32	• Available studies suggest that global mean sea level rise by 2100 will be ~0.1m greater in a 2ºC world compared to 1.5ºC [but there will be multimeter sea level rise at 2° C equilibrium and equilibrium warming is the only policy relevant horizon for sea level.] [Peter Carter, Canada]	This value refers to differential sea-level rise by 2100 at 1.5 degrees C vs 2 degrees C of global warming. Moreover, the FGD version of the SPM reflects the latest peer-reviewed literature, which indicate that the Greenland and/or Antarctic ice sheet instabilities may be triggered even if global warming is limited to 1.5°C by 2100, and that this could result in multi-metre rise in sea level on centennial to millennial time scales.
49320	9	28			This statement on sea level reflects the underlying section well. However, the ES of CH 03 sends a very different message. There is an issue with consistency. This also goes beyond the sea level assessment and generally the SPM summary more appropriately reflects the underlying sections of the report and the ES should be updated accordingly. [Bill Hare, Germany]	The Chapter text, ES and FGD version of the SPM have all been carefully revised to ensure consistency in the statements made.
49490	9	28	9	32	Following the commitment to sea-level rise, can the differences in sea-level at 2200 or 2300 be added to contrast the number in 2100? The multi-centential element is not coming through strong enough. [Sally Brown, United Kingdom (of Great Britain and Northern Ireland)]	Such more detailed estimates of sea-level rise b 2300 are beyond the scope of SR1.5 and left for further analysis in the SROCC and AR6.
52936	9	28	9	29	is there a range around 0.1m and confidence level? [Ireland]	This statement is made with medium confidence.
59094	9	28	9	32	The year 2100 is now only 82 years from present day (2018), well within many newborns life expectancy. It may be useful for policymakers to see what expected rates of SLR will be beyond 2100 (i.e., how much SLR by 2150 or 2200 for a 1.5 vs 2°C world (at 2100). [United States of America]	Such more detailed estimates of sea-level rise b 2300 are beyond the scope of SR1.5 and left for further analysis in the SROCC and AR6.
59096	9	28	9	32	This sentence needs reworking to incorporate the likelihood/confidence lexicon. Saying "suggest will" is not very helpful. The first sentence needs to also indicate what the projected rise is by 2100 and then also beyond. Just saying "multi-metre" later does not adequately make the point of how much rise is likely. So, the second sentence needs to explain what is meant by a threshhold – assuming this has to do with the potential collapse of a part of one of the ice sheets, leading to a relatively rapid rise (e.g., over a decade) of a metre or more, etc. The phrasing here just seems to be too obscure and cautious, not at all indicating the risk that exists. With the equilibrium sea level sensitivity based on the emergence from the last Glacial Maximum being of order 20 m per degree C change in global average temperature and the rate of warming up from about 1°C per 2000 years to 1°C per half century (so of order 40 times faster), the cautious statements here seem far too understated given the need to act very rapidly to keep global warming below 2°C (or even 3-4°C), much less keeping below 1.5°C. Another way to be talking about this is to give the rate of rise now and then indicate how greater warming will advance the date at which a given higher level will be reached (so, if the increase over the century is perhaps 1 meter, a tenth of a meter is equivalent to a decade), allowing even less time for adaptation. This tenth of a metre amount sounds quite small, due to most of the difference in warming occurring well into the century and not accounting for any possible collapse of parts of ice sheets. It should also be noted that overshoots, which are likely, will greatly increase the projected rate of rise. [United States of America]	The FGD version of the SPM reflects the latest peer-reviewed literature, which indicate that the Greenland and/or Antarctic ice sheet instabilities may be triggered even if global warming is limited to 1.5°C by 2100, and that this could result in multi-metre rise in sea level on centennial to millennial time scales. More detailed estimates of sea-level rise b 2300 are beyond the scope of SR1.5 and left for further analysis in the SROCC and AR6, and similarly so is a detailed analysis of the effects of overshoots.
150	9	29	9	3	See my comment on entire chapter. The WAIS threshold may trigger loss on a much shorter timescale than "multimillennial". Furthermore, the sentence is written as if thresholds only occur at half-integer values. Actually, such a threshold could be anywhere in between 1 and 2C and perhaps even slightly lower. [Michael Oppenheimer, United States of America]	The terms "centennial to millennial time scales" are used in the revised version of the SPM.
15510	9	29			Please use IPCC probability language here; not “may”. [Australia]	The updated version of Chapter 3 and FGD version of the SPM have been carefully revised to make use of formal IPCC language across all sections.
19454	9	29	9	3	Thresholds for irreversible, multi-millennial loss of the Greenland and West Antarctic ice sheets may occur at 1.5°C or 2°C global warming. Why are other irreversible specific impacts from temporary overshoot not listed in SPM? [Jennifer Morgan, Netherlands]	An analysis of these aspects are largely beyond the scope of SR1.5 and is designated for further analysis in the SROCC and AR6.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
29992	9	29	9	32	The message is good but the sentence quite unclear. would it be possible to formulate it with a more affirmative tone ? [France]	The text has been rewritten, and the FGD version of the SPM reflects the latest peer-reviewed literature, which indicate that the Greenland and/or Antarctic ice sheet instabilities may be triggered even if global warming is limited to 1.5°C by 2100, and that this could result in multi-metre rise in sea level on centennial to millennial time scales.
34358	9	29		3	This statement is not written in a way which would be useful to policymakers. The authors should assess what, if any, the impacts of crossing these thresholds is for sea level rise by 2100. And if the impacts discussed are for sea level projections beyond 2100, the authors should explain this. [Nathan Gillett, Canada]	The FGD version of SPM provides very specific statements of the differential impacts of sea-level rise at stabilisation at 1.5 vs 2 degrees C of warming, with these impacts evaluates specifically for 2100 under these stabilisation scenarios.
41464	9	29	9	29	Better: "loss of multi-millenial ice sheets" (not multi-millenial loss) [Maria Pia Carazo Ortiz, Germany]	Accepted, suggestion implemented.
44648	9	29	9	3	This is another extremely significant statement. Could the implication be spelled out if the threshold is just above 1.5 - e.g. in terms of timeframes for these events? [Penny Urquhart, South Africa]	The FGD version of the SPM reflects the latest peer-reviewed literature, which indicate that the Greenland and/or Antarctic ice sheet instabilities may be triggered even if global warming is limited to 1.5°C by 2100, and that this could result in multi-metre rise in sea level on centennial to millennial time scales.
52938	9	29	9	32	Can the information on key tipping points be more precise? [Ireland]	No, the value of these thresholds are not exactly known and are the topic of continued research. The FGD version of the SPM reflects the latest peer-reviewed literature, which indicate that the Greenland and/or Antarctic ice sheet instabilities may be triggered even if global warming is limited to 1.5°C by 2100, and that this could result in multi-metre rise in sea level on centennial to millennial time scales.
53350	9	29	9	29	delete "multi-millennial", since for GIS it could be on a time scale below millennia, so the word falsely characterizes the process [Kjell Kühne, Mexico]	The terms "centennial to millennial time scales" are used in the revised version of the SPM.
63054	9	29	9	3	Thresholds (...) may occur at 1.5°C or 2°C global warming: this is very unclear. Does it mean that there is no difference between 1.5 and 2°C (and even higher levels) wrt. thresholds? Please rewrite in a way that is as clear and easy to understand as possible. [Belgium]	The text has been rewritten, and the FGD version of the SPM reflects the latest peer-reviewed literature, which indicate that the Greenland and/or Antarctic ice sheet instabilities may be triggered even if global warming is limited to 1.5°C by 2100, and that this could result in multi-metre rise in sea level on centennial to millennial time scales.
29994	9	3	9	3	Could you replace "1.5°C or 2°C" by "1.5°C and 2°C" otherwise that suggests it's not true between 1.5 and 2. [France]	The text has been rewritten, and the FGD version of the SPM reflects the latest peer-reviewed literature, which indicate that the Greenland and/or Antarctic ice sheet instabilities may be triggered even if global warming is limited to 1.5°C by 2100, and that this could result in multi-metre rise in sea level on centennial to millennial time scales.
33794	9	3	9	32	Please consider to list the most pressing risks associated with multi-metre-scale sea level rise, rather than simply stating that the risk is higher at 2C than 1.5C, which is obvious in our view. [Norway]	Such a discussion is beyond the scope of the SPM of SR1.5.
33796	9	3	9	3	Please consider replacing "at 1.5°C or 2°C" with "between 1.5°C and 2°C". In light of the Paris ambitions, this wording highlights the possibility that the threshold lies between 1.5 and 2.0, and provides a very real and important example of why it actually matters to strive towards 1.5. [Norway]	The text has been rewritten, and the FGD version of the SPM reflects the latest peer-reviewed literature, which indicate that the Greenland and/or Antarctic ice sheet instabilities may be triggered even if global warming is limited to 1.5°C by 2100, and that this could result in multi-metre rise in sea level on centennial to millennial time scales.
51380	9	3	9	32	No reference found to multi-meter-scale sea level rise in 3.3.12.3. [Anand Patwardhan, United States of America]	The text has been rewritten, and the FGD version of the SPM (as well as the underlying chapter text) reflects the latest peer-reviewed literature, which indicate that the Greenland and/or Antarctic ice sheet instabilities may be triggered even if global warming is limited to 1.5°C by 2100, and that this could result in multi-metre rise in sea level on centennial to millennial time scales.
53348	9	3	9	3	thresholds….may occur should be "may be crossed" [Kjell Kühne, Mexico]	The text has been rewritten, and the FGD version of the SPM reflects the latest peer-reviewed literature, which indicate that the Greenland and/or Antarctic ice sheet instabilities may be triggered even if global warming is limited to 1.5°C by 2100, and that this could result in multi-metre rise in sea level on centennial to millennial time scales.
59098	9	3	9	3	The significance of "Thresholds for irreversible, multi-millennial loss of the Greenland and West Antarctic ice sheets" may not be obvious to a non-expert. Supply the relevance for sea level rise (if known, with appropriate uncertainty language and ranges). [United States of America]	The text has been rewritten, and the FGD version of the SPM reflects the latest peer-reviewed literature, which indicate that the Greenland and/or Antarctic ice sheet instabilities may be triggered even if global warming is limited to 1.5°C by 2100, and that this could result in multi-metre rise in sea level on centennial to millennial time scales.
15512	9	31	9	32	Please note the increased damage, disruption and repair costs for coastal properties and infrastructure [Australia]	Noted. This version of the SPM, however, deals specifically with the physical climate aspects of sea-level rise.
29392	9	31	9	31	commitment is meant to describe a lock-in, correct? Consider to use a different term, as commitment could be mistaken as a political commitment, not a "commitment" that comes along with inaction on mitigation. [Susanne Droege, Germany]	The text has been rewritten, and the FGD version of the SPM reflects the latest peer-reviewed literature, which indicate that the Greenland and/or Antarctic ice sheet instabilities may be triggered even if global warming is limited to 1.5°C by 2100, and that this could result in multi-metre rise in sea level on centennial to millennial time scales.
54254	9	31	9	32	It would be really useful to quantify the difference in the equilibrium sea leavel rise at 1.5 and 2 C. At the very least it appears that the risks for multi-metre sea level rise in the long term is much greater at 2C compared to 1.5C, and that should be reflectd in the text. [David Warrilow, United Kingdom (of Great Britain and Northern Ireland)]	Such an equilibrium analysis falls beyond the scope of the chapter.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
55378	9	31	9	32	This seems an extremelyt weak statement, given that SLR is strongly related to temperature, so higher temperature necessarily means higher SL means higher risk - not exactly a key novel finding. It would be good if this could be quantified in some way. [Andy Reisinger, New Zealand]	The text has been rewritten, and the FGD version of the SPM reflects the latest peer-reviewed literature, which indicate that the Greenland and/or Antarctic ice sheet instabilities may be triggered even if global warming is limited to 1.5°C by 2100, and that this could result in multi-metre rise in sea level on centennial to millennial time scales.
6090	9	34	9	36	This kind of statement, like many others, is pretty bland and almost common sense. However, it assumes there are no differences in socioeconomic development between the 1.5 and 2 deg C worlds. Hypothetically, a strong mitigation scenario involving rapid land use change to achieve 1.5 deg C could conceivably increase the impacts of climate described here, compared to a case of 2 deg C warming but no land use change. The ceteris paribus caveat is missing from many of these statements. [Timothy Carter, Finland]	The SPM text has been rewritten, and in the FGD version focused on differential impacts at 1.5 vs 2 degrees C of global warming. Specifically, it is stated that a reduction to global sea level rise of 0.1m at global warming of 1.5oC compared to 2oC implies 43 that approximately 10 million fewer people are expected to be exposed to related risks, based on a 2010 population estimate.
11298	9	34	9	36	Strengthen -More than 10 million additional people are at risk of flooding under 2°C of warming compared to 1.5°C (3.4.5.2.1). [United Kingdom (of Great Britain and Northern Ireland)]	The SPM text has been rewritten, and in the FGD version focused on differential impacts at 1.5 vs 2 degrees C of global warming. Specifically, it is stated that a reduction to global sea level rise of 0.1m at global warming of 1.5oC compared to 2oC implies 43 that approximately 10 million fewer people are expected to be exposed to related risks, based on a 2010 population estimate.
15514	9	34	9	36	This sits under section 2.5 Sea level rise, but similar considerations and flow on impacts also apply to other types of climate change impacts especially ocean warming. [Australia]	The SPM text has been rewritten, and in the FGD version focused on differential impacts at 1.5 vs 2 degrees C of global warming. Specifically, it is stated that a reduction to global sea level rise of 0.1m at global warming of 1.5oC compared to 2oC implies 43 that approximately 10 million fewer people are expected to be exposed to related risks, based on a 2010 population estimate.
18930	9	34	9	36	This bullet is vague and not substantiated with scientific findings, and it implies a link between in this case sea level rise and health, reduce coastal protection, loss of cultural identity,etc without scientific evidence. In addition, ultimately the impact will depend on adaptation action and copying capacity. The bullet is misleading referring only to risks. [Andrea TILCHE, Belgium]	The SPM text has been rewritten, and in the FGD version focused on differential impacts at 1.5 vs 2 degrees C of global warming. Specifically, it is stated that a reduction to global sea level rise of 0.1m at global warming of 1.5oC compared to 2oC implies 43 that approximately 10 million fewer people are expected to be exposed to related risks, based on a 2010 population estimate.
29394	9	34	9	34	hundreds of millions - could this be expressed with a range or with a term that refers to digits? [Susanne Droege, Germany]	The SPM text has been rewritten, and in the FGD version focused on differential impacts at 1.5 vs 2 degrees C of global warming. Specifically, it is stated that a reduction to global sea level rise of 0.1m at global warming of 1.5oC compared to 2oC implies 43 that approximately 10 million fewer people are expected to be exposed to related risks, based on a 2010 population estimate.
29630	9	34			Please, consider adding after 'coastal communities' -> "and cities" [Finland]	Rejected. We have chose to in the SPM refer the impacts of sea-level rise on populations in general, but in the underlying text we do discuss impacts on cities in particular.
31204	9	34	9	36	Please clearly specify at what point in time. [Japan]	The SPM text has been rewritten, and in the FGD version focused on differential impacts at 1.5 vs 2 degrees C of global warming. Specifically, it is stated that a reduction to global sea level rise of 0.1m at global warming of 1.5oC compared to 2oC implies 43 that approximately 10 million fewer people are expected to be exposed to related risks, based on a 2010 population estimate, and by 2100.
32240	9	34	9	35	Replace ‘eroding’ with ‘loss of’. [Jamaica]	This statement has been removed from the SPM.
33798	9	34	9	36	This statement is important. However, it is somewhat unclear on how much of these increased risks are caused by anthropogenic GHG emissions or by other anthropogenic causes such as unsustainable development of cities, ill-use of groundwater that results in e.g. subsidence etc., [Norway]	The SPM text has been rewritten, and in the FGD version focused on differential impacts at 1.5 vs 2 degrees C of global warming. Specifically, it is stated that a reduction to global sea level rise of 0.1m at global warming of 1.5oC compared to 2oC implies 43 that approximately 10 million fewer people are expected to be exposed to related risks, based on a 2010 population estimate, and by 2100.
36642	9	34	9	35	Replace ‘eroding’ with ‘loss of’. [Snaliah Mahal, Saint Lucia]	This statement has been removed from the SPM.
38464	9	34	9	36	Are Small Island States included in the coastal area examples, if so, I would specify that since it was specified 4 times in the Paris Agreement and climate change threat to of these states is in debate at th UN-Council. [Linah Ababneh, United States of America]	Impacts on the Small Island States are discussed in numerous places in the revised SPM, and the chapter contains a box that focused entirely on risks posed to the Small Island States.
40406	9	34			add problem climatic migrations [Jonathan Gómez Cantero, Spain]	Rejected. We have chosen to add some statistics on the number of people to be affected by sea-level rise in the SPM, but have left the complex discussion on migration to be discussed in the underlying Chapter. Statements are made in this regard with medium confidence, in the Chapter 3 text.
52940	9	34	9	34	The concept of eroding livelihoods is new, and its meaning may not fully conveyed here [Ireland]	This statement has been removed from the SPM.
59100	9	34	9	36	Something more definitive than this very obvious statement is needed. There will also be the loss of coastal land, inundations of low-lying islands and coastal regions, and so on. [United States of America]	The SPM text has been rewritten, and in the FGD version focused on differential impacts at 1.5 vs 2 degrees C of global warming. Specifically, it is stated that a reduction to global sea level rise of 0.1m at global warming of 1.5oC compared to 2oC implies 43 that approximately 10 million fewer people are expected to be exposed to related risks, based on a 2010 population estimate, and by 2100.
19222	9	35	9	35	delete /mangrove [Spain]	Noted - the text has been rewritten.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
29396	9	35	9	38	the first sentence compares impacts of 1.5 to 2 degrees, the second sentence is not a comparison, but a stand alone message? Or do you mean "still significant" as risks are also significant with 2 degrees? [Susanne Droege, Germany]	The SPM text has been rewritten, and in the FGD version focused on differential impacts at 1.5 vs 2 degrees C of global warming. Specifically, it is stated that a reduction to global sea level rise of 0.1m at global warming of 1.5oC compared to 2oC implies 43 that approximately 10 million fewer people are expected to be exposed to related risks, based on a 2010 population estimate.
43766	9	36	9	36	2.6 ...[Logically by extension however they apply to practically all populations in all regions by 2100 and all populations at equilibrium warming off to 2100] [Peter Carter, Canada]	The SPM text has been rewritten, and in the FGD version focused on differential impacts at 1.5 vs 2 degrees C of global warming. Specifically, it is stated that a reduction to global sea level rise of 0.1m at global warming of 1.5oC compared to 2oC implies 43 that approximately 10 million fewer people are expected to be exposed to related risks, based on a 2010 population estimate.
18932	9	37	9	44	Example of a general trend in the summary; language is timid when it comes to assessing the potential of ecosystem solutions for a location"can be more cost effective". Another example in page 31 last paragraph. [Andrea TILCHE, Belgium]	The SPM text has been rewritten, and in the FGD version focused on differential impacts at 1.5 vs 2 degrees C of global warming. Specifically, it is stated that a reduction to global sea level rise of 0.1m at global warming of 1.5oC compared to 2oC implies 43 that approximately 10 million fewer people are expected to be exposed to related risks, based on a 2010 population estimate.
11300	9	38	9	38	Change to "Impacts associated with sea level rise, coastal storm surges and resultant salinity changes…" [United Kingdom (of Great Britain and Northern Ireland)]	The SPM text has been rewritten, and in the FGD version focused on differential impacts at 1.5 vs 2 degrees C of global warming. Specifically, it is stated that a reduction to global sea level rise of 0.1m at global warming of 1.5oC compared to 2oC implies 43 that approximately 10 million fewer people are expected to be exposed to related risks, based on a 2010 population estimate.
11302	9	38	9	42	What is the 1.5 vs 2 degrees conext here? Seems to be a generic statement, not linked to 1.5 vs 2. [United Kingdom (of Great Britain and Northern Ireland)]	This statement has been rewritten and now specifically refers to differential impacts at 1.5 vs 2 degrees C.
59102	9	38	9	42	Is this statement specific to 1.5 or 2°C? If not, or there is insufficient literature to support the statement, please delete. [United States of America]	This statement has been rewritten and now specifically refers to differential impacts at 1.5 vs 2 degrees C.
59104	9	38	9	42	Given the rates of rise (with projected warming with overshoot being well above the 1.5 to 2°C rise discussed here), this seems much too understated a conclusion, with little consideration given to the inevitable amount of rise that is going to occur over the following centuries. [United States of America]	This is a statement that specifically compares impacts of sea-level rise at 1.5 vs 2 degrees C of global warming, consistent with the main mandate of SR1.5.
15516	9	39	9	42	None of the previous impact statements in section 2 refers to adaptation, so it seems strange to introduce an example here. Specific adaptation options are not addressed well in the SPM. It would be helpful to include a Box with adaptation options - CSIRO's Climate Adaptation Flagship produced a simple schematic based in the IPCC AR5 WG2 report. [Australia]	Noted. This statement has been rewritten towards its focus being largely on impacts and risks, and there is a separate section of the SPM that focused on adaptation options.
18934	9	39	9	42	Reference to specific adaptation options and their effectiveness would seem to belong to a different section of the SPM. [Andrea TILCHE, Belgium]	Noted. This statement has been rewritten towards its focus being largely on impacts and risks, and there is a separate section of the SPM that focused on adaptation options.
36822	9	39	9	39	The provision of examples to clarify "small islands". [CHI KEUNG TAM, Singapore]	Impacts on the Small Island States are discussed in numerous places in the revised SPM, and the chapter contains a box that focused entirely on risks posed to the Small Island States.
44650	9	39	9	42	Preserving or restoring natural coastal ecosystems is not just a question of greater cost-effectiveness, but also of multiple benefits, including for biodiversity, ecosystem functioning, greater amenity value, cultural values, etc. [Penny Urquhart, South Africa]	Noted. The revised SPM deals in more detail with impacts on ecosystems.
54204	9	39	9	42	I wouls suggest to change this last sentence by the one mentioned in the previous row of the sheet. It looks much less ambiguous than the current expression here. [Jordi Salat, Spain]	This statement has been rewritten and now specifically refers to differential impacts at 1.5 vs 2 degrees C.
3852	9	44	9	45	Melting is probably to specific is it still understandable at the summary level to state ice mass loss rahter than melting this is more generic and captures whether the loss is by other processes than melting (e.g. calving) [Roderik VAN DE WAL, Netherlands]	This comment is not applicable to the revised SPM text.
3854	9	46	9	46	unclear meaning guardrail [Roderik VAN DE WAL, Netherlands]	This comment is not applicable to the revised SPM text.
3856	1	1	1	1	not sure whether you can really back this up with literature [Roderik VAN DE WAL, Netherlands]	This comment relates to the opening sentence of 2.6 which relates to a wide range of impacts and is amply supported y references to numerous sections within the report.
3858	1	1	1	1	not sure whether you can really back up with literature that there is a significant difference between 1.5 and 2 it may well be that the long term commitment for these two scenarios is rather similar. It is doubtful whether there is a treshold between these two values. On top a multi meter commitment from Greenland??, that must be a flaw. [Roderik VAN DE WAL, Netherlands]	This comment relates to the first sentence of the 2.6 chapeau which does not mention Greenland specifically. Elsewhere in the SPM, text relating to Greenland instability has been substantially revised so that reference to a threshold temperature is now "around 1.5 and 2.0" rather than anything more specific.
3886	1	1	1	1	1.5 significantly reduced w.r.t. 2 [Roderik VAN DE WAL, Netherlands]	Unclear what this comment relates to - sea ice or ice sheets. If the former then this is true but not in the case of the latter. In both cases, wording substantially revised from FOD
3888	1	1	1	1	tresholds? [Roderik VAN DE WAL, Netherlands]	Editorial - copyedit to be completed prior to publication
3890	1	1	1	1	high rates multi-metre scale for Greenland? [Roderik VAN DE WAL, Netherlands]	SPM FGD clearer on size and timescales of sea level rise
5460	1	1	1	42	This section appears to only be refering to climate risks, and not risks of mitigation to arrive at a 1.5 world. Suggest adding "climate" before each appearance of risk in this section. [Haroon KHESHGI, United States of America]	Taken into account - text revised. For clarity, 'risk' is now defined in SPM1. Synergies and trade-offs of mitigation and adaptation options are now discussed in section D.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
6092	1	1	1	7	So, are no impacts positive? This should probbably state that aggregate risks (however these are measured!) are greater, but there are also cases of reduced risk (i.e. opportunity). [Timothy Carter, Finland]	Taken into account - text revised. The particular text has been revised in terms of increasing impacts at higher warming levels.
9478	1	1	1	3	'The risks to human societies through impacts on health, livelihood, food, and water security, human security, and infrastructure are higher with 1.5°C global warming compared to today, and higher still with 2°C global warming compared to 1.5°C.' Is it somewhere or everywhere? What about severity and spatial scale? [Russian Federation]	This is the first sentence of the HS 2.6, no question attached.
10654	1	1	1	8	The numbers put in for line of sight are very confusing and run into each other. [Chandni Singh, Myanmar]	Editorial - copyedit to be completed prior to publication
18936	1	1	1	46	In all examples try to be more quantative where possible- how much 'safer' is 1.5 compared to 2 degrees? [Andrea TILCHE, Belgium]	Taken into account - text revised. The text has been revised. A shorter headline statement focuses on the impact and shorter sub bullets provide additional details where possible.
29116	1	1	1	7	The headline statement does not send a very clear message about climate risk for human systems. It seems obvious that environmental risk hits those dependent on natural resources and those without the capacity to adapt hardest. By highlighting all groups that are hardest hit as the poor, marginal and vulnerable, this section may unintendedly create the impression that climate change impacts hit ONLY the poor and marginalized, so that a large part of the more wealthy world doesn't have anything to worry about, at least not at 1.5 or 2C. If this is the message the authors want to convey based on the literature, it should be made explicit. However if impacts are expected to occur across strata and also hit the economy, e.g. via higher costs for health systems and damages to infrastructure, then this should be stated first and more clearly. We would also suggest to reformulate "these risks are amplified for ..." instead of "these risks are greatest", as such a formulation would express more clearly that risks are not limited to vulnerable groups. [Germany]	Taken into account - text revised. The text has been revised. A shorter bullet statement focuses on the impact and shorter sub bullets provide additional details where possible.
29582	1	1	1	7	In this and many other boxes explain how climate/impacts develop/worsen from today to 1.5 and 2 degree situations. Is there a possibility to come up with a verbal shortcut (like climate warming) instead of every time listing the different stages/degrees? This makes the text long. Naturally the benefit is clarity. It is important that the readers understand that the focus is on the analysis on the difference on 1.5 and 2 degree warming. In section 4, reference is made to 2C and 1.5C scenarios, which seems to work OK. [Finland]	Rejected. The comparisons are retained to ensure clarity.
30000	1	1	1	7	The figure of 100 M people projected to go into poverty through impacts of agriculture and food prices (lines 21 and 22 of this page) should be highlighted here. [France]	Taken into account. The text has been removed. A more detailed discussion is provided in Section 3.4.10 of the full report.
33800	1	1	1	46	Highlighted box 2.6 and 2.7: The two highlighted statements appear to contain same level statements, but the wording in 2.7. is more general. Please consider to make sure the two fulfill rather than overlap. [Norway]	Taken into account - text revised. Headline statements have changed, they are now under Section B
52942	1	1	1	7	This statement could be more specific on the incremental differences [Ireland]	Taken into account - text revised. The text has been revised. A shorter headline statement focuses on the impact and shorter sub bullets provide additional details where possible.
59106	1	1	1	7	This sentence is a very good example of where 1.5°C is emphasized even though 2°C is included as well. However, what seems to be missing is ENERGY in the first line. All of the items in the list are certainly critical, but omission of energy is not really good. Certainly societies must address security in food, energy, water as well as the health, livelihoods, and security. [United States of America]	Accepted - text revised. Energy will be added to the text, thank you for pointing this out.
59108	1	1	1	41	It would be helpful to have more discussion of absolute risks at 1.5°C. [United States of America]	Taken into account - text revised. The text has been revised. A shorter headline statement focuses on the impact and shorter sub bullets provide additional details where possible.
57794	1	1	1	41	Throughout the document, the authors employ the term "risk" as a close synonym for costs and threats. However, the plain English meaning of "risk" relates much more to uncertainty than it does to costs. SPM boxed statement 2.6 is an example of this misleading framing. The ISO standard 3100, section 2.1, documents the strong correspondence between the meaning of risk and the meaning of uncertainty. See https://www.iso.org/obp/ui/#iso:std:iso:31000:ed-1:v1:en As a result policy makers and others hear "uncertainty" when the authors employ the term "risk." Explicating an alternative definition for risk does not solve this problem. The terms "threat" and "cost" are more appropriate plain English terms, particulalry in an SPM. The use of the term "risk" is innapropriate in this context. [Hunter Cutting, United States of America]	Taken into account. Box SPM 1 covers definitions used throughout the SPM including the term 'risk'.
29996	1	4	1	4	« Multiple forms of poverty » Unclear/confusing - not sure if that means that risk increases with the combination of these factors or if it encompasses various forms of poverty and inequality - defining them would be useful [France]	Taken into account - text revised. Text will be revised for clarity indicating that people facing poverty and inequality are at greater risk.
11304	1	5	1	5	Change to "people in coastal communities and on flood plains…" [United Kingdom (of Great Britain and Northern Ireland)]	Taken into account - text revised. Text will be revised for clarity
29998	1	5	1	5	Could you precise "those dependent on agriculture for their livelihoods" to make it clearer ? [France]	Taken into account - text revised. Text will be revised for clarity, this refers to those whose income is mostly or highly dependent upon agriculture
50404	1	5	1	5	Write: " …people in coastal and mountain communities …" (cf. Chp 3 and 5). [Switzerland]	Taken into account - text revised. Text will be revised for clarity
62934	1	5	1	6	Box 2.6 should include those dependent on fisheries and tourism. Many coastal communities are dependent on these two economic sectors. This is especially the case for SIDS [Michelle Mycoo, Trinidad and Tobago]	Taken into account - text revised. The text has been revised. A shorter headline statement focuses on the impact and shorter sub bullets provide details where possible.
40874	1	6	1	6	and added adoptation cost to small and marginal farmers [NARESH KUMAR SOORA, India]	Taken into account - text revised. Second headline statement rewritten to focus on adaptation.
58642	1	6	1	6	Clarify that this includes communities displaced for other reasons than just climate change. [New Zealand]	Taken into account - text revised. The phrase has been deleted.

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11306	1	9	1	41	Additional impact - Global GDP loss due to heat stress ranges between 2.4 and 6%; GDP loss is 0.3% higher under 2°C of warming compared to 1.5°C (3.4.7.3) [United Kingdom (of Great Britain and Northern Ireland)]	Rejected. Projected GDP loss associated with higher ambient temperatures is highly uncertain. Modeling assumptions limit confidence to the extent it was decided to not include in the SPM.
11308	1	9	1	41	Additional impact - Migration flows may increase by 1.9% with a 1°C warming from the present day (3.4.10.2). [United Kingdom (of Great Britain and Northern Ireland)]	Rejected. Climate is one of many drivers of migration. High uncertainty with how those drivers could change with climate and development limit confidence to the extent it was decided to not include in the SPM.
17180	1	9	1	41	Direct impact of heat on mortality can be included somewhere around here. [Yasushi Honda, Japan]	Taken into account - text revised. A bullet point has been added discussing impacts on health & mortality.
17786	1	9	1	41	We suggest to combine the 2.6 and 2.7 section with the topic of human society and risk. bullets of two sections would be summarized as the compact sentence. [Republic of Korea]	Taken into account - text revised. The headline statements have changed and are now under Section B.
18938	1	9	1	15	Naturally, the rich will always be better placed to buy their way out of a problem, but the question is whether the rich will remain rich. A reflection/analysis on the vulnerability of "developed" coutries due to the higher complexity of their society and its vulnerability to critical pieces of infrastructure is lacking. [Andrea TILCHE, Belgium]	Not Applicable - no longer included in the chapter. Comment misplaced?
33802	1	9	1	22	Please consider to include critical infrastructure and remote communities (in addition to indigenous) to these bullet points. [Norway]	Taken into account - text revised. Text will be revised for clarity
35456	1	9	1	12	Consider adding more categories of disadvantaged people who would be affected such as urban poor, landless, destitute and other poor in developing countries. [Ashok Sreenivas, India]	Taken into account - text revised. Text will be revised for clarity
44652	1	9	1	15	A more nuanced disaggregation of 'disadvantaged' and 'vulnerable' might be more accurate. Not all disadvantaged people are vulnerable, and not all vulnerable people are disadvantaged - e.g. many people in ocastal communities are vulnerable, even the rich, as has been seen in recent events in the Caribbean and US. This nuance could be brought in in several places throughout the report, supported by emerging evidence. [Penny Urquhart, South Africa]	Taken into account - text revised. Text will be revised for clarity. IS THIS IN CH. 5?
45886	1	9	1	1	It would help the reader if you can clarify how you define and who you refer to with vulnerable, disadvantaged and indigenous populations. [Deger Saygin, Turkey]	Taken into account - text revised. The bullet has been rewritten with specific groupings now referenced.
59110	1	9	1	11	This seems far too limited a set of peoples who will be facing significant consequences. For example, there are many who will be facing the increasing intensity of tropical cyclones, those facing aridification (i.e., the proper term for those facing lower and lower precipitation levels – such conditions are not "drought" as drought implies there is an expectation of a return to previous levels and this is not the situation at the poleward edge of the subtropics) and associated increases in wildfires, and so on. What seems to be the problem with the sentence is that it does not make clear what the baseline adverse impacts that the typical person will be facing and so there is not a suitable context for having this sentence of what disproportionately greater means. [United States of America]	Accepted. The statement will be edited to better represent the intentions of the paragraph, namely (i) to suggest that there are multiple vulnerable populations and regions (ii) to acknowledge that everyone is at risk to some degree from the changes in weather patterns associated with climate change, and (iii) to suggest that some populations and regions are projected to experience greater risks.
82	1	1	1	1	Typo: "indigenous people" should read "indigenous peoples". [Guillermo Montt, Switzerland]	Editorial - copyedit to be completed prior to publication
10656	1	1	1	12	Further cross-linking to be done with cross chapter box on adaptation which talks of Arctic, SIDs, Amazon etc. It discusses impacts, adaptation measures and SD implications for each ecosystem case. [Chandni Singh, Myanmar]	Taken into account - text revised. Text revised and line of sight references added to cross chapter boxes to support cross linkages
15518	1	1	1	1	Indigeneous people and systems': what is an indigenous system? [Australia]	Taken into account - text revised. Text will be revised for clarity
32908	1	1	1	1	Change "indigenous people" to "indigenous peoples". [Thomas Damassa, United States of America]	Editorial - copyedit to be completed prior to publication
50406	1	1	1	1	Write: " …in the Arctic, mountain, agriculture- and …". [Switzerland]	Editorial - copyedit to be completed prior to publication
54256	1	1	1	1	what does "systems" mean here? [David Warrilow, United Kingdom (of Great Britain and Northern Ireland)]	Editorial - copyedit to be completed prior to publication
59112	1	1	1	1	Consider highlighting that rain-fed agriculture is a particularly vulnerable system because of the absence of irrigation to supplement crop production. [United States of America]	Taken into account - text revised. Text will be revised for clarity
15520	1	11	1	12	More severe than what, given that the previous sentence referred to 1.5 C warming? Do you mean more severe for 2 C? Evidence and agreement metrics are not used elsewhere, so combine into a confidence rating [Australia]	Not Applicable - no longer included in the chapter. Statement deleted.
18940	1	11	26	1	SPM P10L11 and P26L9-10 points to SIDS (among others) as particularly impacted by 1.5° of warming. But SIDS as a group is a political construct, not a scientific category. This particular vulnerability is presumably about islands in general, not SIDS in particular. [Andrea TILCHE, Belgium]	Taken into account - text revised. The SPM has been substantially rewritten. Where terminology such as small islands and coastal, low lying etc. is more appropriate it has been changed. Instances where the statement is premised on literature specifically referencing SIDS it has been retained.
30002	1	11	1	12	« More severe impacts are expected where global temperature exceeds 1.5°C » This sentence is quite unclear, although it is essential to say that local variations can be higher than global temperature rise. This message could be written in SPM Box 1 as well. [France]	Not Applicable - no longer included in the chapter. Statement deleted.
38944	1	11	1	12	Unclear what "where" points to when you talk about global tempereratures. [Jan Fuglestvedt, Norway]	Editorial - copyedit to be completed prior to publication
19224	1	12	1	12	substitute if for where… or local for global [Spain]	Editorial - copyedit to be completed prior to publication
41662	1	12			Change "where" to "when"? [Czech Republic]	Editorial - copyedit to be completed prior to publication
59114	1	12	1	12	where regional temperature exceeds'? Otherwise, say 'when' instead of 'where'. [United States of America]	Editorial - copyedit to be completed prior to publication
6880	1	13	1	13	Lack of clarity. The following wording is suggested: … Limits to adaptation and associated losses exist at a global warming of 1.5oC as well as at a global warming of 2oC, with …. [Klaus Radunsky, Austria]	Taken into account - text revised. Related text now speaks to global warming levels.
32214	1	13	1	13	Need to change the example provided to "all islands". This change is supported by Figure SPM 3 and 5.2.2 on page 14, line 51-53, which included Caribbean and Pacific islands. [Jamaica]	Taken into account - text revised. All islands will be included

Comment No	From Page	From Line	To Page	To Line	Comment	Response
36616	1	13	1	13	Need to change the example provided to "all islands". This change is supported by Figure SPM 3 and 5.2.2 on page 14, line 51-53, which included Caribbean and Pacific islands. [Snaliah Mahal, Saint Lucia]	Taken into account - text revised. All islands will be included
59116	1	13	1	15	The relationship between limits to adaptation and the potential for losses is a multidimensional problem that ultimately cannot be disentangled from questions of future governance and development. Simple, high level statements are not sufficient for capturing this complicated relationship and should be avoided. The authors should instead focus on making specific statements regarding sectors or regions that may be affected by higher levels of warming. For example, more information is needed as to why the Pacific Small Island Developing States are chosen as an example of place-specific implications that is specific to 1.5°C of warming. [United States of America]	Taken into account - text revised. The text has been revised. A shorter headline statement is provided with bullets providing detail.
18942	1	14	1	15	Please remove reference to SIDS. Other things being equal, impacts would affect equally "Low Lying Islands, Coasts and Communities". SIDS is a political denomination, not useful in this context. [Andrea TILCHE, Belgium]	Accepted. The particular reference to SIDS has been deleted.
32154	1	14	1	14	Caribbean and Indian Ocean islands should also be included here [Jamaica]	Accepted - text revised. All islands will be included
36602	1	14	1	14	Caribbean and Indian Ocean islands should also be included here [Snaliah Mahal, Saint Lucia]	Accepted - text revised. All islands will be included
38482	1	14	1	14	Caribbean and Indian Ocean islands should also be included here [Grenada]	Accepted - text revised. All islands will be included
30004	1	15	1	15	What about 5.2.4 ? [France]	No longer applicable - draft revised
18944	1	17	1	22	The evidence for this bullet is very limited, and agreement is only medium. Suggest not including such weak conclusions in the SPM. [Andrea TILCHE, Belgium]	Not Applicable - no longer included in the chapter. The section has been deleted.
30008	1	17	1	22	Make it clear that there are two distinct points: 1/today's poorest are most at risk form climate impact ; 2/the multiplication of these impact will drive an additional 100 million into poverty. [France]	Not Applicable - no longer included in the chapter. The section has been deleted.
36918	1	17	1	22	Does "the impacts of 1.5°C global warming" put only focus on climate impacts in this sentence? Mitigation actions to meet 1.5°C target include BECCS and afforestation, which also lead to food price increase. [Keigo Akimoto, Japan]	Not Applicable - no longer included in the chapter. The section has been deleted.
37248	1	17	1	22	This is very general descriptive information. It would be more useful to a general reader if the report more quantitative information of these impacts - how much might food prices rise by, what % increase in people suffering food insecurity, what % income losses (and when and where). [Jonathan Grant, United Kingdom (of Great Britain and Northern Ireland)]	Not Applicable - no longer included in the chapter. The section has been deleted.
40750	1	17	1	17	Inclusion. Current wording implys only the poorest will experience impacts: Suggest rewording: " Globally, the poorest people in particular are projected to …" [Liese Coulter, Australia]	Not Applicable - no longer included in the chapter. The section has been deleted.
43768	1	17	19	22	• Globally, the poorest people are projected to experience the impacts of 1.5°C global warming predominantly through increased food prices, food insecurity and hunger, income losses, lost livelihood opportunities, adverse health impacts and population displacements. [Increased food prices at above 1.5°C will affect all populations (see IPCC AR5 food security)] [Peter Carter, Canada]	Accepted - these aspects are now reflected in new section B5.
51350	1	17	1	22	This paragraph seems to conflate the impacts of climate change with the impacts of mitigation measures. For example, under many stringent mitigation scenarios, food prices are expected to increase. [Anand Patwardhan, United States of America]	Not Applicable - no longer included in the chapter. The section has been deleted.
59118	1	17	1	22	It is surprising not to see a reference here and in the underlying sections of Chapters 3 and 5 to the dependence of the poor on natural resources and ecosystems, many of which are at risk from climate impacts as described in Chapter 3 itself, as an additional contributing factor. There is ample documentation of this dependence in the literature, both peer-reviewed and grey. [United States of America]	Not Applicable - no longer included in the chapter. The section has been deleted.
30006	1	18	1	18	increased food prices. This is only true if you take the 'no carbon fertilization effect scenario" into account. with the opposite scenario there is a decrease in food prices. the conclusion -underlined in the AR5 - is that future evolution is uncertain. Note also that there is a weak agreement among economic models concerning prices change in the future. here you refer to a specific scenario. [France]	Not Applicable - no longer included in the chapter. The section has been deleted.
83	1	21	1	22	Please specify what temperature scenario and what time frame applies to the notion of "100 million people entering poverty" (6-degree scenario? 2-degree scenario? By 2030 or 2050 or 2100?) [Guillermo Montt, Switzerland]	Not Applicable - no longer included in the chapter. The section has been deleted.
3860	1	21	1	22	reads odd that something can not be a safe option but there is no evidence please rephrase [Roderik VAN DE WAL, Netherlands]	Not Applicable - no longer included in the chapter. The section has been deleted.
11310	1	21	1	21	100 million people additional to what baseline? And by when? Is this for 1.5 of warming? What about 2 degrees and the comparison with 1.5? [United Kingdom (of Great Britain and Northern Ireland)]	Not Applicable - no longer included in the chapter. The section has been deleted.
31206	1	21	1	22	The expression "over 100 million people projected to go into poverty" might be too sensational given that only "limited evidence" is provided. Please additionally indicate the level of confidence. [Japan]	Not Applicable - no longer included in the chapter. The section has been deleted.
34360	1	21		22	Over time the number of people in poverty is on average reduced through development. Is the 100m people projected to go into poverty as a result of climate change an absolute increase in the number of people in poverty, or a smaller reduction in the number of people in poverty compared to a world with no climate change? [Nathan Gillett, Canada]	Taken into account - text revised. The text has been removed. A more detailed discussion is provided in Section 3.4.10 of the full report.
45070	1	21	1	21	over 300 million is correct [Iman Babaeian, Iran]	Not Applicable - no longer included in the chapter. The section has been deleted.
15522	1	22	1	22	Evidence and agreement metrics not used elsewhere, suggest combine into a confidence rating. [Australia]	Not Applicable - no longer included in the chapter. The section has been deleted.
29118	1	22	1	22	Please add chapter 3.4.6. as source of information, since problems of food security are explained there in detail. [Germany]	Not Applicable - no longer included in the chapter. The section has been deleted.

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36290	1	22	1	22	Add - Cost of adaptation will further marginalize the small and marginal farmers in tropics [India]	Not Applicable - no longer included in the chapter. The section has been deleted.
40876	1	22	1	22	cost of adaptation will further marginalize the small and marginal farmers in tropics [NARESH KUMAR SOORA, India]	Not Applicable - no longer included in the chapter. The section has been deleted.
15524	1	24	1	29	Suggest address about heat/cold-related mortality. [Australia]	Taken into account - text revised. The bullet point has been rewritten.
18946	1	24	1	29	Very confused sentence. It is suggested to re-draft it with shorter and more direct sentences. [Andrea TILCHE, Belgium]	Taken into account - text revised. The bullet point has been rewritten.
32800	1	24	1	29	The evidence for a temperature component in the transmission of insect-borne diseases such as malaria and dengue is extremely equivocal. Many developing countries see repeated reference to this largely discredited hypothesis as yet another example of the worst kind of colonial imperialism - "So you fixed your problem, but won't allow us to fix ours" It helps to remember that the WHO only declared the Netherlands free of malaria in 1970, while in the 1920s there were 30,000 cases and 10,000 deaths due to falciparum infection (the most deadly malaria parasite) in Archangel, close to the Arctic Circle. I would strongly recommend removing this entire passage from the SPM and equivalent deletions elsewhere in the report. [Philip Lloyd, South Africa]	Taken into account - text revised. The section has not been removed but the bullet point has been rewritten.
36292	1	24	1	29	It would be desirable to rewrite this paragraph to inidicate for which diseases transmission is likely to increase and for which it is likely to decrease. Obviously in terms of health risks, the former is a cause for concern - not the latter. [India]	Rejected. Space constraints do not allow for the additions requested. The bullet point has however been rewritten and the supporting sections in the full report provided.
51352	1	24	1	29	It would be desirable to rewrite this paragraph to inidicate for which diseases transmission is likely to increase and for which it is likely to decrease. Obviously in terms of health risks, the former is a cause for concern - not the latter. [Anand Patwardhan, United States of America]	Rejected. Space constraints do not allow for the additions requested. The bullet point has however been rewritten and the supporting sections in the full report provided.
51382	1	24	1	29	It appears that the information in this bullet point should be attributed to 3.4.7.3 rather than 3.4.7.2 [Anand Patwardhan, United States of America]	Taken into account - text revised. The bullet point has been rewritten.
52696	1	24	1	24	Point on warming of 2 degrees posing higher risk than 1.5 degree: could be made more clear and also this could move to the list of the key messages on page 3. The arument before the publication of the report here was that the difference of warming between 1.5 and 2 degree and its impact may not be discernable. This finding of the report in this and subsequent paragraphs show clearly that it is discernable. [Iulain Florin VLADU, Germany]	Taken into account - text revised. The SPM has been substantially revised.
59120	1	24	1	29	Text unclear. What is "very likely"? What does "complex regional patterns" mean? [United States of America]	Taken into account - text revised. The bullet point has been rewritten.
59122	1	24	1	29	Reverse to make 1.5°C the main emphasis. [United States of America]	Taken into account - text revised. The bullet point has been rewritten.
59124	1	25	1	25	Unless there is going to be an explanation, the "with a few exceptions" seems very out of place (even mysterious) so delete it. Saying "decreases" on line 26 just does not seem enough of a justification for the phrase, and even if for one or another disease in one or another place, is the phrase intending the overall risk from all diseases would be less? Unless overall risk in some regions is dropping, the phrase does not seem justified. [United States of America]	Accepted - text revised. The bullet point has been rewritten.
32610	1	26	1	27	gives examples of diseases whose transmission is affected but does not say which ones increase and which decrease [Jonathan Lynn, Switzerland]	Taken into account - text revised. The bullet point has been rewritten.
40560	1	26	1	26	Correct is "projected increases and decreases", not "increases and decreases projected". [Sergio Henrique Faria, Spain]	Taken into account - text revised. The bullet point has been rewritten.
29120	1	3	1	3	Please add this sentence to SPM 2.6, as an extra bullet, coming from chapter 3, page 35, line 33-38 (see also 3-121, line 47-50): "Another study for key European cities shows that stabilising climate at 1.5°C would decrease extreme temperature-related mortality by 15-22% per summer compared with stabilisation at 2°C, assuming no adaptation and constant vulnerability." [Germany]	Rejected. Space constraints do not allow for the additions requested. The bullet point has however been rewritten and the supporting sections in the full report provided.
29122	1	3	1	3	Please insert an additional para on specific risks on urban areas as described in chapter 3.4.8 and in the Executive Summary, page 12, line 7-13. [Germany]	Rejected. Space constraints do not allow for the addition requested. However the SPM has been substantially revised.
15526	1	31	1	33	Many other regions will experience water stress, e.g. southern Australia, so why focus on the Med? [Australia]	Taken into account - text revised. The text has been revised to speak to the proportion of the world's population subject to water scarcity.
15528	1	31	1	33	It is not clear what is meant by "reduces stress on water resources by 50%." and the cited sections of Chapter 3 did not support this statement. It is also not clear that the stress is reduced by the greatest amount in the Mediterranean region, based on the evidence provided in Chapter 3. [Australia]	Accepted. The bullet point has been rewritten.
15530	1	31		33	Why is the mediteranean alone singled out? e.g. it is surprising that Australia is left out of the regions projected to be under increased 'water stress', given a) the significant rainfall reductions that have already occurred in SW Western Australia and are expected in future, 2) the already water restricted and highly variable nature of the Australian climate and 3) the projections in 'Climate change in Australia' (https://www.climatechangeinaustralia.gov.au/en/) that suggest increasing evaporation and reduced rainfall in southern Australia, along with increased incidence of drought. [Australia]	These are just examples and are not intended to represent an exhaustive list. Further details can be found in the referenced sections.
19462	1	31	1	33	“Constraining global warming to 1.5°C compared to 2°C reduces stress on global water resources by an estimated 50% (relative to 1980-2009), with reduced stress particularly in the Mediterranean region {3.4.10.2, 3.5.5.5, Box 3.2}” How much higher is the stress on global water resources in temporary overshoot 1.5C scenarios vis-a-vis non-overshoot 1.5C scenarios? How much irreversible damage in water resources can we expected from temporary temperature overshoot? [Jennifer Morgan, Netherlands]	Taken into account - text revised. The bullet point has been rewritten. Text provided based on literature available at time of writing.
21618	1	31	1	33	Confusing. What is relative to 1980-2009? "… reduces the increased stress…"? [Sweden]	Accepted. The bullet point has been rewritten.

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29124	1	31	1	33	The statement "Constraining global warming to 1.5°C compared to 2°C reduces stress on global water resources by an estimated 50% (relative to 1980-2009)" is not well substantiated in the underlying chapter, as it can only be found in Ex. Summary (line 31-32, p. 10) and in FAQ (line4-5, p. 190) but not in 3.4.10.2, 3.5.5.5 or in Box 3.2. [Germany]	Accepted. The bullet point has been rewritten.
30010	1	31	1	33	None of the references cited supports the information that "Constraining global warming to 1.5°C comapred to 2°C reduces stress on global water resources by an estimated 50% (relative to 1980-2009). In fact, we don't find any reference to that information in the report except in Chapter 3 in the Executive Summary and FAQ, in which its reference isn't cited either. Where does this figure come from ? [France]	Accepted. The bullet point has been rewritten.
30012	1	31	1	33	Maybe you could also cite {3.4.2.1} ? Box 3.2. doesn't directly deal with water stress. [France]	Accepted. The bullet point has been rewritten.
30014	1	31	1	33	The point of comparison for the 50% is unclear: is it the historical period 1980-2009, or the stress on global water resources that would occur (when?) under a 2°C scenario? [France]	Accepted. The bullet point has been rewritten.
36294	1	31	1	33	Is the 50% reduction figure actually global or for the Mediterranean? Line of sight to source material in chapter not clear. [India]	Accepted. The bullet point has been rewritten.
43770	1	31	1	33	• Constraining global warming to 1.5°C compared to 2°C reduces stress on global water resources by an estimated 50% (relative to 1980-2009) [though there is increased water stress at 1.5°C], [Peter Carter, Canada]	Accepted. The bullet point has been rewritten.
51354	1	31	1	33	Is the 50% reduction figure actually global or for the Mediterranean? Line of sight to source material in chapter not clear. [Anand Patwardhan, United States of America]	Accepted. The bullet point has been rewritten.
53208	1	31	1	33	I would propose to rewritte the sentence. It seems that an increase of 1,5ºC would be positive ("reduces stress") and that water stress won't be important in the Mediterranean Region ("reduced stress") [Maria-Carmen Llasat, Spain]	Accepted. The bullet point has been rewritten.
59126	1	31	1	33	Need confidence statement associated with this statement. [United States of America]	Accepted. The bullet point has been rewritten.
59128	1	31	1	33	The statement needs context with respect to current levels of effect. And is percentage the right way to be comparing relative stress? Small changes in already dry regions can be a large percentage but amounts of change in available moisture can be of much more impactful on water resources and activities in a region. If there is going to be mention of a specific region, more explanation and justification is needed. The whole subtropics are expanding and will have serious impacts around the world. [United States of America]	Accepted. The bullet point has been rewritten.
63056	1	31	1	33	This statement is very relevant, therefore it is one that should probably stay while some others needs to be deleted to shorten the text. [Belgium]	Taken into account - text revised. The relevant idea is captured in a rewritten bullet point.
41294	1	32	1	32	This sentence is too exact. Please provide an uncertainty range for "an estimated 50%". [Michio Kawamiya, Japan]	Accepted. The bullet point has been rewritten.
30016	1	33	1	33	{3.4.10.2} This chapter of the report covers conflicts and population displacements/migrations, some due to a change in water resources availability - but not focused on mediterranean region. - not right reference [France]	Accepted
45072	1	33	1	33	add "and Middle east North Africa" after "Mediterranean" [Iman Babaeian, Iran]	Accepted. The bullet point has been rewritten.
11312	1	35	1	38	Strengthen -The global undernourished population is 10-40 million people higher under 2°C compared to 1.5°C. [United Kingdom (of Great Britain and Northern Ireland)]	Rejected. Some specific examples are included in the full report but due to space limitations not included in the SPM.
11314	1	35	1	38	Risk to crop production is reduced by how much when global warming is limited to 1.5 compared to 2? 'The additional risk for food production and extreme poverty compared to year X (2018?) with 1.5 degrees of global warming'? [United Kingdom (of Great Britain and Northern Ireland)]	Noted. Some specific examples are included in the full report but due to space limitations not included in the SPM.
19226	1	35	1	38	change the order and rewrite these two sentences: the risk is high with 1.5ºC and worse with 2ºC [Spain]	Accepted. The bullet point has been rewritten.
29126	1	35	1	38	Please add these sentences to SPM 2.6, bullet 5 from chapter 3, page 151, line 42-46: "Projections of risks for major cereals reveal that yields of maize and wheat begin to decline with 1° to 2°C of local warming in the tropics." [Germany]	Rejected. Some specific examples are included in the full report but due to space limitations not included in the SPM.
30018	1	35	1	38	If available, illustrate with numbers, especially for major crops (rice, wheat, maize) : yields in a 1.5°C global warming compared to yields in a 2°C global warming, in the most impacted regions, for ex. [France]	Noted. Some specific examples are included in the full report but due to space limitations not included in the SPM.
37252	1	35	1	38	This paragraph would be more useful if it could describe the scale of impacts on agriculture in more quantitative and financial terms and give regional and temporal detail. This would help to illustrate the severity of the issue as it is not clear whether agricultural commodity prices might rise by 10% or 200% or if availability of crops (e.g. particular crops in particular regions) may be affected in certain timeframes. [Jonathan Grant, United Kingdom (of Great Britain and Northern Ireland)]	Noted. Some specific examples are included in the full report but due to space limitations not included in the SPM.
38466	1	35	1	38	I would invert the paragraph to start with " The risk for food production and extreme poverty is significant in the Middle-East, Sub-Saharan Africa, south East Asia and Central and South America with 1.5C global warming but is reduced when global warming is limited to 1.5C compared to 2C.' Just a suggestion. [Linah Ababneh, United States of America]	Accepted. The bullet point has been rewritten.
49400	1	35	1	38	Consider to swap around two sentences in the paragraph (with corresponding amenments). [Alexander Chernokulsky, Russian Federation]	Accepted. The bullet point has been rewritten.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
43772	1	35	1	39	•Risk to crop production in the Middle-East, Sub-Saharan Africa, South East Asia, and Central and South America, is reduced when global warming is limited to 1.5o 36 C compared to 2°C. The risk for food production and extreme poverty is significant in these regions with 1.5°C global warming.[Crop yields from the world's top food producing regions in the northern hemisphere are vulnerable to surface warming of 1.5°C with associated increased extreme weather (IPCC AR5, WG.2, Ch.7 and Zhao et al., 2017 and 'Crop yields have a large negative sensitivity to temperatures around 30° see throughout the growing season high confidence' IPCC AR5 WG2 TS). Global temperature increases at 1°C or 2°C above preindustrial levels, combined with increasing food demand, would pose large risks to food security globally and regionally (report Ch.3)]. Risk to crop production in the Middle-East, Sub-Saharan Africa, South East Asia, and Central and South America, is reduced when global warming is limited to 1.5oC compared to 2°C °,[but high at 1.5°C . 'For South East Asia a 2°C warming by 2040 will result in one third decline in per capita crop production Nelson et al., 2010 associated with a general crop yield decreases' (report Ch.3) Above 1°C crop productivity is projected to decline in tropical regions and by 2°C is projected to decline in temperate regions with the sole exception of rice (IPCC AR5, WG.2, Ch.7 and Zhao et al., 2017 in Ch.3) 'The highest negative impacts are expected at +2°C or more warming in the late-20th-century levels especially over tropical and temperate regions' (report Ch3. P.118)]. The risk for food production and extreme poverty is significant very high in these regions with 1.5°C global warming[which temperature crop productivity is projected to be in decline. (for all the above also see the report Table S5 - 3.4.6 Food security and food production systems) Supplementary Table S5-3.4.6 is so important of food it should be in the SPM. Adverse effects on crop yields which are not well captured and crop models include increasing extreme weather events, surface ozone, weeds, pests and pathogens (IPCC AR5, WG.2, Ch.7 and *) which will increase declining crop productivity for tropical region and risk and of decline in temperate regions at 1.5°C. This applies to ongoing declines in tropical regions and episodic and ongoing declines in temperate food producing regions. With respect to exceeding daily summer time temperature tolerance of 30C at 1.5C all northern hemisphere best food producing regions are at or above 30C, except for the UK and Northern Canada. (refs. 'Crop yields have a large negative sensitivity to temperatures around 30°C throughout the growing season' high confidence IPCC AR5, 2014, WG2, TS) report Figure 3.5 annual maximum warming at 1.5°C and at 2°C and NASA NEX downscaled daily maximum temperatures at 1.5 and at 2C and Influence of extreme weather disasters on global crop production Corey Lesk 2016, and Consistent negative response of US crops to high temperatures in observations and crop models, B. Schauberger, 2017)] [Peter Carter, Canada]	Noted. The bullet point has been rewritten. Specific examples are also included in the full report but due to space limitations not included in the SPM
59130	1	35	1	38	The second sentence should be first; also indicate that the region has serious stresses now. Then say that 2°C makes the situation even worse, with both amounts of rise, much less overshoots, making some regions essentially intolerable in some seasons for those whose occupations depend on being outside as well as for some traditional crops, etc. [United States of America]	Accepted. The bullet point has been rewritten.
40562	1	36	1	37	Poor English in the the passage: "The risk for food production and extreme poverty is significant". Please rewrite it. [Sergio Henrique Faria, Spain]	Taken into account - text revised. The bullet point has been rewritten.
18948	1	37	1	37	what is meant in this case by "significant"? And is this considerating adaptation options, or not? If the latter, what would the implications be? [Andrea TILCHE, Belgium]	Taken into account - text revised. The bullet point has been rewritten.
30020	1	37	1	37	« food production and extreme poverty » Equating those two terms doesn't make much sense. Food scarcity might be a factor leading to extreme poverty. But not the other way around. In any case, even if the argument was recievable it would say "risk for food security and extreme poverty" [France]	Accepted. The bullet point has been rewritten.
51080	1	37	1	37	Add the word "already" before significant. This word is used in the underlying report and is a more accurate description. [Doreen Stabinsky, United States of America]	Accepted. The bullet point has been rewritten.
84	1	4	1	41	By industrial activity the effects are not only constrained to the tourism sector. You can add that even in a 1.5-degree scenario and by 2030 the increasing temperatures will increase heat stress and will render many places too hot to work during much of the year and daytime (see ILO World Employment and Social Outlook 2018 and other forthcoming publications which I am happy to share). Effects will be particularly felt by workers working outside in physical work (e.g. agriculture, construction). You can also add that tourism in urban areas is also likely to suffer as high heat islands in urban areas become more common. [Guillermo Montt, Switzerland]	Not Applicable - no longer included in the chapter. The bullet point has been deleted.
6094	1	4	1	41	Impacts here are not described in relation to 1.5 or 2 deg C. Moreover, the nature of the impacts is not described. Some impacts for tourism would inedvitably be positive; others adverse. [Timothy Carter, Finland]	Not Applicable - no longer included in the chapter. The bullet point has been deleted.
10670	1	4	1	41	in the winter sport world many tuorist operature are scepctic regarding human climate change. It should be better extend this sentence, with more detail, eg regarding the number of ski resort that can be affected on 1.5 and 2°C [luca lombroso, Italy]	Not Applicable - no longer included in the chapter. The bullet point has been deleted.
11316	1	4	1	41	Under both 1.5 and 2 degrees? Otherwise this is another generic statement - be good to make quantified statements. Also It would be beneficial for policy makers to indicate the effect of this impact i.e. positive or negative on these tourism markets, if this is possible [United Kingdom (of Great Britain and Northern Ireland)]	Not Applicable - no longer included in the chapter. The bullet point has been deleted.

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17876	1	4	1	41	is this sentence really worth to be mentioned in the SPM? [Brigitte Knopf, Germany]	Not Applicable - no longer included in the chapter. The bullet point has been deleted.
30022	1	4	1	41	We suggest to delete "including sun and beach and snow sports tourism" as it doesn't bring much information here. [France]	Not Applicable - no longer included in the chapter. The bullet point has been deleted.
37250	1	4	1	41	This sentence would be more compelling if it provides examples of the cost implications of the impact on tourism in particular regions and timeframes. E.g. in country X, total revenue from tourism is expected to fall from $ybn to $zbn (a fall of ..%) by 2030. [Jonathan Grant, United Kingdom (of Great Britain and Northern Ireland)]	Not Applicable - no longer included in the chapter. The bullet point has been deleted.
38946	1	4	1	41	I think this statement is too general and should be left out. There are other sectors/activities that alos are affected and we cannot address all of them. [Jan Fuglestvedt, Norway]	Not Applicable - no longer included in the chapter. The bullet point has been deleted.
40564	1	4	1	41	Poor English. Please rewrite it. [Sergio Henrique Faria, Spain]	Not Applicable - no longer included in the chapter. The bullet point has been deleted.
44098	1	4	1	41	perhaps a line about what the impacts will be? [Moshe Kinn, United Kingdom (of Great Britain and Northern Ireland)]	Not Applicable - no longer included in the chapter. The bullet point has been deleted.
49508	1	4	1	41	I wonder if it will not be perceived as cyncial if the impacts in poor countries are known to be existential and there will be "direct impacts" on tourism. Another framing, e.g. listing more economic sectors, or implications, such as the higher economic losses or impacts of e.g. extreme events on "richer" societies, might be usefuls [Karlheinz ERB, Austria]	Not Applicable - no longer included in the chapter. The bullet point has been deleted.
59132	1	4	1	42	There is no directionality in this statement and no quantifiable language. How will increasing temperatures "directly impact" climate-dependent tourism markets? Seems too broad to be a useful summary statement. [United States of America]	Not Applicable - no longer included in the chapter. The bullet point has been deleted.
59134	1	4	1	41	This statement is overly detailed for the SPM. [United States of America]	Not Applicable - no longer included in the chapter. The bullet point has been deleted.
59136	1	4	1	4	Add a "-" between climate and dependent (e.g., 'climate-dependent'). [United States of America]	Not Applicable - no longer included in the chapter. The bullet point has been deleted.
59138	1	4	1	41	Suggest also mentioning that for some nations a quite large share of their economies is based on such markets, so some regions will be much more seriously impacted. An example that is often missed is Indigenous Peoples who are involved to a greater degree than most in outdoor activities, so more affected by anomalies, changes, disease vectors, etc. [United States of America]	Not Applicable - no longer included in the chapter. The bullet point has been deleted.
36296	1	42	1	45	All disaster related displacement cannot be attributed to climate change. There is a need for better attribution of natural diasaters to climate change. There is very low evidence that climate change is a driver for armed conflict. Attributing causal relationship between armed violence and climate change is conterproductive as well as a distraction that diverts attension from the socio-economic, historical and political factors that are at the centre of the conflicts. [India]	Not Applicable - no longer included in the chapter. The section has been removed.
10658	1	43	1	46	Link to Sec 4.3.6 which discusses migration as an adaptation startegy (and how it can often not be an adaptation). Even under 1.5, migration does not always lead to a positive outcome. [Chandni Singh, Myanmar]	Not Applicable - no longer included in the chapter. The section has been removed.
11318	1	43	1	45	today needs defining, otherwise quote could be taken out of context in future years. Also: this whole statement is very general [United Kingdom (of Great Britain and Northern Ireland)]	Not Applicable - no longer included in the chapter. The section has been removed.
33492	1	43			use a degree symbol ° not a superscript "o" [Stephen Cornelius, United Kingdom (of Great Britain and Northern Ireland)]	Editorial - copyedit to be completed prior to publication
33804	1	43	1	45	We consider this to be a very important message, please consider to quantify these effects. Also the comparison with 2C is of less importance as this is general for most effects and thus more obvious. [Norway]	Not Applicable - no longer included in the chapter. The section has been removed from the SPM. Relevant discussion is provided in the chapters.
52944	1	43	1	45	More detail on differences would be of value [Ireland]	Not Applicable - no longer included in the chapter. The section has been removed.
54570	1	43	1	43	Statements here seem a bit "sensationalistic" and could require more nuance as in the underlying chapters, maybe use langauge suchg as "global warming of 1.5C will impact on factors leading to conflict etc.."? [Reinhard Mechler, Austria]	Not Applicable - no longer included in the chapter. The section has been removed.
59140	1	43	11	15	How much lower is the level of risk expected to be for 1.5 vs 2°C? With more specific information and examples, this statement will be more useful to policymakers. Provide links to the underlying literature containing empirical evidence that is used as the basis for the statement. Expert judgement is not an acceptable basis for making such claims. [United States of America]	Not Applicable - no longer included in the chapter. The section has been removed.
59142	1	43	1	44	Obvious points like this could be consolidated as part of the shortening process. [United States of America]	Not Applicable - no longer included in the chapter. The section has been removed.
59144	1	43	1	45	Also need to indicate that the rate of displacement would rise very sharply if there are overshoots in temperature, and once displaced, having the temperature go back down does not reverse the displacement. [United States of America]	Not Applicable - no longer included in the chapter. The section has been removed.
59146	1	43	14	4	The text following Box 2.7 does not clearly amplify the main point expressed in the box. [United States of America]	Noted. The box and much of the following text is no longer included in the SPM.
9442	11		11		Figure SPM-2 As it follows from the picture, a 0.5C increase in the recent global temperature does not bring the world to the red zone with respect to any of five reasons for concern (RFCs), just to the yellow zone, i.e. 'moderate additional risk'. This is an important finding, it should be highlighted in the SPM. [Russian Federation]	Taken into account - text revised. We thank the reviewer and will retain this point.
17790	11				It would be better to understand when the last paragraph move to the first. [Republic of Korea]	Not Applicable - no longer included in the chapter. The section has been removed.
19232	11		11		Figure SPM 2: delete the icon for economic damages, in the end everything leads to economic damages [Spain]	Editorial - copyedit to be completed prior to publication. We thank the reviewer and we have clarified this issue.
29584	11		11		Figure SPM 2 This is a good summary figure. There is much detail but the traffic light logic can still be picked up rather easily. There are new detailed elements compared to the previous version. All elements require their explanatory text. Please make sure that the 'basic caption' with its key messages is understandable and not too long. [Finland]	Taken into account - text revised. We recognise this issue and have worked on the text and graphics to make them clearer and less cluttered visually.
34362	11				Figure SPM.2. There is lot of information on this figure and it is difficult to read and absorb. [Nathan Gillett, Canada]	Taken into account. Agreed - the authorship team has worked with the text and graphics (with the graphics team). The SPM to graphic is now much improved.
55808	11		11		Figure is too blurry [Debora Ley, Guatemala]	Taken into account - text revised. We recognise this issue and have worked on the text and graphics to make them clearer and less cluttered visually.

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11320	11	1	11	4	what's the confidence level associated with this statement? Additionally, split sentences to aid readability e.g. "…lower the risk of extreme events and threats to food and water security. Hence, the potential for polticial struggles… will be reduced…" [United Kingdom (of Great Britain and Northern Ireland)]	Not Applicable - no longer included in the chapter. The section has been removed.
15532	11	1	11	4	This bullet point is a general statement and should be deleted as it does not add value to the SPM. [Australia]	Not Applicable - no longer included in the chapter. The section has been removed.
30024	11	1	11	4	We suggest to delete the last part of the sentence "which contributes to lessening human conflict", since you underline in chapter 3, there is a lot of debate about "climate wars". [France]	Not Applicable - no longer included in the chapter. The section has been removed.
31208	11	1	11	4	Mentioning that limiting global warming to 1.5°C will contribute to lessening human conflict might not be suitable in this context because climate change is only one of the many factors that may contribute to human conflicts. [Japan]	Not Applicable - no longer included in the chapter. The section has been removed.
45888	11	1	11	3	Similar geopolitical struggles may emerge because of resource availability and distribution related to the low carbon technologies and their supply chain. Hence if the aim is to keep this sentence, new energy mixes should also be considered. [Deger Saygin, Turkey]	Taken into account - text revised. The section has been removed.
59148	11	1	11	4	Worth mentioning that even at 1°C the situation is worsening and would be much higher if there is overshoot. [United States of America]	Not Applicable - no longer included in the chapter. The section has been removed.
6096	11	2	11	2	Extreme events, in and of themselves, are not a threat unless they induce adverse impacts. Substitute likelihood for risk; again the latter term is being used inconsistently with respect to the IPCC risk framework. [Timothy Carter, Finland]	Not Applicable - no longer included in the chapter. The section has been removed.
14218	11	2	11	3	The sentence "lessen the potential for political struggles over scarce resources" is not clear and might be confusing [United Republic of Tanzania]	Not Applicable - no longer included in the chapter. The section has been removed.
52946	11	3	11	3	No need to qualify struggles [Ireland]	Not Applicable - no longer included in the chapter. The section has been removed.
30026	11	4	11	4	Chapter 3 section 3.5. " Avoided impacts and reduced risks at 1.5°C compated with 2°C" could also be cited as a reference [France]	Not Applicable - no longer included in the chapter. The section has been removed.
46004	11	5	11	7	System in the Arctic is not clear. "Arctic System" used in 3-13-44 is also broad meening. [Hiroyuki ENOMOTO, Japan]	Not sure what comment is referring to.
18950	11	6	11	9	Will worsen existing inequalities: Has this really been substantiated? Reference to studies/scientific results will be useful to bck this argument. [Andrea TILCHE, Belgium]	Not Applicable - no longer included in the chapter. The section has been removed.
43774	11	6	11	9	• Limiting global warming to 1.5°C compared to 2oC or higher levels of warming will lower the risk of extreme events and threats to food and water security and hence lessen the potential for political struggles over scarce resources, which contributes to lessening human conflict, [though all of these are substantial at a global warming of 1.5°C (report SPM and Ch.3)]• Global warming above 1.5° ..., [will greatly increase multiple adverse health effects and greatly increase mortality for most vulnerable regions and populations] [Peter Carter, Canada]	Rejected. The extent to which food and water security could change over future decades will depend on more than temperature. The literature is far too limited to determine how warming of 1.5 vs 2C could interact with other drivers of migration with sufficient confidence to include in the SPM.
53210	11	6	11	9	Perhaps it would be possible to join this paragraph and paragraph 17-22 page 10. [Maria-Carmen Llasat, Spain]	Not Applicable - no longer included in the chapter. The SPM has been substantially rewritten.
59150	11	6	11	9	This statement needs a confidence statement, and is perhaps better described in terms of "is likely" or "may" rather than "will." [United States of America]	Not Applicable - no longer included in the chapter. The section has been removed.
59152	11	6	11	9	Bullet seems highly duplicative of lines 17-19 on page 10. Also "what is meaningful for people's dignity and lives" is quite vague as an addition to the specific impacts listed. [United States of America]	Not Applicable - no longer included in the chapter. The section has been removed.
59154	11	6	11	8	Suggest "will further worsen" or similar to make clear that this situation is not just starting to be due to climate change at 1.5°C, but is already occurring now. [United States of America]	Not Applicable - no longer included in the chapter. The section has been removed.
30028	11	7	11	7	increased food prices. This is only true if you take the 'no carbon fertilization effect scenario" into account. with the opposite scenario there is a decrease in food prices. the conclusion -underlined in the AR5 - is that future evolution is uncertain. Note also that there is a weak agreement among economic models concerning prices change in the future. here you refer to a specific scenario. [France]	Not Applicable - no longer included in the chapter. The section has been removed.
15534	11	8	11	8	The statement about "loss of what is meaningful for people's dignity and lives" seems to be overly subjective for this report. [Australia]	Not Applicable - no longer included in the chapter. The section has been removed.
30030	11	8	11	8	« potential loss of what is meaningful for people's dignity and lives » This seems like a quite subjective notion, which should be either explained, rephrased or deleted. [France]	Not Applicable - no longer included in the chapter. The section has been removed.
59156	11	8	11	8	Maybe better to avoid value judgment and let the science speak for itself. [United States of America]	Not Applicable - no longer included in the chapter. The section has been removed.
15536	11	1	11	13	This statement about disaster-related displacement needs to be qualified to reflect that it is not clear how much of this displacement can be unambiguously attributed to climate change as opposed to other drivers (e.g. demographic, economic). For consistency with previous statements, is it possible to quantify the difference in disaster-related displacement between 1.5C and 2C warming - as done elsewhere in the SPM? [Australia]	Not Applicable - no longer included in the chapter. The section has been removed.
6882	11	11	11	12	Lack of clarity. The following wording is suggested: Disaster-related displacement is projected to further increase over the 21st century. Already between 2001-2015 over 90% of disaster-related displacement has been related to climate and weather events. [Klaus Radunsky, Austria]	Not Applicable - no longer included in the chapter. The section has been removed.
11322	11	11	11	13	How much of this is due to climate change and how much is due to societal factors? [United Kingdom (of Great Britain and Northern Ireland)]	Not Applicable - no longer included in the chapter. The section has been removed.
18952	11	11	11	12	Please separate the sentences about projected and observed displacement, preferably starting with the observations. [Andrea TILCHE, Belgium]	Not Applicable - no longer included in the chapter. The section has been removed.

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19228	11	11	11	12	No studies specifically explored the difference in risks between 1.5°C and 2°C on human migration (chapter 3 quote). Therefore, the conclusion should be out of the SPM. [Spain]	Not Applicable - no longer included in the chapter. The section has been removed.
21620	11	11	11	13	Which are the warming scenarios here? 1.5? 2? [Sweden]	Not Applicable - no longer included in the chapter. The section has been removed.
29128	11	11	11	13	„Disaster-related displacement is projected to increase over the 21st century with over 90% of disaster-related displacement between 2001 to 2015 related to climate and weather events (medium confidence). {3.4.10.2}“ If this statement is based on Ch 3 page 137 line 46 “Global: Between 2011 to 2015, over 90% of displacement was related to climate and weather disasters.”, then one of the given years (“2001” in the first sentence, or “2011” in the second) must by wrong." Please check. [Germany]	Not Applicable - no longer included in the chapter. The section has been removed.
30032	11	11	11	13	In our understanding, this sentence has two parts, and should be linked by a "and". Indeed, the first part of the sentence adresses the future, and the second one is refering to the past, so the link in between the two sentences should be made clearer, the way it is written now is confusing. [France]	Not Applicable - no longer included in the chapter. The section has been removed.
31210	11	11	11	13	Could you tell us which world is this sentence referring to, the 1.5°C or the 2°C? [Japan]	Not Applicable - no longer included in the chapter. The section has been removed.
32856	11	11	11	13	· it may be advisable to specify whether this text refers to 1.5 º C or 2º C. [J. David Tabara, Spain]	Not Applicable - no longer included in the chapter. The section has been removed.
33806	11	11	11	13	There is discrepancy between this sentence and the corresponding sentence in the Executive Summary of chp.3 (page 13, line 6-8). This involves a rather important comma (after "century") that changes the meaning of the sentence. Also please check the years of the period. (Is it 2001 or 2011?) [Norway]	Not Applicable - no longer included in the chapter. The section has been removed.
36298	11	11	11	13	The SPM statement does not match the actual text in the chapter (3.4.10.2). Also, the chapter text does not have a supporting reference. Figure SPM 2 is complicated and difficult to understand. The figure should be simplified. [India]	Not Applicable - no longer included in the chapter. The section has been removed.
38532	11	11	11	15	Here a paragraph about adaptation and its limits under 1.5°C vs. higher temperature scenarios could also remind: "The temperature trajectory under a 1.5°C scenario is less steep than in scenarios leading to higher temperature. Accordingly, human and natural ecosystem would have more time to adapt and limits to adaptations would be reached later, if ever". [Valentino Piana, Italy]	Accepted - text revised. Reference to cross-chapter box will be added
38948	11	11	11	13	the first part is a general statement , while the second part is more important. I suggest removing the first part to make the 2nd part more visible. [Jan Fuglestvedt, Norway]	Not Applicable - no longer included in the chapter. The section has been removed.
38530	11	11	11	15	Here a paragraph about the type of adaptation under 1.5°C vs. higher temperature scenarios is called for. E.g. "While stabilizing warming at 1.5°C would allow at least a partial effectiveness of strategies that operate on co-stressors for the same fragile asset (e.g. contrasting water scarsity with improved water pipelines), at higher temperatures there is high risk that such strategies would be powerless (e.g. there would be no water in the place from which the water pipelines start)". And: "In absence of the perspective of stabilizing the temperature to 1.5°C, many costly adaptation investments will provide only short-living relief, leading to the decision of "retreating" rather than "defending". In other words, if temperature is going always up, there is no point in defending certain assets (e.g. certain coastal areas) because any defense work will subdue relatively quickly to the new extremes. Conversely, such investment would provide a stable solution if temperature stabilizes relatively soon. [Valentino Piana, Italy]	Noted, language along the same lines based on the text is included in the Second-Order Draft.
51356	11	11	11	13	The SPM statement does not match the actual text in the chapter (3.4.10.2). Also, the chapter text does not have a supporting reference. [Anand Patwardhan, United States of America]	Not Applicable - no longer included in the chapter. The section has been removed.
59158	11	11	11	13	This statement is weak – increase by how much for 1.5 and 2°C? [United States of America]	Not Applicable - no longer included in the chapter. The section has been removed.
59160	11	11	11	13	What are the other types of disaster-related displacement that are not climate- or weather-related? Earthquakes? How is climate- differentiated from weather-related in this statistic? The 90% figure is high, but has the potential to be misleading if the reader cannot differentiate between climate and weather. How is this statistic specific to 1.5°C of warming? What other factors could affect displacement – for example, population change, demographic shifts, and development patterns? [United States of America]	Not Applicable - no longer included in the chapter. The section has been removed.
59162	11	11	11	12	The phrase should be added that this is when global warming is at 1°C. [United States of America]	Not Applicable - no longer included in the chapter. The section has been removed.
43776	11	15	11	18	Figure SPM 2: [This is policy misleading without including this IPCC AR5 legend text: Red ‘high risk indicates severe and widespread impacts’ Yellow ‘indicates that impacts are both detectable and attributable to climate change’ White ‘undetectable risk indicates no associated impacts are detectable’. This does not show risk as the standard definition being the product of magnitude of impact and the likelihood of impact.] [Peter Carter, Canada]	Comment on Figure SPM. 2. We respectfully disagree. The highest category includes magnitude of impact (severity) and likelihood of impacts (widespread). We have revised the text to be clearer in SPM 2.
46430	11	15	11	19	The placing if the icons in the figure is potentially open for misunderstanding. It may be interpreted as the temperature where these risks start to be relevant. For example, the placing the icons for the Greenland ice sheet and Antarctic ice sheet indicates that these are at risk at 3 degrees but not earlier. Perhaps the icons should be placed also where they start to be relevant. [Göran Finnveden, Sweden]	Agreed. Icons have been removed from the final version.
53698	11	15			This piece of sentence in brackets is not clear. On "residual risk": any reference to the UNFCCC concept of "loss and dammage" has to be done under these explicite terms. [Switzerland]	Taken into account - text revised. Reference to the cross-chapter box will be added
46	11	18	11	24	This graph is a bit difficult to follow [Meinhard Doelle, Canada]	We have worked on the text and the graphics (with the graphics team) and have simplified the graph and feel that it is relevant and appropriate for the SPM.
4438	11	18	11	18	Make it simpler. Too much information is included here that makes anybody including policymakers can not understand. One message (or at the most two messages) in one figure should be the rule throughout IPCC reports. [Mitsutsune Yamaguchi, Japan]	We have worked on the text and the graphics (with the graphics team) and have simplified the graph and feel that it is relevant and appropriate for the SPM.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
8998	11	18	12	11	There is too much information in this figure, and the content is very difficult to understand. You have to read the figure caption very carfully to have any chance to understand. It is recommended to select a key message and focus on it. E.g.: It is confusing to use two different reference levels (recent as well as preindustrial); better stick to one. Global key risks KRi, KRii, etc, should be explained, or - better - omitted. [Urs Neu, Switzerland]	We have worked on the text and the graphics (with the graphics team) and have simplified the graph and feel that it is relevant and appropriate for the SPM.
11082	11	18	11	19	Figure SPM2 is difficult to understand. The figure contains many and detailed information. In order to convey the messages from the figure to policymakers, it is important that it is both clear and legible. We suggest to simplify the selected icons that indicate selected risks. Also the figure caption should bring more interpretation to the figure; explanation of the colorgrading of Global key risks. Finally an interpretation of the figure, either in the figure caption or in the text would improve the readability of the figure. [Denmark]	We have worked on the text and the graphics (with the graphics team) and have simplified the graph and feel that it is relevant and appropriate for the SPM.
11120	11	18	11	19	How does one interprete the presence of 3 agriculture symbols in the RFC3 column? [Denmark]	Agreed. Icons have been removed from the final version.
15538	11	18	11	19	Figure SPM 2: a busy diagram, perhaps better suited to the body of the report, or consider simplifying for the SPM's target audience. [Australia]	We have worked on the text and the graphics (with the graphics team) and have simplified the graph and feel that it is relevant and appropriate for the SPM.
17878	11	18			Figure SPM 2: this figure is hard to grasp, it includes too many dimensions: not only the classical burning ambers, but also the icons and in addtion the key risks. What is the main message? [Brigitte Knopf, Germany]	Taken into account - text revised. We recognise this issue and have worked on the text and graphics to make them clearer and less cluttered visually.
18954	11	18	11	24	This needs to be updated. E.g., it wrongly suggests that the "risks associated with extreme weather events" are to date "undetectable". In contrasts, the impacts themselves are already statistically detectable. Therefore the "risk" is very real and present. [Andrea TILCHE, Belgium]	Agreed - text and graphics modified accordingly.
29130	11	18	12	11	We have strong reservations about the envisaged Figure SPM.2 - It is not clear from the current draft whether the authors intent to update the graphical representation of the Reasons for Concern (RFC) as found in the IPCC TAR and in AR5 (e.g. Synthesis Report Box 2.4 and Figure 2.5), or whether it is planned to follow the concept portrayed in the placeholder figure, which is from a individual post-AR5 publication and adds considerable complexity to the graphical representation by including two additional layers of information. We would strongly encourage the authors to keep this graphic as simple and close to plenary adopted format of the TAR and the AR5 as possible. Also, assessing the current status of Chapter 3 we would urge the author team to reconsider whether an update of the RFC-figure is the best graphical representation of the available evidence. The WGIIAR5 dedicated four years and an entire chapter plus considerable cross-chapter coordination and efforts to produce the RFC version included in the SPM of AR5WGII and subsequently in the SYR. Given the very tight timeline, comparatively small chapter team and limited synthetic research published on the matter, it seems very ambitious to update the assessment of Chapter 19 of AR5WGII in a substantive and well-founded way. We would therefore encourage the authors to either abandon the idea to include an update of the RFC into the SR1.5 and leave this update to the AR6, or to restrict the representation to those risks where meta-level research is actually available that helps inform the assessment in a way that is scientifically robust, straightforward to understand and defendable to governments. [Germany]	Thank you for these insights. The figure is a place holder and we are finalising the version for the next drafts. We have used a combination of expert assessment in combination with the expert opinion of the Ch 3 group (e.g. Gattuso et al. 2015, published in Science).
30034	11	18	12	11	Figure SPM2 is difficult to understand, as there are too many information to process.. We would suggest to replace it with a simple illustrative Table that compares impacts at 1.5°C and 2°C and provides quantitative information on these impacts at a global scale. We suggest to take the table in this article as an inspiration (https://www.carbonbrief.org/scientists-compare-climate-change-impacts-at-1-5c-and-2c) [France]	We have worked on the text and the graphics (with the graphics team) and have simplified the graph and feel that it is relevant and appropriate for the SPM.
33808	11	18	12	11	Figure SPM 2: Please consider applying the following principles from the Guidance for data visuals (J. Harold. et.al., Tyndall Centre, 2017): Guideline 7: Add a descriptive heading and sub-heading, where the latter should articulate a clear message. Integrate the text in the visual to support comprehension. The technical details in the caption can provide important additional context, but the information to comprehend the main message should be included in the visual. Guideline 8: Avoid jargon and explain acronyms. If possible avoid vertical text for increased readability. Finally, please consider making the reference periods (recent and preindustrial) on the temperature scales more visually clear. [Norway]	We have worked on the text and the graphics (with the graphics team) and have simplified the graph and feel that it is relevant and appropriate for the SPM.
38534	11	18	11	21	Switch the left scale and the right scale, since the latter reflects the working definition of 1.5°C for the whole report (as from p. 3), so the reader expects it and risks to be surprised by the abrupt change in baseline. [Valentino Piana, Italy]	Second y axis has been removed.
40580	11	18	11	19	This figure is of rather poor resolution which should be increased. [Jonny Williams, New Zealand]	We have worked on the text and the graphics (with the graphics team) and have simplified the graph and feel that it is relevant and appropriate for the SPM.
43970	11	18			In Figure SPM 2 (though I know it is a placeholder in this draft), the icons for "Greenland ice sheet" and "Antarctic ice sheet" look like floating sea ice instead of continental ice sheets. [Seita Emori, Japan]	Taken into account - text revised. Symbols have been modified to avoid this confusion.
46362	11	18	11	18	Is such a complicated graph appropriate for the SPM ? [Etienne Piguet, Switzerland]	We have worked on the text and the graphics (with the graphics team) and have simplified the graph and feel that it is relevant and appropriate for the SPM.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
49510	11	18	11	2	figure SPM2: I wonder why the risk associated with extreme event is labeled with medium confidence for heat waves and extreme preciptitation. Is this not something recorded already? And: is there really no impact on agriculture? Furtermore, forestry is missing. Extreme events like storms had a massive impact on forest stands, with an ambiguous impact for forest industries (price distortions due to oversupply, high availability of resources). I also wonder why there is no impact (maybe of "distribution of impacts", but this category is not selfexplaining and needs definition) on human health. Think alone of heat islands in Cities - there have been reported cases in Europe (but I am not an expert here) - it is even mentioned in SPMFig3. [Karlheinz ERB, Austria]	The new text has included many supportive studies (especially in the past few months) indicating the strong influence of climate change on many issues such as agriculture, health and extreme events. The previous graphic was a placeholder and was out of date.
50408	11	18	12	11	Figure SPM 2 is too complicated. The very interesting infomation that it contains should be made available in a more friendly way for the reader. [Switzerland]	We have worked on the text and the graphics (with the graphics team) and have simplified the graph and feel that it is relevant and appropriate for the SPM.
54840	11	18	11	19	Figure SPM2: I note that this figure is a placeholder, so provide here some general comments regarding aspects to consider when developing this figure further. [Jordan Harold, United Kingdom (of Great Britain and Northern Ireland)]	New figures have been inserted.
54842	11	18	11	19	Figure SPM2: The figure packs in a lot of information, so reducing or segmenting information would help aid ease of accessibility/comprehension. Are the 'global key risks' information needed? [Jordan Harold, United Kingdom (of Great Britain and Northern Ireland)]	We have worked on the text and the graphics (with the graphics team) and have simplified the graph and feel that it is relevant and appropriate for the SPM.
54844	11	18	11	19	Figure SPM2: Significance of icon locations of the selected key risks placed in risk bars could be explained more directly in the figure legend to aid comprehension (i.e. that these relate to identification of transitions, as explained in the caption). [Jordan Harold, United Kingdom (of Great Britain and Northern Ireland)]	Agreed. Icons have been removed from the final version.
54846	11	18	11	19	Figure SPM2: Consider indicating 1.5 and 2.0 levels of warming using horizontal lines from the y axis. [Jordan Harold, United Kingdom (of Great Britain and Northern Ireland)]	Levels of warming to 1.5 and 2.0oC have been added.
54848	11	18	11	19	Figure SPM2: Consider using only one y-axis, as multiple axes with different scales can confuse. [Jordan Harold, United Kingdom (of Great Britain and Northern Ireland)]	Second y axis has been removed.
54850	11	18	11	19	Figure SPM2: recommend rotating the 'level of additional risk due to climate change' legend by 90 degrees so that it runs vertically, i.e. consistent with the risk bars that contain data. [Jordan Harold, United Kingdom (of Great Britain and Northern Ireland)]	We have worked on the text and the graphics (with the graphics team) and have simplified the graph and feel that it is relevant and appropriate for the SPM.
54906	11	18	11	19	Figure SPM 2: I suggest to remove the left temperature indication. It is too confusing. Only apply the temperature change relative to pre-industrial levels [Bram Bregman, Netherlands]	Second y axis has been removed.
55576	11	18	12	11	Figure SPM 2 -- The dual scale is not needed and distracts from the messages of the report. The left hand scale, relative to "recent", should be deleted. (I understand that it was introduced in an ealirer IPCC report as a compromise during ghe acceotance process in plenary). Given Article 1(a) of Paris Agreement and clear mandate for this report, a single comparator of pre-industrial shoudl be used. [David Cooper, Canada]	Second y axis has been removed.
59164	11	18	11	24	Figure SPM-2 needs refinement. As it stands, sometimes what's at risk appears to be conflated with what triggers the change in risk. For example, RFC5 'Risks associated with large-scale singular events' includes both ice sheet icons. Including those icons would actually indicate that RFC5 means, 'Risk of occurrence of large-scale singular events', rather than the change in risk for particular systems or sectors. If this interpretation is off, then it shows the graphic is too complicated and not getting across the intended message. [United States of America]	Agreed. Icons have been removed from the final version.
59166	11	18	11	24	The authors should consider their ability to update this figure given the availability of empirical evidence related to the risks at 1.5°C of warming versus other levels of warming. Given that this report is focused on a single warming level, it may not be appropirate to present results for other levels of warming that are not comprehensively presented in this report. That said, if there is new information, specific to 1.5°C that is directly comparable to the results from AR5, then an update to this figure could be considered. If the updates are to be based on expert judgment, as they have been in previous assessments, the authors should explain how their expert judgment is comparable to what was judged in the past. Authors should consider reserving any updates to this figure to the AR6. [United States of America]	Figures has been updates - the figure here was a placeholder.
5914	11	19			If retained, this figure should focus in to a more limited future temperature changes range consistent with the SR15 charge. However, the figure is highly complex and hard to grasp. I'm not convinced a lineage to AR5 WG2 is a sufficient rationale not to consider whether some intended key messages couldn't be communicated in a more reader friendly manner. [Peter Thorne, Ireland]	Noted. We recognise this issue and have worked on the text and graphics to make them clearer and less cluttered visually.
11324	11	19	12	11	Figure SPM.2. Given the emerging nature of much of this literature, it's not clear that scientific understanding is yet in a position to be able to make substantial and certain updates to this figure, particularly given the level of quantification in the preceding text. Better to wait and update it in AR6. Furthermore, the RFC figure requires a lot of explanation that could not be achieved here in the space available. Suggest this is deleted. [United Kingdom (of Great Britain and Northern Ireland)]	We have worked on the text and the graphics (with the graphics team) and have simplified the graph and feel that it is relevant and appropriate for the SPM.
62248	11	19	11	24	Using two different thermometer scales in Figure SPM2 is confusing and makes the figure difficult to interpret. Recommend removing the lefthand scale indicating global temperature changes relative to 1986-2005 since that's less relevant to the SOD than the righthand scale indicating temperature change relative to 1850-1900. [Shaye Wolf, United States of America]	Second y axis has been removed.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
6098	11	21	11	21	Fig. SPM 2: The trusty burning embers could be modified here to indicate more detail at the bottom end, and then some iconic tipping points (global and, especially, regional) either within the 1.5 to 2 deg C range or above it, to show the likely impact of overshoot. The kinds of regional impacts that could be shown against GMAT could be disappearance of mountain glaciers providing vital regional water resources; levels/locations at which outdoor employment in summer becomes infeasible, levels at which local fisheries may cease to be viable; levels leading to local extinction of coral; levels associated with unnacceptably high frequencies of regional flood damage). This way there would be an indication of increasing (aggregate) adverse impact with increasing temperature, but also the implications of not keeping within given targets in terms of irreversibilities. It's similar to what was done in AR5, but the examples could be more specific. Perhaps more attention could be accorded individual embers, and for these some representation of uncertainties in vulnerability could also be shown, and its effect on the risk. A wider bar would then have more room for tipping points to be added. Maybe the most critical or iconic tipping point per region could be shown. [Timothy Carter, Finland]	Accepted - some details have been now modified accordingly
11084	11	21	11	21	The abbreviation 'RFC' should be included after spelling out 'reasons for concern' (instead of including it on page 12, line 1) [Denmark]	Accepted and text changed
11326	11	21	11	21	Can it be made clear that RFC means reason for concern by making this more explicit in the text "[5 different] reasons for concern". i.e. to change it to "[5 different] Reasons For Concern (RFC)" [United Kingdom (of Great Britain and Northern Ireland)]	Accepted and text changed
33810	11	21	12	8	Figure SPM 2 caption: Please specify if this concerns warm water coral reefs. [Norway]	Accepted and text modified
53212	11	21	12	11	The explanation text of figure SPM2 is clearer for the reader than this one of figure SPM1. The only think that is not clear is the meaning of KRi,…KRViii. It is explained in the page foot (4). Perhaps it will be better to include "(4)" join to the legend placed at the right side of the figure. [Maria-Carmen Llasat, Spain]	Accepted and changes made to caption.
63058	11	21	11	24	Please simplify figure SPM. We suggest removing the "key risk color bullets" from the figure. We also suggest adding a line at 1.5/pre-ind, and possibly also one at 2°C. The left temperature scale was relevant for AR5 because that temperature reference was widely used in that report, but it is no longer useful here: we think that it would be very useful to simplify the figure by deleting that axis, keeping only the right temperature scale. [Belgium]	We have revised SPM2 - removing symbols and generally simplifying the figure
19230	11	22	11	22	add surface after mean [Spain]	Suggestion adopted.
15540	12	7			Every 0.1C clearly contributes to increased impacts. Another issue is whether models can show statistical differences at low increase in temperature because they are not sensitive enough. A statement like this one seems to imply that we could add 0.4C to any target we decide to stabilize climate because it won't make much of a difference. Please amend. [Australia]	Caption for SPM 2 figure has been updated
59168	12	12	12	12	Do you mean: "where global temperature INCREASE exceeds 1.5°C"? This is one of many awkward sentences that are potentially misleading due to their ambiguity. [United States of America]	Accepted and text modified
11086	13		13		Are the risks associated with the near-term scenario (2030-2040) relatable/equal to a 1,5 degree world? If so it might be worth writing in the explanatory text below the figure. [Denmark]	Not Applicable - Figure no longer included
29132	13		14	4	We have serious concerns regarding the suggested Figure SPM 3 (update of SYR Figure 2.4): the placeholder figure has been produced during the AR5 process through a coordinated effort across regional and sectoral chapters, with a common framework and thorough review strengthening the expert judgment applied. It is currently unclear how this framework should be served by the outcome of Chapter 3, where regional key risks and risk reduction through adaptation are not discussed in a structured manner that would allow for such a far-reaching assessment to be adopted. In the light of the scientific integrity we would therefore strongly recommend to choose a different format for the synthetic representation of risks, and save updating this figure for the AR6. [Germany]	Thank you for your comment. The team decided to delete this figure because there is not enough information about key risks for each region.
29586	13				Figure SPM 3. The small text is hard to read. Perhaps making the figure elements smaller (make the orange vertical bars thinner) would make it possible to increase the size of the text. [Finland]	Not Applicable - Figure no longer included
38538	13		13	1	Please consider the possibility of separating Sub - Saharan Africa from Sahara, because the two areas are polarly different as for current climate. Similarly, although not so radical, there is a difference between the Mediterranean region and the Central-Northern Europe. Please consider the possibility of a stand-alone Asian Middle-East (capturing e.g. the risk of inhabitability - see https://www.nature.com/articles/nclimate2833). More in general, remember that this report is called to provide independent indications on adaptation plans, so eccessively generic maps generate - at national level - a negative reaction towards the IPCC. Adaptation plans reflecting more the contingent convenience of power groups and donors will prevail on those guided by science. [Valentino Piana, Italy]	Not Applicable - Figure no longer included
4440	13	1	14	4	Remove this figure from SPM or replace with more simpler figure. I don't think policymakers understand this figure correctly. [Mitsutsune Yamaguchi, Japan]	Thank you for your comment. The team decided to delete this figure because there is not enough information about key risks for each region.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
5916	13	1			Again, this is a very busy figure to be able to synthesise in the SPM if you intend to retain noting placeholder status. Maybe it really does need to be this busy but it feels like it's a figure that needs a long-time to read and digest with many nuanced messages. Elsewhere in the report you have used interactive graphics. One option may be to present some high level summary in teh print version and have an interactive version of the graphic online that provides the rich tapestry of detail in the current figure? I realise this suggestion may be seen as radical but it would be one way to consider addressing aspects of accessability which otherwise are an issue here. [Peter Thorne, Ireland]	Not Applicable - Figure no longer included
9000	13	1	13	3	Figure SPM3: Make the figure simpler and omit the icons (togeter with the corresponding legend. The text over every figure has the same information, but more precise and informative. [Urs Neu, Switzerland]	Thank you for your comment. The team decided to delete this figure because there is not enough information about key risks for each region.
11328	13	1	14	4	Figures SPM.3. As for SPM.2, it's not clear there is sufficient information available specific to 1.5°C to make a robust assessment in this figure. Suggest this is deleted. [United Kingdom (of Great Britain and Northern Ireland)]	Thank you for your comment. The team decided to delete this figure because there is not enough information about key risks for each region.
19234	13	1	14	5	If risk assessment for +4°C it's going to be dropped out of the figure, there's a overcoming need to reasses ranges. This could result in significant changes in the figure. The near term time frame should have a temperature refrence (1.5º?) as the other frames do. [Spain]	Thank you for your comment. The team decided to delete this figure because there is not enough information about key risks for each region.
30036	13	1	14	4	Figure SPM3 : Using 2°C and 4°C warming hypothesis limits the relevance of this figure. Would it be possible to introduce 1.5°C and 2°C warming? [France]	Thank you for your comment. The team decided to delete this figure because there is not enough information about key risks for each region.
30038	13	1	14	4	Figure SPM3 : The figurative representation for terrestrial ecosystems should be indicated for Europe (like for North America). [France]	Thank you for your comment. The team decided to delete this figure because there is not enough information about key risks for each region.
31212	13	1	14	4	About the Figure SPM3, please refer to both 2°C and 1.5°C in the figure's pictures and its caption. [Japan]	Thank you for your comment. The team decided to delete this figure because there is not enough information about key risks for each region.
31214	13	1	14	4	Instead of dropping risk assessment for +4°C, risk assessment for +1.5°C should be added for Figure SPM3. [Japan]	Thank you for your comment. The team decided to delete this figure because there is not enough information about key risks for each region.
38950	13	1	13	12	There is no reference in the text to Figure SPM 3. Needs to be integrated. [Jan Fuglestvedt, Norway]	Thank you for your comment. The team decided to delete this figure because there is not enough information about key risks for each region.
46168	13	1	14	4	Contrary to Figure SPM-2, here no reference is made to 1.5C and hence in ts current form it is not instrumental for the purpose of the report. Suggest to redress ommission, if net possible: drop altogether from SPM. [Netherlands]	Thank you for your comment. The team decided to delete this figure because there is not enough information about key risks for each region.
33812	13	1	14	3	Figure SPM 3: Please consider making it clear in each bar chart what the different bars are (as shown in example panel: present, near term, long term 2C). Please consider if it is possible to describe risk levels – what is meant by low, medium and very high risk. Also, please consider splitting information into two or more panels/illustrations to make it easier to read and digest the information (how important is it to show these illustrations on top of a global map?). Please consider applying the following principle from the Guidance for data visuals (J. Harold. et.al., Tyndall Centre, 2017): Guideline 7: Add a descriptive heading and sub-heading, where the latter should articulate a clear message. Integrate the text in the visual to support comprehension. [Norway]	Thank you for your comment. The team decided to delete this figure because there is not enough information about key risks for each region.
43778	13	1	13	12	Figure SPM 3: Representative key risks for each region, including the potential for risk reduction through adaptation and mitigation, as well as limits to adaptation. [Assumed successful adaptation cannot inform policymaking. To inform policymaking success of adaptation would have to be established with a very high level of certainty which is certainly not the case. This adaptation figure should be removed. Successful adaptation reducing the risks as assumed in figure SPM three is for many reasons not valid and policy misleading. Without successful mitigation today assumed successful adaptation in the future can only delay impacts of global climate change. The adaptation projections are only taken up to 2100 which makes them invalid for the long term security of humanity and the natural world. It is urgent that adaptation measures be applied particularly for the most vulnerable regions but this will require l and success depends on large infusions of economic and resource support for a vast upgrading in public services to these regions and there is little or no indication of this happening. It is a principle that adaptation success can't be assumed without ongoing mitigation and we do not have ongoing mitigation because global omissions is still increasing. Adaptation is highly dependent on the rate of global climate change and this is extremely fast and on an accelerating trend. Under rapid the increasing global climate change and increasing extreme weather events such as applies today access for adaptation cannot possibly be assumed. The research into adaptation is far beyond the level on which success can be assumed. The IPCC has not assessed risk in the sense of magnitude and the likelihood of impacts. Many adverse impacts including on global food security are not well captured by models. The sum of vital human and natural systems are essentially not all very poorly adaptable. This includes terrestrial and ocean ecosystems, indigenous populations countries with nuts low economic resources to draw on which are also the most climate change vulnerable regions, and the Arctic. The IPCC AR5 2014 WG2 reported that 'a range of biophysical, institutional, financial, social, and cultural factors constrain the planning and implementation of adaptation options and potentially reduce their effectiveness (very high confidence)'. It is not yet clear if these efforts are translating into effective adaptation actions for the benefit of human and natural systems including the avoidance of limits (IPCC 2014 , AR5, Ch. 16 Exec Summary). As adaptation practice has focused on what adaptation efforts can achieve in terms of avoided damages rather than on the residual damages that adaptation cannot avoid question remains largely unexplored (IPCC 2014 , AR5, Ch. 16 , p. 927)] [Peter Carter, Canada]	Thank you for your comment. The team decided to delete this figure because there is not enough information about key risks for each region.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
50410	13	1	14	4	Figure SPM 3 is too complicated. The very interesting infomation that it contains should be made available in a more friendly way for the reader. [Switzerland]	Thank you for your comment. The team decided to delete this figure because there is not enough information about key risks for each region.
52948	13	1	13	1	SPM 3 is overly dense [Ireland]	Not Applicable - Figure no longer included
59170	13	1	13	12	Similar to Figure SPM-2, Figure SPM-3 is much too complex to be useful. Suggest splitting the graphic into two figures, showing the eastern hemisphere on one page and western hemisphere on the next (or even across 3 pages with Americas on one, Europe and Africa on another, and Asia, Australasia, and small islands on the third). Either that, or just display this on html websites rather than pdf or document form. [United States of America]	Thank you for your comment. The team decided to delete this figure because there is not enough information about key risks for each region.
59172	13	1	13	1	The use of so-called "expert judgment" should be avoided in the creation of this figure and throughout the report as this lacks the necessary transparency and support for a scientific assessment process. If there is no reliable measurement or modeling data (preferably based on first principles), the authors should note the hypothesis and the lack of verifiable information. The authors should avoid giving undue weight to the opinions of a few consulted experts. [United States of America]	Not Applicable - Figure no longer included
49404	13	1	14	4	In the Figure SPM 3 the 'near term (2030-2040)' is presented. This period is not fully consistent with the '1.5ºC warming'. The figure aims to illustrates the main points of the Section SPM 2; however, it does not contain risk estimates for the '1.5ºC warming'. According to the definition of the '1.5ºC warming', this is 30-years-long period, not 10-years. Consequently, the Figure SPM3 does not support evidences in the Section SPM 2 and may misinform readers. This figure should be redrawn for displaying risk for the '1.5ºC warming' (corresponding bars may be added to each subplot, or, they may replace bars for 2030-2040 period). [Alexander Chernokulsky, Russian Federation]	Thank you for your comment. The team decided to delete this figure because there is not enough information about key risks for each region.
49512	13	1	13	12	figure SPM3: There appears to be a bias in the world representation of impacts/risks. The food production risk-of-failure is to be found in poor countries, while rich regions show impacts / risk proneness of loosing capital assets. Well, this is apparent, while the poor countries will be existentially at risk, rich countries will be affected by loosing infrastructure or property. But reduced crop productivity and water scarcity will also occur in Northern America and Europe - but these regions can import or reduce exports - this will affect other regions, which deserves mentioning; Likewise, there will be health impacts in many regions now not listed. [Karlheinz ERB, Austria]	Thank you for your comment. The team decided to delete this figure because there is not enough information about key risks for each region.
54852	13	1	13	1	Figure SPM3: It is noted that this figure is a placeholder, and so I have not provided specific comments regarding cognition /likely comprehension for this figure. However, depending on Chapter 3 outcomes and decisions of what information to include here, it might be that the information is more effectively communicated via a table. In the placeholder figure, readers have to match up information in each panel to multiple legends (i.e. to check what each icon means, to check what each bar represents, and to check the scale of the risk level). A table is likely more easily comprehend in terms of matching up the data to what it means. Although it is noted that the map layout enables readers to quickly identify data relevant to a specific geographic region. Testing the figure and alternative representations with readers will provide useful insights re ease of comprehension. [Jordan Harold, United Kingdom (of Great Britain and Northern Ireland)]	Not Applicable - Figure no longer included
59174	13	1	13	12	The authors should consider their ability to update this figure given the availablity of empirical evidence related to the risks at 1.5°C of warming versus other levels of warming. Given that this report is focused on a single warming level, it may not be appropirate to present results for other levels of warming that are not comprehensively presented in this report. That said, if there is new information, specific to 1.5 degrees that is directly comparable to the results from AR5, then an update to this figure could be considered. If the updates are to be based on expert judgment, as they have been in previous assessments, the authors should explain how their expert judgment is comparable to what was judged in the past. Authors should consider reserving any updates to these figure to the full AR6. [United States of America]	Thank you for your comment. The team decided to delete this figure because there is not enough information about key risks for each region.
6100	13	3	13	3	For Figure SPM 3 is the intention to remove 4 deg C estimates, but then to add 1.5 degC estimates alongside 2 degC estimates? I didn't see much evidence of quantitiative results for the high adaptation case in Chapter 3, so this will presumably again require a cross-chapter expert judgement process. I also wonder how two levels of adaptation sits alongside the various futures that are mapped by the SSP worlds (and in SRES before them). Hence, adaptive capacities would vary among the SSPs, among regions and among sectors. So might the expert judgement actually start to look into the uncertainty around estimates of "enhanced adaptation". This way, we begin to acknowledge (albeit qualitatively) that there are error bands around adaptation just as there are around the climate hazard and the risk. In fact, the unadapted case is essentially the potential impact - we don't offer an uncertainty estimate for that either! Compared to the sometimes painful rigour of the uncertainty estimates for climate projections, this seems to begin to be inexcusable in the era of AgMIP, ISIMIP and other impact model MIPs that may take our fancy. I think it's time to confront this issue - maybe it's too late here, but certainly in the AR6. [Timothy Carter, Finland]	Thank you for your comment. The team decided to delete this figure because there is not enough information about key risks for each region.
52698	13	3	13	3	Consider adding a figure on avoided impacts at 1.5°C (Figure 5.2) [Iulain Florin VLADU, Germany]	Thank you for your comment. The team decided to delete this figure because there is not enough information about key risks for each region.
47	13	6	13	8	Might be hekpful to clarify that medium term is 2040 - 2080. [Meinhard Doelle, Canada]	Not Applicable - The figure has been removed
44100	13	6	13	7	The use of the word hear, perhaps should be removed or changed to another word [Moshe Kinn, United Kingdom (of Great Britain and Northern Ireland)]	Not Applicable - The figure has been removed

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38536	13	7	13	8	A misleading statement here risks to generate great confusion in the overall societal reception of this Report. "In the near term, projected levels of global mean temperature increase do not diverge substantially across different emission scenario" neglects that for high emission scenario we lock in into high temperature, whereas with deep decarbonization we consolidate the level of risk. The time frame 2030-2040 is the window of opportunity we have, according to Ch. 2, to reduce emissions to zero (or a small - always reducing - amount, e.g. thanks to a reduction by 9% yearly) to definitely avoid to exhaust the carbon budget. So what is currently labeled as "Near term" should be better labeled "Trajectory towards 1.5°C (2030-2040)". This gives consistency with the use of a temperature to distinguish two "long term" horizontal bars. [Valentino Piana, Italy]	Thank you for your comment. The team decided to delete this figure because there is not enough information about key risks for each region.
29134	13	9	13	13	The current statement is almost trivial, and hence meaningless: please be more specific about the qualities of these pathways. [Germany]	Thank you for your comment. The team decided to delete this figure because there is not enough information about key risks for each region.
63060	13	12	13	12	We suggest removing figure SPM3 because it was published already and does not provide information about 1.5°C - (it is only about near-term, 2 and 4°C). However, if information about 1.5°C can be added, then it would become more relevant for this SPM. The text on page 10 referring to this figure mentions 1.5°C, so the current version is not sufficiently related to the text. [Belgium]	Thank you for your comment. The team decided to delete this figure because there is not enough information about key risks for each region.
15552	14		14		There is a lot here and beyond on "CO2 removal", but there is no mention about methods of removal that would satisfy the associated statements/projections. [Australia]	Accepted. The text has been revised in line with the comment.
33832	14				SPM 3 and SPM 4: In its current form, the SPM expresses the urgent need for large scale land use changes to achieve negative emissions. However, it does not specify how land use changes will be implemented and what the trade-offs are. This is very important information for policy makers as the scale of land use changes suggested are very large. [Norway]	Thank you for your comment. The team decided to delete this figure because there is not enough information about key risks for each region.
58162	14				SPM3: It is crucial to explicitly state that according to the assessment of emission mitigation studies the 1.5°C target is achievable. This is the outcome of the studies that have been reviewed in Chaptre 2. [Nico Bauer, Germany]	Thank you for your comment. The team decided to delete this figure because there is not enough information about key risks for each region.
29398	14		15		Rearrange the chapter 3, in particular 3.1 and 3.2 are confusing. Maybe starting with the budget and types of budgets would be a better order than introducing pathways first? Use consistent terminology. terms relate to one another: threshold return budgets and overshoot pathways. counterparts: peak budget and no overshoot pathways. [Susanne Droege, Germany]	Thank you for your comment. The team decided to delete this figure because there is not enough information about key risks for each region.
18956	14	1	14	6	Why is the risk assessment for a 4º world going to be dropped from the chart? [Andrea TILCHE, Belgium]	Thank you for your comment. The team decided to delete this figure because there is not enough information about key risks for each region.
33814	14	7			In many parts of the SPM, particularly in SPM 3, the wording may give the impression that the scenarios and pathways describes a likely future. The challenge is that such statements often fail to mention the difficulties and trade-offs involved when actually implementing policy. Readers might unconsciously interpret that this is more easily achievable than it actually is, and not that it requires substantial collective efforts and major alteration of society. An example of this is "In 1.5°C pathways rapid and extensive mitigation as well as CO2 removal occur simultaneously." (page 17, line 38-39). We understand that this is difficult when communicating short, but please be cautious on this issue, especially when describing pathways and scenarios. [Norway]	Taken into account - text has been revised to more explicitly state the role of scenarios and their results in the SPM
33816	14	7			SPM 3: When describing land use change, we find it unclear what are model assumptions and what are model output. Please consider to clarify this. [Norway]	Taken into account. Thank you.
33818	14	7			SPM 3 and SPM 4: Land use changes are understandable only mentioned at the global level. However, information relevant to policy makers are often at regional or local level. It can be difficult to absorb the information at global scale to make local policies. Although this will probably get more attention in the IPCC SR on land, it is also worth keeping in mind when writing about the large scale changes in land use in this special report and SPM. [Norway]	Noted
43972	14	7			Section SPM 3 focuses on discussing "prospective" pathways rather than "adaptive" ones, as stated in Chapter 2. We can discuss pathways to stay below 1.5 degree at a certain likelihood (e.g., 66%). However, I believe that the real policy-relevant and existential questions should include what if "the remaining 33%" is materialized. I hope this question is treated somehow in this Special Report. Emori et al. (2018) have duscussed it and organized ideas as follows: If the climate sensitivity is proven to be relatively high and the temperature goals are not met even when the net zero emission goal is achieved, the options left are: (A) accepting/adapting to a warmer world, (B) boosting mitigation, and (C) climate geoengineering, or any combination of these. (https://link.springer.com/article/10.1007/s11625-018-0530-0) [Seita Emori, Japan]	Taken into account - adaptation has been strengthened in the new draft of the SPM, see sections D2, D3, D5 & D6. Emori eta l is already considered in chapter 2 of the assessment.
49292	14	7			This section could benefit from a figure that summarises the key policy relevant determinants of mitigation pathways. The warming target and probability, 2030 GHGeq/yr emission levels and the cumulative need for CDR. Such a figure should also be included in the underlying Ch 02. [Bill Hare, Germany]	Taken into account - new figure (SPM3) shows 4 architype 1.5°C pathways. This focuses on achieving net-zero at 2050 rather than milestones at 2030.
21622	14	7	16	19	Carbon budget is central to this report. The report would benefit from a clearer narrative including the consequences of delaying mitigation efforts. [Sweden]	Accepted. The revised SPM includes a clearer discussion of the remaining carbon budget under bullet C1

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29512	14	7	19	29	The concept of carbon budget should be explained more clearly. Figure SPM 4 is difficult to interpret. [Italy]	Accepted - text revised. The figure referred to by the reviewer has not been included in the revised SPM. Message C1 now discusses the remaining carbon budget in detail.
29594	14	7	16	2	On section SPM3: the highligted text boxes should be reconsidered. The key issues from bullets starting on lines 21 and 30 should be taken up into a box. Box 3.2, seems to contain technical elements which are not especially relevant for the policy makers (e.g. there are two types of carbon budgets). The concept of carbon budget is an important one. However, for the policy maker the tehnical issues are less relevant. It is most important to convey what policy making should learn from this: Timing? Urgency? non-CO2 issues ? [Finland]	Accepted. The headline statements have been reconsidered and now focus on the implications of NDCs (in D1), with less focus on technical elements.
29514	14	7	19	29	Negative implications of 'overshooting', solar radiative forcing and removal of CO2 should be elaborated further, also clarifing their feasibility. [Italy]	Taken into account - there is now explicit reference to the factors influencing the feasibility of CDR (either to return form overshoot or to offset remaining positive emissions): "Different CDR methods exist, with widely differing maturity, potentials, costs and side-effects. 7 Examples include afforestation and reforestation, BECCS, direct air carbon capture and storage and 8 soil carbon sequestration. The feasibility of CDR measures relates to their impacts on sustainable 9 development, and depends on scale, implications for land, water and energy use (high confidence). 10 Feasibility of CDR could be enhanced by a portfolio of options deployed at smaller scales, rather than 11 a single option at a large scale (high confidence)." In addition, Figure SPM3 makes overshoot and CDR deployment graphically transparent in typical stabilization pathways.
31216	14	7	19	29	It would be very helpful for policy makers if this section could include more comparisons of 1.5°C and 2°C scenarios, in terms of the extent of efforts required and the social changes needed including quantitative information regarding impacts and cost of measures (mitigation / adaptation), as we must make informed decisions regarding which would be a better and feasible policy goal under UNFCCC. [Japan]	Taken into account - This is done in the new section C3.1. Also, D2.1 compares the costs of a 2°C goal to those of targeting 1.5°C warming.
38952	14	7	19	29	I think it would be useful if you make it clear that the staments and findings aee based on what is available of scenario studies. [Jan Fuglestvedt, Norway]	Taken into account - Even though the text itself has changed substantially, the FGD version makes sure to refer explicitly to pathways and inserts "modeled" wherever there might be a doubt.
50012	14	7	19	29	The current structure of this section is confusing, as it starts with discussion the 1.5 pathways, then moves to the CO2 budget and returns to the emission pathways thereafter. A more logical structure would be to (1) start with the budget issue (explaining the two approaches for the overshoot and non-overshoot pathways, including the point on cumulative emissions from section 1.2, including the first sentence from the second bullet from 3.1 and deleting the much too complicated figure SPM4), then (2) discuss the pathways to stay below 1.5 degrees, using the first and second sentence of the second, the third and fthe ourth bullet from 3.1 and point 3.3 (without the second bullet that should move to the budget item), a graph and a table, showing the 1.5 pathways (currently missing in the SPM, but can be taken from chapter 2) and making a clear distinction between the 50 and 66% probabiliy pathways. [Bert Metz, Netherlands]	Accepted - structure has been revised.
339	14	9	14	13	It should indicate the years of warming by 1.5? for the various emission pathways. [Zong-Ci Zhao, China]	Not Applicable - no longer included in the chapter. Text has been removed
6012	14	9	14	13	this point should also report the likelihood of meeting the 1.5 degree target, otherwise it sounds feasible but not difficult [Sara Budinis, United Kingdom (of Great Britain and Northern Ireland)]	Accepted. This is not included in Box SPM 1
9156	14	9			At the beginning of this section on emissions pathways, you need to have the presentation on discount rate issues discussed above. This should then lead into a discussion of the scenario literature which does not assume or rely on 5% discount rates, and separately, the literature that relies on the 5% discount rate. As indicated above, I believe the pathways which result from assuming a 5% discount rate are irrelevant for policy makers, and this should be clearly stated. The fact that so much of the literature is dominated by pathways which assume a 5% discount rate should be described as unfortunate to policy makers, but indicate that this can and will change in the future. [Richard Rosen, Germany]	Rejected. Not every aspect can be highlighted in the SPM. The authors' understanding of the literature is that the discount rate for investments affects the timing and shape of mitigation pathways quite strongly if weak mitigation action is assumed. However, in the context of holding warming to 1.5°C, the literature suggests that all options have to be deployed immediately. The discount rate thus plays a much smaller role in determining the shape and timing of emissions reductions. Note that no damages are being discounted.
11330	14	9	14	12	What is the key message you are trying to get across here? A headline statement should be clearer and bolder. Suggest this is rephrased/refocused to make a statement on 1.5°C pathways and their technical feasibility from the literature. [United Kingdom (of Great Britain and Northern Ireland)]	Accepted. Text has been removed
11332	14	9	14	13	It would be useful to know what % of 1.5 pathways hold warming below 1.5 degC throughout the 21st century and what % of pathways involve overshooting? [United Kingdom (of Great Britain and Northern Ireland)]	Rejected. The number of pathways in an arbitrary ensemble does not contain much information to the non-expert.
15542	14	9			When saying “rapid and deep’ reduction, people don’t know what it really means. Please say what’s the range of emission reductions per year, eg, compared with the emissions increase per year over the past 10 years. What is the range of global peak emissions required; please be specific. [Australia]	Accepted. The revised text provides estimates of emissions reductions.
29530	14	9	14	13	Suggest replacing this box with for instance the next bullet (page 14: line 15 to 16). The key message to our understanding is "deep and repid reductions required" not that "the assessed litterature identifies pathways..." [Finland]	Not Applicable - no longer included in the chapter. Text has been removed

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30040	14	9	14	13	This statement is quite unclear. We suggest the following : "The assessed literature identifies potential emission pathways consistent with limiting global warming to 1.5°C, but they feature global agregate greenhouse gas emissions in 2030 which are lower than the one expected with the full implementation of the current NDCs submitted under the Paris Agreement. Any delay in emission reductions significantly increases the risk associated with a temperature overshoot and would require faster subsequent emissions reductions and/or more CO2 removal." [France]	Taken into account - text revised. The text of the SPM has been thoroughly revised, with explicit messages on the estimated emissions under the NDCs and their implications for 1.5°C consistent pathways.
32918	14	9	14	36	This section should include a specific bullet on the role of non-CO2 forcers/short-lived climate pollutants in the various pathways assessed (waiting to raise non-CO2 forcers in Box 3.3 is too late as specific points regarding them are raised in Box 3.2). [Thomas Damassa, United States of America]	Taken into account - text revised. Non-CO2 emissions are highlighted in Figure SPM.3 and their impact on the remaining carbon budget is also highlighted separately.
33822	14	9	14	19	The statement about the NDCs in the bullet point is very important and we find it more policy relevant than what is currently written in the highlighted box above. Please consider to highlight the message about the NDCs. Perhaps the statements in the bullet point and the highlighted box could be swapped? [Norway]	Taken into account - text revised. The section has been revised and the NDC bullet has been elevated.
46170	14	9	14	13	Box mentions no overshoot scenarios, earlier it was mentioned that no overshoot is already very unlikely, as illustrated by (modelling) literature. Rephrase to distinguish ths ' mainstream' from exceptional no overshoot examples [Netherlands]	Not Applicable - no longer included in the chapter. Text has been removed
55580	14	9	14	13	Headline 3.1: note however that this is qualified by headline 3.5 regarding feasibility [David Cooper, Canada]	Not Applicable - no longer included in the chapter. Text has been removed
57142	14	9	14	13	Why are potential overshoot scenarios coming back to 1.5 after 2100 not considered ? AR5 suggests that at least RCP2.6 is an example of scenario that could come back to 1.5 after 2100. Would the absence of discussion of this topic be solely related to the lack of any emission scenario post 2100 except for those based on stylistic assumptions such as for the extension of the RCPs beyond 2100? If so, should this be regarded as a limitation of current literature? This would be important to asses the risks related to sea-level rise. [Philippe Marbaix, Belgium]	Rejected. Scenarios groups and classes are defined in a way which reflects their use and understanding in the policy debate. A scenario that remains above 1.5°C for a century or more to decline below it by 2200, is not considered a 1.5°C compatible scenario.
59176	14	9	14	13	This point needs to make clear that these pathways are technologically possible (or conceivable), but there is no indication that they are politically achievable (or even conceviable) given the present commitments and willingness to move economically by the business and other sectors of the economy. It really needs to be said right at the start of this section how much commitment will be needed to accomplish this. [United States of America]	Taken into account - text revised. The introductory section now clarifies that "There is no simple answer to the question of whether it is feasible to limit warming to 1.5°C and to adapt to the consequences because feasibility has multiple dimensions that need to be considered simultaneously and systematically. {1.4, Cross-Chapter Box 3 in Chapter 1, 4.3, 4.4}"
33820	14	9	16	19	Table SPM 1: In the table and supporting text the terms "threshold return/peak budgets" while in the the rest of the SPM mostly use the term "temperature overshoot" and sometimes "temporary overshoot". Please consider the consistency. E.g. consider to call these budgets in the table and supportive text "budgets with/without overshoot" or "budgets with/without temporary overshoot". This is also relevant to the first bullet under section 3.2 (page 14 line 45 - 15 line 3). [Norway]	Taken into account - text revised. The general carbon budget discussion has been revised for clarity, with one carbon budget concept being presented and used throughout the SPM.
55380	14	1	14	12	It would be helpful to give a sense here what percentage of the pathways in the literature manage to avoid overshooting 1.5 degrees, and under what assumptions. Otherwise this statement is descriptive only and thus hardly worth making. [Andy Reisinger, New Zealand]	Rejected. The number of pathways in an arbitrary ensemble does not contain much information to the non-expert.
15544	14	14	34	34	Define 'radiative forcing' or include a glossary. [Australia]	Accepted - definition added in footnote 4 to avoid disturbing the flow.
15546	14	14	21	21	Delete "CO2" since it's not the only greenhouse gas. Include a comment about the relative importance of reducing non-CO2 GHGs. [Australia]	Not applicable/accepted - The text referred to has changed substantially. The importance of reducing non-CO2 emissions has been highlighted by including their reduction profiles in Figure SPM3.
6884	14	15	14	16	Clearer wording might be: Limiting global mean warming to 1.5oC requires rapid and deep reductions in greenhouse gas emissions, even with a temporary overshoot and later return to 1.5oC. However, the Nationally …. [Klaus Radunsky, Austria]	Taken into account - text revised. The text of this section has been revised significantly to consolidate the messages related to NDCs.
18958	14	15	14	19	See comments on p.4, line 43. In addition, this paragraph is redundant. It repeats with almost the same words a conclusion already presented above. [Andrea TILCHE, Belgium]	Taken into account - text revised. The text of this section has been revised significantly to consolidate the messages related to NDCs.
29136	14	15	14	19	Redundancy, see also page 4 line 39-44 [Germany]	Taken into account - text revised. The text of this section has been revised significantly to consolidate the messages related to NDCs.
29588	14	15	14	19	This bullet point contains a crucial message which is repeated in some other bullets and sections in the SPM. Some repetititon serves the purpose. However we hope that there is careful consideration especially regardig repetition of the highly important message of the second sentence in several highlighted boxes. [Finland]	Taken into account - text revised. The text of this section has been revised significantly to consolidate the messages related to NDCs.
30042	14	15	14	19	Chapter 2 shows that not only are the agregate emissions higher, but also that 2030 levels of emissions with current NDCs put 1.5°C almost out of reach. We suggest to add "[Models] indicate that [with the current NDCs,] there is a high risk that the required post-2030 transformations are too steep and abrupt to be achieved by the mitigation measures [they include] (high confidence)" (Chapter 2, p.60) [France]	Taken into account - text revised. The text of this section has been revised significantly to consolidate the messages related to NDCs. It highlights that "Collectively meeting the current conditional or unconditional NDCs would imply pursuing an overshoot trajectory to return global warming to 1.5°C. This would result in higher impacts and adaptation challenges, higher transitional challenges to reduce GHG emissions after 2030 and a higher reliance on CDR compared to pathways that are consistent with limited or no overshoot and which have deeper GHG emissions reductions until 2030 (high confidence)"

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33824	14	15	14	19	If all NDC's are implemented in their current state, the global warming will be much higher than 1.5 and even 2 degrees, probably more than 3 degrees. What temperature increase we actually can expect with current NDC's should be mentioned in this bullet point. Otherwise the reader may assume the increase will be only slightly larger than 1.5. Also the principle of progression of the NDC's should be mentioned. [Norway]	Rejected. This has not been included, but the implications of following the NDCs has been highlighted in more detail.
33826	14	15	14	19	Please consider adding how much higher the total NDCs are compared to the scenarios with limiting global warming to 1.5°C by 2100. Would help the reader understand how far off we are to meet the Paris Agreement. [Norway]	Taken into account - text revised. This information is now available, although not in the same bullet.
43780	14	15	14	19	• Limiting global mean warming to 1.5°C would require [immediate] rapid and deep reductions in greenhouse gas emissions, even with a temporary overshoot and later return to 1.5°C. The Nationally Determined Contributions (NDCs) submitted under the Paris Agreement will result, in aggregate, in global greenhouse emissions in 2030 which are [substantially (UN climate Secretariat and DC update May 2016 16% higher by 2030 at 2010)] higher than those in scenarios compatible with global warming of 1.5°C by 2100 (high confidence)[projected to be .over 3C by 2100 (Climate Action Tracker) so much higher after 2100 to equlibrium warming [Peter Carter, Canada]	Taken into account - text revised. The text of this section has been revised significantly to consolidate the messages related to NDCs. Although it was unclear what the intention of this comment was.
44052	14	15		16	As comment 6 [Stephan Singer, Belgium]	Not Applicable - no longer included in the chapter. Unclear
46172	14	15	14	19	rapid and deep reductions is very qualitative; need for quantification; moreover the need for negative emissions should be indicated [Netherlands]	Taken into account - text revised. The text of this section has been revised significantly to consolidate the messages related to NDCs.
52950	14	15	14	19	This could be clearer [Ireland]	Taken into account - text revised. The text of this section has been revised significantly to consolidate the messages related to NDCs.
54258	14	15	14	16	It would really help the policy world to have a quantitive number or range for the reduction fo a specific date - eg 2040 or 2050 [David Warrilow, United Kingdom (of Great Britain and Northern Ireland)]	Taken into account - text revised. Reduction ranges are now included in the revised text.
56932	14	15	14	15	On the same basis as discussed for previous changes (eg page 4 line 39) there needs to be a caveat here because of the possibility of albedo modification. I would suggest inserting "…warming to 1.5C without recourse to large-scale albedo modification would require…" [Oliver Morton, United Kingdom (of Great Britain and Northern Ireland)]	Rejected. This is not a topic assessed in depth by the underlying report.
18960	14	15	15	28	All of these assertions apply also to <2°C as established in AR5. This should be stated and these paragraphs should be substantially reduced. The important information (more specific information about 1.5°C and how it differs from 2°C) is explored in subsequent sections. [Andrea TILCHE, Belgium]	Taken into account - text revised. This entire section has been edited and bullet D1 now more directly focusses on the implications of NDCs only.
9034	14	16	14	19	This is only true, if NDCs will be fully implemented. Please specify in the the text. [Luxembourg]	Accepted. This has been clarified.
9480	14	16	14	19	'The Nationally Determined Contributions (NDCs) submitted under the Paris Agreement will result, in aggregate, in global greenhouse emissions in 2030 which are higher than those in scenarios compatible with global warming of 1.5°C by 2100' The statement is ambiguous. How can one estimate 2100 global temperature without any info about reductions of GHG emissions beyond 2030? Perhaps, no additional reductions (i.e., in addition to Paris NDCs) are implied. If so, it should be formulated explicitly. [Russian Federation]	Taken into account - text revised. The text of this section has been revised significantly to consolidate the messages related to NDCs.
18962	14	16	14	19	This text is largely identical to the one on p. 4, ll. 41-43. [Andrea TILCHE, Belgium]	Taken into account - text revised. The text of this section has been revised significantly to consolidate the messages related to NDCs.
19406	14	16	14	19	This is a very weak statement about the compatibility of the NDCs with 1.5°C, and as such a misleading understatement. The SPM needs deliver at least as clear messages to the policymakers as the UNEP Emission Gap Report 2017. [Jennifer Morgan, Netherlands]	Taken into account - text revised. The text of this section has been revised significantly to consolidate the messages related to NDCs.
32910	14	16	14	19	Can "higher" be more explicitly quantified? It would be helpful for readers to understand how large the difference is between NDC pledged levels and a 1.5°C trajectory. [Thomas Damassa, United States of America]	Taken into account - text revised. The text of this section has been revised significantly to consolidate the messages related to NDCs. The compatible 2030 levels are included in a separate bullet.
41292	14	16	14	19	It is often pointed out that NDC emissions are also higher than those for the 2.0degC target. I think there should be some mentioning to that fact. [Michio Kawamiya, Japan]	Rejected. We here focus on 1.5°C.
46178	14	16	14	18	Does this apply to full implementation of all NDCs or does this take into account that some NDCs are conditional? [Netherlands]	Taken into account - text revised. The difference between the conditional and unconditional interpretation has been clarified.
58636	14	16	14	18	The NDCs submitted under the Paris Agreement will result in … --> "The initial NDCs currently submitted under the Paris Agreement WOULD result in..." [New Zealand]	Taken into account - text revised. The text now reads "the current pledges under the Paris Agreement"
32782	14	17	14	19	the substance message of "these NDC projections imply a total of about 600 GtCO2 until 2030. Thus, following an NDC trajectory would exhaust the TPB of 1.5°C by 2030." from chapter 2, lines 46 and 47 is worth to appear in the SPM near line 19 [Manfred Treber, Germany]	Taken into account - text revised. This has been captured in the revised bullet D1.2 but without explicitly referring to the remaining carbon budget.
40752	14	17	14	18	Readability/concise. Suggest rewording from "The Nationally Determined Contributions (NDCs) submitted under the Paris Agreement will result, in aggregate, in global greenhouse emissions in 2030 which are higher than those …" to "In aggregate, The Nationally Determined Contributions (NDCs) submitted under the Paris Agreement will result in higher global greenhouse emissions in 2030 than those …" [Liese Coulter, Australia]	Taken into account - text revised. The text of this section has been revised significantly to consolidate the messages related to NDCs.
53214	14	17	14	19	This assessment is very important for policy makers and should be included in the orange square [Maria-Carmen Llasat, Spain]	Taken into account - text revised. The text of this section has been revised significantly to consolidate the messages related to NDCs.

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59178	14	17	14	19	This is a rather obscure way of saying that by 2030 all of the allowable emissions to keep below 1.5°C will have been used up and so all future emissions above zero are taking the global average temperature to higher levels. I think a much clearer statement is needed here – basically, saying that "unless there are emissions reductions in addition to the NDCs before 2030, any further emissions beyond that year will take warming beyond 1.5°C in the absence of significant levels of CDR and or SRM." [United States of America]	Taken into account - text revised. This has been captured in the revised bullet D1.2 but without explicitly referring to the remaining carbon budget.
63062	14	17	14	19	This is a very important message. We would like to see it in an headline message box, as well as in the high level messages. [Belgium]	Taken into account - text revised. The text of this section has been revised significantly to consolidate the messages related to NDCs.
18964	14	18			Section 3.2 on carbon budgets and in particular Table SPM 1 therein is extremely important, because it has direct implications for global mitigation policy. However, the current explanation of the two types of carbon budgets (return and peak budgets) is rather confusing and, likely as a result, some figures are counter-intuitive. First, it is not clear whether both types of budgets apply equally to overshoot and non-overshoot scenarios or not. Second, it is counter-intuitive that for 2 °C warming, the peak budget is larger than the return budget whereas for 1.5 °C warming, it is the opposite. Please reformulate and extend the explanations in this very important section. [Andrea TILCHE, Belgium]	Accepted. The text has been fully revised to clarify the size and uncertainties surrounding the remaining carbon budget
55382	14	18	14	19	This seems a very convoluted statement. Be clear and say that NDCs in aggregate are NOT compatible with 1.5 degrees. It probably needs a statement on feasibility of post-2030 emissions reductions though for this statement to hold. [Andy Reisinger, New Zealand]	Taken into account - text revised. The text of this section has been revised significantly to consolidate the messages related to NDCs.
29138	14	18	19	19	Please note the request from the Paris decision 1.CP21/17 to identify in the SR1.5 the level of emissions consistent with 1.5?C by 2030. Please respond to this request. Could you also please specify how much higher global emissions will be in 2030 than those in scenarios compatible with 1.5 degree. The information on the insufficient emission reductions is also given on page 4 line 39-44 and in section SPM 4.1, please remove redundancies. [Germany]	Taken into account - see new section D1; also, redundancies have been removed and the SPM shortened by a third in the process.
59180	14	19	14	19	A chapter reference should be included here. [United States of America]	Editorial - copyedit to be completed prior to publication. Done
5462	14	21	14	22	Directionally risk increases, but the justification for this being significanly higher is missing. Suggest removing "significant". [Haroon KHESHGI, United States of America]	Taken into account - text revised. The text of this section has been revised significantly (no pun intended) to consolidate the messages related to NDCs.
6886	14	21	14	23	Clearer wording might be: Because of the cumulative impact of CO2 emissions, any delay in emission reductions (including the delay implied by the post-2020 start date of NDCs) significantly increases the risk of temperature overshoot and requires faster subsequent emission reductions and/or more CO2 removal. CO2 removal can compensate a too slow decline of CO2 emissions to help avoid a temperature overshoot, ... [Klaus Radunsky, Austria]	Taken into account - text revised. The text of this section has been revised significantly to consolidate the messages related to NDCs.
10212	14	21	14	28	Should be consistent with above bullet and put the focus on GHG rather than CO2. Cumulative impact of GHG and not only CO2; the paragraph shall relate to GHG and not CO2 only [Saudi Arabia]	Accepted. The text of this section has been revised significantly to consolidate the messages related to NDCs. It now highlights total GHG emissions.
10942	14	21	14	28	Should be consistent with above bullet and put the focus on GHG rather than CO2. Cumulative impact of GHG and not only CO2; the paragraph shall relate to GHG and not CO2 only [Nedal KATBEHBADER, Switzerland]	Accepted. The text of this section has been revised significantly to consolidate the messages related to NDCs. It now highlights total GHG emissions.
17676	14	21	14	28	Suggest adding a sentence at the end of this bullet point: "However, the CO2 removal technology is still at its infancy today." [Sai Ming Lee, China]	Taken into account - text revised. The feasibility and availability of CDR is discussed elsewhere in the SPM.
29140	14	21	14	28	Explanations on delay in emission reductions are important and should be kept wherever possible. [Germany]	Noted
36300	14	21	14	22	SPM 3: Post 2020 comment should be removed altogether. Not having met those is also a reason why more effort will be required in the future. [India]	Taken into account - text revised. The text of this section has been revised significantly to consolidate the messages related to NDCs.
43782	14	21	14	28	• Because of the cumulative impact of CO2 emissions, any delay in emission reductions [DELETE(including the delay implied by the post-2020 start date of the NDCs)] significantly increases the risk associated with a temperature overshoot and would require faster subsequent emissions reductions and/or more CO2 removal [both of which would more likely than not be infeasible]. [With a massive amount of research and development on the model of the global R&D Manhattan project, neither of which is planned, CO2 removal can might [contribute to a] decline of CO2 emissions to help avoid a temperature overshoot, and [in scenarios because of an unintended risk] where a temperature overshoot occurs, active net CO2 removal is required [yet to be developed to] achieve a global mean temperature of 1.5°C by the end of the 21st century (high confidence). [However there is no current evidence that CDR at any significant scale would be feasible, it is certainly not today, so it cannot possibly relied on for policy making.] [Peter Carter, Canada]	Taken into account - text revised. The text of this section has been revised significantly to consolidate the messages related to NDCs.
46174	14	21	14	24	It is unclear how delayed action is defined and compares to current NDCs; current NDCs already bring 1,5 degrees out of reach [Netherlands]	Taken into account - text revised. The text of this section has been revised significantly to consolidate the messages related to NDCs.
46176	14	21	14	24	this is background information; not a message; message better focus on the Carbon budget for meeting 1,5 without T overshoot and with T overshoot and how these compare to 2 degree pathways. [Netherlands]	Accepted. The text of this section has been revised significantly to consolidate the messages related to NDCs.
53216	14	21	14	24	As in my previous comment this assessment should be included in an orange square [Maria-Carmen Llasat, Spain]	Noted
54908	14	21	14	28	How relevant is this conclusion, realizing that large-scale CO2 removal is not feasible? There is no indication of experimental setups that would lead to more insight. [Bram Bregman, Netherlands]	Taken into account - text revised. The higher challenges have been highlighted, but CDR is discussed elsewhere in the SPM.
56934	14	21	14	21	On the same basis as discussed for previous changes (eg page 14 line 15) there needs to be a caveat here because of the possibility of albedo modification. I would suggest inserting "…CO2 emissions, in the absence of large-scale albedo modification any delay in emissions reduction…" [Oliver Morton, United Kingdom (of Great Britain and Northern Ireland)]	Rejected. No evidence to support this statement is available in the underlying report.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
59184	14	21	14	28	This is helpful phrasing. Also add that SRM would possibly have the potential to offset some of the warming if research is built up in the near term to evaluate possibilities. [United States of America]	Rejected. This is not supported by the report's assessment.
59182	14	21	14	28	Does a delay in emissions reduction: (1) increase the risk OF an overshoot? or (2) increase the damage resulting FROM the overshoot because the overshoot is higher? And if society choose to compensate for the delay with faster emission reductions and/or more CO2 removal, wouldn't that eliminate either 1 or 2 above, but with a higher cost of abatement? As written now, it implies that there will be more damage AND more reduction, but presumably there is a tradeoff. [United States of America]	Noted. If warming is to be kept to 1.5°C, now assuming with overshoot until 2100, delay in emissions reductions will imply that emissions need to decline faster (because net zero needs to be reached well before the end of the century) and deeper (because more net CDR is required) thereafter.
11334	14	21	15	28	This section would benefit from a clearer narrative that leads the reader logically through the concept of a carbon budget to what this implies for net zero , to links with near-term action, and then need for CO2 removal if there is any delay or insufficient action. At the moment, it doesn't flow or help the reader to understand the carbon budget as the basis for net zero/negative emissions. [United Kingdom (of Great Britain and Northern Ireland)]	Accepted. This entire section has been edited and hopefully reads better now.
8286	14	22	14	22	The bracketed words here consider the post-2020 NDCs as a delay implied, which is in fact a misunderstanding of NDCs and inconsistent with the notion that NDCs are voluntary commitments for post-2020 climate actions at the national level under the Paris Agreement. These words are suggested to be deleted. [China]	Accepted. The precise reference to 2020 was removed.
18966	14	22	14	22	This picks upon the post2020 start date of NDCs as a particular area of concern. This is unfortunate, as most countries are already pursuing climate actions and preparing for NDC implementation prior to 2020. This reference should be deleted as it just tends to validate the viewpoint that the implementation of NDC can wait until 2020. [Andrea TILCHE, Belgium]	Accepted. The precise reference to 2020 was removed.
30044	14	22	14	22	There is no explicit "start date" of NDCs. Hence, it would seem preferable to say 'including should implementation of the NDCs be delayed". [France]	Taken into account - text revised. The text of this section has been revised significantly to consolidate the messages related to NDCs.
35458	14	22	14	22	Rephrase "(including the delay implied by the post-2020 start date of the NDCs)" to "(compounding the effects of emissions already accumulated in the atmosphere and including the delay implied by the post-2020 start date of the NDCs)" [Ashok Sreenivas, India]	Taken into account - text revised. The text of this section has been revised significantly to consolidate the messages related to NDCs.
46180	14	22	14	22	There is still pre-2020 action that countries have committed themselves to; the implementation date of the PA is not going to be moved forward. [Netherlands]	Accepted. The precise reference to 2020 was removed.
58638	14	22	14	22	2021 would be more precise than "post-2020" [New Zealand]	Taken into account - text revised. The precise reference to 2020 was removed.
58640	14	22	14	22	There is not necessarily a delay in emission reductions implied by the 2021 start date of the NDCs. Suggest deleting the clause in parentheses. [New Zealand]	Accepted. The precise reference to 2020 was removed.
59186	14	22	14	22	The parenthetical "including the delay implied by the post-2020 start date of the NDCs" is misleading and should be deleted. This seems to assume that prior to the start date of NDCs there is no action or that all action must come under the Paris Agreement. In fact, while NDCs were intended to start in 2020, many countries have made pledges under the Copenhagen Accord. There may be a question as well regarding the adequacy/effect of those pledges, but to imply that the start date of NDCs necessarily means a delay is misleading. [United States of America]	Accepted. The precise reference to 2020 was removed.
52952	14	23	14	23	Unclear how increased removals reduce emisisons? [Ireland]	Noted. Because it are the net CO2 emissions that drive temperature increase. Net = emissions minus removals.
52954	14	23	18	27	Consider spilitting this up [Ireland]	Accepted - emissions pathways, mitigation options, CDR and carbon budgets now all have their own sections.
5464	14	24	14	24	Is this sentence contingent on reaching 1.5 by the end of the century? If so this should be stated in this sentence. [Haroon KHESHGI, United States of America]	Taken into account - text revised. Box SPM 1 clarifies how 1.5°C pathways are defined.
11336	14	24	14	26	Change to: "CO2 removal, if employed at sufficient scale, can accelerate the decline of….". Additionally, there are references to “CO2 removal”, and “active net CO2 removal”. What’s the difference? [United Kingdom (of Great Britain and Northern Ireland)]	Taken into account - text revised. The contributions of CDR have been clarified in bullet C2.2. The word "active" was used to imply that this is due to human activities.
18968	14	24	14	25	“CO2 removal can accelerate the decline of CO2 emissions to help avoid a temperature overshoot". This sounds misleading. Removal does not lead to declining emissions. Removal leads to declining concentrations, other things being equal. If anything, removal leads to moral hazard and could thereby slow down the emissions decline. Suggested reformulation: “CO2 removal can complement the decline of CO2 emissions to help avoid a temperature overshoot" [Andrea TILCHE, Belgium]	Taken into account - text revised. Net emissions are defined as gross emissions minus removals. This hence means that removals do reduce (net) emissions. This message has been clarified in bullet C2.2
18970	14	24	14	27	The core report (and the SPM, p.18, lines 27-29) presents doubts about feasibility and other risks of CO2 removal. This should be mentioned already here in the SPM. [Andrea TILCHE, Belgium]	Taken into account - text revised. The contributions of CDR have been clarified in bullet C2.2, which is before this section.
29142	14	24	14	26	This is the first time that the term "CO2 removal" is used, therefore it would be helpful to explain is, see Ch 2.3.1. Is there a difference between "CO2 removal" and "active CO2 removal"? [Germany]	Taken into account - text revised. The contributions of CDR have been clarified in bullet C2.2. The word "active" was used to imply that this is due to human activities.
36302	14	24	14	29	Consider deleting entire part of para starting from “and/or more CO2 removal” to the end of para. [India]	Taken into account - text revised. The entire text was thoroughly edited and revised.
40936	14	24	14	25	net CO2 removal or CO2 removal? [Neelam Singh, United States of America]	Taken into account - text revised. It would be net CO2 emissions, but not necessarily net removal. The contributions of CDR have been clarified in bullet C2.2
49514	14	24	14	27	Caveats that are discussed on carbon removals, such as land-use competition or efficiency, should also be mentioned here. The pathways of removal, a-and reforestation and CDR/BECCS should be mentioned here, including the current state of knowledge. [Karlheinz ERB, Austria]	Rejected. The CDR trade-offs have been clarified in bullets of C2.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
49516	14	24	15	24	The statement is wrong. C removal is not accelerating the declinen of emissions, but slowing the increase of carbon stocks in the atmosphere [Karlheinz ERB, Austria]	Noted. It accelerates the decline of net emissions, while it does not affect gross emissions.
21624	14	26	14	26	Change "global mean temperature of" -> "global mean temperature rise of" [Sweden]	Accepted. The entire text was thoroughly edited and revised.
30046	14	26	14	26	One does not want to "achieve" a global mean temperature of 1.5°C. Beter formulate it as "to limit global mean temperature to a 1.5°C warming". [France]	Accepted. The entire text was thoroughly edited and revised.
49518	14	26	14	27	This statement makes it sound like there would be technologies in place and model reality - reformulate, e.g. to "scenarios without active additional C removals are not feasible within 1,5° and overshoot...") It is important to state that active removel needs to be additional, because already in the today accounts, terrestrial sinks are occuring and important. And, furthermore, I wonder if there is any scenario that can avoid overshoot, given the dynamics illustrated in Figure 1.2 (chapter1) - The circumstances of such a 1,5° scenario without overshoot certainly require a special mention in the SPM, including specific model assumptions and constraints for such a scenario (beyond what is written on pg15ln5ff [Karlheinz ERB, Austria]	Taken into account - text revised. Just like CO2 emissions, CDR refers to the removals due to human activities. Terrestrial and other natural sinks are not counted towards CDR. So by definition it is additional.
4442	14	3	14	32	Add explanation what equilibrium climate sensitiviey has been used for this calculation. [Mitsutsune Yamaguchi, Japan]	Not Applicable - no longer included in the chapter. This statement has been edited so that this comment doesn't apply anymore.
5466	14	3	14	32	This conclusion excludes the use of SRM. Suggest adding at the end "through the reduction in emissions and the growth of sinks." [Haroon KHESHGI, United States of America]	Rejected. SRM is not considered a mitigation option, so this clarification would not be required here. At the same time, the statement was thoroughly edited.
9130	14	3	14	32	This very important sentence is very deceptive. Agaiin, this 66% likelihood figure is unknowable, and is really just a state about the distribution of climate model results. But the statement is even more deceptive because the sentence starts by saying "based on integrated assessment models", without informing the reader that all those models assume continued population and GDP growth, etc., which the world could change relative to those assumptions if it really wanted to. The world could also enact various emergency measures to cut down on GHG emissions very quickly, in ways in which the models do not capture. Since we don't know the likelihood of any of those things happening, we can't know the likelihood at staying below 1.5 degrees C without overshoot. This sentence simply seems designed to promote pessimism throughout the world. Similarly, the sentence on page SPM-4, lines 6-7, cannot be known to be true or false. IAM-type modeling simply reflects the biases and assumptions of the modelers, and not any objective probabilities about the world. For example, we don't know the probability of any particular GDP or population growth scenario. [Richard Rosen, Germany]	Rejected. The statement clearly indicates that based on "current policies" and the emissions implied by those until 2030 and beyond. This entire section has been edited and the statement does not appear anymore as such.
9482	14	3	14	32	'Based on integrated assessment models, historical emissions, current policies and patterns of investment have already placed scenarios limiting warming below 1.5°C without overshoot with at least 66% likelihood out of reach. (medium confidence). {2.1.3, 2.3.2, 2.5.1, 2.5.2}' The statement is vague, should be reformulated. [Russian Federation]	Taken into account - text revised. This entire section has been edited and the statement does not appear anymore as such.
11338	14	3	14	32	would it be possible to add when other likelihood levels of 1.5C will be out of reach (under current emissions/NDCs) under other interpretations/likelihoods? [United Kingdom (of Great Britain and Northern Ireland)]	Rejected. This level of detail was not possible to include in the SPM.
15548	14	3	14	32	The finding summarised by this point is significant and important but is lost in the overly complicated sentence use to communicate it. Suggest simplifying. E.g. "Most scenarios that have a high chance (above 66%) of limiting warming to low 1.5oC without overshoot, are already out of reach, according to analyses of integrated assessment models, historical emissions, current policies and patterns of investment. " [Australia]	Taken into account - text revised. The statement was edited and included at a higher level in "Fulfilling the current pledges under the Paris Agreement (known as Nationally-Determined Contributions or NDCs) will still result in global warming of more than 1.5°C, with associated risks and adaptation challenges"
18972	14	3	14	32	Probably the most important statement of the report- but somewhat awkwardly placed (neeeds to be elevated) and formulated. [Andrea TILCHE, Belgium]	Taken into account - text revised. The statement was edited and included at a higher level in "Fulfilling the current pledges under the Paris Agreement (known as Nationally-Determined Contributions or NDCs) will still result in global warming of more than 1.5°C, with associated risks and adaptation challenges"
18974	14	3	14	32	We suggest to start the sentence with "Historical emissions, …" and to conclude it as "…out of reach, as shown by integrated assessment models." [Andrea TILCHE, Belgium]	Taken into account - text revised. The statement was edited and included at a higher level in "Fulfilling the current pledges under the Paris Agreement (known as Nationally-Determined Contributions or NDCs) will still result in global warming of more than 1.5°C, with associated risks and adaptation challenges"
19236	14	3	14	32	The sentence presents composition problems, resulting in unclear meaning. The same statement appears in section SPM1.2 (page 4, lines 6-7) with a better structure and meaning. [Spain]	Taken into account - text revised. The statement was edited and included at a higher level in "Fulfilling the current pledges under the Paris Agreement (known as Nationally-Determined Contributions or NDCs) will still result in global warming of more than 1.5°C, with associated risks and adaptation challenges"
29144	14	3	14	32	This bullet could become a headline statement. Please remove redundancy with page 4 line 6-7. [Germany]	Taken into account - text revised. The statement was edited and included at a higher level in "Fulfilling the current pledges under the Paris Agreement (known as Nationally-Determined Contributions or NDCs) will still result in global warming of more than 1.5°C, with associated risks and adaptation challenges"
29590	14	3	14	32	is this bullet better placed in section 3.2? Would this bullet point belong to one of the headline boxes? The formulation in the high level statements is good. [Finland]	Taken into account - text revised. The statement was edited and included at a higher level in "Fulfilling the current pledges under the Paris Agreement (known as Nationally-Determined Contributions or NDCs) will still result in global warming of more than 1.5°C, with associated risks and adaptation challenges"

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31218	14	3	14	3	We would appreciate clarification on what "current policies" include. It would be helpful for policy makers if the SPM could be explicit whether "current policies" refers to NDCs or if it represents other policies. [Japan]	Taken into account - text revised. The text now clarifies that it is the fulfilment of the NDCs that is meant here.
31220	14	3	14	32	The position of the phrase "with at least 66% likelihood" in this paragraph is confusing because it is too close to the phrase "out of reach". Please consider using the explanation "pathways with at least a 66% likelihood of holding global warming below 1.5°C are out of the reach" in Chapter 2. [Japan]	Taken into account - text revised. This entire section has been edited and the statement does not appear anymore as such.
32612	14	3	14	32	Had to read this a couple of times and still not sure I understand. How about: "Historical emissions, current policies and patters of investment mean that scenarios limiting warming below 1.5ºC without overshoot are already out of reach with a 66% likelihood, based on integrated assessment models." ? [Jonathan Lynn, Switzerland]	Taken into account - text revised. This entire section has been edited and the statement does not appear anymore as such.
32912	14	3	14	32	Is it not then also true that there is a 33% chance that 1.5°C is still within reach? It seems that there has been a specific choice made here in terms of framing that will impact how media and others interpret this report. I think both the likeliness and unlikeliness of holding temperatures below 1.5°C should be presented. [Thomas Damassa, United States of America]	Taken into account - text revised. This entire section has been edited and the statement does not appear anymore as such.
36608	14	3	14	32	Mention is made of below 1.5C with 66% probability is out of reach but IAM do have below 1.5C with 50% probability within reach and this should be included in the SPM [Snaliah Mahal, Saint Lucia]	Rejected. This entire section has been edited and the statement does not appear anymore as such.
38954	14	3	14	32	I think this bullet fits better earlier in this section and should be lifted up [Jan Fuglestvedt, Norway]	Taken into account - text revised. The statement was edited and included at a higher level in "Fulfilling the current pledges under the Paris Agreement (known as Nationally-Determined Contributions or NDCs) will still result in global warming of more than 1.5°C, with associated risks and adaptation challenges"
38540	14	3	14	32	Based on should be substitute with "According to". IAM are models mostly produced well before the Paris Agreement, largely ignoring its architecture and the use of non-market mechanisms, including direct ban of certain technologies. None of them include e.g. a diesel ban, which is already a city-level policy which might in principle lead to a diesel phase-out. They have been incapable of capturing the take off of renewables and they contain very conservative estimate of EVs, reflecting the view of legacy manufacturers. Moreover the respect this sentence pays to "patterns of investment" is undeserved. If some coal plant recently constructed has to be closed down, giving rise to a stranded asset hurting its investor, let it be. We don't care about the pain of the polluter. For a bibliographic reference of failures of IAM in capturing innovation dynamics see "Complexity and the Economics of Climate Change: a Survey and a Look Forward". T. Balint, F. Lampert, A. Mandel, M. Napoletano, A. Roventini, and A. Sapio - http://www.lem.sssup.it/WPLem/files/2016-29.pdf A second reference (stating e.g. "to give policymakers the reliable information that they need when implementing the Paris agreement, incremental improvements to the present generation of IAMs may not be enough) is Stern, 2016, https://www.nature.com/news/economics-current-climate-models-are-grossly-misleading-1.19416 [Valentino Piana, Italy]	Not Applicable - no longer included in the chapter. These are indeed limitations of the scenarios produced with IAMs, but not necessarily of the IAMs per se. The entire section, however, was edited so that this statement does not appear anymore.
41282	14	3	14	32	This sentence appears to be inconsistent with the statement in the orange box above ("Some pathways hold warming below 1.5degC throughout the 21st century"). Please reconcile them. [Michio Kawamiya, Japan]	Taken into account - text revised. The orange box that was located above has been removed and the text of the section edited for clarity.
41466	14	3	14	32	Perhaps: "Based on integrated assessment models, historical emissions, current policies and patterns of investment, scenarios limiting warming below 1.5°C without overshoot are with at least 66% likelihood out of reach." or "Integrated assessment models, historical emissions, current policies and patterns of investment have already placed scenarios limiting warming below 1.5°C without overshoot with at least 66% out of reach" [Maria Pia Carazo Ortiz, Germany]	Not Applicable - no longer included in the chapter. This entire section has been edited and the statement does not appear anymore as such.
51152	14	3	14	32	Given that such emphasis is placed on IAMs, there are important policy decisions associated with the use of key numerical parameters for the scenarios that need to be made transparent. This is especially so because policy makers and the broader public are unaware of the large degree to which the choice of numerical parameters determines the oucome of scenarios. Most importantly, the discount rate has a great impact on what is perceived to be cost-effective mitigation, and a high discount rate will incentivise postponing mitigation investments into the future. A range of discount rates should be modelled to illustrate its importance for the scenario outcomes. Cost-effective mitigation is a societal imperative, not a matter of private profit or loss. [Linda Schneider, Germany]	Taken into account - text revised. The statement on whether current NDCs are consistent with 1.5°C of warming has been updated and is now independent from the assessment with IAMs. The IPCC does not model pathways in itself. It assesses the available literature. So the request by the reviewer cannot be accommodated.
52700	14	3	14	32	This formulation seems to be positive as compared to what was used on page 4, lines 6-7 and in line with Table SPM 1. [Iulain Florin VLADU, Germany]	Noted. Unclear what action is expected.
55384	14	3	14	32	This is an important statement but could be misread - do you mean that scenarios with "1.5 without overshoot with 66% likelihood" are out of reach, or do you mean "1.5 without overshoot" is out of reach with 66% likelihood? Clarify. [Andy Reisinger, New Zealand]	Taken into account - text revised. The level of precision of the statement has been reduced as this was not warranted by the available evidence.
53474	14	3	14	32	Sentence is somewhat overstating the findings. "placed out of reach" sounds very definitive, which is not consistent with the "medium confidence" statement or the underlying chapter. I suggest rewording to something like this: "Integrated assessment modeling exercises were not capable of producing scenarios limiting warming below 1.5°C without overshoot with at least 66% likelihood based on historical emissions and a continuation of current policies and patterns of investment scenarios." [Christian Holz, Canada]	Taken into account - text revised. This entire section has been edited and the statement does not appear anymore as such. The messages in the entire D1 bullet are now better building on the underlying chapter, including the assessment of the remaining carbon budget.
58242	14	3	14	32	I don't understand this entire sentience. Perhaps missing a such as "research" or "studies" prior to "have already placed" [Peter Marcotullio, United States of America]	Noted. This entire section has been edited and the statement does not appear anymore as such.

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19408	14	32	14	32	Please add here the full reference from the underlying chapter (Chapter 2. Page 11. Row 29) that includes the comparison to the 2°C threshold too. For example, the following way: "Based on integrated assessment models, historical emissions, current policies and patterns of investment have already placed scenarios limiting warming below 1.5°C without overshoot with at least 66% likelihood out of reach, as well as scenarios with at least 90 % likelihood of staying below 2°C . [Jennifer Morgan, Netherlands]	Accepted. Full references and line of sight have been added.
40754	14	32	14	32	Sense: after 'likelihood' insert 'to be' before 'out of reach' [Liese Coulter, Australia]	Noted. This entire section has been edited and the statement does not appear anymore as such.
4262	14	34		36	This text repeats an idea that has been stated already more than once (see lines 11-14 in the same page). Delete? [Abanades Carlos, Spain]	Accepted. Text has been removed
5468	14	34	14	36	This statement does not appear to be true (contingent on the definition of risk which is ambiguous and perhaps misused here). For example, if on is on a pathway to 2C, the likelihood of arriving below 1.5 would be increased (not decreased) due to uncertainty. Suggest omitting this paragraph. [Haroon KHESHGI, United States of America]	Noted. This entire section has been edited and the statement does not appear anymore as such.
9084	14	34	14	34	It should be mentioned that, beyond uncertainties, solar radiative forcing that induced cold or warm periods during the past centuries were of a few tenths of W/m2, compared with the 2.6 to 8.5 W/m2 of the RCP scenarios. [Frédéric Durand, France]	Rejected. This information is not available in the assessment of the underlying report.
34364	14	34		36	The statement says that uncertainites in feedbacks increase the risk of exceeding 1.5C for a given emissions scenario. This statement is presumably in comparison to the risk in climate model simulations for a given emissions scenario. But, if this statement is made with reference to the CMIP5 simulations, this is not the case based on a comparison of past simulated and observed warming. IPCC AR5 WGI pg 884 notes 'Overall there is some evidence that some CMIP5 models have a higher transient response to GHGs and a larger response to other anthropogenic forcings... than the real world (medium confidence).' Additional clarification is required. [Nathan Gillett, Canada]	Not Applicable - no longer included in the chapter. Text has been removed
14220	14	34	14	36	It is not clear how does uncertainities increases the risk of global warming exceeding1.50C [United Republic of Tanzania]	Noted. This entire section has been edited and the statement does not appear anymore as such.
15550	14	34	14	36	Please clarify (i) what is meant by earth system feedbacks; (ii) why the uncertainties only increase the risk of exceeding 1.5C. Is this because the uncertainties are all on the positive feedback side? If the latter is the case then why aren't these uncertainties built into the 'best estimate' so as to make the uncertainties 'neutral' on likelihood of achieving 1.5C? [Australia]	Taken into account - text revised. The impact of additional Earth System feedbacks is highlighted under bullets C1 of the revised SPM.
18976	14	34	14	36	Can this statement be connected to the previous one: because not all RF's and feedbacks have been appropriately addressed, the likelyhood of not reaching is even higher than 66 %??? [Andrea TILCHE, Belgium]	Noted. This entire section has been edited and the statement does not appear anymore as such.
30048	14	34	14	36	Would it be possible to clarify this sentence ? [France]	Noted. This entire section has been edited and the statement does not appear anymore as such.
32802	14	34	14	36	Uncertainties are symmetrical. This means that they could increase the risks, but they could also decrease them. A better text might read "Uncertainties remain in radiative forcings and Earth system feedbacks. For a given emission scenario, these uncertainties may increase or reduce the time taken to reach 1.5 deg C above pre-industrial temperatures." [Philip Lloyd, South Africa]	Rejected. Uncertainties are not symmetrical. For example, Earth System feedback uncertainties have the tendency to increase warming rather than support a cooler response.
42854	14	34	14	36	Some of the Earth system feedbacks—like CO2 and methane released from thawing permafrost—are not fully reflected in the models. [Kristin Campbell, United States of America]	Noted. This entire section has been edited and the statement does not appear anymore as such. However, this aspect has been taken up under statement C1
42904	14	34	14	36	Some of the Earth system feedbacks—like CO2 and methane released from thawing permafrost—are not fully reflected in the models. [Durwood Zaelke, United States of America]	Noted. This entire section has been edited and the statement does not appear anymore as such. However, this aspect has been taken up under statement C1
46182	14	34	14	36	Is it possible to give an example of radiative forcings here? [Netherlands]	Noted. This entire section has been edited and the statement does not appear anymore as such.
59188	14	34	14	36	This is an important source of uncertainty and should be quantified and contextualized. The statement "...these uncertainties increase the risk of global warming exceeding 1.5°C" could be confusing to a reader who is not a statistical expert. The statement as written seems to imply that the uncertainties make it more likely that the rise would be more than 1.5°C, than less than 1.5°C. Since the uncertainties mean that there could also be a warming of less than 1.5°C, the statement would be better rephrased as "... these uncertainties mean that global warming could either further exceed 1.5°C, or not reach 1.5°C at all." [United States of America]	Noted. This entire section has been edited and the statement does not appear anymore as such. The uncertainties are now highlighted in the section on the remaining carbon budget under C1.
59190	14	34	14	36	Uncertainties aren't increasing the risk of exceeding 1.5°C but, rather, the uncertainties are decreasing our ability to predict the bounds of possible temperature futures from a given emission scenario. [United States of America]	Noted. Decreasing our ability to predict the bounds of possible temperature futures increases risks.
29146	14	35	14	35	Should the word "risk" be replaced by "probability"? [Germany]	Noted. This entire section has been edited and the statement does not appear anymore as such.
55386	14	35	14	35	replace "risk of" with "likelihood that…" - you're not assessing risk here in the glossary sense. [Andy Reisinger, New Zealand]	Noted. This entire section has been edited and the statement does not appear anymore as such.
30050	14	38			Overall comment on SPM3.2. : Carbon budgets are a really important concept. However, it is difficult to understand it as presented here. [France]	Taken into account. We have changed how we describe carbon budgets and only give one budget in the revised text - until the time of zero CO2 emissions.
432	14	38	14	43	HS 3.2 is purely definitional. There is nothing in this statement that makes it a HS. Put entire text into a footnote. [Thomas Stocker, Switzerland]	Taken into account. This is no longer a headline - headlines now focus on new findings

Comment No	From Page	From Line	To Page	To Line	Comment	Response
676	14	38	14	43	Statement 3.2 says "They also account for changes in non.CO2 climate forcers, such as methane and aerosols.". This poses a problem because the radiative forcing of most aerosols is negative, therefore their reduction will lead to warming. For instance, in page 15, lines 18 to 20, it refers to non-CO2 climate drivers, linking their reduction to fulfillment of 1.5ºC scenarios. Such statement is not true if aerosols in general are included in "non-CO2 climate drivers". A better term for page 14, line 41 would be "black carbon", with positive radiative forcing, as it is done in page 17, line 4 (statement 3.3) [Francisco Molero, Spain]	Taken into account - text revised. Aerosols to still affect budgets but text is clarified. Black carbon is highlighted in figure SPM3
8052	14	38	14	43	Isn't is strange to put a definition as a highlight? The bullet point page 15, line 18, has been chosen as a key higlight of the entire report, but is not even mention in the highlight of the section… [Quentin Perrier, France]	Taken into account. This is no longer a headline - headlines now focus on new findings
9484	14	38	14	43	It is not a statement, it is a definition. Therefore it should be placed in the glossary. [Russian Federation]	Taken into account. This is no longer a headline - headlines now focus on new findings
10214	14	38	14	39	Sentence limiting the scope of the Carbon Budget definition that extends to GHGs and not only CO2 [Saudi Arabia]	Rejected. Not clear what this comment means
10944	14	38	14	39	Sentence limiting the scope of the Carbon Budget definition that extends to GHGs and not only CO2 [Nedal KATBEHBADER, Switzerland]	Rejected. Not clear what this comment means
18978	14	38	14	43	This looks more as an explanation than as a statement. It can however be re-formulated as a statement. [Andrea TILCHE, Belgium]	Taken into account. This is no longer a headline - headlines now focus on new findings
18980	14	38	15	21	In contrast to the impacts section, this is a quite informative section. It may be useful to include statements about:how is these numbers changing compared to the AR5 peak/return budgets? Consistent, more stringent, more flexible? It would be useful to include in the table the 'time left' information like in the second bullet, possibly also what these periods are when DNC's conditional unconditional are implemented. [Andrea TILCHE, Belgium]	Taken into account - text revised. Added footnote on AR5 differences
29148	14	38	16	21	We strongly suggest the authors revise section 3.2 completely in order to more clearly present the implications of the remaining carbon budget for 1.5°C. The entire section 3.2 is currently too technical, and does not bring forward relevant content. The current headline statement contains definitions rather than a policy-relevant statement on the size of the remaining carbon budget for 1.5°C, which would be expected from this section, and is also repeated almost verbatim in the first bullet. We recommend for the authors to find a formulation that allows a statement about the order of magnitude of the remaining Carbon budget for 1.5°C in the headline statement, and list the more technical details of the assessment below in the bullets below, as is customary. The Carbon budget concept has already been introduced in the Background section (for clarity, it would be useful to also use the term "carbon budget" in Section 1). We would also prefer to see a short explanation as to why the budget concept and ranges given here have changed from those given in AR5, and whether it is expected that we see further (significant) change towards AR6 as science progresses. In this context it may be helpful to frame a finding as preliminary if the surrounding uncertainties are large and give rise to the expectation of further change. We'd also suggest to merge the bullets p 15 ln 18 ff. and p 15 ln 10, leading with what is currently the last bullet, and editing the first bullet for clarity and readability, reflecting a level of detail more appropriate for a SPM-level statement. We also recommend to delete Figure SPM4, which is too technical and potentially misleading for the SPM. Please also add the notion that current uncertainties are likely to rather decrease than increase the budget in the future (as per Chapter 2 ES: Remaining uncertainties in the Earth system, including feedbacks and radiative forcings, primarily 5 increase rather than decrease the risk of exceeding 1.5°C of warming (medium confidence).) [Germany]	Taken into account - text revised. We have clarified the budget concepts with a single peak budget and a budget that accounts for Earth system feedbacks to 2100
29150	14	38	16	21	The fact that uncertainties in the Earth system are expected to rather increase than decrease the risk of exceeding 1.5C (as stated in ES of Chapter 2, p 5 ln 4) should be included in this SPM section on Carbon budgets. [Germany]	Taken into account - text revised. We have clarified the budget concepts with a single peak budget and a budget that accounts for Earth system feedbacks to 2100
30052	14	38	14	43	This is more a definition than a headline. This important message should appear in a specific SPM Box named "Definitions of carbon budget used throughout this report" The figure of 12-16 years for an exhaustion of carbon budget if emissions were to continue at 2015 levels could be highlighted here instead. [France]	Taken into account. This is no longer a headline - headlines now focus on new findings
31222	14	38	15	28	The term "carbon budget" is a word with many meanings. As the word “carbon budget” will be taken up for the first time in the IPCC Glossary, it is requested that the description should not only focus on the differences between the four terms (TEB, TAB, TPB and TRB) but also should define the respective terms carefully and clearly in the Glossary. [Japan]	Taken into account - text revised. We have clarified the budget concepts with a single peak budget and a budget that accounts for Earth system feedbacks to 2100
32914	14	38	14	43	This box should be rewritten. As is, it provides only contextual information about carbon budgets, rather than a key finding. Suggested key points from the bullets that follow that shoud be reworked and included in this box instead include: "This budget would be exhausted in 12-16 years if emissions were to continue at 2015 levels, and thus it would be impossible, at that point, to limit global warming to 1.5oC without overshoot" & "If emissions of non-CO2 climate drivers are not significantly reduced, there is a higher than 66% likelihood that global temperature will exceed 1.5°C, even with the most stringent CO2 mitigation considered in 1.5°C scenarios." [Thomas Damassa, United States of America]	Taken into account. This is no longer a headline - headlines now focus on new findings
33494	14	38	14	43	agree important to have this concept somewhere but it seems more definitional rather than a headline statement. (could also say the same with the following bullets) [Stephen Cornelius, United Kingdom (of Great Britain and Northern Ireland)]	Taken into account. This is no longer a headline - headlines now focus on new findings

Comment No	From Page	From Line	To Page	To Line	Comment	Response
33828	14	38	14	39	We prefer the use of the term "carbon budget" as opposed to "cumulative CO2 emissions". [Norway]	Taken into account. Section reworded to talk about carbon budgets
33830	14	38	14	43	Please reconsider this statement, as the information provided is more suited as background information. Key statement should be on the key results, for example a more useful formulation as a highlighted statement could be, "Without significant reductions in non-CO2- climate drivers, it is likely that global temperatures will exceed 1.50 C even with the most stringent CO2 mitigation. The carbon budget associated with scenarios that limit warming below 1.50 C will be exhausted in 12-16 years if emissions were to continue at 2015 levels." [Norway]	Taken into account. This is no longer a headline - headlines now focus on new findings
36304	14	38	14	43	“Carbon budgets may refer to cumulative emissions from 2016 until peak warming or until warming returns to 1.5°C after a temporary overshoot " IPCC (2014) has assessed carbon budgets from pre-industrial times. This report has been used to change that definition. Future remaining carbon is important, however the reference to historical emissions should not be erased as is done in this report. It is suggested that this definition be modified to include the original definition of the carbon budget first. [India]	Taken into account. The report makes an assessment of remaining budgets but does not go into detail of budget to-date. Therefore SPM targets remaining budgets
39322	14	38	14	43	We think that the use of the Carbon Budget "family" of concepts is a step forward of this SR1.5. But, we would prefer to start this introduction defining the concept of the GLOBAL CARBON BUDGET as the total amount of emissions (from 2016 onwards) compatible with a specific goal of temperature stabilization. This allows us to use more properly the words Carbon Budget as the cumulative emissions in a determined time period (for instance from 2016 until peak warming, or until warming returns to 1.5°C after a temporary overshoot). We would like to propose a fully change in the redaction of this box that could be written in the following way: 3.2 Cumulative future global CO2 emissions compatible with avoiding a given level of final global warming expressed by a specific final level of temperature increase (1,5°C, 2°C, 3°C, …) are often referred to as Global Carbon Budgets. Global Carbon Budgets depend on the likelihood of avoiding a given level of global warming, a given final increase in temperature. They also account for changes in non-CO2 climate forcers, such as methane and aerosols. In this SR1.5 Global Carbon Budgets will be referred as cumulative emissions from 2016 onwards. In this context will be very useful to talk about the concept of Carbon Budget. For example, the cumulative emissions that the world, or some states or group of them, would use, or would release to the atmosphere, in a determined period of time must be called the Carbon Budget used in this period. The emission pathway that the world or some states or group of them would follow in this period of time is clearly interrelated with the corresponding Carbon Budget. [Olga Alcaraz, Spain]	Taken into account - text revised. We think the remaining carbon budget is less confusing so have retained this wording
43784	14	38	14	43	Cumulative future CO2 emissions compatible with avoiding a given level of global warming are often referred to as carbon budgets [but are not reliable to limit warming to 1.5° C with any high level of certainty]. [Peter Carter, Canada]	Taken into account - text revised. Text clarified to talk about uncertainty
43786	14	38	14	43	Carbon budgets .... They [may] also account for changes in non-CO2 climate forcers, such as methane and aerosols. [However carbon budgets are not valid for policy making because the evidence is there is no so-called allowable carbon budget left. Because it is more likely than not some CO2 will have to be removed from the atmosphere it follows there is no allowable budget more carbon into the atmosphere. This is further substantiated by observations already documented in this review that of the following accelerating data, global surface warming, atmospheric carbon dioxide concentration, ocean acidification and ocean deoxygenation. It is further substantiated as documented there is evidence that the terrestrial carbon sink is losing efficiency with the Arctic switching from carbon sink carbon source. Carbon budgets do not account for ocean heating ocean acidification or ocean deoxygenation, nor reduced efficiency of carbon sinks nor increased emissions from the several enormous sources of greenhouse gas feedback emissions.] [Peter Carter, Canada]	Taken into account. Text clarified that C budget is the scope of this section. Section 2 deals with wider impacts
43788	14	38	14	43	Carbon budgets may refer to cumulative emissions from 2016 until peak warming or until warming returns to 1.5°C after a temporary overshoot.[Carbon budget calculations make no difference to the fact that to limit warming to 1.5° C requires the immediate decline of global emissions. The concept of the carbon budget for his an extremely dangerous substitute for a limit to atmospheric greenhouse gas concentrations, which is the required metric in the 1992 framework convention on climate change, and may be used by governments as an excuse to continue on with business as usual economics, energy and emissions.] [Peter Carter, Canada]	Taken into account - text revised. The new headline focuses on emission reduction requirements
46184	14	38	14	43	The notion of 'carbon budget' was an important one in the previous IPCC reports. Is it possible to give an indication of where we are with 'spending' the carbon budget or what the current rate of CO2 emission is over the past year-5-years? This give a better indication of the remaining carbon budget and the speed at which it is being spent. [Netherlands]	Taken into account - text revised. Carbon budgets are placed in wider context in the revised text
50014	14	38	14	43	The headline for the budget item should be replaced by the text from the headline in 1.2 (that item to be deleted there altogether as suggested in my comments on the background section 1), which is much better and more clearly reflecting the key issues. In the bullets following the headline the two different approaches for the overshoot and non-overshoot pathways can be discussed. They do not need to be in a headline. [Bert Metz, Netherlands]	Taken into account. This is no longer a headline - headlines now focus on new findings
51358	14	38	14	43	While I welcome the carbon budget details provided, the entire coverage only refers to future budgets - it does not present information about the budget exhausted due to historical CO2 emissions. Provision of this information is needed to better place future budgets in context of the Convention. [Anand Patwardhan, United States of America]	Taken into account. The report makes an assessment of remaining budgets but does not go into detail of budget to-date. Therefore SPM targets remaining budgets

Comment No	From Page	From Line	To Page	To Line	Comment	Response
52956	14	38	15	31	This is a very important section it may need further devlopment for clarity [Ireland]	Taken into account - text revised. We have clarified the budget concepts with a single peak budget and a budget that accounts for Earth system feedbacks to 2100
54746	14	38	14	43	I see the last sentene refers to defintion, but I would say something more clearly like "carbon budgets depend on likelihood…, non-CO2…, and defintion". [Glen Peters, Norway]	Taken into account - text revised. Text substantially altered
55582	14	38	14	38	Headline 3.2: this is a description, but not a key conclusions and does not warrant a headline. [David Cooper, Canada]	Taken into account. This is no longer a headline - headlines now focus on new findings
57144	14	38	15	3	The definition of TRB does not seem to provide all the relevant information : it would also be important to know the peak budget in overshoot scenarios, as the possibility to have a larger budget (than without overshoot) at some point in time is the rationale for such scenarios? [Philippe Marbaix, Belgium]	Taken into account - text revised. We have clarified the budget concepts with a single peak budget and a budget that accounts for Earth system feedbacks to 2100
58648	14	38	14	43	A definition of carbon budgets does not seem like a useful headline statement for policy makers [New Zealand]	Taken into account. This is no longer a headline - headlines now focus on new findings
59192	14	38	14	47	The term "carbon budget" as defined here is not familiar. The "cumulative future CO2 emissions compatible with a given level of warming" seem to be cumulative emissions that lead to a target level of warming, such that these emissions would be lower if the target is 1.5 vs 2°C. Maybe the definition can be improved and still use "carbon balance" – a balance because the warming depends on both emissions as well as sequestration. [United States of America]	Taken into account - text revised. Text revised to be clearer on budget concept
59194	14	38	14	43	This text should focus less on explaining the general concept of a carbon budget; it should be replaced with a stronger statement reflecting what carbon budgets would have to be achieved to meet a 1.5°C target and the feasibility of those budgets. [United States of America]	Taken into account. This is no longer a headline - headlines now focus on new findings
62250	14	38	14	43	The reasons for the differences in the threshold peak budget and threshold return budgets are not clear, and more explanation should be provided for policy-makers in the subpoints of Key Message 3.2 and Table SPM1. [Shaye Wolf, United States of America]	Taken into account - text revised. Only a single budget concept is used in revised text
63064	14	38	15	3	As it is, the information on carbon budget is very confusing. Policymakers need an explanation of the most important aspects of carbon budgets, in layman language; this is quite complex, so we have the impression that any detail has to be provided trough links to the technical summary and report. [Belgium]	Taken into account - text revised. We have clarified the budget concepts with a single peak budget and a budget that accounts for Earth system feedbacks to 2100
11340	14	4	14	4	they also account…. What do you mean by this? [United Kingdom (of Great Britain and Northern Ireland)]	Taken into account - text revised. Text revised to be clearer on budget concept
29400	14	4	14	4	How can the sentence "Carbon budgets depend on the lieklihood of avoiding a given level of global warming." be expressed more clearly? Do the budgets depend on the given level of global warming or on the likelihood that this warming can be expected with? [Susanne Droege, Germany]	Taken into account - text revised. Text revised to be clearer on budget concept
34366	14	41		43	This is poorly expressed. Suggest 'Carbon budgets may refer to cumulative emissions from the present until a given temperature threshold is reached, or until warming returns to a threshold after a temporary overshoot'. [Nathan Gillett, Canada]	Taken into account. We have changed how we describe carbon budgets and only give one budget in the revised text - until the time of zero CO2 emissions.
30054	14	41	14	41	Other non-CO2 climate forcers could be cited along methane and aerosols, such as N2O [France]	Taken into account - text revised. We mention the most important gases in the revised text
63066	14	41	14	43	A definition, such as the definition of carbon budget here, is not something we expect to find in a box devoted to headline statements, unless there is some concrete information. [Belgium]	Taken into account. This is no longer a headline - headlines now focus on new findings
5470	14	42	14	42	suggest replacing "1.5C" with "a given level of global warming" since the budgets that follow refer to both 1.5 and 2 with different likelihoods. [Haroon KHESHGI, United States of America]	Accepted - text revised. Text is now clearer on this
11342	14	42	14	42	…cumulative emissions from 2016…. Clarify that this is the starting year chosen in this report. Carbon budgets could start from any year. [United Kingdom (of Great Britain and Northern Ireland)]	Accepted - text revised. Start date now clarified
8050	14	45	14	45	The interest of having two different carbon budgets should be explained right on: because the retroaction of natural sinks is different if there is an overshoot! So the linear relationship between temperature and carbon is only a first-order approximation, not accurate enough to study 1,5°C [Quentin Perrier, France]	Taken into account - text revised. We have clarified the budget concepts with a single peak budget and a budget that accounts for Earth system feedbacks to 2100
11344	14	45	15	15	Unfortunately, the introduction of two types of carbon budget brings the risk of confusion for readers in the absence of a simple explanation of the basic concept beforehand. Also, it's not clear what the implications of choosing one or the other might be. This section might benefit from a small and simple illustration showing the differences in the two carbon budgets. Also, a clearer explanation of why threshold return is different from threshold peak would be useful. [United Kingdom (of Great Britain and Northern Ireland)]	Taken into account - text revised. We have clarified the budget concepts with a single peak budget and a budget that accounts for Earth system feedbacks to 2100
38956	14	45	14	45	I think "treshold peak budget" should be in bold [Jan Fuglestvedt, Norway]	Taken into account - text revised. We have clarified the budget concepts with a single peak budget and a budget that accounts for Earth system feedbacks to 2100
39324	14	45	16	19	According our before proposal we now propose to change, in all this section, the words: "Carbon Budget" for the words "Global Carbon Budget" [Olga Alcaraz, Spain]	Accepted - text revised. We have made clear that C budget is global
43790	14	45	14	47	DELETE [Peter Carter, Canada]	Taken into account - text revised. We have clarified the budget concepts with a single peak budget and a budget that accounts for Earth system feedbacks to 2100
50016	14	45	16	21	The sequence of the bullets under the budget headline could be as follows: (1) explaining the two approaches, but simplifying the explanation to make clear that this is only because the overshoot scenarios require a different approach); (2) quantifying the CO2 budget, but not only for the non-overshoot case (as is done now) , but also for the two overshoot cases (the 50 and the 66% probability); (3) the first sentence of the second bullet now under 3.1; (4) the current third bullet under 3.2, but simplifying the language and adding the considerations for the 66% probibilty case and deleting or simplifying figure SPM4; (5) the current fourth bullet under 3.2; [Bert Metz, Netherlands]	Taken into account - text revised. We have clarified the budget concepts with a single peak budget and a budget that accounts for Earth system feedbacks to 2100

Comment No	From Page	From Line	To Page	To Line	Comment	Response
56496	14	45	15	3	The nuance between these two types of budgets will be difficult to grasp for many. Could a simple illustration be included to help highlight the difference? Or maybe the description could be improved. I've read this bullet multiple times and don't think I've fully got it, though I'm familiar with carbon budgets. [Eleanor Johnston, United States of America]	Taken into account - text revised. We have clarified the budget concepts with a single peak budget and a budget that accounts for Earth system feedbacks to 2100
62704	14	45	15	8	this is extremely technical for an SPM. I am not at all convinced that both budgets need to be presented in the SPM. The difference between the two, and the reasons for them, are not conveyed, and I'm not sure are really essential to the key message being conveyed. [Greg FLATO, Canada]	Taken into account - text revised. We have clarified the budget concepts with a single peak budget and a budget that accounts for Earth system feedbacks to 2100
59196	14	45	15	3	Avoid the use of a variable end-point for the definition of a carbon budget (same comment made in Chapter 2). The budget should be defined with a fixed end-point (such as 2150). A variable end-point means that a stricter threshold that takes a long time to reach its peak can have a larger budget than a looser threshold that happens to peak quickly: see, for example, Table SPM1, where the threshold peak budgets for 2°C are larger than the threshold return budgets, when intuitively one would expect that allowing the climate to exceed a target and return should be less difficult to achieve. For an artificial example: imagine two scenarios that reach 1.9°C in 2050. In the first, the temperature peaks to 2°C in 2060, and then falls back to 1.9°C in 2070. In the second scenario, the temperature stabilizes at 1.9°C for 100 years, peaks to 2°C in 2160, and falls back to 1.9°C in 2170. These two scenarios are practically identical, but based on a budget definition that is defined by the date on which the temperature peaks, in the first scenario, the budget would be defined by the emissions until 2060, and in the second scenario, the budget would be defined by the much larger emissions until 2160. This discrepancy in budgets between two nearly identical scenarios suggests that the variable end-point definition is likely to lead to misleading results. Table 2.6 is a much clearer summary of carbon budgets, with gross emissions and total CDR through 2100 the key pairing, and the other metrics (peak net cumulative emissions, net cumulative emissions, and the CDR breakdown) to be less central but potentially interesting supporting details. [United States of America]	Taken into account - text revised. We have clarified the budget concepts with a single peak budget and a budget that accounts for Earth system feedbacks to 2100
32614	14	46	16	4	text has "1 January 2016" at 14-46 and 15-1 but table SPM 1 and figure SPM 4 legends have "the 1st January 2016" at 15-27 and 16-4 [Jonathan Lynn, Switzerland]	Taken into account - text revised. We have clarified the budget concepts with a single peak budget and a budget that accounts for Earth system feedbacks to 2100
38958	14	46	14	46	I think "treshold return budget" should be in bold [Jan Fuglestvedt, Norway]	Taken into account - text revised. We have clarified the budget concepts with a single peak budget and a budget that accounts for Earth system feedbacks to 2100
18982	15		15		The difference between peak and return budgets can be difficult to grasp for a non-specialist. It may be useful to insert Figures 2.1c & d here. [Andrea TILCHE, Belgium]	Taken into account - text revised. We have clarified the budget concepts with a single peak budget and a budget that accounts for Earth system feedbacks to 2100
19412	15				Table SPM1 If this table leaves the reader confused: why for the 2°C threshold, is the return budget smaller than the threshold budget (when it's the other way around for 1.5°C)? What is the reader supposed to conclude from it? More context is needed if the table is to stay in the SPM. [Jennifer Morgan, Netherlands]	Taken into account - text revised. We have clarified the budget concepts with a single peak budget and a budget that accounts for Earth system feedbacks to 2100
36308	15				Table SPM 1: Consider adding text on why TPB is higher in 'limiting warming to 2 degree C' as compared to TRB and the difference flips in other case. [India]	Taken into account - text revised. We have clarified the budget concepts with a single peak budget and a budget that accounts for Earth system feedbacks to 2100
41286	15	2	15	3	Both types… drivers-> With this expression, some people may misunderstand that the carbon budgets shown here are expressed in terms of so called CO2 equivalence. Wording should be improved. [Michio Kawamiya, Japan]	Taken into account - text revised. Wording clarified
59198	15	2	15	3	Need a statement regarding the treatment of negative emissions. Does the budget include negative emissions offsetting positive emissions? Can the total released to the atmosphere be greater than the budget if negative emissions subsequently reduce net total? Clarification needed. [United States of America]	Taken into account - text revised. We have clarified that budget is a net budget
59200	15	2	15	3	It needs to be indicated how the non-CO2 climate drivers are being accounted for. If done with GWP, is this analysis based on GWP-20 or GWP-100; if done in actual models that account for the different lifetimes and radiative influences, it would be useful to mention this. [United States of America]	Rejected - outside the scope of the chapter. Too technical for SPM
10216	15	5	15	8	The threshold carbon budget should be calculated for all GHG and reported in CO2eq [Saudi Arabia]	Rejected - outside the scope of the chapter. Too technical for SPM
10946	15	5	15	8	The threshold carbon budget should be calculated for all GHG and reported in CO2eq [Nedal KATBEHBADER, Switzerland]	Rejected - outside the scope of the chapter. Too technical for SPM
29152	15	5	15	28	As described in lines 2-3 on this page, both Carbon budgets account also for non-CO2 climate drivers. To avoid confusion that Carbon budgets would therefore be given in GtCO2-equivalents, footnote 5 should indicate that the numbers are given in GtCO2: "Budgets are GIVEN IN GTCO2 and ARE computed assuming that warming is limited to 1.5°C with either 50% likelihood or 66% likelihood and accounting for THE EFFECT OF non-CO2 drivers. ..." [Germany]	Taken into account - text revised. Foot notes clarified
29154	15	5	15	9	Under this bullet point a reference is given for the TPB only. Shouldn't be there an additional reference for the TRB? [Germany]	Taken into account - text revised. We have clarified the budget concepts with a single peak budget and a budget that accounts for Earth system feedbacks to 2100
34368	15	5		8	This cumulative emissions budget is substantially lower than those in three recently published studies on the subject. Millar et al. (doi:10.1038/ngeo3031) reported a 50% budget for 1.5C of 303 GtC relative to 2015 baesd on RCP 2.6 (or 1070 GtCO2 relative to Jan 2016); Goodwin et al. (doi:10.1038/s41561-017-0054-8) estimated this budget at 220 PgC relative to Jan 2017 (846 PgCO2 relative to Jan 2016); Tokarska et al. (Nature Climate Change, accepted) estimated this budget at 208 PgC, or 762 PgCO2, relative to Jan 2016. All three estimates are substantially higher than the 580 PgCO2 estimate reported here. Some description and justification of the approach on which this estimate is based would be helpful. [Nathan Gillett, Canada]	Taken into account - text revised. We have clarified the budget concepts with a single peak budget and a budget that accounts for Earth system feedbacks to 2100

Comment No	From Page	From Line	To Page	To Line	Comment	Response
36610	15	5	15	18	and thus it would be impossible, at that point, to limit global warming to 1.5oC without overshoot recommendations to remove this statement or clearly indicate that this is only if it remains at 2015 levels and with the mitigation action taken for below 1.5 there is a likelihood that it would be lowered from 2015 levels [Snaliah Mahal, Saint Lucia]	Taken into account - text revised. We have clarified the budget concepts with a single peak budget and a budget that accounts for Earth system feedbacks to 2100
39326	15	5	15	8	There is no any comment about the lack of the "Threshold peak budget" for 1.5 ºC and 66% likelihood. We think that the same kind of comment that is done in this paragraph would have to be done for a 66% of likelihood. [Olga Alcaraz, Spain]	Taken into account - text revised. We have clarified the budget concepts with a single peak budget and a budget that accounts for Earth system feedbacks to 2100
9086	15	6	15	8	This point about CO2 budget possibly exhausted in 12-16 years is one of the most important, why is it not more emphasized? [Frédéric Durand, France]	Taken into account - text revised. Statement now begins with emission reduction needs
17880	15	6	15	8	The sentence refering to the 12-16 years is a bit misleading, because it refers to 1 Jan 2016, as given in the caption. But we already have 2018, so it is rather 10-14 years. Quick readers will not understand that, see also the Reuters article on the leaked draft [Brigitte Knopf, Germany]	Taken into account - text revised. Start year clarified
30056	15	6	15	6	If it is "including non-CO2 climate drivers", shouldn't it be GtCO2eq ? [France]	Rejected - not supported by the peer-reviewed published literature. C budgets do not work for CO2eq
30058	15	6	15	8	Would it be possible to discuss equivalent figures for the threshold return budget? [France]	Taken into account - text revised. We have clarified the budget concepts with a single peak budget and a budget that accounts for Earth system feedbacks to 2100
33834	15	6	15	8	It is not currently clear that remaining years in this statement only includes CO2 emissions. Please be more specific by including "CO2" before "emissions were to cont...". [Norway]	Accepted - text revised
45890	15	6	15	7	Why refer to the 2015 data? There is newer data available. A general comment to the report that many reference/base years are mentioned which makes it hard to follow (eg 2010, 2014, 2015, 2017/18...). I suggest to make a consistent reference to a single year. [Deger Saygin, Turkey]	Taken into account - text revised. Start year clarified
53476	15	6	15	8	Add a qualifier such as "in the absence of immediate and substantial divergence from that emissions level" [Christian Holz, Canada]	Taken into account - text revised. We have clarified the budget concepts with a single peak budget and a budget that accounts for Earth system feedbacks to 2100
54748	15	6	15	6	I have not read the underlying report, but 580GtCO2 seems to refer to a given scenario? If so, I think this is particularly unhelpful. The text follows up on societal choices, but as a bar minimum, if 580 is based on one scenario, this should be made abundantly clear, and it should also be emphasised that a budget based on one scenario is not really that useful as other pathways are equally plausable. [Glen Peters, Norway]	Taken into account - text revised. We have clarified the budget concepts with a single peak budget and a budget that accounts for Earth system feedbacks to 2100
39032	15	7	15	8	Number of years left at current emission level is one of several ways to communicate the amount of remaining carbon consistent with a goal. But this highly idealized case may be too simple - at least if it is used alone. Therefore I suggest that the authors consider if you could also illustrate by giving the timeframe based on a linear reduction to zero. [Jan Fuglestvedt, Norway]	Taken into account - text revised. We have clarified the budget concepts with a single peak budget and a budget that accounts for Earth system feedbacks to 2100
54750	15	7	15	7	The 12-16 years is misleading. I think it is more relevant for an exceedance budget, but for an avoidance type budget, the budget will be "exceeded" towards the end of the century, not in 12-16 years? The 12-16 years is just to give scale, it otherwise has no meaning. [Glen Peters, Norway]	Taken into account - text revised. We have clarified the budget concepts with a single peak budget and a budget that accounts for Earth system feedbacks to 2100
11346	15	1	15	16	This paragraph is very confusing and too technical. It's not clear what message you're trying to make. Also, does this imply that the return budget is smaller than the peak budget? If so, here is some inconsistency with the values in Table SPM.1. [United Kingdom (of Great Britain and Northern Ireland)]	Taken into account - text revised. We have clarified the budget concepts with a single peak budget and a budget that accounts for Earth system feedbacks to 2100
19410	15	1	15	16	This paragraph is not very helpful for a policymaker. The message needs to be simplified. [Jennifer Morgan, Netherlands]	Taken into account - text revised. We have clarified the budget concepts with a single peak budget and a budget that accounts for Earth system feedbacks to 2100
29592	15	1	15	16	This paragraph is rather hard to read and understand. [Finland]	Taken into account - text revised. We have clarified the budget concepts with a single peak budget and a budget that accounts for Earth system feedbacks to 2100
30060	15	1	15	16	Non-CO2 emissions have to be addressed, but this paragraph should be simplified. These 2 sentences are quite complicated to understand. Some sentences from chapter 2 seem more illustrative to explain the great role of non-CO2 climate forcers : "Temperature pass 2°C in nearly all scenarios in which non-CO2 warming agents continue to grow, and there is a high risk that temperatures will pass 1,5°C even with the most stringent CO2 mitigation considered in 1,5°C scenarios if non-CO2 warming agents are not strongly reduced (medium confidence)" and "A mean value of about 0.5°C in 2050 can be attributed to non-CO2 forcers" (chap. 2.2.2.3). [France]	Taken into account - text revised. Text reworded on non-CO2
32804	15	1	15	16	The expected magnitude of future warming also depends on the natural component of climate change, and has nothing to do with emission pathways. Completely missing from this whole report is any assessment of the extent of natural temperature variation. This omission should be rectified before the report goes much further. [Philip Lloyd, South Africa]	Rejected - outside the scope of the chapter. This report defines 1.5C targets as the anthropogenic contribution
33836	15	1	15	11	If appropriate, and to highlight the time dependency of Non-CO2 drivers please consider to rephrase the first sentence to the following: "... non-CO2 drivers depends more on their emission pathways than net carbon budgets". [Norway]	Taken into account - text revised. Text reworded for clarity on non-CO2
33838	15	1	15	2	Please consider to merge these bullets, to make your message clearer for policymakers. The references in these two bullets are identical. The two sentences from line 11 to 15 are currently challenging to understand. Please consider to either rephrase them so that your message become more clear or delete them if merging the bullets. [Norway]	Taken into account - text revised. Text reworded on non-CO2

Comment No	From Page	From Line	To Page	To Line	Comment	Response
34370	15	1		16	This description of emissions budgets under different non-CO2 forcing scenarios is abstract and difficult to follow. The text states that in scenarios with strong non-CO2 forcing there is a 3% chance that the 1.5C emissions budget is already exceeded. Presumably what this means is that if we stopped emitting CO2 today and emitted non-CO2 forcings following one of these scenarios, there is a 3% chance that peak warming would exceed 1.5C. But is such a forcing evolution realistic, given that many non-CO2 emissions are co-emitted with CO2? [Nathan Gillett, Canada]	Taken into account - text revised. We have clarified the budget concepts with a single peak budget and a budget that accounts for Earth system feedbacks to 2100
42856	15	1	15	16	This is a very confusing way of saying that ambitious mitigation pathways for non-CO2 warming agents buy us a 25% chance of not exceeding the threshold return budget. It is critical to state the importance of this mitigation pathway clearly. Framing the potential success of the mitigation is also crucial to imparting optimism upon the policymakers for whom this report, and especially this section, is useful. [Kristin Campbell, United States of America]	Taken into account - text revised. Text reworded on non-CO2
42906	15	1	15	16	This is a very confusing way of saying that ambitious mitigation pathways for non-CO2 warming agents buy us a 25% chance of not exceeding the threshold return budget. It is critical to state the importance of this mitigation pathway clearly. Framing the potential success of the mitigation is also crucial to imparting optimism upon the policymakers for whom this report, and especially this section, is useful. [Durwood Zaelke, United States of America]	Taken into account - text revised. Text reworded on non-CO2
49012	15	1	15	16	This is not a clear enough way to articulate these issues in the SPM about the effect of non -CO2 drivers on the carbon budget. Instead, the portion of the carbon budget that is used up based on amount of warming due to non-CO2 drivers would be more easily understood, as noted in 2.2.2.3. [David Waskow, United States of America]	Taken into account - text revised. Text reworded on non-CO2
56936	15	1	15	16	I'm not clear what the term "drivers", introduced in line 3, above, means. Line 15 suggests that the term may be equivalent to "non-CO2 warming agents" If that is the case, then that phrase, which is clearer. [Oliver Morton, United Kingdom (of Great Britain and Northern Ireland)]	Taken into account - text revised. Text reworded on non-CO2
58248	15	1	15	16	I apologize, but this bullet leave me with a lot of questions. Are these statements made with "all else equal" in mind, or something else. Should we spell out what the non-CO2 drivers on in the bullets. Is there a difference between the pathways that experience the greastest warming and the pathways that experience the greatest warming due to non-CO2 drivers? If so, should that be stated here? If there is a 3% chance that the threshold peak budget is already exhausted, then there is a 97% chance that it isn't. Isn't it more optimistic to state it the latter way? Perhaps emphasize the 25% change that the return budget is already exhausted? [Peter Marcotullio, United States of America]	Taken into account - text revised. Text reworded on non-CO2
59202	15	1	15	16	This statement is very technical and convoluted for an SPM. The main message of this section is that emissions of SLCPs can account for the difference between exceeding the 1.5°C budget and staying within it. Suggest focusing on this or a similar message and removing many of the values. [United States of America]	Taken into account - text revised. Text reworded on non-CO2
59204	15	1	15	16	This point has a good bit of jargon in it. An effort to make the very important points more clearly would be worth the investment. [United States of America]	Taken into account - text revised. Text reworded on non-CO2
11088	15	11	15	13	Sentence (starting with "In the 5% of emission pathways (…)") is difficult to understand. [Denmark]	Taken into account - text revised. Text reworded on non-CO2
33840	15	11	15	16	The two sentences about emission pathways and non-CO2 driver are challenging to grasp. Please consider rephrasing and splitting up the sentences to clarify the message. Alternatively, consider replacing this technical sentence with a similar, but simplified, statement. [Norway]	Taken into account - text revised. Text reworded on non-CO2
55388	15	11	15	15	Please try to rephrase this otherwise important statement so there is a chance it will be understood by lay people. Right now, I don't think it is intelligible enough. [Andy Reisinger, New Zealand]	Taken into account - text revised. Text reworded on non-CO2
38468	15	12	15	12	CO2 -- 2 should be subtitled [Linah Ababneh, United States of America]	Accepted - text revised
44102	15	12	15	12	CO2, 2 should be subscript [Moshe Kinn, United Kingdom (of Great Britain and Northern Ireland)]	Accepted - text revised
53218	15	12	15	12	CO2 should be replaced by CO2 [Maria-Carmen Llasat, Spain]	Accepted - text revised
57912	15	12	15	12	There are multiple instances in which CO2 is not formatted to include a subscript. This is one of the examples. [Siir KILKIS, Turkey]	Accepted - text revised
59206	15	12	15	12	subscript needed in "CO2" [United States of America]	Accepted - text revised
29156	15	16	15	16	The reference to Figure SPM 3 (please see our comments above on the figure) is unclear in this context. [Germany]	Taken into account - text revised. Figure removed as it wasn't clear
30062	15	16	15	16	It seems that figure SPM3 is not related to this paragraph. Reference to delete? [France]	Taken into account - text revised. Figure removed as it wasn't clear
5472	15	18	15	2	Since reducing emissions of some non-CO2 forcers such as SO2 will increase raditive forcing and I expect makes this statement false, I suggest replacing "emissions" with "radiative forcing". [Haroon KHESHGI, United States of America]	Taken into account - text revised. Text reworded on non-CO2
19238	15	18	15	2	Adding a time reference (2040-2050?) in the statement would be very useful. [Spain]	Taken into account - text revised. Text reworded on non-CO2
29158	15	18	15	2	In the Executive Summary of Chapter 2 is the likelihood not specified (just a "high risk)", please add this information here. [Germany]	Taken into account - text revised. Likelihood statement now compatible with chapter 2
31224	15	18	15	28	It is difficult to understand the difference between Threshold Return Budgets and Threshold Peak Budgets for policy makers. For example, if cumulative CO2 emissions, including negative emissions, have linear relationship with global mean temperature rise, then TRB and TPB will be the same. Table SPM1 and Table 2.4, however, indicate that TPB has larger budget than TRB, except for the case of 50% likelihood limiting to 1.5. Please add more clear explanation sentences and explanation charts for policy makers to be able to understand where the gaps come from between TRB and TPB to avoid confusion. [Japan]	Taken into account - text revised. We have clarified the budget concepts with a single peak budget and a budget that accounts for Earth system feedbacks to 2100

Comment No	From Page	From Line	To Page	To Line	Comment	Response
36920	15	18	15	28	It is difficult to understand the difference between Threshold Return Budgets and Threshold Peak Budgets for policy makers . If cumulative CO2 emissions, including negative emissions, have linear relationship with global mean temperature rise, then TRB and TPB should be the same. Table SPM1 and Table 2.4, however indicate that TPB has larger budget than TRB. If the gaps come from the emissions scenarios, carbon budget should not be differentiated between TRB and TPB to avoid confusion. If not, the main factor that creates the difference of the budget should be clearly mentioned. [Keigo Akimoto, Japan]	Taken into account - text revised. We have clarified the budget concepts with a single peak budget and a budget that accounts for Earth system feedbacks to 2100
38960	15	18	15	18	It would be useful if you say what "significanty" means here. Give some indication in quantitative terms. [Jan Fuglestvedt, Norway]	Taken into account - text revised. Text reworded on non-CO2
42858	15	18	15	2	This needs to be more clearly stated; absent significant reductions of non-CO2 climate drivers, global temperatures will likely (more than 66%) exceed 1.5ºC. Also, this statement should note whether the 1.5C scenarios are allowing for overshoot or not. [Kristin Campbell, United States of America]	Taken into account - text revised. Text reworded on non-CO2
42908	15	18	15	2	This needs to be more clearly stated; absent significant reductions of non-CO2 climate drivers, global temperatures will likely (more than 66%) exceed 1.5ºC. Also, this statement should note whether the 1.5C scenarios are allowing for overshoot or not. [Durwood Zaelke, United States of America]	Taken into account - text revised. Text reworded on non-CO2
43792	15	18	15	28	If emissions of non-CO2 climate drivers are not significantly reduced, there is a higher than 66% likelihood that global temperature will exceed 1.5°C, even with the most stringent CO2 mitigation considered in 1.5°C scenarios (medium confidence). [The arbitrary 60% likelihood for meeting a 1.5° C or to degree see limit limit or avoiding a disastrous to catastrophic hazard is totally unacceptable on the science of preventing a greater degree of dangerous interference, irreversible catastrophic impacts to the human population and planet and by any ethical extended. According to the science it has to be assumed that whatever the level of climate change is stabilized in the future it will last for many hundreds of years. Therefore the likelihood has to be very 90%. The IPCC best case scenario RCP 2.6 is the only one not exceeding 2° C by 2100, and the UN climate Secretariat May 2016 update, shows that for a mean or better probability of not exceeding 2°C the emissions of CO2 equivalent which includes non-CO2 climate drivers have to decline on an immediate basis. In place of the unreliable carbon budget methodology of this reports SPM 1, I suggest the methodology of the IPCC a for WG 3 SPM 5 for its best case mitigation calculations for an equilibrium global warming between 2 to 2.4° C, which has a CO2 equivalent concentration of 445 to 490 ppm and a peeking year for CO2 emissions of 2000 - 2015. This is further substantiation that global emissions must be declined on an immediate basis. Footnote note (a) still applies that 'The emissions reductions to meet a particular stabilization level reported in the mitigation assessed here might be underestimated due to missing carbon cycle feedbacks'. Footnote (c) applies 'Note that the global average temperature at a blue equilibrium is different from the expected global average temperature at the time that stabilization of greenhouse gas concentrations due to the inertia of the climate system'. It follows from this more reliable calculation that omissions of carbon dioxide and CO2 equivalent have to be immediate and that the immediate launch of a massive global Manhattan model project for the technology to rapidly replace all fossil fuel energy and for the technology of safe and effective carbon dioxide removal obviating plans for BECCS.] [Peter Carter, Canada]	Taken into account - text revised. Section now emphasises emission reduction needs
53358	15	18	15	18	If emissions of non-CO2 climate drivers Add: "including methane" "are not significantly reduced…" Making this explicit serves to counter the false notion that a switch from one fossil fuel (coal) to another (gas) would help us move towards 1.5°. [Kjell Kühne, Mexico]	Taken into account - text revised. Text reworded on non-CO2
53374	15	18	15	2	Add to the paragraph: "calling into question the suitability of natural gas as a bridge fuel. Its associated methane emissions must be phased down as swiftly as other fossil fuels, leaving little time for such a role." Addressing this potential explicitly is very important, because additional gas infrastructure could lock us into not achieving 1.5° (as noted in Cross-Chapter Box 1.3 under Dynamic Effects). Making the incompatibility of additional - or even continued - natural gas use with 1.5° pathways explicit will help clear up the misunderstanding around "clean gas" as the low-carbon fuel of the future. [Kjell Kühne, Mexico]	Rejected - outside the scope of the chapter. Too detailed for SPM
54910	15	18	15	2	I don't think this conclusion is consistent with conclusion page 3, lines 15-16. Please make consistent. [Bram Bregman, Netherlands]	Taken into account - text revised. Consistency checked but ok
56938	15	18	15	18	non-CO2 warming agents (as on line 15, above) should be preferred to "non-CO2 climate drivers"; tropospheric sulphate aerosols are non-CO2 climate drivers, but the context here suggests clearly that the text only refers to warming agents. [Oliver Morton, United Kingdom (of Great Britain and Northern Ireland)]	Taken into account - text revised. Text reworded on non-CO2
59208	15	18	15	21	What about the effects of cooling aerosols – both in terms of contributing masking and contributing unmasking? [United States of America]	Taken into account - text revised. Text reworded on non-CO2
4444	15	21	15	22	I don't understand why threshold peak budget is bigger than threshold return budget (overshoot path) in case of limiting warming to 2 degree C. In case of 1.5 degree, the former is smaller that the latter. Is this correct? If yes. explanation is necessary. [Mitsutsune Yamaguchi, Japan]	Taken into account - text revised. We have clarified the budget concepts with a single peak budget and a budget that accounts for Earth system feedbacks to 2100

Comment No	From Page	From Line	To Page	To Line	Comment	Response
4446	15	21	15	22	Based of AR5, global climate strategies to limit temperature increase to 2 degree or less meant to achieve this goal with the probability of 66-100% (defined as "likely". In Table SPM 1 of 1.5 SR, both 50 and 66% probabilities are shown for 1.5 and even for 2 degree target. This may complicate readers understandings, especially for the readers accustomed to AR5. Those two targets (probability of 66% and 50%) in SR1.5 report are very different one from the expression of probability used in AR5. It is definitely necessary to inform policymakers of this difference to avoid their misunderstandings, as they may not care about the probability of achieving certain target. Also for 1.5 degree target, basic case should be 66% and not 50%. Also we need explanation of what does 66% (or 50%) liklihood mean? In AR5 likely (66%) probability meant >66% and 50% probability was divided into two, one more likely than not (>50-100%) and as likely as not (33-66%). In this connection, whether 66% likelihood correspond to "likely" in AR 5 and whether 50% likelihood correspond to >50-100% or 33-66% or not? Or 66% (50%) probability is quite different category than what were in AR5, and 66% means 66-90% and 50% means 50-66% as shown in Table 2.1 in page 11 of 1.5SR(SOD)? Please make this point clear. This is a very important point. [Mitsutsune Yamaguchi, Japan]	Taken into account - text revised. We have clarified the budget concepts with a single peak budget and a budget that accounts for Earth system feedbacks to 2100
5474	15	21	16	2	Given the importance of aerosols in 1.5 pathways, and the large uncertainty in their radiative forcing, I am concerned that this table and figure does not fully account for their uncertainty in bands given for geophysical uncertainty which claims to account for uncertainty in radiative forcing (not clear to me if this includes accurately uncertainty of aerosol RF). Suggest considering if this section accurately describes this uncertainty. [Haroon KHESHGI, United States of America]	Taken into account - text revised. Our budget approach accounts for non-CO2 forcing including aerosol uncertainty
5772	15	21	15	22	SPM Table 1; One would expect the threshold peak budget (TPB) to be smaller than the threshold return budget (TRB) as seen for the “limiting warming to 1.5 deg C” case. Instead, we see the opposite for the “limiting warming to 2 deg C” case. Why? A sentence on this counter-intuitive behavior of the climate-carbon system would be helpful. In Chapter 2, it is explained that the net negative CO2 emissions in TRB estimates are the main cause this. [Govindasamy Bala, India]	Taken into account - text revised. We have clarified the budget concepts with a single peak budget and a budget that accounts for Earth system feedbacks to 2100
5780	15	21	15	22	Table 1: A column that shows the year when the budget would be exhausted if emissions continue at 2016 level would send a powerful message to policymakers on the urgency of CO2 emission reductions. [Govindasamy Bala, India]	Taken into account - text revised. This point is made in text
6888	15	21	15	22	Table SPM1: the confidence intervals for the threshold return budgets and the threshold peak budgets differ we those provided in figure SPM4. [Klaus Radunsky, Austria]	Taken into account - text revised. We have clarified the budget concepts with a single peak budget and a budget that accounts for Earth system feedbacks to 2100
6892	15	21	15	22	Table SPM1: It seems strange that the threshold peak budget for limiting warming to 1.5oC with 50% likelihood is smaller compared to the threshold return budget. This is so strange because at the end-point in time of the carbon budget the net emissions should be zero and the carbon budget should not further increase. [Klaus Radunsky, Austria]	Taken into account - text revised. We have clarified the budget concepts with a single peak budget and a budget that accounts for Earth system feedbacks to 2100
6890	15	21	15	22	Table SPM1: It is suggested to avoid introduction of new concepts in the SPM but to inform on the basis of the concepts used in AR5. It seems more easy to say that carbon budgets differ depending on the amount of carbon dioxide removal assumed. Only a second best option seems to be to explain better, e.g. saying that the difference between threshold return budget and threshold peak budget (e.g. limiting warming to 2 degrees, 50% likelihood: 490 GtCO2) indicates the amount of net carbon removal required to finally stabilize temperature at 1.5 or 2 degrees after overshoot. Such explanation might be inlcuded in the figure caption. [Klaus Radunsky, Austria]	Taken into account - text revised. We have clarified the budget concepts with a single peak budget and a budget that accounts for Earth system feedbacks to 2100
10218	15	21	15	21	Update table with CO2 equivalent numbers to account for all GHG [Saudi Arabia]	Rejected - not supported by the peer-reviewed published literature. C budgets do not work for CO2eq
10364	15	21	15	22	In table SPM1, the GtCO2 values associated with the two different carbon budget concepts are unclear and the two carbon budget concepts should be clarified. [Hungary]	Taken into account - text revised. We have clarified the budget concepts with a single peak budget and a budget that accounts for Earth system feedbacks to 2100
10948	15	21	15	21	Update table with CO2 equivalent numbers to account for all GHG [Nedal KATBEHBADER, Switzerland]	Rejected - not supported by the peer-reviewed published literature. C budgets do not work for CO2eq
11122	15	21	15	22	How does one interprete "not available". This is not covered in the literature? Or the budget is already exhausted? [Denmark]	Taken into account - text revised. We have clarified the budget concepts with a single peak budget and a budget that accounts for Earth system feedbacks to 2100
15554	15	21	15	27	This table is difficult to read and should be removed form the SPM. [Australia]	Taken into account - text revised. We have clarified the budget concepts with a single peak budget and a budget that accounts for Earth system feedbacks to 2100
17890	15	21		22	it would be very helpful to make a bar plot out of this table. Also NDC budget and current level of yearly emissions could be added. Alternatively, a figure such as here in Figure 1 would be helpful to get an impression of the order of magnitude: http://onlinelibrary.wiley.com/doi/10.1002/gch2.201600007/full or alternatively such as here in Figure 2: http://www.economics-ejournal.org/economics/journalarticles/2017-33/version_1/count [Brigitte Knopf, Germany]	Taken into account - text revised. We have clarified the budget concepts with a single peak budget and a budget that accounts for Earth system feedbacks to 2100
17882	15	21	15	27	This table is one of the key results. To make it even more policy relevant I would suggest to include a column for "years left before budget is exhaused if emissions stay at current levels", because this is a more conceivable number for policy makers than the abstract budgets. It should be noted much more clearly that the numbers are given from 2016 onwards, so already additional 2x40 GtCO2 are eaten up, and even 40 GtCO2 more when the report comes out. In addtion, the span of the "net zero year" should be given, what should be easy to extract from the models (including the ranges). This could be taken from Table 2.7. I think there is a mismatch that an exact budget is given but that e.g. on p. 17/line 2+3 it is only said that "net zero is reached around or shortly after the middle of the 21st century". [Brigitte Knopf, Germany]	Taken into account - text revised. We have clarified the budget concepts with a single peak budget and a budget that accounts for Earth system feedbacks to 2100. Text added on dates for net zero

Comment No	From Page	From Line	To Page	To Line	Comment	Response
29160	15	21	15	28	The information on carbon budgets incl. Table SPM 1 should be kept; carbon budgets for 1.5°C and 2.0°C pathways are very important for any further analysis on decarbonisation scenarios and pathways. However, solely indicating some numbers of the carbon budget garnished with likelihoods in the last paragraph of page 14 and in Table SPM 1 seems to be not suitable for policymakers, in order to call their attention on this relevant issue. The information is too technical and too little explanations are given, including why the peak budget can be smaller or larger than the return budget depending on the temperature level and information on the timing of peak warming (TPB) and the timing of returning to a threshold (TRB). [Germany]	Taken into account - text revised. We have clarified the budget concepts with a single peak budget and a budget that accounts for Earth system feedbacks to 2100
30064	15	21	15	27	Table SPM1 : Is it possible to explain why data is not available refering to the explanations given in Chapter 2 ? [France]	Taken into account - text revised. We have clarified the budget concepts with a single peak budget and a budget that accounts for Earth system feedbacks to 2100
30066	15	21	15	27	Unclear why the "threshold peak budget" is higher than "threshold return budget" for 2°C scenario, it would be good to have an explaination in the SPM [France]	Taken into account - text revised. We have clarified the budget concepts with a single peak budget and a budget that accounts for Earth system feedbacks to 2100
33842	15	21	15	22	Please consider to include the budgets with 75% or 90% (table 2.4) likelihood for both temperature targets. If this information is not available, is also a useful message to policymakers to simply state so. Please consider to use wording for "not available" that corresponds better with the messages you present on page 14 line 30-32, where you state that this is "out of reach". "Considered not feasible" might be an alternative. [Norway]	Taken into account - text revised. We have clarified the budget concepts with a single peak budget and a budget that accounts for Earth system feedbacks to 2100
33844	15	21	15	22	Table SPM 1: It may seem illogical that the threshold peak budget for limiting warming to 2C is larger than the threshold return budget for the same temperature target. If this is because of larger amounts of negative emissions or any other reasons, please explain this in a supporting bullet point. Please consider to add two columns in the table with the amount of negative emissions included in each budget. In addition, please consider to include a separate column with associated atmospheric concentrations. [Norway]	Taken into account - text revised. We have clarified the budget concepts with a single peak budget and a budget that accounts for Earth system feedbacks to 2100
36306	15	21			Table SPM 1 - Consider adding one more column to include the total carbon budget, showing the total carbon budget since pre-industrial times, in addition to the future available carbon budget (begining from 2017) [India]	Taken into account - text revised. We have clarified the budget concepts with a single peak budget and a budget that accounts for Earth system feedbacks to 2100
41284	15	21	15	22	Please explain why TPB for 1.5degC with 66% likelihood is not available, while the corresponding TRB is available. [Michio Kawamiya, Japan]	Taken into account - text revised. We have clarified the budget concepts with a single peak budget and a budget that accounts for Earth system feedbacks to 2100
43794	15	21	15	23	Delete Table SPM 1 Carbon budget is unreliable under-estimating due to omitted forcings there is no carbon budget left The reliable methodology is IPCC 2007 AR4 WG3 SPM 5 (table) This shows that for CO2 concentration stabilization at 350 to 400 ppm giving an equilibrium warming of 2 to 2.4°C peaking year for CO2 emissions is 2015 at the latest.There is no carbon budget left. [Peter Carter, Canada]	Rejected - not supported by the peer-reviewed published literature. Our budget approach accounts for non-CO2 forcing
44054	15	21			Not clear why carbon "peak budgets" (no overshoot) are higher than "treshold return" carbon budgets for the 2C likelihhod scenarios [Stephan Singer, Belgium]	Taken into account - text revised. We have clarified the budget concepts with a single peak budget and a budget that accounts for Earth system feedbacks to 2100
46186	15	21	15	27	Why are the budgets for threshold return smaller than for peak budgets for 2 degrees scenarios? [Netherlands]	Taken into account - text revised. We have clarified the budget concepts with a single peak budget and a budget that accounts for Earth system feedbacks to 2100
49014	15	21	15	28	Table SPM 1 may not be easily understood. It is counter-intuitive that a threshold budget for 'return' (i.e. overshoot and return) would be smaller than one for 'peak,' which does not involve overshoot. The table should be presented in a way that makes clear the cumulative gross emissios and negative emissions assumptions underlying these budgets. [David Waskow, United States of America]	Taken into account - text revised. We have clarified the budget concepts with a single peak budget and a budget that accounts for Earth system feedbacks to 2100
54752	15	21	15	22	Why is one box "not avaiable"? I missed an explanation [Glen Peters, Norway]	Taken into account - text revised. We have clarified the budget concepts with a single peak budget and a budget that accounts for Earth system feedbacks to 2100
54754	15	21	15	22	Just looking at the numbers in the table, and thinking about distributions, one will start to wonder if these statistics are internally consistent. I have not read the underlying report, but knowing scenarios are not a large-N sample, I think it is important to say something about the statistics. Is each box in the table based on the same number of scenarios? What are the underlying distributions like? Are there any known biases (model X more represented, particular CH4 pathways, etc)? By just showing a number, with an uncertainty range, can hide a lot of the real uncertainty... [Glen Peters, Norway]	Taken into account - text revised. We have clarified the budget concepts with a single peak budget and a budget that accounts for Earth system feedbacks to 2100
59210	15	21	15	27	The explanations for Threshold Return Budgets vs Threshold Peak Budgets were not clear. [United States of America]	Taken into account - text revised. We have clarified the budget concepts with a single peak budget and a budget that accounts for Earth system feedbacks to 2100
59212	15	21	15	28	This important table needs to be revised to consider the time periods captured by the budgets under the overshoot vs the threshold scenario. As written, there are no set time period for crossing this threshold, such that emissions "allowed" under the overshoot budget are lower than those allowed under what should be the more stringent scneario of the threshold peak budget. This lack of time consideration leads to the misconception that overshooting would be the harder scenario to achieve. Furthermore, it is unclear why only low-end likelihoods (50% and 66%) are provided here. Suggest also including higher percent likelihoods. [United States of America]	Taken into account - text revised. We have clarified the budget concepts with a single peak budget and a budget that accounts for Earth system feedbacks to 2100

Comment No	From Page	From Line	To Page	To Line	Comment	Response
5918	15	22			This table suffers from the same logic paradox as I noted in Chapter 2 review. There are non-intuitive numbers here that as far as I could tell from Chapter 2 resulted from sample size effects for the 1.5C scenarios. It makes no sense that the carbon budget lower bound for peak and return is lower than that for keep below in the first row. In all other entries the result is consistent (lower mean AND lower and upper bounds in column 3 than column 4) but for 50% likelihood the two sets of ranges must be conflicted somehow arising from the limited sample size available. If this table is retained reasons for this seemingly paradoxical result need to be explicitly addressed. But, if it is sampling effects then the use of these numbers in the SPM to drive policymakers decisions needs to be extremely seriously questioned. If there is an insuffiucient sample of IAM scenarios to properly characterise the keep below 1.5C option then it would be better to say so than to show numbers that are potentially seriously misleading to policymakers. [Peter Thorne, Ireland]	Taken into account - carbon budget text has been revised for clarity in the spam draft.
9036	15	22	15	28	Table SPM1: We would suggest to avoid introduction of new concepts in the SPM and explain differences with figures found in AR5 on this topic. To our understanding the main difference between Peak Budget an the Return Budget is an additional source of CO2 removal. This could be explained and quantified in the caption [Luxembourg]	Taken into account - text revised. Footnote added explaining AR5 differences
9038	15	22	15	28	Table SPM1: We do not understand why the threshold peak budget for limiting warming to 1.5°C with 50% likelihood is smaller compared to the threshold return budget. This should be explained. [Luxembourg]	Taken into account - text revised. We have clarified the budget concepts with a single peak budget and a budget that accounts for Earth system feedbacks to 2100
11348	15	22	15	27	Table SPM.1. Check consistency with the text above. [United Kingdom (of Great Britain and Northern Ireland)]	Taken into account - text revised. We have clarified the budget concepts with a single peak budget and a budget that accounts for Earth system feedbacks to 2100
11350	15	22	15	27	Table SPM.1. How many scenarios are available for each case? [United Kingdom (of Great Britain and Northern Ireland)]	Taken into account - text revised. We have clarified the budget concepts with a single peak budget and a budget that accounts for Earth system feedbacks to 2100
59214	15	22	15	28	Suggest adding one more column to Table SPM 1 that lists the expected range of years until the budget is exhausted if emissions continue at 2015 levels (similar to first full bullet on SPM-15, lines 5-8). Adding the time frame would probably make this the most useful table OR figure in the entire report. [United States of America]	Taken into account - text revised. We have clarified the budget concepts with a single peak budget and a budget that accounts for Earth system feedbacks to 2100. Text added on dates for net zero
33846	15	24	15	27	The second sentence in the caption for Table SPM 1 can be difficult to understand. Please consider rephrasing and/or splitting up the sentences to clarify the message. Especially the parenthesis "around median non-CO2 contribution" is difficult to understand. [Norway]	Taken into account - text revised. We have clarified the budget concepts with a single peak budget and a budget that accounts for Earth system feedbacks to 2100
40756	15	27	15	27	Spelling: Footnote 5 -' arund' should be 'around' [Liese Coulter, Australia]	Editorial - copyedit to be completed prior to publication
40582	15	28	15	28	There is a typo in the footnote; 'arund' should read 'around'. [Jonny Williams, New Zealand]	Editorial - copyedit to be completed prior to publication
57914	15	28	15	29	Below line 28 in footnote 5, the word "arund" should be “around” in the second line. [Siir KILKIS, Turkey]	Editorial - copyedit to be completed prior to publication
59216	15	28	15	28	arund mispelled in footnote. Change to "around" [United States of America]	Editorial - copyedit to be completed prior to publication
434	16				FIGURE SPM 4: this is a very colorful and yet hardly compelling, an overall unattractive figure. Very technical and not presentable to a non-scientific audience. [Thomas Stocker, Switzerland]	Taken into account - all figures have been revised and simplified
6894	16				Figure SPM4: It might be usefulk to inform readers that at the point in time when the report will have been adopted the actual carbon budget will be around 100GtCO2 higher than indicated in the figure. [Klaus Radunsky, Austria]	Rejected - carbon budgets have been calculated
7230	16		16		Many of the Figures of the SPM are quite complex and may be relatively difficult to understand for the decision makers. An example of such a difficult Figure is e.g Fig SPM 4. It could be good if a simpler Figure could be developed. [Ilkka Savolainen, Finland]	Taken into account - all figures have been revised and simplified
9040	16				Figure SPM4: This figure seems rather technical and we are not convinced that it should be included in the SPM. We suggest either to delete it or to replace it by a simplified version illustrating the concept of carbon budgets, which could be inspired by the video included in Chapter 1 of the report. [Luxembourg]	Taken into account - all figures have been revised and simplified
29600	16				Figure SPM4 The figure contains an awful lot of infomation. It is very confusing to understand what is the message. It is difficult to see what the policy makers could learn from this figure. What is important? Is it the fact that societal factors (= what climate and other policies deliver) are the main uncertainty ? Or is the key issue the societal issues related to non CO2? It is also difficult to know if the bar in the top green panel is linked to the figure in the purple part (societal choices). [Finland]	Taken into account - all figures have been revised and simplified. The number has been reduced from 7 to 4.
32616	16		16		in figure SPM 4 typo in top green panel sentivity not sensitivity [Jonathan Lynn, Switzerland]	Editorial
34372	16				Figure SPM.4. Are the non-CO2 pathways described fully consistent with limiting global warming to 1.5C? For example, are there emissions pathways in which warming is stabilised at 1.5C, and which therefore have net zero or negative CO2 emissions, yet which still have substantial SO2 emissions? [Nathan Gillett, Canada]	Not applicable - the figure has been removed
55810	16		16		Text in figure is blurry [Debora Ley, Guatemala]	Noted
151	16	1	16	21	The appearance of SO2 strategies in the figure with no discussion I can see in caption or related text is highly problematic. Is the reference to geoengineering? Air pollution? Both? There are so many tradeoffs to be considered that this aspect of the figure should not be allowed to stand alone. [Michael Oppenheimer, United States of America]	Taken into account. There were multiple comments that this figure was confusing, so figure has been deleted and a simpler carbon budget analysis presented. The remaining carbon budget is now discussed in the text. This includes an analysis of how short lived forcers contribute to it
341	16	1	16	2	This Figure is hard to be known. [Zong-Ci Zhao, China]	Taken into account. There were multiple comments that this figure was confusing, so figure has been deleted and a simpler carbon budget analysis presented. The remaining carbon budget is now discussed in the text. This includes an analysis of how short lived forcers contribute to it

Comment No	From Page	From Line	To Page	To Line	Comment	Response
4448	16	1	16	1	Please make it clear on what Equilibrium Climate Sensitivity this figure was based. [Mitsutsune Yamaguchi, Japan]	Not Applicable: figure has been removed
5920	16	1			As I noted in Chapter 2, and related to my comment on Table SPM1 I cannot understand how the result in the lower panel of this figure can be true. In addition, this figure seems complicated for inclusion in the SPM. Efforts to simplify would aid readers to take home the intended points here. [Peter Thorne, Ireland]	Taken into account - figure have been revised and simplified for comprehension
9006	16	1	16	19	I simply do not understand this figure!! Not either after reading the capiton. You need quite a teamwork to get a clue... What message do you want to tell the reader? [Urs Neu, Switzerland]	Taken into account. There were multiple comments that this figure was confusing, so figure has been deleted and a simple carbon budget analysis presented
11090	16	1	16	1	Figure SPM4 is difficult to understand. [Denmark]	Noted
11092	16	1	16	1	Figure SPM 4; The bar in the upper panel ("Climate Response Uncertainties") is not readable, The text in the upper panel is blurred. Text in the panel on "Total Carbon Budget Range for Threshold Peak Budget" is not readable. [Denmark]	Taken into account - all figures have been revised, simplified or removed
11352	16	1	16	19	Figure SPM.4. This figure is far too complicated for a policy maker. What are the top 1/2 messages? Suggest an alternative design is explored for illustrating the magnitude and uncertainties in the carbon budgets. Are the bottom two panels needed at all if the detail is included in Table SPM.1? Also, the "spider" illustration for showing the societal choices doesn't work. It feels a bit unnecessary. The caption also needs simplifying. [United Kingdom (of Great Britain and Northern Ireland)]	Taken into account. There were multiple comments that this figure was confusing, so figure has been deleted and a simple carbon budget analysis presented
17888	16	1	21		I am not sure if Figure SPM4 is suited for an SPM. It is certainly an important information, but it is more an explainer, rather than a straight forward message. If I understand the figure correctly, the response uncertainty that ranges from 450-680 GtCO2 increases to -200 - 1400 GtCO2. If this is the case, the budget concept seems to be useless (or I misunderstood the figure). [Brigitte Knopf, Germany]	Taken into account. There were multiple comments that this figure was confusing, so figure has been deleted and a simpler carbon budget analysis presented. The remaining carbon budget is now discussed in the text. This includes an analysis of how short lived forcers contribute to it.
18984	16	1	16	21	Is there a specific reason to single out SO2 emission in Figure SPM4- given that other air pollution controls will also have some importance. It also misses the point of co-variation of SO2 with emisison controls- or co-benefits: the more stringent CO2 emissions are abated- also the cooling of SO2 will disappear. [Andrea TILCHE, Belgium]	Taken into account. There were multiple comments that this figure was confusing, so figure has been deleted and a simpler carbon budget analysis presented. The remaining carbon budget is now discussed in the text. This includes an analysis of how short lived forcers contribute to it
19240	16	1	16	21	In order to facilitate a clearer, easier understanding of the figure, the reference to panels (upper/bottom, etc.) should be added in the text below figure. In the panel "societal choices for non-CO2 pathways" it is not clear if the scale is the same as for the other panels. If not, it should be explained what is left side/right side. [Spain]	Taken into account. There were multiple comments that this figure was confusing, so figure has been deleted and a simpler carbon budget analysis presented. The remaining carbon budget is now discussed in the text. This includes an analysis of how short lived forcers contribute to it
29162	16	1	16	1	Finally, please consider to delete Figure SPM 4. It contains a lot of information, is poorly linked to the text, and is not self-explanatory. While useful for background in the underlying chapter, this figure provides a level of detail not commensurate with the SPM level, and is potentially very confusing, especially since its main message to the uninformed reader seems to be "the budget can be 0 to 1200 GtCO2, we do not know anything, really". If kept, please revise Figure SPM 4 in a way that non-experts would understand what is presented in the different panels. From the titles it does not become clear, what the difference is between the green, yellow and the grey panel. The caption might give more information, but is written in a very technical and quite confusing style. In addition, the numbers given in Table SPM 1 should become discernible. It seems that in the lowest panel, the median estimate for reaching 1.5°C with 50% probability is shown (this should be marked in the caption), but the ranges given in the table are not discernible on the graph. Clarification is needed for second top graph on "societal choices for non-CO2 pathways". And why are choices for non-CO2 pathways highlighted given the fact that choices for CO2-pathways are even more critical given the long life time of CO2-related infrastructure and of CO2 itself in the atmosphere. The term "choices" is rather unclear too, maybe better "options". What do the blue boxes at the end of the different lines mean? We suggest removing this graph from the Figure. [Germany]	Taken into account - the figure has been deleted
29296	16	1	16	1	In the pink area of the Fiugre, should "SO2" in the text be "CO2"? [Yuanyuan Huang, France]	Rejected - labelling is correct
30068	16	1	16	21	Figure SPM4 : First-sub-plot, Cumulative CO2 emissions from 2016 CO2eq? [France]	Taken into account. There were multiple comments that this figure was confusing, so figure has been deleted and a simpler carbon budget analysis presented. The remaining carbon budget is now discussed in the text. This includes an analysis of how short lived forcers contribute to it
30070	16	1	16	19	Figure SPM4 : The figure is difficult to understand. We think the second subplot, which contains important but limited information could be removed (the subplot with yellow background provides emission ranges due to societal choices anyway). [France]	Taken into account. There were multiple comments that this figure was confusing, so figure has been deleted and a simpler carbon budget analysis presented. The remaining carbon budget is now discussed in the text. This includes an analysis of how short lived forcers contribute to it

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31226	16	1	16	1	Could you tell us what climate sensitivity does IPCC use for the calculation of carbon budget? Also, the range of the carbon budget written in sentences does not seem to match the range of the black part of the figure of Figure SPM4. Could you tell us what are the black and blue parts indicate? Please explain the relationship between table and sentences. [Japan]	Partially taken into account - main chapter text has been revised to more clearly explain the factors that effect carbon budgets (section 2.2.2). These factors are too detailed for an spam but clear call outs are shown in the revised SPM text to where this information is available. Figure 4 has been removed.
31228	16	1	16	1	Please clarify the Equilibrium Climate Sensitivity on which this Figure was based. [Japan]	Partially taken into account - main chapter text has been revised to more clearly explain the factors that effect carbon budgets (section 2.2.2). These factors are too detailed for an spam but clear call outs are shown in the revised SPM text to where this information is available.
32814	16	1			The text associated with the bars in the 'Societal Choices' section refers only to greenhouse gases and SO2, and neglects other agents that cause both warming and cooling. Better text would be 'Rising emissions of non-CO2 greenhouse gases and/or BC and large mitigation of SO2 and other cooling aerosols'. (Ch 2 figure can be harmonized). [Drew SHINDELL, United States of America]	Taken into account - figure has been removed and simplified, more clear text has been added in replacement
32920	16	1	16	21	Figure SPM 4 is somewhat unclear - particularly the component on "societal choices for non-CO2 pathways". For example, it does not have a horizontal Gt scale like other panels and it is unclear what the lighter-shaded blue boxes represent or how they should be interpreted. [Thomas Damassa, United States of America]	Taken into account. There were multiple comments that this figure was confusing, so figure has been deleted and a simpler carbon budget analysis presented. The remaining carbon budget is now discussed in the text. This includes an analysis of how short lived forcers contribute to it
33848	16	1	16	18	Figure SPM 4: PLease make sure all the panels have axis. Also please make sure that the visual data fit vertically across the panels, and with the information given in the text and table SPM 1. Consider applying the following principles from the Guidance for data visuals (J. Harold. et.al., Tyndall Centre, 2017): Guideline 4: Choose visual formats that are familiar to your audience. Guideline 6: Build-up the information to provide visual structure. Guideline 7: Add a descriptive heading and sub-heading, where the latter should articulate a clear message. Integrate the text in the visual to support comprehension. The technical details in the caption can provide important additional context, but the information to comprehend the main message should be included in the visual. Guideline 8: Avoid jargon and explain acronyms. [Norway]	Taken into account. There were multiple comments that this figure was confusing, so figure has been deleted and a simple carbon budget analysis presented
38470	16	1	16	21	Graph's black backgrounds are illegible. [Linah Ababneh, United States of America]	Taken into account. There were multiple comments that this figure was confusing, so figure has been deleted and a simpler carbon budget analysis presented. The remaining carbon budget is now discussed in the text. This includes an analysis of how short lived forcers contribute to it
40584	16	1	16	1	In the 'societal choices for non-CO2 pathways' panel, it is not clear to me what the 4 middle boxes represent since only the outer 2 are annotated. [Jonny Williams, New Zealand]	Not applicable - the figure has been removed
44792	16	1	16	1	Figure SPM1.4 may be difficult to umderstand particularly for policy makers. [Hiroaki Kondo, Japan]	Taken into account - figure has been removed
46188	16	1	16	1	It seems as if the sentence starting with 'climate' is being overshadowed by the rest of the black bar in the second 'cumulative CO2 emissions from 2016 [GtCO2]' graph. [Netherlands]	Not applicable - the figure has been removed
46190	16	1	16	1	The term SO2 mitigation is confusing, since reduction of SO2 emissions has a warming effect. Suggestion to use another word than mitigation, like reduction. [Netherlands]	Rejected - this term is consistent with the glossary definition of mitigation
46192	16	1	16	1	I don't understand why the upper, non-CO2 info, is parallel to the lower, carbon budget info. Depending on the amount, the different non-CO2 pathways can also occur in other total carbon budget scenario's, there is no direct correlation. [Netherlands]	Not applicable - the figure has been removed
46194	16	1	16	7	I don't understand what the lower part of the figure expresses, it looks to differ from the ranges in table SPM 1. The text in line 6-7 is not (good) enough to let me understand. [Netherlands]	Taken into account. There were multiple comments that this figure was confusing, so figure has been deleted and a simple carbon budget analysis presented
49520	16	1	16	1	Figure SPM4. The second (purple) block is not clear. Whaat doe the different levels (y-axis) mean? Why are only two variants labelled? Why are the others shaded, what is the meaning of the shadings? [Karlheinz ERB, Austria]	Not applicable - the figure has been removed
50412	16	1	16	19	Figure SPM 4 is too complicated. The very interesting infomation that it contains should be made available in a more friendly way for the reader. [Switzerland]	Taken into account. There were multiple comments that this figure was confusing, so figure has been deleted and a simpler carbon budget analysis presented. The remaining carbon budget is now discussed in the text. This includes an analysis of how short lived forcers contribute to it
52702	16	1	16	21	This figure may be less useful for the SPM. It is just indicating large uncertainties in the TPB and TRB and their sources. A table could take less space [Iulain Florin VLADU, Germany]	Taken into account. There were multiple comments that this figure was confusing, so figure has been deleted and a simpler carbon budget analysis presented. The remaining carbon budget is now discussed in the text. This includes an analysis of how short lived forcers contribute to it
52958	16	1	16	2	SPM is very complex [Ireland]	Taken into account. There were multiple comments that this figure was confusing, so figure has been deleted and a simpler carbon budget analysis presented. The remaining carbon budget is now discussed in the text. This includes an analysis of how short lived forcers contribute to it

Comment No	From Page	From Line	To Page	To Line	Comment	Response
54756	16	1	16	1	I generally like the figure, but it does confuse me. I would have expected budget ranges like rows 3 and 4, but it seems the report has taken budget ranges like row 1. I have not read the underlying report, but it seems Row 1 is based on a sigle scenario? If so, what scenario was chosen and why? Is it more representative than any other? Is it more likely? So sure, each scenario has a narrower budget range, but the collection of scenarios has a much broader range. [Glen Peters, Norway]	Not applicable - the figure has been removed
54854	16	1	16	1	Figure SPM4: My understanding is that the top three panels (blue, pink, yellow) demonstrate a worked example for threshold peak budget, and the fourth panel (grey) compares the threshold return and threshold peak budgets. Therefore, consider segmenting the top three panels apart from the bottom panel by including horizontal spacing between third and fourth panel. Amend heading to clarify that the top three panels all relate to threshold peak budget (currently this is only mentioned for the third panel). [Jordan Harold, United Kingdom (of Great Britain and Northern Ireland)]	Not applicable - the figure has been removed
54856	16	1	16	1	Figure SPM4: Colour of panels, blue, pink, yellow, does not convey meaning other than that they are separate panels. Multiple colours might be distracting to readers - hence consider removing these colours and using horizontal rules and/or spacing instead to indicate these three chunks of information. [Jordan Harold, United Kingdom (of Great Britain and Northern Ireland)]	Not applicable - the figure has been removed
54858	16	1	16	1	Figure SPM4: Test, and consider alternative representations as needed, for the 'societal choices for non-CO2 pathways' panel - readers may or may not intuitively understand that the different black lines represent examples from across a wide range of pathways. A 'slider' representation might be more intuitive (e.g. analogous to a ball on an abacus). Choices here should ideally be informed by reader testing/feedback. [Jordan Harold, United Kingdom (of Great Britain and Northern Ireland)]	Not applicable - the figure has been removed
54912	16	1	16	1	SPM 4: This figure is complicated and need substantial explanation. I suggest to significantly simplify this figure to make the main message clear. [Bram Bregman, Netherlands]	Not applicable - the figure has been removed
59218	16	1	16	21	A very confusing figure for an SPM. Figure 4 is very difficult to understand. This seems like a far more complicated figure than is needed to convey the pretty simple idea of a budget range. What does it add to Table SPM 1? [United States of America]	Taken into account. There were multiple comments that this figure was confusing, so figure has been deleted and a simpler carbon budget analysis presented. The remaining carbon budget is now discussed in the text. This includes an analysis of how short lived forcers contribute to it
6102	16	3	16	3	Fig SPM 4: I find this very difficult to understand. The curved lines in the second panel in violet appear to be schematic, but are they somehow aligned with the horizontal scale? What is the significance of their curvature and depth (if any). [Timothy Carter, Finland]	Taken into account. There were multiple comments that this figure was confusing, so figure has been deleted and a simpler carbon budget analysis presented. The remaining carbon budget is now discussed in the text. This includes an analysis of how short lived forcers contribute to it
55390	16	3			Figure SPM 4: the carbon budgets are for 50% probabilities - this needs to be made prominently clear within the figure itself (and in the caption). [Andy Reisinger, New Zealand]	Taken into account. There were multiple comments that this figure was confusing, so figure has been deleted and a simpler carbon budget analysis presented. The remaining carbon budget is now discussed in the text. This includes an analysis of how short lived forcers contribute to it
56498	16	3	16	3	This figure is very challenging to interpret. Not sure the target audience would be able to find this useful. Particularly the section "societal choices for non-co2 pathways"--are the graphical aspects referring to the scales found in the sections shaded other colors and what is the significance of some boxes being dim and why are there 6 boxes and at different heights? [Eleanor Johnston, United States of America]	Taken into account. There were multiple comments that this figure was confusing, so figure has been deleted and a simpler carbon budget analysis presented. The remaining carbon budget is now discussed in the text. This includes an analysis of how short lived forcers contribute to it
63068	16	3	16	4	Figure SPM.4 could be simplified: the TPB total range is shown twice - it could be arranged so that it only appears once (by removing the last 'TPB' line at the bottom of the figure), and the labels "climate" and "societal variations" could then be shown also for the TRB. We wonder if there is a need to have both table SPM.1 and figure SPM.4. Could you try merging these in a single framework (either a table or a figure) ? [Belgium]	Taken into account. There were multiple comments that this figure was confusing, so figure has been deleted and a simpler carbon budget analysis presented. The remaining carbon budget is now discussed in the text. This includes an analysis of how short lived forcers contribute to it
63070	16	3	16	4	It seems strange to consider limited SO2 mitigation in the context of low emission scenarios. How can this happen, is it a realistic scenario to mitigate greenhouse gases and keep SO2, also considering the health and environmental effects of SO2? If its not realistic, than it is not a choice and it should not be included in the range. Could you please double check this and provide an explanation if needed (eg. in a footnote)? [Belgium]	Taken into account. There were multiple comments that this figure was confusing, so figure has been deleted and a simpler carbon budget analysis presented. The remaining carbon budget is now discussed in the text. This includes an analysis of how short lived forcers contribute to it
59220	16	6	16	6	Consider rewriting to "associated with" rather than "associated to" [United States of America]	Editorial - copyedit to be completed prior to publication. There were multiple comments that this figure was confusing, so figure has been deleted and a simpler carbon budget analysis presented. The remaining carbon budget is now discussed in the text. This includes an analysis of how short lived forcers contribute to it
59222	16	9	16	9	Consider rewriting to "associated with" rather than "associated to" [United States of America]	Editorial - copyedit to be completed prior to publication. There were multiple comments that this figure was confusing, so figure has been deleted and a simpler carbon budget analysis presented. The remaining carbon budget is now discussed in the text. This includes an analysis of how short lived forcers contribute to it

Comment No	From Page	From Line	To Page	To Line	Comment	Response
46196	16	13	16	16	Why are these ranges different from the F+, F0 and F- in figure SPM 1? [Netherlands]	Taken into account. There were multiple comments that this figure was confusing, so figure has been deleted and a simpler carbon budget analysis presented. The remaining carbon budget is now discussed in the text. This includes an analysis of how short lived forcers contribute to it
59224	16	14	16	15	Remove extraneous spaces between "non-CO2" [United States of America]	Editorial - copyedit to be completed prior to publication. There were multiple comments that this figure was confusing, so figure has been deleted and a simpler carbon budget analysis presented. The remaining carbon budget is now discussed in the text. This includes an analysis of how short lived forcers contribute to it
30072	16	15	16	15	“non-CO2” : remove space [France]	Editorial - copyedit to be completed prior to publication. There were multiple comments that this figure was confusing, so figure has been deleted and a simpler carbon budget analysis presented. The remaining carbon budget is now discussed in the text. This includes an analysis of how short lived forcers contribute to it
15556	16	16	3	3	This figure is too complex for the SPM, better suited to a Technical Summary. [Australia]	Taken into account. There were multiple comments that this figure was confusing, so figure has been deleted and a simpler carbon budget analysis presented. The remaining carbon budget is now discussed in the text. This includes an analysis of how short lived forcers contribute to it
54766	17		18		Perhaps I am overly sensetive, but I got the impression that the discussion on negative emissions went out of the way to brush aside the significance. Perhaps the authors are (understandably) overly sensitive to critiques on negative missions in IAMs, but at the same time, negative emissions would seem to be a quite pivotal technology. If that is the case, then it is in the interests of policy makers that the scientific community says that load and clear. [Glen Peters, Norway]	Accepted - The statements on CDR are more pronounced now. In addition, C2.3 makes clear that there are no 1.5°C pathways that do not remove CO2 (even if BECCS does not remove CO2, AFOLU measures will).
9042	17	1	17	14	This section describes pathways, to limit global warming to 1,5°C but lacks some quantitative figures. Carbon budget described in previous section, are not sufficient to inform policy-makers. These numbers could be given in a table. [Luxembourg]	Taken into account - text revised. Additional quantitative information, including a simpler presentation of the carbon budget, now follows this opening in the new section C of the SPM
10220	17	1	17	14	The text provide quantitative emission reduction target of the CO2 and qualitative description of non CO2 emissions. Improving the feasibility of the 1.5oC and maximizing the benefits of 1.5oC global warming require all GHGs impact to be quantified. [Saudi Arabia]	Noted. Impacts of GHGs are covered in a different part of the SPM. For non-CO2 emissions, there are various pathways possible and these depend on what's done with other emissions so cannot easily be quantified for a single species without reference to what's happening with all other species. However, we show emissions pathways for a couple of the main additional warming agents, methane and BC, in the revised Figure SPM3.
10950	17	1	17	14	The text provide quantitative emission reduction target of the CO2 and qualitative description of non CO2 emissions. Improving the feasibility of the 1.5oC and maximizing the benefits of 1.5oC global warming require all GHGs impact to be quantified. [Nedal KATBEHBADER, Switzerland]	Noted. Impacts of GHGs are covered in a different part of the SPM. For non-CO2 emissions, there are various pathways possible and these depend on what's done with other emissions so cannot easily be quantified for a single species without reference to what's happening with all other species. However, we show emissions pathways for a couple of the main additional warming agents, methane and BC, in the revised Figure SPM3.
15558	17	1			This section has no numbers; it is difficult to know what cutting emissions rapidly and deep really means. A range of emission reductions rates per year would help, compared to, eg. rate of emissions growth in past 10 years. Generic statements don’t give the sense of urgency that the data is really telling us. [Australia]	Taken into account - text revised. Opening statement on emissions pathways is more general, but rates included in subsequent statements.
19418	17	1	17	14	It would be highly informative and policy-relevant to add here the Figure 2.7 from Chapter 2, as this comparison of alternative example scenarios illustrates the key choices and trade offs between rapid emission cuts and pervasive BECCS. [Jennifer Morgan, Netherlands]	Accepted. Figure SPM 3 in revised SPM shows scenarios for several key emissions.
29164	17	1	17	5	Please keep the headline statement in box 3.3, since it clearly indicates that net zero emissions have to be reached in middle of century or shortly thereafter. [Germany]	Accepted. This is now the first sentence in the entire 'emissions pathways' section of the SPM, so emphasizes this and is in a HS.
30074	17	1			Sections 3.1 and 3.3 are very similar and there is even redondancy between the 2nd paragraph of 3.1 and the 2nd paragraph of 3.3. [France]	Accepted - text revised
30076	17	1	17	3	This message would deserve to be better emphasized. [France]	Accepted - text revised. This is now the first sentence in the entire 'emissions pathways' section of the SPM
43796	17	1	17	5	3.3 All emission pathways compatible with [a 50% or higher Unethical target] likelihood of limiting global warming to 1.5°C by 2100 imply[immediate] rapid reductions in global CO2 and CO2 equivalent emissions, reaching net zero [around or shortly after[well before] the middle of the 21st century. Such pathways also imply stringent reductions in non-CO2 climate forcers, primarily methane, black carbon and hydrofluorocarbons [and also long lived nitrous oxide] [Peter Carter, Canada]	Rejected - not supported by the peer-reviewed published literature. Some of the suggested changes are inconsistent with the literature (e.g. the timing for net zero CO2).
44056	17	1		5	should read: "net-zero for all GHG emissions" [Stephan Singer, Belgium]	Rejected. Net-zero is not required for all GHGs as short-lived species could have constant (or declining) emissions and they would not accumulate so not cause additional warming. Hence this applies only to CO2 and other long-lived GHGs. This is clearly stated in revised SPM (see Figure SPM3).

Comment No	From Page	From Line	To Page	To Line	Comment	Response
46198	17	1	17	5	does the statement relate to peak or threshold return scenarios? Can it be indicated what level of negative emisions are needed after reaching net zero emissions? [Netherlands]	Taken into account - text revised. The revised SPM includes differentiation between no-overshoot and overshoot scenarios, and has more information (including Figure SPM 3) on the relationship between negative emissions requirements after net zero and the given scenario.
49318	17	1	17	42	The statements on this whole page appear unbalanced. All statement identify charactersitics of 1.5°C mitigation pathways. While some note qualitative or quantitative difference and similarities with ("likely"?) below 2°C pathways, others do not. By omitting the comparison to 2°C, several statements suggest that certain characteristics are unique to 1.5°C pathways, while in fact they are not, as the underlying chapter 2 shows. This holds, for example for lines 7-9, 11-14, 21-28 and 34-36: the rate of changes required for 2°C are also unprecendented and delayed action leads to higher costs (just as for 1.5°C, but only the latter is noted). This makes these statements tendentious and misleading, and useless for policy makers. By contrast, the specifics in lines 30-31 and 38-42 are useful and a positive example for all other statements on this page. [Bill Hare, Germany]	Taken into account - text revised. Greater attention in revised section C to comparing between 1.5C and 2C when relevant.
50018	17	1	17	5	The Headline 3.3 of this section (that now subsumes the material in 1.2 and 3.1) does bring out the key message on the 1.5 pathways that global CO2 emissions should get to net zero by around 2050 (altough not exactly with the right wording), but it misses the point that total GHG emissions should get to net zero by something like 2060-2070 (this conclusion is not clearly visible at the moment in SPM, but is presented in figure 2.8 and the accompanying text in ch 2 and it is of utmost importance for policy). So my suggestion for modifying the headline statement 3.3 would be something like " All emission pathways .... net zero around 2050. These pathways also .... hydrofluorocarbons, leading to net-zero total GHG emissions by [2060-2070]." The exact timeframe for GHG getting to net zero needs to be presented more clearly in chapter 2. [Bert Metz, Netherlands]	Rejected. The SR1.5 discusses at some length how long-lived GHGs that accumulate need to reach net zero emissions, but that is not the case for shorter lived species. So we believe it is not practical to use wording such as that suggested here (and indeed, neither methane nor BC emissions, for example, reach zero - see Figure SPM 3).
55392	17	1	17	5	This is an important and nicely tight statement that should lead the entire SPM section on mitigation pathways. [Andy Reisinger, New Zealand]	Accepted - text revised. This is now the first sentence in the entire 'emissions pathways' section of the SPM
55584	17	1	17	5	delete "or shortly after" since the text also refers to net zero bu 2040 or 2045. [David Cooper, Canada]	Rejected - not supported by the peer-reviewed published literature. Some scenarios reach net zero after mid-century.
31230	17	2	17	2	We request clarification on whether "global CO2 emissions" includes only anthropogenic emissions or if they include emissions resulting from natural disasters as well. [Japan]	Accepted - text revised. Now specified in definitions Box SPM 1.
50026	17	2	17	3	The wording on the timeframe for net CO2 to go to zero here ("around or shortly after the middle of the centrury") is inconsistent with the statements in chapter 2 on the matter. On page 2-22, line 12 it says "Both pathways holding warming below 1.5 oC or returning below 1.5oC by 2100 reach carbon neutrality (or net zero anthropogenic CO2 emissions) before 2050 in most of those scenarios, ...". The SPM text should be made consistent (the Exec summary text of chapter 2 as well). [Bert Metz, Netherlands]	Accepted. Agreed, this was inconsistent. The underlying chapter 2 material has been revised and the revised SPM is now consistent - both show that timing of net zero can in fact be after mid-century.
15560	17	3	17	5	Box 3.3 lists the primary non-CO2 climate forcers as methane, black carbon and hydrofluorocarbons - implies that reducing emissions of black carbon is more important than reducing emissions of N2O. Can this be demonstrated to be true? What is your source? [Australia]	Taken into account - text revised. This was not meant to be an exhaustive or ordered list. We now refer to methane alone in giving a key example of a non-CO2 emission that must be reduced (see section C, revised SPM). N2O in fact increases in some scenarios, so clearly it does not have to be reduced.
15562	17	3	17	5	Reducing black carbon has mainly localised rather than global temperature effects and should be discussed as such - see Rapid Adjustments Cause Weak Surface Temperature Response to Increased Black Carbon Concentrations Camilla Weum Stjern1 , Bjørn Hallvard Samset1 , Gunnar Myhre1 , Piers M. Forster2 , Øivind Hodnebrog1 , Timothy Andrews3 , Olivier Boucher4 , Gregory Faluvegi 5,6 ,Trond Iversen7 , Matthew Kasoar8 , Viatcheslav Kharin9 , Alf Kirkevåg7 , Jean-François Lamarque10 , Dirk Olivié7, Thomas Richardson2, Dilshad Shawki8 , Drew Shindell11 , Christopher J. Smith2 , Toshihiko Takemura12 , and Apostolos Voulgarakis8 Journal of Geophysical Research: Atmospheres Research Article 10.1002/2017JD027326. [Australia]	Taken into account - text revised. This was not meant to be an exhaustive or ordered list. We now refer to methane alone in giving a key example of a non-CO2 emission that must be reduced (see section C, revised SPM). Black carbon has global as well as local impacts, however, so merits inclusions among other forcing agents.
19414	17	3	17	3	Please add the following finding, which is of high relevance for policymakers: Pathways that assume limited or no contribution of BECCS imply at least halving global fossil fuel and industrial CO2 emissions by 2030. (Source: Chapter 2. Figure 2.7 and Figure 2.15) [Jennifer Morgan, Netherlands]	Noted. Space limitations prevent all useful material from being included in the SPM, but there is substantial coverage of BECCS.
59226	17	3	17	3	Chapter 4 (page 4-14, lines 50-51) suggests that emissions would need to reach net zero by 2060-2080, a bit later than what is implied by "shortly after the middle of the 21st century." [United States of America]	Accepted - text revised. Agreed. Chapter 4 has been revised to become consistent with Ch 2 and the SPM
30078	17	4	17	5	N2O could be mentioned along non-CO2 climate forcers [France]	Taken into account - text revised. This was not meant to be an exhaustive or ordered list. We now refer to methane alone in giving a key example of a non-CO2 emission that must be reduced (see section C, revised SPM) as there in not enough space to include all forcers. N2O in fact increases in some scenarios, so clearly it does not have to be reduced.
19416	17	5	17	5	It would be very useful for the reader to understand how the 50 % likelihood for 1.5°C pathways here relate to 2°C. This could be done by adding, in the end: "...and imply at least a 85 % probability of staying below 2°C." (Source: Table 2.5 of the Chapter 2, page 24). See also a corresponding comment under the Chapter 2 executive summary. [Jennifer Morgan, Netherlands]	Noted. The SPM was shortened, so there was not room to add a discussion of this, but this has been covered more thoroughly in the revised Chapter 2.
11354	17	7	17	9	Can we clarify what net zero means for the broader reader [United Kingdom (of Great Britain and Northern Ireland)]	Accepted - text revised. Now specified in definitions Box SPM 1.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
18986	17	7	17	1	Specify the amount of deep reductions be specified for CO2, and non-CO2 and indicate what these non-CO2 ? [Andrea TILCHE, Belgium]	Accepted. Revised SPM now spells out that N2O in fact increases in some scenarios, whereas methane and black carbon decrease greatly (see Figure SPM 3). For non-CO2 emissions, there are various pathways possible and these depend on what's done with other emissions so cannot easily be quantified for a single species without reference to what's happening with all other species, hence we use the figures primarily rather than specify ranges in the text.
29166	17	7	17	8	CO2 emissions […] must reach net zero before global warming reaches 1.5°C - please add a specific time frame. Since it is stated in the headline statement 1.1 that 1.5 degree could be reached in the 2040s, it should be stated that net zero must be reached before that date. However, this seems inconsistent with the headline statement 3.3 that states that for 1.5°C imply net zero around the middle of this century. Please clarify. [Germany]	Rejected. The statement that CO2 emissions much reach net zero before warming reaches 1.5C is independent of time - just physics says one has to happen first. As for when we have to reach net zero, that is not necessarily before the 2040s as that's when we'd likely pass 1.5C if we weren't dramatically cutting CO2, but then we wouldn't be heading to net zero so not relevant. If we're cutting CO2, we warm more slowly and so the timing given in the opening statement is correct.
29168	17	7	17	7	It would be necessary to clarify the term "net zero". [Germany]	Accepted - text revised. Now specified in definitions Box SPM 1.
29602	17	7	17	7	the term 'net zero'. Does the policy maker understand this? Please include the term in the glossary [Finland]	Accepted - text revised. Now specified in definitions Box SPM 1.
29626	17	7	17	14	The importance of non CO2 emissions is clear. As the term is broad, it would be useful to learn more about the role of different emissions and gases mentioned in the headline statement 3.3 [Finland]	Accepted. Revised SPM now spells out that N2O in fact increases in some scenarios, whereas methane and black carbon decrease greatly (see Figure SPM 3). For non-CO2 emissions, there are various pathways possible and these depend on what's done with other emissions so cannot easily be quantified for a single species without reference to what's happening with all other species, hence we use the figures primarily rather than specify ranges in the text.
32922	17	7	17	14	Can greater specificity or a separate bullet be added regarding the importance of non-CO2 climate forcers? For CO2 emissions it is stated that global emissions must reach net zero by approximately mid-century, but no simliar analysis is provided for non-CO2 forcers -- only states that "deep reductions" are needed. [Thomas Damassa, United States of America]	Accepted. Revised SPM now spells out that N2O in fact increases in some scenarios, whereas methane and black carbon decrease greatly (see Figure SPM 3). For non-CO2 emissions, there are various pathways possible and these depend on what's done with other emissions so cannot easily be quantified for a single species without reference to what's happening with all other species, hence we use the figures primarily rather than specify ranges in the text.
36310	17	7	17	9	This sentence should be rewritten to clearly indicate the time when net zero emissions should be reached to meet a specified likelihood of 1.5 C [India]	Taken into account - text revised. Revised SPM text on reaching net zero clearly states that this is around mid-century, and Figure SPM 3 shows the range.
42860	17	7	17	9	Most of these scenarios are also dependent on negative emissions from carbon dioxide removal, with the lowest usages of CDR technologies existing in scenarios with the greatest reductions of GHG emissions in the near-term. Also, this statement should note whether the 1.5C scenarios are allowing for overshoot or not. [Kristin Campbell, United States of America]	Taken into account - text revised. Revised SPM section C spells out the roles of CDR and differentiates between non-overshoot and overshoot scenarios.
42910	17	7	17	9	Most of these scenarios are also dependent on negative emissions from carbon dioxide removal, with the lowest usages of CDR technologies existing in scenarios with the greatest reductions of GHG emissions in the near-term. Also, this statement should note whether the 1.5C scenarios are allowing for overshoot or not. [Durwood Zaelke, United States of America]	Taken into account - text revised. Revised SPM section C spells out the roles of CDR and differentiates between non-overshoot and overshoot scenarios.
43798	17	7	17	9	• 1.5°C scenarios involve [immediate[deep reductions in global CO2 emissions and must reach [zero fossil fuel combustion defined] net zero before global warming reaches 1.5o C. [Peter Carter, Canada]	Taken into account - text revised. Revised text states that reductions need to be "rapid". Fossil fuel combustion is combined with CCS in some scenarios and does not go to zero, however.
50020	17	7	17	14	The sequence of the bullets under the Headline could be as follows: (1) the text from the 3.1 headline; (2) the first sentence from the first bullet from 3.1 (the second sentence stays in section 1 of the SPM as suggested); (3) the first bullet from 3.3, but phrasing it more simply in terms of reaching net zero by around 2050, making a distinction between the overshoot and non-overshoot pathways and between a 50 and a 66% probability case., adding a graph and a table (not in SPM now, but necessary to support this key finding); (4) a new bullet on total GHGs reaching net zero (with figure 2.8 and based on material in chapter 2); (5) the third bullet from 3.1; (6) the fourth bullet from 3.1 [Bert Metz, Netherlands]	Taken into account - text revised. Substantially revised text and flow in new SPM section C takes into account some of these suggestions.
51360	17	7	17	9	This sentence should be rewritten to clearly indicate the time when net zero emissions should be reached to meet a specified likelihood of 1.5 C [Anand Patwardhan, United States of America]	Taken into account - text revised. Revised SPM text on reaching net zero clearly states that this is around mid-century, and Figure SPM 3 shows the range.
56940	17	7	17	7	Probably better to say "1.5C scenarios considered in this report involve deep reductions" [Oliver Morton, United Kingdom (of Great Britain and Northern Ireland)]	Noted. The SPM was shortened, so there was not room to specify that we refer specifically to pathways considered in this report but we trust that this will be clear to readers by definition.
59228	17	7	17	8	Not clear what "net zero emissions" is. Does this include natural fluxes as well as anthropogenic emissions? [United States of America]	Accepted - text revised. Now specified in definitions Box SPM 1.
59230	17	7	17	9	It also needs to be said that even achieving these reductions will result in impacts that have important consequences for society and the environment. [United States of America]	Taken into account. Covered in section D, and see also Figure SPM 4
38472	17	8	17	8	CO2 -- 2 should be subtitled [Linah Ababneh, United States of America]	Editorial - copyedit to be completed prior to publication

Comment No	From Page	From Line	To Page	To Line	Comment	Response
38962	17	8	17	8	It would be useful if you find and decide consistent wording regarding "drivers", "agents", "compounds", and be sure to use it in a way that a broad range of readers understand [Jan Fuglestvedt, Norway]	Taken into account - text revised. Shifted to using 'emissions' in the revised SPM to stave off confusion.
40566	17	8	17	8	CO2, not "CO2". [Sergio Henrique Faria, Spain]	Editorial - copyedit to be completed prior to publication
49016	17	8	17	9	It would also be important to note here the effect of non-CO2 forcers on temperature by mid-century, as noted in 2.2.2.3, and the key role they can play in addressing temperature change in the near-term, as noted in 4.3.7. [David Waskow, United States of America]	Noted. Good suggestion, but the SPM was shortened during revision and there is not enough room for all good suggestions.
53220	17	8	17	8	CO2 should be replaced by CO2 [Maria-Carmen Llasat, Spain]	Editorial - copyedit to be completed prior to publication
59232	17	8	17	8	subscript needed in "CO2" [United States of America]	Editorial - copyedit to be completed prior to publication
33850	17	1	17	1	Consider including a new bullet point to make the connection between cumulative emissions of GHGs and mitigation pathways especially in 2030 since the decision in Paris COP (see para 17 in dec. 1/CP.21; fccc/cp/2015/10/add.1) asked IPCC to address the level of emissions in 2030 which will be consistent with a 1.5 degree global warming. Since this decision also refer to the emission level that are consistent with below 2 degree warming it will be important that IPCC also update the number for 2 degrees to make them comparable. Information that is relevant can be found in Table 2.7 we suggest that you present information from this Table in the SPM e.g. those numbers that are most relevant to the Paris agreement for example 2030 and 2050 annual emissions (median or mean values) for Kyoto GHG for "Return 1.5 66" and "Below 2C 66". You may also consider to include numbers for CO2. Please also consider adding information about the total GHG emissions in 2030 from the NDCs . This would help the reader to understand the gap between the NDC and the long term goal in the Paris Agreement. Information is available from Table 2.7, and information regarding the NDCs is explained in Ch. 2 Executive Summary, page 5, line 19-20, and also in Ch. 2 FAQ, page 116, line 18-22. [Norway]	Noted. Good suggestion, but the SPM was shortened during revision and there is not enough room for all good suggestions. We have included the 2030 carbon emissions range consistent with no or limited overshoot scenarios as well as how much of a reduction that represents from 2010. With overshoot, higher ranges are possible,, but are more easily misunderstood as they then require improbably large amounts of CDR later on.
11356	17	11	17	13	This is repetition of an earlier bullet point. It should be woven in with the narrative around carbon budgets. [United Kingdom (of Great Britain and Northern Ireland)]	Accepted - text revised
15564	17	11	17	14	This bullet point is repeated earlier in the second bullet point for headline 3.1 (page 14). [Australia]	Accepted - text revised
29170	17	11	17	14	Strong similarities to the paragraph page 14 line 21-28, please streamline. [Germany]	Accepted - text revised
29604	17	11	17	13	Dealing with 'delay' is an issue to be taken up in a highlighted box (e.g into 3.4) [Finland]	Accepted. Now covered in HS C1.
30080	17	11	17	14	This is redudant with second paragraph of SPM3.1. [France]	Accepted - text revised
42862	17	11	17	14	At present, many carbon removal technologies have yet to be proven at scale, even though they are readily incorporated into the climate modeling scenarios. In particular, BECCS erroneously assumes that bioenergy is carbon neutral, when in fact there is a carbon deficit for many years, generally several decades to a century; moreover, CCS has not be perfected at scale, nor has it proved to be socially acceptable. [Kristin Campbell, United States of America]	Taken into account. Section D and Figure SPM4
42912	17	11	17	14	At present, many carbon removal technologies have yet to be proven at scale, even though they are readily incorporated into the climate modeling scenarios. In particular, BECCS erroneously assumes that bioenergy is carbon neutral, when in fact there is a carbon deficit for many years, generally several decades to a century; moreover, CCS has not be perfected at scale, nor has it proved to be socially acceptable. [Durwood Zaelke, United States of America]	Taken into account. Section D and Figure SPM4
43800	17	11	17	14	• Because of the cumulative impact of global CO2 emissions, any initial delay[past the immediate basis]in emission reductions requires faster [DELETE subsequent] reductions to meet the same temperature ambition or subsequent active net CO2 removal [which is not feasible today and unlikely to be feasible at any scale (Expert assessment concludes negative emissions scenarios may not deliver Naomi E Vaughan 2016 and The limits to global-warming mitigation by terrestrial carbon removal L. Boyse, 2017 and this report (Ch. 2.3.4.2) 'There is uncertainty in the future deployment of CCS given the limited pace of current deployment' (Ch.2.3.4.2) 'Strong concerns about the high level of CDR deployment in deep mitigation pathways have been raised on sustainable development grounds. There is substantial uncertainty about the adverse effects of large-scale CDR deployment on the environment and societal sustainable development goals'.] [Peter Carter, Canada]	Noted. Now covered in HS C1 with revised wording as to the effect of rapid action vs delay.
52960	17	11	17	14	Is active net CO2 removal only envisaged in this scenario? [Ireland]	Taken into account - text revised. Revised section C covers the role of active CDR under the various scenarios.
56942	17	12	17	12	..to meet the same temperature ambition through emissions reduction, or subsequent… [Oliver Morton, United Kingdom (of Great Britain and Northern Ireland)]	Not Applicable - no longer included in the chapter. This sentence was replaced during revisions of the SPM
50022	17	15	17	42	I suggest the headline 3.4 text to be replaced by the text of the fifth bullet of the high level statement section (that I suggested to be removed altogether), and modified as follows: " Rapid and deep emissions reductions …… atmosphere." This is a key message and is a good introduction to discuss the three main components. The first, second and fourth bullets under 3.4 can then be retained, as they address the headline point; the third bullet can be deleted, as it is already covered in the first sentence of the second bullet under 3.1 (that moves to the budget item). [Bert Metz, Netherlands]	Taken into account - text revised. Revised section C has HS reading "Limiting global warming to 1.5°C would require rapid and far-reaching systems transitions occurring during the coming one to two decades, in energy, land, urban, and industrial systems." We believe this addresses the suggestion although we could not follow some of the recommendation as there were only 4 bullets in this section so the 5th was unclear.
342	17	16	17	43	adding a point to mention urban systems [Zong-Ci Zhao, China]	Accept. This has been implemented in the FGD section C3.
6014	17	16	17	19	this point could comapre the rate of change required to meet the 1.5 degree target with historical trends, to give an idea of the challenge ahead [Sara Budinis, United Kingdom (of Great Britain and Northern Ireland)]	Taken into account. The next paragraph does exactly this.

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9046	17	16	18	39	Section 3.4 and 3.5: These sections contain very policy-relevant numbers on CO2 mitigation, both for 2°C and 1,5°C pathways as well as the associated CO2 removals. Please add one or two tables summarizing the relevant figures. [Luxembourg]	Noted. The possibility and merits of a table were discussed but eventually were not considered feasible given space constraints.
44058	17	16		19	Include: "and consumption pattern" [Stephan Singer, Belgium]	Rejected. This is implied in (some of) the transitions, and further detailed in the text in the FGD version of the SPM.
46200	17	16	17	19	The Box misses any reference to options associated with changes in consumer behaviour and preferences (diets, travel volume and mode, etc). This refelcts the underlying chapter 4, which also lacks information on opportunities beyond options commonly discussed. So, 1.5C might even more than 2C hinge on societal responses that go beyond ' doing more of the same' in terms of (technical) mitigation options. [Netherlands]	Accept and taken into account. The next version of the SPM (and the report) has more on this, including in emission pathways as some new papers emerged. In Chapter 4, we discuss the measures affecting behaviour extensively in section 4.4.3.
52962	17	16	17	19	Include more detail on timing and differential rates [Ireland]	Accept. More on this is included in the new draft, based on chapter 2's sectoral outcomes.
50414	17	16	17	42	This section 3.4 poses serious problems of transparency of the message that is delivered: in 2.3.1, important and critical mitigation approaches such as BioEnergy with Carbon Caprture and storage (BECCS) are considered. Nothing in this SPM 3.4 section provides for such important and critical information. As a matter of fact, the implications of BECCS are important in terms of surface of land needed for deploying BECCS at a quantitative level able to contribute to reaching the objective of stabilising at 1.5 degrees, as well as ecological impacts of BECCS. Most important is the efficiency of BECCS: probably 100 times less than photovoltaic in terms of transforming solar radiation in usable énergy. Therefore, we recommend that this section considers being more transparent. [Switzerland]	Taken into account. We have brought the information on CDR in general and BECCS specifically together in section C2 in the FGD version of the SPM.
55812	17	16	17	42	Section 4.3 could benefit from a bullet on specific mitigation options for energy, land use, and urban, and industrial transitions. [Debora Ley, Guatemala]	Accept. This has been implemented in the FGD section C3.
59236	17	16	17	16	More specificity on what is meant by "rapid" would be helpful here. [United States of America]	Taken into account. The emission pathways in figure SPM.1 tried to make this clear. In the SPM FGD, this is clarified further in Figure SPM.3.
59234	17	16	17	28	Line 23-26 states, "There is, however, no documented precedent for the geographical and economic scale of the energy, land, urban, and industrial transitions implicit in pathways consistent with a 1.5°C warmer world has no documented historic precedents." The wording for this is awkward, suggest instead, "There is, however, no documented historic precedent for the geographical and economic scale of the energy, land, urban, and industrial transitions implicit in pathways consistent with a 1.5°C warmer world." More substantively, this is an incredibly important point that should be highlighted. This is probably one of the most important findings in the report and should be highlighted as a key finding. The point actually highlighted at the top of this section (3.4), while technically correct, sets a tone that fails to convey the scale of the challenge. [United States of America]	Noted. We see the point jointly with the point though that speed has documented precedents, while scale has not (so unprecedented measures need to be taken). We will discuss whether this warrants a bolded headline statement.
62252	17	16	17	19	Key Message 3.4 and its subpoints should emphasize the need for a phase-out of fossil fuels. At present, there is only brief mention of fossil fuels on lines 34-37, referring to delayed or weak action increasing the amount of stranded investment in fossil fuel capacity. [Shaye Wolf, United States of America]	Taken into account. Indeed, the phase-out of fossil fuels is part of the transition. We have included number on the reduction of primary energy from coal (by two-thirds in 2030 compared to 2020, and by even more by 2050, leaving 1-7% of primary energy)
50416	17	17	17	17	Write: " … patterns of land use which may rise questions about trade-offs with sustainable development." since choosing a pathway may generate winners and loosers in the short term. [Switzerland]	Accept. The language both in the headline statement and in the supporting text has been revised and expanded to reflect the concerns over land use change.
59238	17	17	17	19	The mention of CO2 removal is very glancing; it is an important point that should be addressed head on – clearly stating that (significant) CDR will likely be essential for 1.5°C pathways. Recommend pulling forward the first sentence of SPM 3.5 to follow the first sentence of SPM 3.4, so that the box would have three sentences. [United States of America]	Taken into account. A full section C3 on CDR is included.
5782	17	21	17	28	2nd sentence needs correction??? [Govindasamy Bala, India]	Accept. Text modified, which has taken care of the mistake.
11358	17	21	17	21	How rapid? [United Kingdom (of Great Britain and Northern Ireland)]	Taken into account. See response to comment 59236.
15566	17	21	17	21	Modelled pathways for remaining below 1.5C … needs to be rewritten "Pathways for limiting temperature change to less than 1.5C …" First we are not talking about "remaining below 1.5 C" - that would be a very cold planet indeed! Also need to make clear that ALL pathways for remaining below 1.5C of temperature change are "modelled" [Australia]	Accept, language removed and made consistent with other mentions of this in the SPM and the report.
19420	17	21	17	28	The paragraph here could acknowledge that neither is there no precedent for adapting to a world warming this fast. So we're entering an uncharted territory in any case, whether we pursued a 1.5°C pathway or not. [Jennifer Morgan, Netherlands]	Taken into account. It is a fair point that is highlighted elsewhere in the SPM and the report. This section is on the emission pathways so focussed on mitigation.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
19470	17	21	17	28	The way this paragraph is not balaned. The way it is framed it wieghs heavily on the fact that there is no presedent for the time of transformation needed given the scope and breath. Although this is true, a more balanced paragraph would also point out that modelled pathays have consistently failed to account for disruption (https://www.rmi.org/wp-content/uploads/2017/08/RMI_Report_Positive_Disruption_2017.pdf. On solar specifically, see https://www.nature.com/articles/nenergy2017140.epdf?referrer_access_token=24nnff3WFpD3GAxujAdI3dRgN0jAjWel9jnR3ZoTv0MwubtPHaj9zPdI8QQdt_62Nf5urePRubvGnv689V1YjulS9gFrLjkl1HDh5Ouz6lmUnnoltYEF3HukClj2cmyu86hoBVAvUOCYbbx5mxSRG6gWEMa1Wsr2K1BtGc42qVrSmd_NsKZZu2sU-d_rddJPRxVs1A6E21yg3zf4bGnKn2DTWny_oNOgUF_z-4cniQbS0AdTel2Un9QaTUWC--vI83PlIZ3AEtF9FW88bMEh_XBb6tzo9dR5YRBeUsYzzEY%3D&tracking_referrer=www.vox.com.) The burden would then also lay not only on history but on the inadequacy of the models used to provide any insight on how this disruption may happen. It would be relevant to bring up language from the Chaper 2; section 2.5.1.2 "Limitiations of Integrated Assessment Models in examining policy options" (pp. 92-95; lines 30-32): "Although model-based assessments project drastic near, medium and long-term transformations in 1.5°C scenarios, projections also often struggle to capture a number of hallmarks of transformative change, including disruption, innovation, and nonlinear change in human behaviour (Rockstro?m et al., 2017)." And Chapter 4, Section 4.2.22 "Disruptive adn socio-technical innovation, decoupling and behaviour change" (p.14, lines 2-6). "Understanding rates of change requires knowledge of, and preferably modelling of disruptive innovation and the sources of robustness of the socio-technical systems, it disrupts. Disruptive innovations are technological changes that lead to significant system change (Christensen et al., 2015; Green and Newman, 2017a; Seba, 2014) that are very hard to predict by economists and modellers as economic feasibility is a limited predictor of the success of innovations (Geels et al., 2016a; Green and Newman, 2017b)." [Jennifer Morgan, Netherlands]	Accept. This is better elaborated now in both chapters 2 and 4, and in the next draft of the SPM.
36824	17	21	17	21	It willl be helpful to quantify or elaborate the term rapid rate of change. [CHI KEUNG TAM, Singapore]	Taken into account. See response to comment 59236.
43802	17	21	17	28	Modelled pathways for remaining below 1.5o C require [immediate global emissions declining and] rapid rates of change in emissions. [Peter Carter, Canada]	Taken into account. In the FGD of the SPM, this is amply elaborated in section D1.
45874	17	21	17	22	A numerical quantification of this "rapid pace of change" should be added. In particular you can note that a fall of 9% in total emissions (each year from 2016 on) would forever keep the cumulated emissions under the TRB for 1.5°C . [Valentino Piana, Italy]	Taken into account. See response to comment 59236.
49522	17	21	17	21	Can the rapid rates of change be somehow quantified? Would be extremely helpful. Like this, it sounds like a generic statement [Karlheinz ERB, Austria]	Taken into account. See response to comment 59236.
56500	17	21	17	21	Change can happen when emissions go up or down. For this sentence to be meaningful it should say "rapid rates of REDUCTION in emissions." [Eleanor Johnston, United States of America]	Noted. This section is about the various system transitions, implying there are more changes than just emissions. The language has been revised to reflect this point.
58158	17	21		28	So far, GHG emissions have not been addressed seriously by policies. However, there have been instances of rapid reduction of e.g. sulphur emissions. Also, the built up of crucial infrastructure such as sanitations have been performed in relatively short time more than 100 years ago. It is true, that GHG emissions have not declined rapidly (with the exception of the restructuring of economies of former socialist countries), but this is also the reason why the global warming problem is as large as it is, and it is a falacy to argue that future emission reductions are somehow questionable because there is "no documented historic precendent" of exactly this. There are more than enough historic precendents in other areas. [Nico Bauer, Germany]	Taken into account. We are looking at other transitions in the chapter (though admittedly not the examples listed). However, the argument that the speed may have been shown before but the scale not still holds.
59240	17	21	17	28	The historical precedent point is very good. It would be useful to highlight this much more. It's one of the few places that feasibility is addressed effectively. [United States of America]	Taken into account. See response to comment 59236.
59242	17	21	17	21	Instead of "rapid rates of change" indicate the sign, so say "rapid reductions" so the sign of the change is clear. [United States of America]	Noted. See response to comment 56500.
11360	17	22	17	22	Change to: "Historically, at a national or regional scale, rapid rates of change…" [United Kingdom (of Great Britain and Northern Ireland)]	Accept. Text is revised, but "spatial contexts" is added to reflect this point.
45980	17	22	17	27	Add a quantification: "A fall by 9% of national emissions has occurred 1132 times in the years 1959 to 2016 in the 220 countries considered by the Global Carbon Budget 2017. This corresponds to 9% of cases. However, in the large majority of these cases, the fall was connected to a GDP reduction." You may also note,immediately or in the following sentence, that "Effective policies at sectoral and economy-wide levels are decisive to decouple emission from GDP dynamics". [Valentino Piana, Italy]	Noted, interesting point. However, this is not in the underlying report so it cannot be adopted.
1530	17	23	17	25	Remove "has no documented historic precedents" from the end of this sentence. It repeats what is stated at the beginning, and the sentence is grammatically incorrect with this phrase at the end. [David Wratt, New Zealand]	Accept, text revised.
17794	17	23	17	25	It needs to realign this sentence. (There are two 'no documented (historical) precedents in the same sentence.) [Republic of Korea]	Accept, text revised.
19242	17	23	17	25	Review the writing; final sentence "has no documented historic precedents" is superfluous/repeated? [Spain]	Accept, text revised.
29532	17	23	17	25	The sentence "There is, however, no documented precedent…" is difficult to understand - there is also some repetition. [Finland]	Accept, text revised.
30082	17	23	17	25	This is a very complex sentence, please clarify as possible. [France]	Accept, text revised to clarify and shorten.

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32618	17	23	17	25	Sentence has unnecessarily repeated words at beginning and/or end [Jonathan Lynn, Switzerland]	Accept, text revised.
36800	17	23	17	25	There is, however, no documented precedent for the geographical and economic scale of the energy, land, urban and industrial transitions implicit in pathways consistent with a 1.5°C warmer world. [Birgit van Munster, United Kingdom (of Great Britain and Northern Ireland)]	Accept, text revised considerably anyway to clarify.
40758	17	23	17	23	Repetition: delete 'no documented precedent for' [Liese Coulter, Australia]	Accept, text revised.
41288	17	23	17	25	Delete "has no documented historic precedents" in the end of the sentence. [Michio Kawamiya, Japan]	Accept, text revised.
45892	17	23	17	25	Sentence is repetitive [Deger Saygin, Turkey]	Accept, text revised.
45982	17	23	17	25	There is a duplication in negation. "There is, however, no documented precedent... has no documented historic prcedence". One or the other expression should be dropped. [Valentino Piana, Italy]	Accept, text revised.
49406	17	23	17	25	Remove repeated words 'no documented precedent' [Alexander Chernokulsky, Russian Federation]	Accept, text revised.
49736	17	23	17	25	There is, however, no documented precedent for the geographical and economic scale of the energy, land, urban and industrial transitions implicit in pathways consistent with a 1.5°C warmer world. [Birgit van Munster, United Kingdom (of Great Britain and Northern Ireland)]	Accept, text revised considerably anyway to clarify.
52704	17	23	17	26	There seem to be some editorial problems with this sentence. [Iulain Florin VLADU, Germany]	Accept, text revised.
53360	17	23	17	25	There is, however, no documented historic precedent for the geographical and economic scale of the energy, land, urban and industrial transitions implicit in pathways consistent with a 1.5°C warmer world. [Kjell Kühne, Mexico]	Accept, text revised considerably anyway to clarify.
54576	17	23	17	25	Versions of "no documented precedent" repeated in the sentence [Christopher Bataille, Canada]	Accept, text revised.
57644	17	23		25	sentence garbled [WGII TSU, Germany]	Accept. Sentence revised.
57916	17	23	17	25	There is a duplication of similar phrases "no documented precedent" and "no documented historic precedents" in the same sentence. Only one of them should be used. [Siir KILKIS, Turkey]	Accept, text revised.
54514	17	24	17	24	I suggest to add buildings and transportation after urban [Paolo BERTOLDI, Italy]	Taken into account. We have agreed to include these aspects in urban and infrastructure system transitions.
6896	17	25	17	25	Please, delete after "warmer world" the words "has no documented hisdtoric precedents" because this wording is already included in line 23 at the beginning of this long sentence. [Klaus Radunsky, Austria]	Accept, text revised.
9002	17	25	17	25	omit "has no documented historic precedents" (already mentioned at the beginning of the sentence) [Urs Neu, Switzerland]	Accept, text revised.
13296	17	25	17	25	Delete the text "has no documented historic precedents". [Eleni Kaditi, Austria]	Accept, text revised.
21626	17	25	17	25	Delete "has no documented historic precedents" - already stated at the beginning of the sentence [Sweden]	Accept, text revised.
30084	17	25	17	25	Delete "has no documented historic precedents" at the end of the sentence – Repetition [France]	Accept, text revised.
33852	17	25	17	27	Please consider to define or explain "disruptive innovation". [Norway]	Noted. The text revision has led to the removal of this term.
56502	17	25	17	25	The phrase "has no documented historic precedents" is redundant. The first part of the sentence covers it. [Eleanor Johnston, United States of America]	Accept, text revised.
38542	17	27	17	27	Large fall in emissions were not the result of some randomness ("coincidental change"), but of the effectiveness of politicies that could locally find the political space to be advocated, adopted and maintained, sometimes only until a new government would liquidate them. The Report should highlight which policies worked, when and where and under which conditions they can be applied elsewhere. Imitation of effective policy practices, including their adaptation to local condition, is a major venue for achiving globally relevant results. Example of sentences to be introduced: "If every country would have the carbon emission in sector xx as country yy, we would cut emission by zz". "If the carbon intensity in xx group of countries would be equal to yy country, emissions would be... lower". The report talks a lot about the future but does not point enough at existing good examples. [Valentino Piana, Italy]	Noted. This seems to be a comment on the report rather than on the SPM. Literature is sparse on applicable historical examples - we were mandated to be as 1.5C-relevant as possible. Note also that the statements here in the SPM relate often to systemic changes in technologies, and not necessarily in emissions.
11014	17	3	17	32	....."mitigation options like energy efficiency, renewables, fuel switching, nuclear, CCS on fossil fuels, etc. , are deployed ..... (to connect Policy Maker's to the tangible technologies to target with policies, also as the 1.5 pathways rely more heavily on them than on CO2 removal) [Wilfried Maas, Netherlands]	Taken into account. Because of space constraints, this was not included at first. The FGD of the SPM contains a more extensive discussion of the energy, industry and urban system transition, mentioning some of these options.
11366	17	3	17	3	In 1.5°C scenarios, can these still be considered "options"? i.e. are there some mitigation actions that don't need to happen? [United Kingdom (of Great Britain and Northern Ireland)]	Noted. Good point. On a global level, all are probably needed. On a national level, they are options. This is also consistent with the definition in the glossary.
18988	17	3	17	32	Please provide some quantification: what is meant with more rapidly, greater scale, more complete portfoglio [Andrea TILCHE, Belgium]	Taken into account. See response to comment 59236.
29172	17	3	17	42	Please merge under subsection 3.4: Line 30-32 (bullet point 2) and line 38 - 42 (bullet point 4). [Germany]	Noted. We have not included the numbers in the 4th bullet anymore as more diverse scenarios are now included (see Figure SPM.3 in the FGD) which doesn't make the one-third/two-third statement defendable anymore. The text has been restructured significantly.
29610	17	3	17	32	This bullet point and the bullet point on page 19 lines 1-7, contain a similar message. The page 17 text is short and clear and the page 19 text is a longer version plus other issues. [Finland]	Accept. Text is streamlined.
30086	17	3	17	32	Suggestion : "mitigation options are broadly similar to those deployed in 2°C scenarios, but they are deployed more rapidly...." To take on board the interesting message from Chap 2 that the type of mitigation options are similar [France]	Taken into account, but text revised to "Pathways that are consistent with limiting global warming to 1.5°C are qualitatively similar to those for 2°C"
31232	17	3	17	32	We would appreciate if IPCC can clarify differences between 1.5°C and 2.0°C since this seems to be a general statement which is not limited to 1.5 warming world. [Japan]	Accept. See response to comment 30086.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
33854	17	3	17	32	This is an important bullet point. However, it would be even more useful for policy makers if an additional sentence listed the most important mitigation options required to achieve the very sharp decline in net global emissions that is needed. Especially, we wish to see more information on the differences in scale and implementation rate of mitigation options between the 1.5 and 2 degree pathways. Perhaps the options could be formulated like "more use of renewable energy, substantial life style change, less deforestation and less use of conventional coal, oil and gas"? [Norway]	Accept, see response to comment 11014.
33856	17	3	17	32	This statement is easy to understand and summarises the challenge very well. Consider to start SPM 3 on page 14 with this statement. [Norway]	Noted. It was considered but eventually did not make the final cut in the FGD.
36922	17	3	17	32	This is a general statement. 2°C scenarios imply the significance of the challenge without deploying complete portfolio of possible mitigation options. It should be explained that the difference of 1.5°C and 2°C scenarios is not the portfolio but the scale and speed of deployment. [Keigo Akimoto, Japan]	Taken into account. That is precisely what the statement tries to say. The language is further clarified in C3.1 in the next draft.
40004	17	3	17	32	Can you be specific about how much more rapidly, eg. for some key variables, like power system decarbonization, ending deforestation, etc. [Kornelis Blok, Netherlands]	Accept. More numbers, coming from the IAMs, are included in the next draft.
37254	17	3	17	32	It would be more useful if the report could describe what rapid deployment of mitigation options means in practical terms from an investment or infrastructure perspective. Is there some comparable period of technological change or investment that could illustrate this such as e.g. the pace of technology change associated with mobile phone uptake or the level of investment in infrastructure in post-WW2 Europe or the level of investment in shale gas extraction in the US since 2000. [Jonathan Grant, United Kingdom (of Great Britain and Northern Ireland)]	Noted. This would indeed be very useful. The report describes this to the extent that the literature allows this, for instance in section 4.2. In the SPM, we don't have space to go into such details, hence this summarising bullet. It should also be noted (as we try to) that the scale (e.g. population size, size of the economy) is greater now than ever before.
59244	17	3	17	31	Regarding phrases "1.5°C scenarios" and "2°C scenarios", it needs to be made clear that these are scenarios that do not go over these temperature values. If their names include overshoot possibilities, this needs to be indicated as the key impacts are dependent primarily on peak warming – not the eventual level that is reached. [United States of America]	Accept. This is now explained in section C1. We now consistently use "1.5C-consistent pathways" for all scenarios that keep temperature rise below 1.5C by 2100, so including overshoot. Same with 2C-scenarios.
38544	17	31	17	31	The expression "with a more complete porftolio" is false. Mere "Low carbon" solutions have less place than "zero carbon solutions" in a 1.5°C scenario. You need to jump immediately to the zero carbon solution, without "bridging" technologies that would lock-in into a pathway of "lower" but not "low" total emissions. [Valentino Piana, Italy]	Accept. Language is also prescriptive. Text is revised and this term is dropped.
29174	17	32	17	32	Please add a notion about the difference between 1.5°C and 2°C-pathways regarding additional reductions, which would be on top of reductions from both CO2 and non-CO2 required for 2°C,are mainly from CO2 (cf 2.4, Tabl. 2.9 "All climate forcers, including CO2, non-CO2 GHGs and aerosols, are strongly reduced by 2030 and until 2050 in 1.5°C scenarios. The greatest difference to 2°C scenarios, however, lies in additional reductions of CO2, as the non-CO2 mitigation potential that is currently included in integrated pathways is mostly already fully deployed for reaching a 2°C pathway."). [Germany]	Noted. This is implicit in the statements on 1.5C pathways. We are now almost exclusively reporting in the SPM on 1.5C rather than comparing it to below 2C.
54516	17	32	17	32	section 4.4.4 and 4.5 shall be added inside the bracket [Paolo BERTOLDI, Italy]	Accept. This is done in the FGD.
6898	17	34	17	34	Lack of clarity. The following wording is suggested: 1.5oC scenarios with weak or delayed near-term policies and/or mitigation actions increase the likelihood of exceeding the …….. [Klaus Radunsky, Austria]	Accept. Text has been revised and moved to D2.2 in the FGD.
10222	17	34	17	36	Fossil based investment are needed to meet global demand; failing to do so increases the likelihood of not meeting this demand [Saudi Arabia]	Accept. The new text in the FGD gives more clarity on the changes in investments in fossil fuels, such as in D2.3 and in C3.2 in the FGD.
31234	17	34	17	36	Fossil-based capacity can be stranded asset in terms of 1.5°C target, but it also could have implication that investment toward global warming of 1.5°C can be stranded with the significance of the challenge to realize 1.5°C target in the real world. Therefore, before debating on which asset should be stranded or not, it would be good to define what a stranded asset is in the report. [Japan]	Accept. Stranded assets are defined in the glossary. But the term is avoided in the FGD.
33858	17	34	17	36	Please consider to define or explain "stranded investment". [Norway]	Accept. Stranded assets are defined in the glossary. But the term is avoided in the FGD.
36924	17	34	17	36	Fossil-based capacity can be stranded asset in terms of 1.5°C target, but it should be also noted that investment toward global warming of 1.5°C can be stranded with the significance of the challenge to realize 1.5? target in the real world. [Keigo Akimoto, Japan]	Accept. See response to comment 31234.
41290	17	34	17	36	Isn't this also true for the 2.0degC? In view of the mission of this Special Report, there should be some comparison between the 1.5degC and 2.0degC target. [Michio Kawamiya, Japan]	Accept. This is also true for the 2C limit. The likelihood of stranded assets would be higher when reductions are done more quickly, like in 1.5C pathways, but since most models don't include capital goods, this is not a result of the literature yet and not assessed as such in the report. In any case, we are removing the reference to stranded assets in the next draft.
52706	17	34	17	35	Delayed action is compared to which reference point? [Iulain Florin VLADU, Germany]	Accept. Text has been revised to avoid the term. The reference is immediate action compared to NDCs. Text now in D2.2 of the FGD.
52964	17	34	17	37	Costs should be included [Ireland]	Taken into account. In the FGD, this is reflected in section D2.1. In the underlying report, we did not do a full cost assessment though - that is in the mandate of the AR6.
59246	17	34	17	36	The statement is too weak. It needs to begin with the observation that limiting global average surface temperature change to 1.5°C inevitably creates stranded investments. There is no way that the present coal fleet in China could possibly be run through the remainder of its physical life and still achieve a 1.5°C limit. [United States of America]	Noted. This statement is in fact not as such in the report. D4.3 is the place where economic losses as a result of fossil fuel use decline is addressed.
13298	17	35	17	35	Delete the text "and the amount of stranded investment in fossil-based capacity". [Eleni Kaditi, Austria]	Accept. Text is deleted.
15568	17	35	17	35	…the amount of stranded investment in fossil-based capacity… is not included in the equivalent high-level point in section 1.2, but it should be. [Australia]	Noted. This statement is in fact not as such in the report. D4.3 is the place where economic losses as a result of fossil fuel use decline is addressed.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
31236	17	35	17	35	Please clarify whether "capacity" in "fossil-based capacity" refers to the physical installed capacity or the availability of fossil fuels as a while. [Japan]	Noted. Text revised which makes the comment obsolete. The meaning is both production and use infrastructure.
54518	17	36	17	36	section 4.4.4 shall be added inside the bracket [Paolo BERTOLDI, Italy]	Rejected. Text revised, and this section does not draw on 4.4.4.
9044	17	38	17	42	This seems to us a very important message to give to policymakers, including the quantification of CO2 removals. Please highlight this more clearly in the key message and also in the high level statements [Luxembourg]	Accept. CDR statements are discussed more extensively and l a more balanced way in the FGD in section C2.
11362	17	38	17	42	I think greater care needs to be made in communicating this point or else it might be misleading about the scale of the impact of the additional CO2 removal. It's important to recognise that the balance when shifting to 1.5 is greater towards mitigation than removal, but the extra removal required is still significant in absolute terms. This is made clear in chapter 5 (section 5.4.3.2, page 35). Don't downplay the implications of the additional CO2 removal required. [United Kingdom (of Great Britain and Northern Ireland)]	Accept. This point is made more carefully now in section C2 and also in figure SPM.3.
18992	17	38	17	42	This paragraph (and also p19 1-7) are examples of the kind of message the SPM should be communicating prominently. They are informative, clearly within scope and inform the reader about 1.5°C rather than messages that could have come equally from AR5. [Andrea TILCHE, Belgium]	Thank you.
18990	17	38	17	42	When first talking about "removals" in the SPM, it should be clearly stated what is meant. CO2 removal is mentioned only for the future, without any reflection on the fact that it is already a major factor in the C balance, as oceans and terrestrial systems already remove more than half of CO2 emissions. As awareness of policy makers to these issues is rather limited, it would be essential to clarify: - the assumptions about the land and ocean sink for the future - a statement that the "CO2 removal" mentioned (180 Gt) would be additional to the above land/ocean sink - An indication of the nature of that additional sink, notably whether it would be increased land sink, increased oceanic sink or it is some sort of geoengineering (like free air capture through artificial means). It should also be stated whether (and how) BECCS is taken into account, if double counting is avoided. Erb, Karl-Heinz, Thomas Kastner, Christoph Plutzar, Anna Lisa S. Bais, Nuno Carvalhais, Tamara Fetzel, Simone Gingrich, Helmut Haberl, Christian Lauk, Maria Niedertscheider, Julia Pongratz, Martin Thurner, Sebastiaan Luyssaert, 2018. Unexpectedly large impact of forest management and grazing on global vegetation biomass. Nature, 553, 73-76 doi: 10.1038 Shows that half of these costs are very likely neglected because land management effects beyond deforestation are almost never taken into account when assessing the C effects of land-use changes, even more so in coarse models such as IAMs [Andrea TILCHE, Belgium]	Accept, thank you for pointing this out. CDR is defined in the glossary and linked to anthropogenic removals. With such a definition, the first point is clear from the outset. The other points will be clarified in the text.
29176	17	38	17	42	This paragraph is difficult to understand, where do the 600 Gt come from? And would the fraction of CDR not depend on the pathway? [Germany]	Taken into account. In the FGD, we will clarify the numbers, the type of CDR, their issues and the differences between scenarios. See FGD section C2 and Figure SPM.3.
29612	17	38	17	42	This bullet point brings an interesting and important information on the share of CO2 removal measures among additional mitigation measures. How is this information linked to the paragraph on page18, lines 19-20? [Finland]	Taken into account. The number on page 17 is the additional CDR in a 1.5C compared to a 2C pathway. The amount on page 18 (or rather, the range) is the total. This explains why the number on P17 is lower.
30088	17	38	17	39	In 1.5°C pathways rapid and extensive mitigation as well as CO2 removal occur simultaneously Check against this article: Oberstener, doi:10.1038/s41558-017-0045-1 [France]	Accept. This and other new literature are taken on-board, resulting in statements such as those in section C2 in the FGD.
36804	17	38	17	42	Add: Both 2 C as well as 1.5 C pathways rely heavily on CO2 removal, compared to [Birgit van Munster, United Kingdom (of Great Britain and Northern Ireland)]	Rejected. Text is revised. New scenarios point out that CDR can be completely or almost completely avoided by focussing early on lowering energy demand.
42864	17	38	17	42	Include that non-CO2 emissions are also crucially important to the 1.5C goal, and show their contribution in Gt CO2-e through end of century. [Kristin Campbell, United States of America]	Taken into account in section 3.2.
42914	17	38	17	42	Include that non-CO2 emissions are also crucially important to the 1.5C goal, and show their contribution in Gt CO2-e through end of century. [Durwood Zaelke, United States of America]	Taken into account in section 3.2.
43804	17	38	17	42	1.5°C pathways rapid and extensive mitigation [as well as possible potential] CO2 removal [may] occur simultaneously in future decades . Such pathways generally rely more heavily on additional mitigation measures than they do possible CO2 removal. [DELETE Compared to 2°C pathways, additional mitigation measures account for around two thirds of the ~600 GtCO2 of CO2 reductions by the end of the century, 42 and CO2 removal for the remaining third (~180 GtCO2 for the median). [This is insufficient for any high probability of 1.5° C or 2°C and faster decline is feasible.] [Peter Carter, Canada]	Taken into account. The text will be restructured leading to a change of this sentence.
46474	17	38	17	39	The statement "In 1.5°C pathways rapid and extensive mitigation as well as CO 2 removal occur simultaneously." seems to be an inaccurate characterisation of the findings. For example, chapter 2 table 2.7 implies that while already significant CO2 mitigation has happened by 2030 in 1.5C scenarios, BECCS and CCS are still at very low levels (if I understand the graphs right). Only AFOLU is delivering substantial negative emissions then. If only AFOLU is meant with the carbon removal in thi sentence then it should be said [Sven Harmeling, Germany]	Accept. This and other new literature are taken on-board, resulting in statements such as those in section C2 in the FGD.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
49524	17	38	17	42	It would be helpful if the three options described in the very beginning (pg3ln39ff: demand reduction, low-carbon technologies, removals) would be used consistently also here. Furthermore, which carbon removal approaches are meant here. Important: these carbon removals have to be additional to the levels of 2016, where carbon sinks in terr. ecosystems are playing a strong role). [Karlheinz ERB, Austria]	Noted. In the report, the modelling-related results are grouped in the demand/supply/removal categories. In chapter 4, the results are grouped in "system transitions" in an attempt to better reflect organisational realities on the ground, as this chapter is on implementation. More explanation on CDR will be included in the FGD (section C3).
49738	17	38	17	42	Add: Both 2°C as well as 1.5°C pathways rely heavily on CO2 removal. Compared to etc [Birgit van Munster, United Kingdom (of Great Britain and Northern Ireland)]	Rejected. Text is revised. New scenarios point out that CDR can be completely or almost completely avoided by focussing early on lowering energy demand.
54768	17	38	17	42	Sure, no doubt this is true when compared to a baseline. But, you cant do one without the other. The question is not whether X% of mitigation is not negative emissions, the question is the implications of the negative emissions. Can you get to 1.5C without negative emissions? If 95% of scenarios say negative emissions are needed, then it is a bit of a moot point if negative emissions account for 33 or 66% of the mitigation? This statement just seems to want to say that conventional mitigation is more important than negative emissions, but that seems somewhat irrlevant if large scale negative emissions are needed. [Glen Peters, Norway]	Accept. We are reflecting this better, hopefully, in the FGD, which differentiates between archetype pathways and their CDR aspects.
17884	17	39	17	42	This sentence is very hard to understand: … two third of 600 …and remainig third… I don't get how many Gt are meant here, can't you simply state the number? [Brigitte Knopf, Germany]	Accept. Text is revised.
34374	17	39			It isn't clear what the 'additional mitigation measures' are additional to. Are they additional to migation measures included in 2C scenarios? [Nathan Gillett, Canada]	Accept. Unclear phrasing removed.
36802	17	39	17	4	Such pathways generally rely more heavily on additional mitigation measures than they do on CO2 removal. [Birgit van Munster, United Kingdom (of Great Britain and Northern Ireland)]	Noted. Text revised which makes the comment obsolete. The
6900	17	4	17	4	Clearer language might be: .. on additional mitigation measures than on CO2 removal. [Klaus Radunsky, Austria]	Accept. Text is revised and restructured. We hope we captured this comment in the new version.
9004	17	4	17	4	than they do on CO2 removal. instead of "than they do CO2 removal". [Urs Neu, Switzerland]	Accept. Text is revised and restructured. We hope we captured this comment in the new version.
30090	17	4	17	42	Sentence is unclear : are we speaking about the different measures approaches for achieving 1.5°C or are we speaking about the different carbon budgets for 1.5°C and 2°C respectively ? [France]	Noted. We are talking about the amount of reductions through "conventional" mitigation measures and CDR. Not about carbon budgets. Text is revised so we hope the unclarity is now removed.
32620	17	4	17	4	…than they do on CO2 removal… (adding 'on') clearer [Jonathan Lynn, Switzerland]	Accept. Text is revised and restructured. We hope we captured this comment in the new version.
33860	17	4	17	42	This statement is important. However, perhaps it could be simplified. An example is "Approximately 600 Gt more CO2 must be reduced by the end of the century in 1,5 degree pathways compared to 2 degree pathways. Additional mitigation measures account for around two thirds of this amount, while CO2 removal accounts for the remaining third." [Norway]	Noted. This is indeed a much clearer way of saying it. However, the text has been restructured and included in a new section C2, which does not mention the cumulative numbers anymore, but the average annual numbers until 2050 and 2100.
36312	17	4	17	4	Add 'on' before 'CO2 removal' [India]	Accept. Text is revised and restructured. We hope we captured this comment in the new version.
40586	17	4	17	4	do CO2 removal' should be reworded to 'do on CO2 removal'. [Jonny Williams, New Zealand]	Accept. Text is revised and restructured. We hope we captured this comment in the new version.
57646	17	4		4	...than they do on CO2 removal [WGII TSU, Germany]	Accept. Sentence revised.
59248	17	4	17	42	This sentence is unclear. Is the comparison to 1.5°C? Are the "Additional mitigation measures" those required for 1.5°C? [United States of America]	Accept. Text is revised and restructured. We hope we captured this comment in the new version.
59250	17	4	17	42	This sentence is too complex to understand and should be more simply expressed. [United States of America]	Accept. Text is revised and restructured. We hope we captured this comment in the new version.
11364	17	42	17	42	This seems to be an important statement and it's a shame to see it relegated to an afterthought in this paragraph. Could this be a separate bullet, along the lines of: 1.5 pathways require a median of an additional 180 GtCO2 removal compared with 2C pathways. The greater balance of effort in 1.5C is towards mitigation, but the additional removal required is still a non-trivial amount and that needs to be emphasised. [United Kingdom (of Great Britain and Northern Ireland)]	Noted. However, the text has been restructured and included in a new section C2, which does not mention the cumulative numbers anymore, but the average annual numbers until 2050 and 2100.
50024	17	44	17	45	two additional headlines need to be inserted here, one on the importance of demand reduction (more or less the current 3.4 headline) and the other on the importance of the supply transitions; these points then cover the first two issues raised in the new text of 3.4 and the current 3.5 headline covers the third element of CO2 removal. On the first new headline the text from the Executive Summary of chapter 2 on page 2-7, line 39 could be used: "A number of demand-side measures and behavioural changes are critical elements of 1.5 scenarios ....", maybe followed by the second sentence of the current 3.4 headline text:" More extensive and rapid demand reductions would lower the requirement for CO2 removal....." For the second new headline on the need for rapid transition in energy supply, agriculture and land-use the text from the executive summry of chapter 2 on page 2-7, line 26 on energy supply could be used, supplementing it with something on agriculture and land-use. [Bert Metz, Netherlands]	Accept, the FGD mentions in a headline statement (C2) that demand-side and behavioural measures are important. The main point here though is the systemic transitions.
54764	18		18		I may have missed it, but there seemed to be no comment on the scale of negative emissions, or more specifically, the land use implications. That is a pretty policy relevant consideration? [Glen Peters, Norway]	Taken into account - New section C2.3 gives the scale of CDR deployment in the 1.5°C pathways. Section 2.1 explicitly mentions environmental and social implications, amongst which land use change.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
4450	18	1	18	7	It wuold be a good idea to put the same kind figure shown in UNEP Emission Gap Report (Figure 7.2) showing gross GHG emissions (CO2 and other GHGs) and gross negative emissions and net emissions (either positive or negative). This kind of graph will help policymakers to understand how huge negative emissions we must rely upon to achieve either 2 or 1.5 degree target. In this sense, this kind of graph is quite policy relevant. Also additional information of land area that those negative emissions require for BECCS and Forestation/Afforestation and the portion of the area to global land taking into consideration of arable land should be added here. [Mitsutsune Yamaguchi, Japan]	Accepted/Rejected: The net versus gross emissions idea has been taken up in new Figure SPM3. The land footprints vary widely across studies for different CDR methods and there was thus not sufficient confidence to report numbers in the SPM. In addition, this would have meant singling out one side effect over all others (e.g. impacts on nutrients, water footprint, energy use or generation) and thus signalling that the others may be less important. Chapters 3 and 4 contain the required information.
11044	18	1	18	7	Any discussion of removal of CO2 from the atmosphere needs to make it clear that this CO2 must be stored through some mechanism. Geological storage is the ideal in that it has near absolute certainty. [Wilfried Maas, Netherlands]	Noted - Even though we agree that the storage argument is very important, the need to reduce the SPM's length by a third implies that we couldn't go into this detail. The issue of permanence is taken up in chapter 4, however.
19422	18	1	18	2	For comparability, please add a corresponding conclusion also for below 2°C pathways. [Jennifer Morgan, Netherlands]	Not applicable - this sentence no longer exists. In general, 2°C pathways have more flexibility to reach the target without CDR than 1.5°C, however.
29178	18	1	18	27	In the SPM the term "CO2 removal" is used, in chapter 2 the abbreviation "CDR" is used. Assumed that the meaning is identical, is there any reason for this approach? [Germany]	Noted - once defined, the abbreviation of carbon dioxide removal is used, especially on figures.
31238	18	1	18	7	Regarding SPM3.5, it is recommended that the same kind figure shown in “UNEP Emission Gap Report 2017” (Figure 7.2) showing gross GHG emissions and gross negative emissions and net emissions (either positive or negative) is described. This kind of graph will help policy makers to understand how huge negative emissions we must rely upon to achieve either 2°C or 1.5°C target. [Japan]	See response to 4450
32624	18	1	18	39	this could be clearer in pointing to the conflict between CDR through BECCS/afforestation and food production, and the implications of this conflict given that it says that this kind of CDR is substantial in all 1.5 pathways. This should be one of the key messages but it seems to me we're not expressing it properly (also discussed in SPM 4.3) [Jonathan Lynn, Switzerland]	Taken into account - Food security concerns constitute only one dimension of possible conflicts in this context. We have added the following sentence to make such trade-offs visible in the SPM: "The feasibility of CDR measures relates to their impacts on sustainable development, and depends on scale, implications for land, water and energy use (high confidence)."
38966	18	1	18	7	this headline statement contains much important information and it would be an advantage is you split it into two. I would make a separate headline statement from "There is a high risk…" [Jan Fuglestvedt, Norway]	Not applicable - Please note that the SPM has been restructured.
39328	18	1	18	7	We look now to another of the important statements of this SPM. We think that the sentence “Scenarios with high overshoots, where global warming may reach up to 1.9°C before returning to 1.5°C by 2100, involve more CO 2 removal than scenarios that keep overshoot as low as possible” should be removed from this part of the text and inserted into the explanation given below. This sentence could be read and could be transform into a consolidated opinion that the temperature really will increase more than 1,5ºC but then, in the future, we could finally easily return (we don't know when and how) to the temperature goal of 1,5ºC. We know, and this SPM insists a lot in this idea, that if we live at some level of warming above 1.5ºC for some years, there is a high risk of important impacts in earth ecosystems and the earth conditions in general. Because of that we would keep the highlighted box as follows: “All mitigation pathways compatible with limiting global warming to 1.5°C by 2100 involve removal of CO 2 from the atmosphere. There is a high chance that the levels of CO 2 removal implied in the scenarios might not be feasible due the required scale and speed of deployment required and trade-offs with sustainable development objectives” . [Olga Alcaraz, Spain]	Taken into account - the SPM has been restructured and the recommendation was taking into account in the process resulting in a headline statement on CDR levels in different pathways, detailing the situation of overshoot in a later statement.
42866	18	1	18	7	Overshooting the 1.5C goal risks offsetting feedbacks and tipping points—a large cluster of which exist between 1.5 and 2ºC of warming (Drijfhout et al 2015)—that could amplify warming and jeopardize successfully limiting warming to 1.5C. Furthermore, when the uncertainty of climate sensitivity and climate feedbacks like released carbon from permafrost thaw are considered, the “fat tail” risk of warming extends into the catastrophic range (Xu and Ramanathan 2017). [Kristin Campbell, United States of America]	Noted - the SPM does not feature literature reference, but the new section D1.2 does report the higher impacts during overshoot.
42916	18	1	18	7	Overshooting the 1.5C goal risks offsetting feedbacks and tipping points—a large cluster of which exist between 1.5 and 2ºC of warming (Drijfhout et al 2015)—that could amplify warming and jeopardize successfully limiting warming to 1.5C. Furthermore, when the uncertainty of climate sensitivity and climate feedbacks like released carbon from permafrost thaw are considered, the “fat tail” risk of warming extends into the catastrophic range (Xu and Ramanathan 2017). [Durwood Zaelke, United States of America]	Noted - the SPM does not feature literature reference, but the new section D1.2 does report the higher impacts during overshoot.
43806	18	1	18	7	3.5[Most but not all (this report Gruber 2017)] mitigation pathways compatible with limiting global warming to 1.5°C by 2100 involve removal of CO2 from the atmosphere. Scenarios with high overshoots, where global warming may reach up to 1.9°C before returning to 1.5°C by 2100, involve more CO2 removal than scenarios that keep overshoot as low as possible,[so these scenarios are not acceptable for mitigation policy making.] There is a high chance that the levels of CO2 removal implied in the scenarios might not be feasible due the required scale and speed of deployment required and trade-offs with sustainable development objectives,[so such scenarios and BECCS is not acceptable for policy making mitigation] [Peter Carter, Canada]	Rejected - also Grübler et al. (2018) remove CO2, just not with the particular technology BECCS.
53478	18	1	18	2	The statement "All mitigation pathways ..." is inconsistent with the analysis of chapter 2, which highlights several CDR-free scenarios (e.g. Grubler et al 2017, Holz et al 2017, etc) [Christian Holz, Canada]	Rejected - also these pathways remove CO2, just not with BECCS. Note that SR1.5 also defines nature-based solutions such as CO2 uptake through restoration etc. as CO2 removal practice.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
53876	18	1	18	39	I suggest using stronger language that emphasizes the impacts of CDR technologies, should they be deployed at the scales suggested. One option would be to convert the 380-1130 GtCO2 that is assumed to be removed to eg. area of land used for BECCS. See: https://www.nature.com/articles/d41586-018-02184-x?utm_source=twt_nnc&utm_medium=social&utm_campaign=naturenews&sf182855449=1 and Heck, V., Gerten, D., Lucht, W., & Popp, A. (2018). Biomass-based negative emissions difficult to reconcile with planetary boundaries. Nature Publishing Group, 1–7. http://doi.org/10.1038/s41558-017-0064-y [Grandin Jakob, Norway]	Taken into account - The land footprint is only one dimension of the potential of trade-offs for large-scale CDR deployment. The following sentence has been added to deal with this "The feasibility of CDR measures relates to their impacts on sustainable development, and depends on scale, implications for land, water and energy use (high confidence)." Please note that we do not consider the conversion of Gt CO2 into land as helpful in the SPM, as different pathways facing 1.5°C can have very different land footprints depending which type of land the model in question uses, for example: cultivating biomass on marginal land will cause less competition with food production, yet have a much larger land footprint than using the most productive agricultural land, for instance. Also, some pathways that minimize the use of BECCS use more bioenergy without CCS also resulting in a large land footprint. So putting random land area numbers into the SPM would be misleading in our opinion.
54348	18	1	18	4	This section also needs an assessment of feasibility of GHG removals. For BECCS it says that increased use of biomass is likely to put pressure on other systems and that implementing speed, that is foreseen in some scenatios, can be challenging. The question here is whether it is possible at all to have biomass production at that scale, will the CCS technology be ready for deploying BECCS at a large scale, and if it is not possible to have BECCS what are the alternatives then? These questions are crucial for achieving 1.5°C and need clear answers in SPM with confidence levels added. [Estonia]	Taken into account - the following paragraph has been included on the assessment of the feasibility of large-scale CDR: "The feasibility of CDR measures relates to their impacts on sustainable development, and depends on scale, implications for land, water and energy use (high confidence). Feasibility of CDR could be enhanced by a portfolio of options deployed at smaller scales, rather than a single option at a large scale (high confidence)."
59252	18	1	18	39	The Summary for Policymakers states: "3.5 All mitigation pathways compatible with limiting global warming to 1.5°C by 2100 involve removal of CO2 from the atmosphere." This excludes solar radiation management (SRM). The exclusion of SRM is a consequence of the formal definition of 'mitigation' as presented in the Glossary: "Mitigation (of climate change) – A human intervention to reduce emissions or enhance the sinks of greenhouse gases, therefore encompassing also Carbon Dioxide Removal (CDR) options." Policymakers might be confused and perhaps misled by this formal definition. The point that is obscured by the Summary for Policymakers is that SRM offers a potential pathway for limiting global warming without the necessity of removing CO2 from the atmosphere. In another embodiment, one concept is to deploy SRM to limit global warming until CDR technology is implemented successfully. The Summary for Policymakers does not clearly state this. [United States of America]	Taken into account - the new version of the SPM features the following text to clarify this: "Solar radiation modification (SRM) measures are not included in any of the available assessed pathways. Though some may be theoretically effective in reducing an overshoot, SRM measures face large uncertainties and knowledge gaps as well as substantial institutional and social constraints to deployment related to governance, ethics, and impacts on sustainable development (medium confidence)."
59254	18	1	18	7	Provide an expert assessment of the importance of the role of CDR in 1.5°C scenarios, rather than just simply describing them. [United States of America]	Taken into account - New section C2.2 is explicitly on the role of CDR.
59256	18	1	18	39	The text states that "All mitigation pathways compatible with limiting global warming to 1.5°C by 2100 involve removal of CO2 from the atmosphere." The implications of this statement are stark, and not made clearly enough. As described in van Vuuren et al (2017) (an important paper that is not referenced in Chapter 2), "of the approximately 110 scenarios in the AR5 WGIII database that are relevant for achieving the 2°C target, practically all achieve net negative CO2 emissions in the second half of the century through extensive application of bioenergy with carbon capture and storage (BECCS)." The need for CDR is even greater in 1.5°C scenarios as the deeper mitigation that can be a substitute for CDR in 2°C scenarios is needed in addition to CDR in 1.5°C scenarios (see discussion in Chapter 2.3.1, 2.3.4). However, there is great uncertainty around CDR technologies. As enumerated in van Vuuren et al (2017), there are significant uncertainties related to CDR technologies due to (1) physical limitations, there are considerable impacts that large-scale bioenergy production are expected to have on food security and biodiversity; (2) social limitations, at least in the short term, there is a lack of societal and governmental support for CCS, and significant societal concerns about large scale deployment of BECCS; and (3) policy limitations, it is not yet clear how markets should be organized in the real world to take into account negative emissions (e.g., how will governments fund the significant payments that will be required under policies with a high carbon price and net negative CO2 emissions). van Vuuren et al (2017) concludes, "While IAM modellers typically assume that technologies are deployed on the basis of economic and technical considerations alone, BECCS in particular faces constraints with respect to societal support. The application of a wider set of criteria in model-based scenarios (other than those focussing on full cost optimization) and an exploration of scenarios with more pessimistic assumptions regarding the feasibility and public support for BECCS will allow for a more in-depth and constructive discussion of the relevant issues in the scenario literature, and can help avoid unintended interpretations of the published research." This special report is at risk of just such an unintended interpretation of the published research. The topline statement in SPM 3.5 states that, "There is a high chance that the levels of CO2 removal implied in the scenarios might not be feasible due the required scale and speed of deployment required and trade-offs with sustainable development objectives." However, the SPM falls short of making the implication of this statement clear: If these levels of CDR are infeasible, then there is a high chance that 1.5°C is infeasible. See https://www.nature.com/articles/s41560-017-0055-2 [United States of America]	Noted - van Vuuren et al. (2018) has been published in the meantime and has as a result been included in chapter 2. Its conclusions now also feature in the SPM.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
62254	18	1	18	7	The important subpoint that “the required scale of CO2 removal depends on emissions reductions in the coming decades and the degree by which they exceed the 1.5°C carbon budget” should be incorporated into the main text of Key Message 3.5. The enormous amounts of CO2 removal (up to 1130 GtCO2!) required in pathways that don’t require aggressive emissions reductions must be highlighted in the Key Message, in addition to the likelihood that this level of CO2 removal would be infeasible. [Shaye Wolf, United States of America]	Taken into account - the new version of the SPM explicitly states that pathways that overshoot 1.5°C need to rely on CO2 removal exceeding remaining CO2 emissions to return global warming to 18 below 1.5°C by 2100and earns that the geophysical understanding is limited about the effectiveness 19 of CDR to reduce temperatures after they peak. Also, Figure SPM 3 shows the extent and the timing of emissions reductions and CDR graphically to make this point clear.
62914	18	1	18	7	In various places in the SPM, it has been emphasized that CDR is necessary for reaching the 1.5°C target. However, here it is stated that large-scale CDR is likely not feasible. Still, no information is offered to policymakers how to deal with this, which leaves the reader with a very pessimistic feeling. [Sabine FUSS, Germany]	Accepted - this language was imprecise and confusing and has been changed in the new version of the SPM to detail the factors upon which the feasibility of large-scale CDR hinges.
19466	18	2	18	8	“Scenarios with high overshoots, where global warming may reach up to 1.9°C before returning to 1.5°C by 2100, involve more CO2 removal than scenarios that keep overshoot as low as possible. There is a high chance that the levels of CO2 removal implied in the scenarios might not be feasible due the required scale and speed of deployment required and trade-offs with sustainable development objectives. {2.2.2, 2.4.1, 2.3.1, 2.3.3, 2.3.4. 2.4.2, 2.4.4, 2.5.3, 2.6.4, 4.3.8}” If the chance of not delivering significant CO2 removal in high overshoot (1.9C) scenarios is so high, why these scenarios belong still to “Return to 1.5C 50%” and “Return to 1.5C 66%” scenarios? Why isn't a summary of the large land-use, flora, agriculture, food production etc impacts from these extreme high CDRs are not summarised in the SPM? [Jennifer Morgan, Netherlands]	See response to 62914
40006	18	2	18	3	We have a problem here. I think a scenario that overshoots to 1.9 degree C can no longer be called a 1.5 degree C scenario. I would limit maximum acceptable overshoot to, for example, 1.7 degree C. [Kornelis Blok, Netherlands]	This would be a value judgment. Chapter 2 provides data for several categories of scenarios that limit warming to 1.5°C in 2100, without, with low, or with high overshoot.
18994	18	4	18	7	The current text is not clear whether the reference 'in the scenarios' refers to all 1.5°C scenarios (first sentence in red) or only to those with high overshoots (second sentence in red). Please clarify. [Andrea TILCHE, Belgium]	Taken into account - the sentence does no longer exist in the new version of the SPM, but care has been taken to always specify the type of scenarios referred to.
29534	18	4	18	5	Suggest deleting "there is high chance that" and starting the sentence "The levels of CO2 removals…" - then add the level of confidence or/and agreement. [Finland]	Taken into account - the sentence does no longer exist in the new version of the SPM, but care has been taken to avoid the further use of "high chance".
35460	18	4	18	7	Consider adding that therefore, if one has to stay within the 1.5 target, it is better not to overshoot it. [Ashok Sreenivas, India]	Taken into account - Though not using this language, the new version of the SPM features the following new text "Pathways that overshoot 1.5°C need to rely on CO2 removal exceeding remaining CO2 emissions to return global warming to below 1.5°C by 2100 (high confidence)." and continues to warn that "[g]geophysical understanding is limited about the effectiveness of CDR to reduce temperatures after they peak."
38964	18	4	18	4	keep overshoot as low as possible is vague. Can you be more clear and (semi-)quantitative? [Jan Fuglestvedt, Norway]	Not applicable - this text is gone due to a major rewriting of this section.
46202	18	4	18	7	3.5 is unclear: to which scenarios does the secoond statwement relate? What are the levels of negative emissions the statement is relating to? [Netherlands]	See response to 18994
50028	18	4	18	7	The last sentence of the headline states that there is a risk that CO2 removal (at whatever level) might not be feasible. That statement is not supported by chapter 2. The amount of CO2 removal varies enormously across scenarios and the risks of being infeasible therefore apply to those scenarios with high amounts of CDR. The text of the headline therefore should be modified to read "There is a high chance that high levels of CO2 removal implied in some of the scenarios might ...." [Bert Metz, Netherlands]	See response to 62914
49018	18	4	18	7	In 3.5 and elsewhere, it would be important to note that integrated models do not incorporate some potentially very important approaches to CDR. As demonstrated in Chapter 2, Table 2.8, measures such as reduced land degradation, forest and landscape restoration, agroforestry, and to some degree soil carbon practices, have not been considered in integrated models. The potential for such measures to address the overall need to reduce GHG, and for CDR in particular, should be noted in this section of the SPM. [David Waskow, United States of America]	Taken into account - Alongside the results from the pathways literature (chapter 2), the new version of the SPM now also features the results of the bottom-up literature assessment on technologies currently not widely deployed in models (chapter 4). The following conclusion has been added "Feasibility of CDR could be enhanced by a portfolio of options deployed at smaller scales, rather than a single option at a large scale (high confidence)."
49294	18	4			There is a high chance that the levels of CO2 removal implied in the scenarios might not be feasible. What is the basis for this statement? Furthermore, the levels required are very different between scenarios. Does the 'high' qualifier applies to all scenarios, or just to specific ones? This statement being general in nature is misleading. There is a very large range of scenarios and deployment of CO2 removal (see line 14 on this SPM page: 380-1130 GtCO2 over the 21st century). Chapter 2 contains specifics of the scenarios that can make this section more useful. See lines 38-39 on this SPM page. [Bill Hare, Germany]	Taken into account - We agree that this was confusing and have clarified the role of CDR and the feasibility of its deployment and its drivers in the new section C2.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
49526	18	4	18	4	The statement is eventually correct, but it is arguing only indirectly, without stating the frame-conditions. Please reformulate towards a straightforward statement, along such a line: Scenarios without overshoot are only possible with considerable, immediate emission reductions. Otherwise, overshoot will occur. Scenerios with overshood are characterized by smaller emission reductions (from demand and low-carbon techs) and thus require larger additional carbon removals. But there is a high risk that these levels of active, addtional carbon removals are not feasible, due to the sustainability implications, the current maturity of some technologies, or the trade-offs that emerge. An option are the large immediate absorption potentials in forests which exist (Erb et al., 2018, doi 10.1038/nature25138; Griscom et al., 2018 doi 1710465114; Houghton and Nassikas 2017 doi 10.1111/gcb.13876), but which are in trade-offs with biomass harvest, in particular forestry. Reducing harvest pressures in forests globally would create a strong, immediate sink. [Karlheinz ERB, Austria]	Taken into account - this part of the SPM has been completely rewritten actively considering this concern for clarity.
51088	18	4	18	7	See note 51 above. The feasiblity is not just because of the required scale and speed of deployment, nor trade-offs. There are biogeophysical limits that make imagined levels of CO2 removal actually physically IMPOSSIBLE. Reword to reflect this. [Doreen Stabinsky, United States of America]	Taken into account - Reference has been made to biogeophysical constraints on large-scale CDR deployment in the new section C2. However, the evidence shows that smaller deployment of different CDR options can work against many biogeophysical constraints, so we have added this finding as well, cautioning though that the "[g]eophysical understanding is limited about the effectiveness of CDR to reduce temperatures after they peak."
52708	18	4	18	4	high chance not defined in the IPCC language for dealing with uncertainties [Iulain Florin VLADU, Germany]	Accepted
59258	18	4	18	5	Articulate "high chance" in IPCC likelihood terminology. [United States of America]	See response to 29534
63072	18	4	18	5	Failing to reach the level of CO2 removal shown in scenarios can hardly be described as a "chance". Wouldn't the word "risk" be more appropriate than "chance"? [Belgium]	See response to 29534
9008	18	5	18	6	end of line 5: ""... Feasible du to the required scale ..."? [Urs Neu, Switzerland]	Not applicable - this part of the text is gone due to major restructuring for the new version of the SPM.
32622	18	5	18	6	…might not be feasible due to the required scale… (insert 'to' at start of line 6) [Jonathan Lynn, Switzerland]	Not applicable - this part of the text is gone due to major restructuring for the new version of the SPM.
40760	18	5	18	5	Overly conditional; change 'might' to 'will' as chnace is already mentioned in the sentence. [Liese Coulter, Australia]	Not applicable - this part of the text is gone due to major restructuring for the new version of the SPM.
43974	18	5			due should be "due to"? [Seita Emori, Japan]	Not applicable - Text has been changed.
52966	18	5	18	5	Can chance be developed? [Ireland]	Not applicable - this part of the text is gone due to major restructuring for the new version of the SPM.
58252	18	5	18	6	Perhaps "...not be feasible due to the reguired scale…" [Peter Marcotullio, United States of America]	Not applicable - this part of the text is gone due to major restructuring for the new version of the SPM.
59260	18	5	18	5	Insert 'to' after 'due' [United States of America]	Not applicable - this part of the text is gone due to major restructuring for the new version of the SPM.
62146	18	5	18	5	This statement does not respect chapter 2 and 4, in particular some scenarios do not use large scale removal by CCS, and some do it as a more limited scale; The statement could also be used to say the same for the 2°C path, and in favour of choosing a 3°C target! [Antoine Bonduelle, France]	Rejected - even Grübler et al. and van Vuuren et al. feature net negative emissions and thus remove more CO2 than is eventually emitted. They just do it without BECCS.
43976	18	6			required is duplicated. [Seita Emori, Japan]	Not applicable - Text has been changed.
9140	18	9	18	11	I am not aware of any sectors of the economy for which "no mitigation measures" have been identified. Almost any end-use of energy could use electricity or biofuels or hydrogen. The cement sector may be the main exception to the extent that CO2 is released by the raw materials, yet there are many substitutes for cement. [Richard Rosen, Germany]	See response to 19244.
19244	18	9	18	1	A reference to sectors for which no mitigation measures have been identified couldn't be found. Which are these sectors? [Spain]	Taken into account - this was an unfortunate formulation and meant to indicate that some sectors are more difficult (more costly, taking more time) to decarbonize than others and that CDR can help to offset residual emissions from these sectors in the meantime. The text has been removed for the next version of the SPM.
34376	18	9			Is this referring to emissions of CO2 from sectors with no mitigation, or emissions of all GHGs? [Nathan Gillett, Canada]	Taken into account - This text was suboptimally formulated and has been changed.
38546	18	9	18	12	If a sector has not even one mitigation measure available, then we should dampen its growth and, if this lack persists, the sector should be drastically shrinked. This perspective should motivate investments in R&D and design so to have mitigation options and should induce policies to support them. If this does not happen, we should not necessarily use negative emissions, with all the negative consequences of their large-scale deployment. We can also act on the emitting sector and the related demand. For instance, a century ago there was no civil aviation for the masses and life was perfectly possible. So if in the future we shall need to restrict intercontinental flights, then we shall do. By the way, the list of sectors for which "no mitigation measures have been identified" is getting shorter and shorter over time. In synthesis, the sentence should become "... for which no mitigation measures will have been identified by that time, notwithstanding high international R&D and design efforts, and balancing the consequences of negative emissions with the possibility of dampening growth or limiting demand in such sectors". [Valentino Piana, Italy]	See response to 19244.
42868	18	9	18	11	Identify which sectors this would apply to. [Kristin Campbell, United States of America]	Note by Sabine: Same as 19244.
42918	18	9	18	11	Identify which sectors this would apply to. [Durwood Zaelke, United States of America]	Note by Sabine: Same as 19244.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
50030	18	9	18	11	This statement should also include that many scenarios also use CDR to compensate for overshoot of the total available CO2 budget [Bert Metz, Netherlands]	Accepted - The following sentence has been inserted "Pathways that overshoot 1.5°C need to rely on CO2 removal exceeding remaining CO2 emissions to return global warming to 18 below 1.5°C by 2100 (high confidence)."
51072	18	9	18	11	Qualify CO2 removal so it is clear the breadth of technologies that are discussed in the underlying report. In some pathways (Gruber et al) this removal is through expansion of forest cover. Other pathways rely heavily on BECCS. Not all CO2 removal is the same, with the same negative impacts that accompany a technology such as BECCS. [Doreen Stabinsky, United States of America]	Taken into account - Non-BECCS options are now explicitly mentioned and the following text has been added "There is variation in the amount and types of CDR used in 1.5°C-consistent pathways, suggesting flexibility in addressing implementation challenges (medium confidence). In 1.5°C-23 consistent pathways, BECCS deployment ranges from 0–9 GtCO2/yr in 2050, and 0–16 GtCO2/yr in 24 2100, while agriculture, forestry and land-use (AFOLU) related CDR measures remove 0–11 25 GtCO2/yr in 2050 and 1–5 GtCO2/yr in 2100. Some pathways avoid BECCS deployment through low energy demand and greater reliance on AFOLU-related CDR measures."
51156	18	9	18	11	It would be hard to think of any sector for which "no mitigation measures" could be identified, especially when considering demand-side measures and changes in consumption patterns and lifestyles. To the extent that the cement sector may be considered an exception due to emissions released by the raw materials, substitutes to cement exist and should be explored. [Linda Schneider, Germany]	See response to 19244.
52710	18	9	18	9	Need to add to "removal" "removal from the atmosphere". [Iulain Florin VLADU, Germany]	Not applicable - this part of the text is gone due to major restructuring for the new version of the SPM.
52968	18	9	18	11	Consider rewording sectors for which no mitigation measures have been identifed as all sectors have mitigation potentials but not to zero emissions [Ireland]	See response to 19244.
55394	18	9	18	11	add "and for the delay in emissions reductions to date and in the near future". [Andy Reisinger, New Zealand]	Noted - However, this text is gone due to a restructuring of this part of the SPM. The comment has been considered though and is implicit - though worded differently - in the new section C2.2 and furthermore graphically represented in Figure SPM3.
21628	18	1	18	1	Does the "which" refer to "emissions" or "sectors"? Please clarify. [Sweden]	Not applicable - this sentence does no longer exist.
46204	18	1	18	1	Suggestion to name these sectors [Netherlands]	See response to 19244.
59262	18	1	18	1	Not just for 'no mitigation measures' but really also for mitigation measures that don't completely eliminate emissions. [United States of America]	See response to 19244.
30092	18	13	18	17	It could be more explicit to know the absolute value of emissions for which no mitigation measures have been identified, as here there is a mix between uncompressible and avoidable which makes it not clear [France]	See response to 19244.
33862	18	13	18	14	The total amount of CO2 removal projected in 1.5°C pathways in the literature is of the order of 380-1130 GtCO2 It may also be useful to relate these numbers to the potential for sustainable removals by sinks. [Norway]	Noted - however, there are more options to put these numbers into relation with and we did not want to elevate one over the other in the face of space constraints and also to avoid confusion between existing carbon sinks and deliberate removal (e.g. through an extension of existing sinks).
42870	18	13	18	17	Include when this would start (and suggest that it ideally begins as quickly as possible) and the speed with which CDR technologies would need to scale in order to achieve the requisite negative emissions. [Kristin Campbell, United States of America]	Taken into account - In new section C2.3 we now give the timing (2050 and 2100) for removals. Note that C2.2 contains additional qualifications concerning the timing of removals.
42920	18	13	18	17	Include when this would start (and suggest that it ideally begins as quickly as possible) and the speed with which CDR technologies would need to scale in order to achieve the requisite negative emissions. [Durwood Zaelke, United States of America]	Taken into account - In new section C2.3 we now give the timing (2050 and 2100) for removals. Note that C2.2 contains additional qualifications concerning the timing of removals.
43808	18	13	18	17	• The total amount of CO2 removal projected in 1.5°C pathways in the literature is of the order of 380-1130 GtCO2 over the 21st century [but the feasibility at best is unknown and cannot be relied on for policy making]. 25-85% of this CO2 removal is used to compensate for emissions for which no mitigation measures have been identified while the remainder is used after carbon neutrality has been achieved to compensate for exceeding the carbon budget prior to that point [but the feasibility of this is the best unknown and with an immediate and rapid decline in global omissions should not be necessary] [Peter Carter, Canada]	Rejected - There is knowledge on the feasibility and that has been added to the new draft. There is no evidence that with immediate emissions reductions, CDR won't be needed.
51076	18	13	18	14	add a qualification to this sentence that reflects the infeasibility of most of this range. Just because these numbers come out of a model doesn't mean there is any biogeophysical possibility of achieving them. See comment 8 above made in reference to chapter 2. [Doreen Stabinsky, United States of America]	See response to 51088

Comment No	From Page	From Line	To Page	To Line	Comment	Response
51158	18	13	18	17	There are scenarios that limit end-of-century warming to below 1.5°C that do not, or only to a very limited extent, rely on CDR: Holz et al. 2017, Grubler et al. 2017, van Vuuren et al. - they should be highlighted as the by far most desirable 1.5 pathways - rather than withheld. And again, if 25-85% of CDR is to compensate emissions from sectors for which no mitigation measures have been identified, the more useful approach would be to explore additional (e.g. demand-side) measures for eliminating such emissions, rather than relying on high-risk CDR technologies that may never materialise due to technical, ecological, social, political, economic, ethical and geophysical infeasibility (particularly not in the order of >300 GtCO2!) Given the SDG anchoring of the present report, and the fundamental SDG incompatibility of many proposed CDR technologies (Dooley/Kartha 2018, Int Environ Agreements), especially at larger scale, assuming CDR at an order of 400-1100 GtCO2 borders on the insane and is clearly no realistic SDG-compatible option. It is also a very poor scientific quality to neglect the manifold uncertainties and adverse impact associated with CDR technologies and, to the extent that they are identified in other chapters, to continue relying on them for 1.5 pathways regardless. [Linda Schneider, Germany]	Taken into account - these papers had not been accepted before the FOD SPM was drafted, so couldn't be included. They have now been included in the assessment and their conclusions are taken up in the SPM. It is not true, however, that they don't remove CO2 - they only exclude BECCS for doing so.
56024	18	13	18	2	These two bullet points could benefit from reflecting the clarity found in chapters 2 and 4 on the different purposes that negative emissions play in pathways (namely, to prevent accumulation of carbon in the atmosphere from exceeding a budget while the world is decarbonizing and removing carbon from the atmosphere later in the century to return to 1.5 C. [Kelly Stone, United States of America]	Taken into account - even though this part of the text is gone the role of CDR is now discussed along these lines in C2.2.
58160	18	13		17	It is important to note here that CDR not only is used to compensate CO2 emissions, but also non-CO2 GHG emissions. For temperature change all GHG are relevant. [Nico Bauer, Germany]	Not applicable - this sentence no longer exists.
59264	18	13	18	17	What processes contribute to the wide range of estimates of required volume of CO2 removal for 1.5°C? This is the type of uncertainty that is important to convey to policymakers. Is the driver of uncertainty the fact that there are many varied pathways to 1.5°C, or that there is uncertainty on the pathways? [United States of America]	Taken into account - new section C2.3 gives explanations behind the ranges in CDR deployment, which are wide because of the variety of pathways.
50032	18	13	2	17	It is unhelpful to throw all scenarios together when discussing the amount of CDR they use. There is a difference in scenarios that have an overshoot (emphasis on compensation for budget exceedence) and scenario's that do not have an overshoot (empahsis on compensation of remaining emissions of CO2) in temperature. Please show that difference and present the share needed for compensating remaining emissions for both categories. When you do that the seperate bullet in lines 19-20 is not longer needed [Bert Metz, Netherlands]	Taken into account. The new Figure SPM3 graphically illustrates this point and we also explain that "Pathways that overshoot 1.5°C need to rely on CO2 removal exceeding remaining CO2 emissions to return global warming to below 1.5°C by 2100 (high confidence)." which takes into account the reviewer's point.
11368	18	14	18	14	380-1130 Gt is an enormous range. Can we say why the range is this large? [United Kingdom (of Great Britain and Northern Ireland)]	See response to 59264
29614	18	14	18	15	emissions for which no mitigation measures have been identified' This may create questions like why they were not identified / implemented ? or which sectors are referred to? etc. Some clarification would be helpful [Finland]	See response to 19244.
54758	18	14	18	14	25-85% covers nearly all option. In that case, I would be tempted to rewrite something like "in some scenarios, negative emissions offset hard to mitigate sector and in others, negative emissions compensates for earlier emissions". Or something to that effect. [Glen Peters, Norway]	See response to 56024
38968	18	15	18	15	You may consider writing "CO2 and non-CO2" before "emissions". Just to remind the reader that remaining emisisons may not only be CH4, N2O from some sectors, but that this may also apply to fossil CO2. [Jan Fuglestvedt, Norway]	Not applicable - Though a valid comment, this sentence does no longer exists and the suggested addition cannot be implemented.
18996	18	16	18	16	Suggest deleting "carbon neutrality", as it is an deeply ambiguous term with multiple interpretations. If retained, it should be clearly defined (e.g., whether or to what extent it includes natural fluxes, like the ocean sink). [Andrea TILCHE, Belgium]	Taken into account - the definition of carbon neutrality is now given in Box SPM 1. It is no longer used in this context, however.
9048	18	19	18	2	This seems to us a very important message to give to policymakers. Please highlight this more clearly in the key message and also in the high level statements [Luxembourg]	Accepted - the following sentence has been elevated to the high-level statement of C2: "Behaviour change, demand-side measures and emission reductions in the short term can limit the dependence on CDR."
42872	18	19	18	2	In the discussions of the total amount of carbon removal needed and the scale with which it needs to be deployed, there should be an inclusion of the timing by which carbon removal begins its proliferation as well as to when it should be expanded to the necessary scale. [Kristin Campbell, United States of America]	Comment by Sabine: Same as 42870.
42922	18	19	18	2	In the discussions of the total amount of carbon removal needed and the scale with which it needs to be deployed, there should be an inclusion of the timing by which carbon removal begins its proliferation as well as to when it should be expanded to the necessary scale. [Durwood Zaelke, United States of America]	Comment by Sabine: Same as 42870.
51162	18	19	18	2	Emphasis should be placed on the need to eliminate, or at least minimise CDR requirements by exploring further, demand side-driven mitigation measures. CDR should not be allowed above levels that can be achieved through natural climate solutions at a maximum of 370-480 GtCO2 (Dooley/Kartha 2018 Land-based negative emissions: risks for climate mitigation and impactson sustainable development, Int Envir Agreements, and Griscom, 2017, PNAS paper). [Linda Schneider, Germany]	Taken into account - The new headline statement for C2 now reads "1.5°C-consistent pathways can have different levels of carbon dioxide removal (CDR). Some limit global warming to 1.5°C without relying on bioenergy with carbon capture and storage (BECCS). Behaviour change, demand-side measures and emission reductions in the short term can limit the dependence on CDR (high confidence)."
59266	18	19	18	2	Given the large degree of uncertainty in CO2 removal required (stated in lines 13-17), it seems that this statement requires an acknowledgment that a great degree of variation in the required scale of CO2 removal depends on the range of its estimates. In line 20, the meaning of the word "they" is ambiguous. If it means "emissions," it should be replaced with "emissions." [United States of America]	See response to 59264

Comment No	From Page	From Line	To Page	To Line	Comment	Response
11370	18	2	18	2	Does "they" refer to cumulative emissions rather than the emissions reductions? [United Kingdom (of Great Britain and Northern Ireland)]	Not applicable - This sentence no longer exists.
11372	18	22	18	24	This has been placed in the middle of statements on CO2 removal, but isn't it a wider message about bioenergy as a whole? Also, what does 'multiple energy uses' mean exactly? [United Kingdom (of Great Britain and Northern Ireland)]	Taken into account - The sentence has been amended as follows: "Bioenergy can still be substantial without BECCS due to its cross-sectoral potential for replacing fossil fuels (high confidence)" However, we have kept it in the CDR section because it is an important insight for assessing pathways: in particular, if one is concerned about the land footprint of BECCS and excludes it from the mitigation portfolio, then this does not mean that the land footprint is necessarily lower, as biomass might be upscaled elsewhere to make up for the shortfall of BECCS.
18998	18	22	18	24	Biomass has no "removal potential". Productive land (and ocean) has a removal potential, and it removes CO2 with or without using the biomass (although saturation may set in), and when biomass is used, it may or may not be used for energy. See: Haberl et al. 2012. Correcting a fundamental error in greenhouse gas accounting related to bioenergy. Energy policy, Vol: 45-222, Issue: 5, Page: 18-23 See also: Haberl, Helmut, 2013. Net land-atmosphere flows of biogenic carbon related to bioenergy: towards an understanding of systemic feedbacks. Global Change Biology Bioenergy, 5, 351-357Biomass for energy only implies removals only if (and to the extent that) it is ADDITIONAL, that is to the extent the use of biomass for energy triggers assitional removal by the vegetation (or if it reduces losses, like from natural decomposition). [Andrea TILCHE, Belgium]	Not applicable - could not find a sentence saying that biomass had removal potential.
29180	18	22	18	24	Please add references to the underlying chapters. [Germany]	Accepted - the new draft of the SPM features chapter references for all statements.
30094	18	22	18	24	verify this part in the main report on an agricultural point of view: food feed and fuel production may be depleted by fertile land availability, water availability for plants, thermic and hydric stresses, availability of nutriments, pests, weeds and bugs extensions. [France]	Not applicable - this bullet no longer exists. However, the availability of land is discussed as one dimension of BECCS feasibility in new section C2.1.
30096	18	22	18	24	There is a risk that the more biomass is produced, the more N20 is emitted and the less carbon returns to the soils. [France]	Noted - however, we can only refer to concerns regarding feasibility in general (see new section C2.1) in the SPM.
30098	18	22	18	24	Missing reference [France]	See response to 29180
33864	18	22	18	24	Please add references to the report for this statement. [Norway]	See response to 29180
44656	18	22	18	22	Clarify what 'biomass demand' means here. [Penny Urquhart, South Africa]	Not applicable - This sentence no longer exists.
45894	18	22	18	24	Please clarify how you define substantial. The magnitude is not clear to the reader. [Deger Saygin, Turkey]	Noted - however, the objective here is not to give any magnitudes, but to say that excluding BECCS from the mitigation portfolio does not solve the problems associated with the bioenergy portion of the supply chain because bioenergy remains a relevant part of the mitigation mix. Magnitudes differ across scenarios, which is why we abstained from specifying numbers here.
46206	18	22	18	24	Add reference to possible conflicts with sustainable development goals, introduced earlier but more relevant for biomass than for most other alternatives. [Netherlands]	Taken into account - new section C2.1 now features a list of feasibility dimensions including impacts on sustainable development.
49530	18	22	18	24	Biomass for energy is only a mitigation option if it is additional - i.e. when it triggers additional plant growth or uses plants (parts) that would be emitted anyway (e.g. due to decay) - Searchinger 2010 doi: 10.1088/1748-9326/5/2/024007. [Karlheinz ERB, Austria]	Noted - however, this is not the point to be made here, see also reply to comment 49528. The statement has been reformulated to avoid this misunderstanding.
50034	18	22	18	24	Make more explicitly clear that scenarios that use BECCS are not necessarily use more biomass that scenarios without BECCS. Please add an indication of global biomass demand in EJ/yr and add a comparison with what is considered a sustainable level of biomass supply. [Bert Metz, Netherlands]	Taken into account - While space constraints kept us from adding more numbers, the following sentence has been added to clarify this statement as suggested by the reviewer: "Bioenergy can still be substantial without BECCS due to its cross-sectoral potential for replacing fossil fuels."
49020	18	22	18	33	The level of biomass demand depends in large part on the degree to which other CDR measures can be employed. In particular, it would be important to note here that integrated models do not incorporate some potentially very important approaches to CDR related to land-use and agriculture. As demonstrated in Chapter 2, Table 2.8, measures such as reduced land degradation, landscape and forest restoration, agroforestry, and to some degree soil carbon practices, have not been considered in integrated models. The potential for such measures to address the overall need to reduce GHG, and for CDR in particular, should be noted in this section of the SPM. In addition, these types of measures can provide important sustainable development benefits, which should aso be noted here (consistent with elsewhere in the SPM). [David Waskow, United States of America]	Taken into account - this is a very valid point and has led to the inclusion of the following sentence: "Feasibility of CDR could be enhanced by a portfolio of options deployed at smaller scales, rather than a single option at a large scale." Also, non-land-dependent options like DACCS have been taken up in the new SPM text and a separate statement on the benefits of AFOLU measures has been included (C2.4).

Comment No	From Page	From Line	To Page	To Line	Comment	Response
49528	18	22	18	24	I really wonder on this unprecise (and misleading) statement granting a "removal potential" to biomass. Biomass has no removel potential, terrestrial ecosystems have a removal potential. Therefore, it is just the opposite: due to a systemic effect (a trade-off), biomass harvest will lower carbon stocks (Holtsmark 2011 doi 10.1007/s10584-011-0222-6), and thus removal potentials (Pingoud et al., 2018 doi: 10.1016/j.jenvman.2017.12.076) , and it will accelerate biomass turnover rates that can lower the buiild-up of carbon stocks while productivity is enhanced (Erb et al., 2016, doi 10.1038/ngeo2782). These trade-offs must be menitoned in the second half of the para on the future availability: The contribution of biomass is not only constrained by its availability, but by these systemic effects that can be large. It is important that these repercussions of enhancing biomass demand are included in the model runs with biomass contributions (chapter 2), otherwise the conclusions are simply wrong. [Karlheinz ERB, Austria]	Noted - however, this statement did not attribute a removal potential to biomass. To make it even clearer, it has changed into the following sentence: "Bioenergy can still be substantial without BECCS due to its cross-sectoral potential for replacing fossil fuels." The point is not that bioenergy is carbon-negative (which it isn't), but that most pathways excluding BECCS (e.g. due to concerns about large land footprints) still feature a lot of biomass cultivation. So if the concern is for the land footprint, decision-makers need to know this.
56026	18	22	18	22	Biomass is not substantial in all pathways. Biomass does not play heavily into COMMENTS HERE. [Kelly Stone, United States of America]	Taken into account - This sentence has been changed into the following: "Bioenergy can still be substantial without BECCS due to its cross-sectoral potential for replacing fossil fuels (high confidence)"
56028	18	22	18	24	Biomass is being discussed in this section in the context of CDR (which is why it is being discussed as opposed to other technologies in most patheways such as solar). And while some kind of biomass appears in most pathways, there are major differences in what types of biomass is being relied on (such as biofuels, BECCS, Afforestation etc). The point this sentance should be making is that biomass of some kind appears broadly, that there are competing demands for land and biomass, including biofuels for hard to decarbonize or electrify areas, CDR and food production, and that therefore policies around land-use are closely tied to climate policies in the 1.5 context [Kelly Stone, United States of America]	See response to 49528
57648	18	22		24	While biomass may be prominent in available scenarios the text is misleading in suggesting that this is the only or prominent or only feasible option. Chemical means of CO2 removal from the atmosphere and technologies recycling CO2 exist but have been poorly explored in scale and feasibility. This should be said here as well, and not only in the next bullet point. [WGII TSU, Germany]	Taken into account - Even though this particular sentence no longer exists, care has been taken to explicitly also mention the chemical means of CO2 removal assessed in chapter 4.
56504	18	22	18	24	This is the first mention in the SPM of any specific mitigation technology and it is for biomass, which is well documented to have many caveats and concerns that call into question its ability to mitigate climate change (see for example: Sterman, Siegel, Rooney-Varga 2018 http://iopscience.iop.org/article/10.1088/1748-9326/aaa512 and Booth 2018 http://iopscience.iop.org/article/10.1088/1748-9326/aaac88, both in Environmental Research Letters). Any mention of biomass should include caveats that it is not always good for the climate. At least when biomass is mentioned later in the SPM on pg21 line 9 there is a reference to it being "sustainable" [Eleanor Johnston, United States of America]	Noted - however, biomass is not presented as a mitigation technology here. To avoid further misunderstanding, this statement has been changed into the following sentence: "Bioenergy can still be substantial without BECCS due to its cross-sectoral potential for replacing fossil fuels." The point is not that bioenergy is a preferable mitigation option, but that most pathways excluding BECCS (e.g. due to concerns about large land footprints) still feature a lot of biomass cultivation for bioenergy. So if the concern is about the land footprint, decision-makers need to know this to be able to take it into consideration.
58166	18	22		24	It is important to add here that biomass feedstock production and conversion can create new sources of income in rural areas. [Nico Bauer, Germany]	Noted - Due to the need to reduce the SPM length by a third, such synergies couldn't be spelled out for all technologies, but could only be generally referred to. See also new Figure SPM4, where synergies are graphically represented.
59268	18	22	18	23	It also needs to be said that, to bring warming back to 1 or 0.5°C, it would virtually all have to be done by CDR and involve biomass. [United States of America]	Taken into account - New section C2 includes this sentence: "Bioenergy can still be substantial without BECCS due to its cross-sectoral potential for replacing fossil fuels (high confidence)"
62256	18	22	18	33	“Biomass demand” and BECCS should be more clearly defined and explained so that readers know the range of approaches that fall under the BECCS category. [Shaye Wolf, United States of America]	Noted - BECCS is used throughout SR1.5 for any bioenergy technology combined with CCS, while biomass demand refers to the demand for the feedstock (i.e. also for bioenergy without BECCS). See glossary.
11374	18	24	18	24	land use transitions and transitions in other sectors' - can we make this more explicit what you mean here, e.g. for other purposes such as growing food, water resource availability, etc.? [United Kingdom (of Great Britain and Northern Ireland)]	Not applicable - this sentence no longer exists.
50418	18	24	18	24	Write: "… in other sectors, as well as the energy efficincy of the biomass approach and other issues related to sustainable development.". [Switzerland]	Not applicable - This sentence no longer exists. The concern for impacts on sustainable development in the BECCS context has been taken up in new section C2.1, however.
10672	18	26	18	33	this is a my personal comment and view: I'm sceptict about the possibility to use reomoval tecnology like BECCS. They are ipotetical, and involve a lot of implication etical ant social. According the Pope Francesco enciclica Laudato si, "Technology, which, linked to business interests, is presented as the only way of solving these problems, in fact proves incapable of seeing the mysterious network of relations between things and so sometimes solves one problem only to create others" [luca lombroso, Italy]	Noted - please note that chapter 4 also assesses implications in terms of costs and side effects of large-scale implementation of BECCS and that C2.1 lists the different dimensions of feasibility concerns.
11376	18	26	18	26	What would be of interest to policy makers would be an illustration of the land area needed for BECCS or Forestry to deliver the scale of CO2 removal required in these scenarios. If this assessment is made elsewhere it would be valuable to include here in the SPM. [United Kingdom (of Great Britain and Northern Ireland)]	Noted - however, we do not consider the conversion of Gt CO2 into land as helpful in the SPM, as different pathways facing 1.5°C can have very different land footprints depending which type of land the model in question uses, for example: cultivating biomass on marginal land will cause less competition with food production, yet have a much larger land footprint than using the most productive agricultural land, for instance. Also, some pathways that minimize the use of BECCS use more bioenergy without CCS also resulting in a large land footprint. So putting random land area numbers into the SPM would be misleading in our opinion.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
15570	18	26	18	33	It is recommended that reference be made to appropriate land management (or "conservation agriculture" as referred to in s.4.3.3.1 and SPM s.4.3) as a means of carbon capture and storage - not just afforestation and biomass energy production [Australia]	Taken into account - soil carbon sequestration has been elevated from chapter 4 to the SPM and new section C2.4 features further AFOLU measures like restoration.
17678	18	26	18	33	Suggest adding further information on the actual annual amount of CO2 captured and stored by BECCS (i.e. ~30 MtCO2, Section 4.3.2.3) in this bullet point. [Sai Ming Lee, China]	Rejected - there is no space in the SPM to document current removals for BECCS and it has also not been done for the other technologies, neither are current emissions reductions by other specific mitigation methods estimated in the SPM.
19002	18	26	18	33	Reference to BECCS and afforestation is made in the context of viable removal options, complementing emission reduction. This is fine, however these should not overlook other (if not more) 'realistic' options such as soil management and avoiding deforestation. [Andrea TILCHE, Belgium]	Taken into account - other removal options have been added as examples, e.g. soil carbon management. Avoided deforestation does not count as CDR and is thus not covered in new section C2.
19000	18	26	18	33	See above on line 22. BECCS can only mean "negative emissions" to the extent it comes from "additional" biomass, like planting of new forest specifically for bioenergy on land that has no opportunity cost (i.e., land that would not otherwise provide carbon sertvices). But this land then can only be counted towards BECCS, and not (again) towards afforestation, to avoid double-counting. BECCS using biomass that comes from plant growth that would have happened anyway cannot be considered to deliver "negative emissions". See: Haberl et al. 2012. Correcting a fundamental error in greenhouse gas accounting related to bioenergy. Energy policy, Vol: 45-222, Issue: 5, Page: 18-23 See also: Haberl, Helmut, 2013. Net land-atmosphere flows of biogenic carbon related to bioenergy: towards an understanding of systemic feedbacks. Global Change Biology Bioenergy, 5, 351-357 [Andrea TILCHE, Belgium]	Noted - however, there is no space in the SPM to reproduce the full BECCS assessment of chapter 4 and, in addition, the SPM does not feature references other than to chapters and chapter sections.
21630	18	26	18	27	The section would benefit from also considering the limitations of BECCS. [Sweden]	Taken into account - the different dimensions of feasibility including the demand for land and possible impacts on sustainable development have been taken up in new section C2.1.
29182	18	26	18	32	This paragraphs mentions afforestation and BECCS as potential CDR options. When mentioning both options in close relationship it should be mentioned that while afforestation is a proven and ready to use option, BECCS is not. Open questions around BECCS including the demonstration of safe long-term storage should be made transparent in the SPM. [Germany]	Noted - however, space constraints keep us from going into as much detail in the SPM as in the assessment of chapter 4. Therefore, we could only include a general list of feasibility concerns in new section C2.1.
30100	18	26	18	33	A distinction should be made between afforestation and BECCS, as BECCS is still an option that is in early stages of development or needs significant upgrading to be effective mitigation option. [France]	Taken into account - BECCS and afforestation are presented as distinct options, yet space constraints prevent us from expanding on the assessment of chapter 4 here with respect to technological status etc.
30102	18	26	18	27	What about sequestration in agricultural soils through best practices ? [France]	Taken into account - soil carbon sequestration has been elevated from chapter 4 to the SPM.
30104	18	26	18	33	What about CCU, even in short term storage, as in algae? Their potential has to be assessed, their trade off compared to BECCS could be lower [France]	Noted - CCU is addressed as an emerging technology in the report, yet not systematically assessed, which will be done in AR6 and therefore not included in the SPM.
33866	18	26	18	33	The current version of the SPM gives us the impression that large scale BECCS is a necessary and viable mitigation option to prevent more than 1,5 degrees global warming. However, section 3.6.2.1.1 tells a more nuanced story, especially on page 167, line 37-45. It is important to be transparency around the underlying assumptions in the IAMS, as these assumptions are crucial for policy makers to make informed decisions. Please consider to include statements that highlights trade-offs and risks related to large scale implementation of BECCS either in this bullet point, or as an additional bullet point in the SPM. [Norway]	Taken into account - there were indeed discrepancies between the assessment in chapters 3and 4, translating into vague statements in the FOD SPM. This has been remedied in the new version, so that assessment and SPM match. Note that C2.1 does point to the dimensions of feasibility concerns around large-scale CDR deployment, but that the SPM is too limited in space to repeat the technology assessments in more detail.
42924	18	26	18	33	BECCS is also further complicated by the fact that it is not carbon neutral in the near-term, which is crucial for mitigating emissions and avoiding hitting the 1.5C mark. Booth M. S. (2018) “Not carbon neutral: Assessing the net emissions impact of residues burned for bioenergy”, Envtl. Research Letters; and Sterman et al (2018) “Does replacing coal with wood lower CO2 emissions? Dynamic lifecycle analysis of wood bioenergy”, Envtl. Research Letters. [Durwood Zaelke, United States of America]	Noted - however, due to space constraints, the BECCS assessment cannot be repeated in the SPM and only general reference can be made to the different dimensions of feasibility concerns (see C2.1).
43810	18	26	18	32	• [In an undesirable scenarios with biomass combustion for energy and BECCS both that should not be included] .. The future availability of, and demand for, biomass is closely linked to land use transitions and transitions in other sectors [which supports the fact that biomass combustion and BECCS should not be used] • All 1.5o C pathways include the option of CO2 removal measures such as afforestation and/or biomass energy with carbon capture and storage (BECCS) [which should not be considered an option]. Other options, such as direct air capture and storage, [are far preferable and safe sustainable and promising to BECCS.] DAC is in early stages of development needing significant upgrading [as is BECCS]... DAC and are not typically included in current scenarios [DAC shouid be included in scerantios. BECCS is deployed as early as 2020 in some scenarios but is NOT deployed at all in others (my emphasis)[which contradicts previous statements in this report BEECS as employed in all 1.5° C scenarios] Both BECCS and afforestation have implications for how land is used to produce biomass through the growth of trees and energy crops [(for BECCS)]or to store CO2 in vegetation and soil[(for afforestation) and so afforestation is far preferable than BECCS which at any scale would have far more adverse impacts] [Peter Carter, Canada]	Rejected - the SPM cannot have policy-prescriptive language (and neither can the report).

Comment No	From Page	From Line	To Page	To Line	Comment	Response
44060	18	26		27	include: "fully halting tropical deforestation, destruction of peatlands…" [Stephan Singer, Belgium]	Noted - however, this paragraph was only about CDR, land-based mitigation which is not CDR is now dealt with in C.3 and avoided deforestation features explicitly in Figure SPM4.
50036	18	26	18	33	As policy decisions on CDR are politically sensitive and land-based CDR is less controversial and has other benefits, it is important to clarify the amount of land-based CDR versus technological CDR options, such as BECCS. Chapter 2 does show (in figure 2.16) that scenario's differ a lot in the balance between land-based and technological CDR (and that high land-based CDR leads to lower BECCS use). This should be brought up to the SPM. It is also necessary to emphasise that land-based CDR options like soil carbon enhancement and biochar application, are not covered in any of the IAM scenarios and that land-based CDR potential is therefore underestimated in the scenario's. Chapter 4.3.8 shows the large potential of soil carbon enhancement (1.5-4.7 GtCO2/yr) and biochar (1.7-4.6 GtCO2/yr). That should be clearlt]y stated here, supplemented with figure 4.3, panel A. [Bert Metz, Netherlands]	Taken into account - new Figure SPM 3 shows separately CO2 removals from BECCS and AFOLU measures. The benefits of the latter have been elevated to the SPM, see new section C2.4. However, we think it is important to note that we do not draw any conclusions with respect to the desirability of different options from this. If BECCS is controversial because of its land footprint, it is actually a counterargument, as afforestation would require even more land per ton of CO2 removed.
51074	18	26	18	27	This sentence seems to be written with a particular set of IAMs in mind that only include two different CDR options: afforestation and BECCS. There are several new articles describing pathways that do not rely on afforestation or BECCS but rather other nature-based CO2 removal methods (Griscom et al, Grubler, et al., Holz, et al). Reword this sentence in a way that it captures these other pathways. [Doreen Stabinsky, United States of America]	Taken into account - other pathways are now explicitly mentioned and this sentence has been added as a qualifier: "Some pathways avoid BECCS deployment through low energy demand and greater reliance on AFOLU-related CDR measures." See also new section C2.4.
51164	18	26	18	33	It is crucial to highlight that there are safer and more sustainable ways of removing CO2 from the atmosphere than through technological means. According to Dooley/Kartha (2018), an amount of 370-480 GtCO2 could be removed through forest ecosystem restoration and, to a lesser degree, reforestation. Other ecosystem restoration, such as moors and peatland, can achieve additional CO2 removal. Such ecological options are low- to no-cost, ready to be deployed, tested and proven, safe, provide for adaptation co-benefits and allow for livelihoods, food and water security to be sustained. Given the SDG context of the present report, these options should receive great attention. [Linda Schneider, Germany]	Taken into account - chapter 4 covers in its assessment also restoration and the corresponding literature. New section C2.4 also elevates the benefits to the SPM.
53480	18	26	18	27	The statement "All mitigation pathways ..." is inconsistent with the analysis of chapter 2, which highlights several CDR-free scenarios (e.g. Grubler et al 2017, Holz et al 2017, etc) [Christian Holz, Canada]	See response to 53478.
55396	18	26	18	27	please add a quantification of how much BECCS in the model median and how much afforestation, and relate this to current gross CO2 emissions to indicate the scale. [Andy Reisinger, New Zealand]	The 2050 and 2100 ranges for BECCS and AR have been included, but no comparison to current gross emissions due to space constraints.
55586	18	26	18	33	This text refers to "afforestation" while subsequent sections refer to a wider range of land use measures including reduced deforestation, reforestation and ecosystem restoration as well as soil carbon enahncements. Thus this section gives the wrong impression that CO2 removal techncques are so limited. This may be a refelction of the FOD of Chapter 2 which in turn reflected the lack of alternatives of AR in the models. The SOD chapter 3 now treats these issues ratehr well and the SPM needs to be updated to reflect this. Perhaps the term AFOLU or Ecosystem management could be used as a more general terms? [David Cooper, Canada]	Taken into account - chapter 4 covers in its assessment also restoration and the corresponding literature. New section C2.4 also elevates the benefits to the SPM.
56506	18	26	18	29	This makes it sound like BECCS is a robust technology that can be readily deployed. This is misleading. BECCs is hardly a robust technology and there are very few commercial applications. [Eleanor Johnston, United States of America]	Rejected - it is clearly stated that this statement is about deployment in 1.5°C consistent pathways.
56508	18	26	18	27	What is meant by the word choice "option"? It sounds very indefinite, the scenarios either include an assumption about BECCs or they don't, right? [Eleanor Johnston, United States of America]	Taken into account - "Option" had been used as a more general word than "technology" to cover e.g. also land use practices. However, to avoid confusion, this has been changed to "method".
56512	18	26	18	3	The opening sentence makes it sound like BECCS is included in all scenarios, but then in the sentence beginning on line 29 it refers to some scenarios where it is not deployed. Perhaps the opening sentence should avoid mentiong specific approaches to CO2 removal. [Eleanor Johnston, United States of America]	Taken into account - Some papers excluding BECCS have meanwhile been published and taken up in the assessment. The language has been changed accordingly.
57886	18	26		33	BECCS is mentioned, but please add a integrating remark, that growing biomass may and should bring new prosperity as a byproduct, such as in Northern Africa, where climate refugees could find a new home and a job in the agriculture activities for energy crops, an freshwater production for these crops, will also bring fresh water for citizens living there too. Use the SPM for what it is for, attract attention, line 32: ...store Co2 in vegetation and soil, and may bring new prosperity for inhabitants and climate refugees in coastal arid environments, such as Northern Africa. [Henk Daalder, Netherlands]	Noted - Due to the need to reduce the SPM length by a third, such synergies couldn't be spelled out for all technologies, but could only be generally referred to. See also new Figure SPM4, where synergies are graphically represented.
59270	18	26	18	33	BECCS is comprised of two components: bioenergy production and use, and carbon capture, utilization, and storage (CCUS). Bioenergy production and use might be done without CCUS, and CCUS may be applied to a number of different energy production facilities, including those using biomass. Each of these components is discussed separately in this report. Suggest focusing on these two component parts throughout the report, rather than treating BECCS as a unique technology. [United States of America]	Rejected - Bioenergy and CCS are assessed seperately as well, but only in their combination is there a chance to reach a carbon-negative balance and as BECCS features prominentlyin the 1.5°C pathways, a thorough assessment cannot be omitted.
49532	18	27	18	3	reformulate. In the current version, the text seems to suggest that BECCS is an existing, large-scale technolgy (("beccs is deployed as early as 2020"). But these are all model assumption not reality, and this must become clear (see Anderson and Peters, 2016, doi10.1126/science.aah4567). A formulation could be: Some scenarios assume carbon removal technologies such as BECSS already to be deployed as early as 2020, while others do rely on BECSS to be feasible within a 1,5° C pathway. [Karlheinz ERB, Austria]	Taken into account - the new text makes sure to speak of deployment only in the context of pathways.
11378	18	28	18	28	instead of 'upgrading' suggest 'upscaling of effort', to be clearer [United Kingdom (of Great Britain and Northern Ireland)]	Not applicable - This sentence no longer exists.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
59272	18	28	18	28	Upgrading should be replaced with something that is more precise. Specifically, does the technical ability exist, is it just cost prohibitive, does it just need to be scaled up, etc.? [United States of America]	Not applicable - This sentence no longer exists.
11380	18	29	18	29	suggest 'effective global mitigation options' [United Kingdom (of Great Britain and Northern Ireland)]	Not applicable - This sentence no longer exists.
54760	18	29	18	29	not typically included in current scenarios. Are they or arent they? Is it possible to say, X scenarios include DAC, Y include BECCS, Z include afforestation, out of N total scenarios"? [Glen Peters, Norway]	Not applicable - This sentence no longer exists.
19004	18	3	18	3	The sentence stating that BECCS are not deployed in some scenarios seems at odds with the beginning of the bullet, that states that all pathways to 1.5 include BECCS. [Andrea TILCHE, Belgium]	Rejected - The beginning of the bullet talks about CDR such as BECCS or afforestation, s o it is completely possible to have a scenario without BECCS, but still CO2 is removed (through afforestation).
19424	18	3	18	3	Add here a key sentence from the underlying paragraph: "More BECCS is required in 1.5°C scenarios when fossil fuels are phased-out more slowly. " (Chapter 2. Page 6. Row 47) [Jennifer Morgan, Netherlands]	Not applicable - This sentence does no longer exist. However, the suggestion has been considered in the headline statement of C.2 ("Behaviour change, demand-side measures and emission reductions in the short term can limit the dependence on CDR"), and later on in D1.2 ("Collectively meeting the current conditional or unconditional NDCs would imply pursuing an 24 overshoot trajectory to return global warming to 1.5°C. This would result in higher impacts and adaptation challenges, higher transitional challenges to reduce GHG emissions after 2030 and a higher reliance on CDR compared to pathways that are consistent with limited or no overshoot and which have deeper GHG emissions reductions until 2030"). It is also graphically visible in the new Figure SPM3.
49534	18	3	18	31	It must be made clear that in 2020 such a contribuiton of BECCS is only a model assumption, not reflected in the availabiltiy of a mature technology that suffices the condition of additionality and permanence. It is also essential to make clear that BECCS from forest biomass can (a) not be accounted on top of afforestation sinks , due to the systemic linkages of biomass harvest and biomass stocks mentioned above, and (b) will create a carbon dept due to the mobilization of the forest stock, which needs to be discounted (Schulze et al., 2012, doi 10.1111/j.1757-1707.2012.01169.x). The para should be followed by a para discussing the available options, their performance, maturity and these constraints of BECCS technologies. [Karlheinz ERB, Austria]	Taken into account - text revised. Due to space constraints, the SPM cannot contain an assessment of a particular technology in too large detail and so only the dimensions of feasibility concerns have been given with details referred to in the corresponding chapter sections. The revised SPM now includes a more relevant discussion of BECCS deployment - See message C2.3
54762	18	3	18	3	is not deployed at all in others. How many of the 1.5C scenarios don't include BECCS? Or afforestation? Or DAC? [Glen Peters, Norway]	Taken into account - the revised text clearly states that all 1.5°C scenarios include CDR, yet a few don't include BECCS. Note that these (van Vuuren et al. 2018, Grübler et al. 2018, Holz et al. 2018) are very challenging scenarios as well, requiring immense reductions on the demand side and still significant cumulative CO2 removals until 2100.
50420	18	31	18	31	Withe: "… have implications for sustainable development on how land is used …". [Switzerland]	Not applicable - This sentence no longer exists. However, the impacts on sustainable development and land use have been explicitly mentioned in new section C2.1 .
50038	18	34	18	34	Insert a bullet here that shows how the use of CDR can be minimised, which is important given the uncertainties around CDR and the political sensitivity. This can draw upon chapter 2, section 2.3.4.1 (and figure 2.17) that discusses conditions under which CDR use can be minimised, such as the socio -economic drivers and energy and food demand. It would be useful to more fully explore such conditions, including other life-style issues and stronger reduction of non-CO2 gases (so that the CO2 budget increases). [Bert Metz, Netherlands]	Taken into account - this has been implemented and elevated to the headline statement of C2: "Behaviour change, demand-side measures and emission reductions in the short term can limit the dependence on CDR."
8054	18	35	18	39	This is a crucial point, and it might be expanded. All 1.5°C rely on negative emissions (that is well said already), but this is a bet given current uncertainties (this should be stressed more). [Quentin Perrier, France]	Taken into account - concerns with respect to feasibility are listed in new section C2.1.
19246	18	35	18	38	It should be clarified that the conclusions established are valid only when biomass is used for energy purposes. [Spain]	Not applicable - This paragraph is about the feasibility constraints, which apply to any kind of biomass use.
30106	18	35	18	36	This is a crucial point, and it might be expanded. All 1.5°C rely on negative emissions (that is well said already), but there are still uncertainties. Note that "feasibility" hasn't been properly defined yet, is it technical, political, economical ? cf. van Vuuren, doi:10.1038/s41560-017-0055-2 [France]	Taken into account - the dimensions of feasibility concerns/uncertainties have been listed now in C2.1, but please note that feasibility itself is defined by chapter 1.
50040	18	35	18	39	As mentioned in my comment on the headline 3.5, it is important to make a distinction between scenario's with very high CDR use and other scenario's with low or moderate use of CDR. The feasibility risks particularly apply to the scenario's with high CDR use. As my comments on the bullet in lines 22-24 indicate, high biomass use is not limited to scenarios with BECCS, even sceanrios without BECCS do use high amounts of biomass for energy supply. In other words, high biomass usage and the impled risks for land pressure and water resources are not only relevant for BECCS, but also for non BECCS scenario's with high biomass usage. That should be explained much more carefully. [Bert Metz, Netherlands]	Taken into account - This has been elevated to the headline statement of new section C.2: "1.5°C-consistent pathways can have different levels of carbon dioxide removal (CDR). Some limit global warming to 1.5°C without relying on bioenergy with carbon capture and storage (BECCS)."It is also visible in Figure SPM 3.
51078	18	35	18	39	There are more fundamental biogeophysical constraints that should also be mentioned. See comment 36 and comment 8 above. The issue is not merely scale and speed. There are real biogeophysical limits. Some of these pathways suggested are not just challenging, they are physically IMPOSSIBLE. [Doreen Stabinsky, United States of America]	See response to 51088
56510	18	35	18	39	The use of the word "challenging" undercuts things. It is obviously going to be challenging. Suggest choosing much stronger word like "unprecendtly challenging" or "incredibly challenging" [Eleanor Johnston, United States of America]	Not applicable - This sentence no longer exists.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
15572	18	36	18	36	Biomass security will be reduced due to increased fire risk. [Australia]	Noted - however, space constraints keep us from including full risk assessments of individual options in the SPM and the reader is referred to the respective chapter sections for more detailed information.
30108	18	36	18	36	biomass : If it has an impact on food production, here it's not just biomass production, it's biomass for energy production (food is also biomass) [France]	Taken into account - the revised text refers to bioenergy wherever applicable, instead of to biomass.
38970	18	36	18	46	Would it be possible to be more specific than just "associated risks"? [Jan Fuglestvedt, Norway]	Taken into account - This text is gone and the new C2.1 is more specific on the dimensions of concern with respect to feasibility.
56070	18	36	18	39	As long as technologies and resouces are applied in considering constraints in the long run biomass production and use has the potential to decrease pressure on resources ,food production,biodiversity and air quality.Scale and speed must be adopted to fulfill the criteria requested for this potential to be realized. [alberto pedace, Argentina]	Noted
30110	18	37	18	37	« land » Is it possible to precise the pressure on land in terms of quantity, in terms of fertility and in terms of carbon stock ? [France]	Noted - however, we do not consider the conversion of Gt CO2 into land as helpful in the SPM, as different pathways facing 1.5°C can have very different land footprints depending which type of land the model in question uses, for example: cultivating biomass on marginal land will cause less competition with food production, yet have a much larger land footprint than using the most productive agricultural land, for instance. Also, some pathways that minimize the use of BECCS use more bioenergy without CCS also resulting in a large land footprint. So putting random land area numbers into the SPM would be misleading in our opinion.
49536	18	37	18	37	increased demand for biomass will also decrease carbon stocks if it is not additional (see above), and this reduces the net contribution - needs to be stated here. [Karlheinz ERB, Austria]	Noted. IAMs do consider additional biomass for BECCS and not e.g. biomass from primary forest. All caveats and risks cannot be detailed in the SPM, but the assessment of the literature suggests that due consideration is given to this in the current pathways. We do however highlight the feasibility issues linked to BECCS and CDR: "The feasibility of CDR measures relates to their impacts on sustainable development, and depends on scale, implications for land, water and energy use (high confidence)."
9088	18	38	18	39	The notion of "slow economic development" is misleading. We all know that at world scale "high economic development" cannot really be separate from energy consumption, while more than 75% of world energy consumption is from fossil sources (cf. incoherence with page 20 lines 33-34). [Frédéric Durand, France]	Not applicable - This sentence does no longer exist in the new version of the SPM.
11124	18	38	18	39	Considering the high agreement, can the statement be strengthened from "may be" to "will be"? [Denmark]	Not applicable - This sentence no longer exists.
11382	18	38	18	38	levels of biomass in some pathways - or is it most of the 1.5 degree pathways? Important to be transparent about how much scenarios are relying on this. [United Kingdom (of Great Britain and Northern Ireland)]	Taken into account - this statement has been made more precise: "Some pathways avoid BECCS deployment through low energy demand and greater reliance on AFOLU-related CDR measures. Bioenergy can still be substantial without BECCS due to its cross-sectoral potential for replacing fossil fuels."
19006	18	38	18	39	The expression 'may be challenging' seems much weaker than the expression 'high chance that [...] might not be feasible' in the summary box in red (ll. 1-7). Please use consistent language in both contexts, preferably based on the IPCC uncertainty guidance. [Andrea TILCHE, Belgium]	Not applicable - This sentence no longer exists.
21632	18	38	18	38	some sounds like there would be many 1.5 deg pathways in which implementation would not be challenging. Please check and revise for clarity. [Sweden]	Not applicable - This sentence no longer exists.
30112	18	38	18	38	It would be possible to add messages of 2.3.4.2 including p.58 lines 48 and 53 "and would pose significant governance challenges, although large amounts of bioenergy are still used to substitute fossil-fuel based liquids, gases and solids even if BECCS is not available." [France]	Accepted - this has been incorporated as follows: "Some pathways avoid BECCS deployment through low energy demand and greater reliance on AFOLU-related CDR measures. Bioenergy can still be substantial without BECCS due to its cross-sectoral potential for replacing fossil fuels."
33868	18	38	18	39	When reading the underlying chapter, it seems that the scale and speed of implementation of measures that lead to net removal of CO2 is much more challenging to implement than what is communicated in this statement. Especially if this transition is going to be sustainable. Please consider to rephrase the sentence accordingly. [Norway]	Taken into account - Sentence has been removed in the course of restructuring and rewording this.
51172	18	38	18	39	The scale and speed of CDR implementation assumed in some, in fact: most 1.5 pathways is beyond reasonable, and the infeasibility of assuming such large amounts of CDR should be communicated as such as well as such pathways removed from the range of scenarios considered. [Linda Schneider, Germany]	Rejected - the SPM (and in fact the report) cannot discard selected evidence from the assessment, neither can it be policy-prescriptive in stating that some options are not "reasonable" - all criteria (costs, potentials and side effects) have to be assessed without ranking based on personal preference.
56944	18	38	18	39	This sentence is too weak: to sau that implementation "may be challenging" implies that it may not be challenging. Does anyone think that emissions reduction and negative emissions on this scale would not be challenging? At very least this sentence should read "will be challenging", not "may be challenging", surelu [Oliver Morton, United Kingdom (of Great Britain and Northern Ireland)]	Not applicable - This sentence no longer exists.
29606	18	39	18	39	… may be challenging… > is challenging (high agreement) [Finland]	Not applicable - This sentence no longer exists.
30114	18	39	18	39	« may be » Should be replaced by "is". [France]	Not applicable - This sentence no longer exists.
55398	18	39	18	39	may be challenging - seems like a distinct understatement, surely the authors can come up with a stronger and more policy-relevant expression here. [Andy Reisinger, New Zealand]	Not applicable - This sentence no longer exists.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
5784	18	41	18	46	A powerful statement on the danger of "business as usual" is made here. [Govindasamy Bala, India]	Taken into account. A5 now discusses enabling conditions that enhance feasibility of limiting warming to 1.5C
10660	18	41	18	46	Box 3.6 needs to be fleshed out with supporting statements. Strong text in Ch 4 ES, Sec 4.4 on enabling condtions (governance, financial, behavioural etc.). Given that the SR 1.5 is a policymaker-facing report, there is a need to highight entry points for action more clearly. Box 3.6 is one place to possibly do so. [Chandni Singh, Myanmar]	Taken into account. A5 now discusses enabling conditions that enhance feasibility of limiting warming to 1.5C. Entry points of actions are discussed in C
35462	18	41	18	43	Continuing high levels of consumption by the affluent countries / peoples should also be part of the list of examples cited of patterns of development that increase the change of not remaining within the 1.5 target. [Ashok Sreenivas, India]	Accepted. A5 now describes that feasibility to limit warming to 1.5C depends on, among others changes in behaviour and lifestyles. C3.2 and C3.5 emphasise that energy demand needs to be substantially reduced to limit global warming to 1.5C, and that this implies lifestyle changes. D2 identifies behaviour change as one of the enabling conditions for limiting warming to 1.5C
44658	18	41	18	46	Needs greater sepcificity. Why would 'slow economic development' necessarily increase the chance that 1.5 is out of reach? It could be argued, and in fact is elsewhere in the report, I seem to recall, that current rapid pace of development in some regions is fuelled by fossil fuels and hence would be more deleterious than 'slow' development, whatever that may mean, for holding to 1.5. Surely the main point is that decoupling development from emissions is the optimal approach for 1.5? [Penny Urquhart, South Africa]	Taken into account. We no longer refer to slow economic development, but rather discuss conditions enabling limiting warming to 1.5C, in A5
49740	18	41	19	11	As important as mentioning the range of CO2 removal quantities, it is very important to give the range of the 'patterns of development' like global population, consumption and resource extraction by 2100, and decadal change rates of energy system transformations like energy efficiency and renewable energy, carbon pricing by 2020, 2030, etc, so that the policy makers UNDERSTAND what is required for 1.5 / 2°C and or what makes 1.5 / 2°C impossible. These are very policy relevant numbers, without which policymakers will be unable to make the right policies. [Birgit van Munster, United Kingdom (of Great Britain and Northern Ireland)]	Taken into account. Text has been removed, we now discuss different dimensions that affect the feasibility of limiting warming to 1.5C in A5. C1.1 indicate different pathways can be followed to achieve emission reductions.
50042	18	41	19	11	The headline of this section contains a key message: there are socio-economic conditions under which meeting a 1.5oC limit is beyond reach! That is a very important point that needs further elaboration. What are these socio-economic conditions that are to be avoided? The headline text and the subsquent bullets do not answer this question. The discussion on SSP based studies in chapter 2, section 2.3.2.1 provides material. The text in this section of ch 2 says (page 2-39, lines 29-34) that high population growth, low educational achievements, low per capita income growth, high inequality and a focus on regional security are factors that would make achieving the 1.5oC limit very difficult. This message needs to be in the SPM very prominently, because it means that policy should be directed to prevent such conditions to happen. 1.5oC policy is much broader than reducing emissions and realising an energy and land-use transition. The first bullet appearing under the headline (page 19, lines 1-7) does not belong here. It would fit much better under a hew headline that I suggested (see my comment on page 17, lines 44-45), as that is the place where demand reduction and the role of behavioural and lifestyle chnge is discussed. The second bullet (page 19, lines 9-11) could be made useful by reformulating it as a pre-consition for meeting the 1.5oC limit, rather than relating it to sustainable development in general. It would underpin quite well the message about conditions to be avoided in the reformulated headline. [Bert Metz, Netherlands]	Taken into account. Text has been removed, we now discuss different dimensions that affect the feasibility of limiting warming to 1.5C in A5. C3.2 and C3.5 emphasise that energy demand needs to be substantially reduced to limit global warming to 1.5C, and that this implies lifestyle changes. D2 identifies behaviour change as one of the enabling conditions for limiting warming to 1.5C
55588	18	41	18	46	Perhaps this headline should start with the message that "patterns of development with regard to population, economy ….. Strongly influence challenges for mitigation and adaptation. [David Cooper, Canada]	Taken into account. Text has been removed, we now discuss different dimensions that affect the feasibility of limiting warming to 1.5C in A5
56514	18	41	18	46	It is irresponsible to use the example of high pop growth and slow econ development as a risk to 1.5. Conversly it is areas of high economic development that have historically produced the most emissions and it is continued levels of high economic development that jeopardize 1.5. While future emissions are anticipated to come from regions where population growth is highest the assumption is that that will be tied to high economic development as well. [Eleanor Johnston, United States of America]	Taken into account. Text has been removed, we now discuss different dimensions that affect the feasibility of limiting warming to 1.5C in A5
63074	18	41	18	46	What is meant by "slow economic development" ? We think that the fundamental features, the elements used as a basis to define those "patterns of development" need to be explained in a clear and precise way. Are alternative scenarios "defined" by features such as birth control (which the reader may imply if population growth reduction appears to be an objective), or by other features such as sustainability, development, education, inclusiveness... ? We would like to have a confidence statement (and if it is low, consider removing from the SPM). [Belgium]	Taken into account. Text has been removed, we now discuss different dimensions that affect the feasibility of limiting warming to 1.5C in A5
19426	18	42	18	44	That slow economic development increases the chance of 1.5°C being beyond reach - is the justification for this claim robust enough? [Jennifer Morgan, Netherlands]	Taken into account. Text has been removed, we now discuss different dimensions that affect the feasibility of limiting warming to 1.5C in A5
30116	18	42	18	42	Slow economic development is less obvious than others [France]	Taken into account. Text has been removed, we now discuss different dimensions that affect the feasibility of limiting warming to 1.5C in A5
46440	18	42	18	42	Here it is stated that slow economic development increase the chance that holding global warming to 1.5 degrees is beyond reach. A similar statement is also made in Chapter 2, p. 4. A question this statement and cannot see that the references provided in Executive Summary of Chapter 2 supports this statement (but I haven't read all the chapters that are referenced here). [Göran Finnveden, Sweden]	Taken into account. Text has been removed, we now discuss different dimensions that affect the feasibility of limiting warming to 1.5C in A5

Comment No	From Page	From Line	To Page	To Line	Comment	Response
59274	18	43	18	43	Does the phrase "holding global warming to 1.5 C by 2100" mean keeping global warming below 2100 through the whole 21st century, or is this really referring to the near impossibility of returning an overshoot temperature back to 1.5°C? The challenge is keeping the global average temperature below 1.5°C in mid-century. If on a path to do that, a level of effort may have been achieved that could make the threshold possible through the rest of the century. [United States of America]	Taken into account. The glossary now include a definition on 1.5C-consistent pathways, which imply either remaining below 1.5C or returning to 1.5C by around 2100 after an overshoot
45896	18	44	18	46	It also depends on the availability of techologies. [Deger Saygin, Turkey]	Taken into account. Text has been removed, we now discuss different dimensions that affect the feasibility of limiting warming to 1.5C in A5, including technological innovation and transfer
46208	18	44	18	46	The second sentence of 3.6 is unclear: how can the extent and speed of the mitigation required be related to the pace and nature of decvelopmemnty, political will and behaviopur and lifestyle? [Netherlands]	Taken into account. Text has been removed, we now discuss different dimensions that affect the feasibility of limiting warming to 1.5C in A5
59276	18	44	18	44	is beyond reach should probably read "could be placed beyond reach". Note that it is unclear whether the text in box SPM 3.6 is referring to the status quo or to the current pathway. [United States of America]	Taken into account. Text has been removed, we now discuss different dimensions that affect the feasibility of limiting warming to 1.5C in A5
43978	18	45	18	46	It might be a naïve comment, but emphasizing only "political will, behavior and lifestyle" sounds too idealistic and stoic to me. I personally believe that disruptive technological and social system innovation should go in tandem with those ideas. Actually, the changes in behavior and lifestyle can be driven by innovations, like we are experiencing for personal mobility, where ride-share apps are changing peoples behavior and driverless cars will propel it further in the near future. I hope to have this kind of message more visible. Relevant materials seem to be found in 4.4.4.2 "Technologies as enablers of climate action" in Chapter 4. [Seita Emori, Japan]	Taken into account. Text has been removed, we now discuss different dimensions that affect the feasibility of limiting warming to 1.5C in A5. C3.5 discusses that effects technology change depends on behaviour.
58172	19				SPM4: the section does not quantify CO2 prices required to achieve the target. This is a crucial information for the policy makers and a key outcome of the assessment. A figure on carbon prices would be appropriate and instrumental for policy makers. [Nico Bauer, Germany]	Noted. Agreed such information is valuable. The report authors consistently worked to review scientific literature of carbon pricing. The assessment revealed that valid and reliable estimates of these numbers were not available in the literature
58176	19				SPM4: it is curial to mention that scenarios based on regional rivalry (SSP3) and inequality (SSP4) find the 1.5°C target unachievable. This finding is as important as the finding on NDCs on page 20. [Nico Bauer, Germany]	Noted. A variety conditions under which is would not be feasible to create the conditions of a 1.5°C warming world were presented.
11094	19	1	19	7	Consider including in section with high-level statements [Denmark]	Accepted. This issues is addressed in C1, stating "All 1.5°C-consistent pathways imply rapid reductions in net global anthropogenic CO2 emissions to reach net-zero around mid-century, together with rapid reductions in other anthropogenic emissions, particularly methane. Greater emissions reductions by 2030 lead to a higher chance of limiting global warming to 1.5°C without, or with only limited overshoot (zero to 0.2°C). (high confidence)"
29184	19	1	19	7	This paragraph seem to be important and should be absorbed in the headline. [Germany]	Accepted. This issues is addressed in C1, stating "All 1.5°C-consistent pathways imply rapid reductions in net global anthropogenic CO2 emissions to reach net-zero around mid-century, together with rapid reductions in other anthropogenic emissions, particularly methane. Greater emissions reductions by 2030 lead to a higher chance of limiting global warming to 1.5°C without, or with only limited overshoot (zero to 0.2°C). (high confidence)"
31240	19	1	19	2	The transformations necessary to limit (…). is an important sentence. It should be highlighted that even 2°C target, let alone 1.5°C, is very challenging and involves deep transformation. [Japan]	Accepted. This issues is addressed in C1, stating "All 1.5°C-consistent pathways imply rapid reductions in net global anthropogenic CO2 emissions to reach net-zero around mid-century, together with rapid reductions in other anthropogenic emissions, particularly methane. Greater emissions reductions by 2030 lead to a higher chance of limiting global warming to 1.5°C without, or with only limited overshoot (zero to 0.2°C). (high confidence)"
33870	19	1	19	6	This bullet point contains a lot of important information, but it is perhaps a bit long and grasps over too much. Particularly the last sentence about "rapid and large scale behaviour and lifestyle change" is an essential message, especially when aiming for a very ambitious temperature goal. Please consider giving this topic more emphasis by including a new bullet point, in which such changes are described more specifically. [Norway]	Accepted. This issues is addressed in C1, stating "All 1.5°C-consistent pathways imply rapid reductions in net global anthropogenic CO2 emissions to reach net-zero around mid-century, together with rapid reductions in other anthropogenic emissions, particularly methane. Greater emissions reductions by 2030 lead to a higher chance of limiting global warming to 1.5°C without, or with only limited overshoot (zero to 0.2°C). (high confidence)". C3.2 states "In energy systems, 1.5°C-consistent pathways include a substantial reduction in energy demand, a decline in the carbon intensity of electricity to zero by mid-century, and an increase in electrification of energy use (high confidence)", while C3.5 states: "Transport and buildings, and their associated infrastructure, achieve deep emission reductions by 2050 in 1.5°C-consistent pathways. Technical measures (such as efficient appliances, insulation and electrification) and lifestyle choices that lower energy demand or favour cycling and walking can achieve such deep emissions reductions while enhancing multiple SDGs".
36926	19	1	19	2	The transformations necessary to limit (…). is an important sentence. It should be highlighted that even 2? target, let alone 1.5?, is very challenging and involves deep transformation. [Keigo Akimoto, Japan]	Accepted. This issues is addressed in C1, stating "All 1.5°C-consistent pathways imply rapid reductions in net global anthropogenic CO2 emissions to reach net-zero around mid-century, together with rapid reductions in other anthropogenic emissions, particularly methane. Greater emissions reductions by 2030 lead to a higher chance of limiting global warming to 1.5°C without, or with only limited overshoot (zero to 0.2°C). (high confidence)"

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43812	19	1	19	6	The transformations necessary to limit warming to 1.5oC are qualitatively similar to those for a 2oC limit, ... Such transformations would involve rapid and large scale behaviour and lifestyle change [and a massive international venture to rapidly convert all fossil fuel energy to clean renewable energies and to develop safe and effective direct air capture removal of CO2 at scale. [Peter Carter, Canada]	Accepted. This issues is now addressed in C1, stating "All 1.5°C-consistent pathways imply rapid reductions in net global anthropogenic CO2 emissions to reach net-zero around mid-century, together with rapid reductions in other anthropogenic emissions, particularly methane. Greater emissions reductions by 2030 lead to a higher chance of limiting global warming to 1.5°C without, or with only limited overshoot (zero to 0.2°C). (high confidence)"
46210	19	1	19	2	Suggestion to include this important finding in the High level statements on page 3 [Netherlands]	Accepted. This is now a headline statement, C1, stating "All 1.5°C-consistent pathways imply rapid reductions in net global anthropogenic CO2 emissions to reach net-zero around mid-century, together with rapid reductions in other anthropogenic emissions, particularly methane. Greater emissions reductions by 2030 lead to a higher chance of limiting global warming to 1.5°C without, or with only limited overshoot (zero to 0.2°C). (high confidence)"
52970	19	1	19	4	details on how pronounced and how rapid by comparison would be of interest [Ireland]	Noted. As much as possible additional detail was added.
55520	19	1	19	6	The comparison of the mitigation roadmaps between 1.5D and 2D is of extremely high interest for policy-makers. I would suggest to reinforce this comparison. [Maryse Labriet, Spain]	Noted. The comparison of the 1.5°C and 2.0°C conditions were a significant component of the assessment process. Wherever possible the authors attempted to assess these differences
63076	19	1	19	11	These bullets are important and could be integrated in the high level statements [Belgium]	Accepted. This issues is addressed in C1, stating "All 1.5°C-consistent pathways imply rapid reductions in net global anthropogenic CO2 emissions to reach net-zero around mid-century, together with rapid reductions in other anthropogenic emissions, particularly methane. Greater emissions reductions by 2030 lead to a higher chance of limiting global warming to 1.5°C without, or with only limited overshoot (zero to 0.2°C). (high confidence)". Limiting global warming to 1.5°C in the context of sustainable development and poverty eradication is now a highlight statement (D2)
48614	19	3	19	5	The sentence is too vague for policy makers. Suggest being more precise about what you mean with " more complete portfolio of measures…demand" [Yamina Saheb, France]	Accepted. This issues is addressed in C1, stating "All 1.5°C-consistent pathways imply rapid reductions in net global anthropogenic CO2 emissions to reach net-zero around mid-century, together with rapid reductions in other anthropogenic emissions, particularly methane. Greater emissions reductions by 2030 lead to a higher chance of limiting global warming to 1.5°C without, or with only limited overshoot (zero to 0.2°C). (high confidence)". The portfolio of mitigation and adaptation actions that enable limiting global warming to 1.5C is discussed in D2.
44660	19	4	19	4	Suggest this is re-phrased as "implementation of more ambitious international policies" - merely having the policies in place does not suffice. [Penny Urquhart, South Africa]	Accepted. This issues is addressed in C1, stating "All 1.5°C-consistent pathways imply rapid reductions in net global anthropogenic CO2 emissions to reach net-zero around mid-century, together with rapid reductions in other anthropogenic emissions, particularly methane. Greater emissions reductions by 2030 lead to a higher chance of limiting global warming to 1.5°C without, or with only limited overshoot (zero to 0.2°C). (high confidence)". The portfolio of mitigation and adaptation actions that enable limiting global warming to 1.5C is discussed in D2.
54520	19	4	19	4	there are no international policies, but international agreements which may suggest policies and targets. Policy are usually at national level (or regional in the EU), but could also be sub-national at state or cinty level. I suggets to remove international and just leave policies (or policy at all level of governance). [Paolo BERTOLDI, Italy]	Accepted, revised to "international agreements" in second order draft.
11384	19	5	19	6	Suggest the point on the role of behaviour and lifestyle changne is made a separate point. [United Kingdom (of Great Britain and Northern Ireland)]	Taken into account. D2.6 discusses strategies to accelerate wide scale changes in behaviour
30118	19	5	19	6	rapid and large scale behaviour and lifestyle change : Executive Summary of Chapter 4, p.6 lines 9-15 contains important messages that could be introduced here, including on participation of the public. [France]	Taken into account. D2.6 discusses strategies to accelerate wide scale changes in behaviour, while D2.5 discusses fairness of decision procedures as an important factor influencing public acceptability; participation is also included under D6.3
49296	19	6	19	7	There seems little evidence for the statement that such transformations would involve rapid and large-scale behaviour and lifestyle change that would warrent the label "very high confidence". Chapter 2 merely notes the need for demand-side measures in end-use sectors for 1.5°C, focused on transport and buildings, but other then such general remarks, often without clear literature references, Chapter 2 (e.g. Ch2 P92L2-3) refers to Chapter 4 (section 4.4.3) for further assessment. But section 4.4.3 refers back to Chapter 2 for the need of such changes and focuses itself on the potential, not the need for it. Overall therefore, this seems circular, and there is no substance in the underlying chapters 2 & 4 to support this statement in the SPM. [Bill Hare, Germany]	Taken into account. This issues is addressed in C1, stating "All 1.5°C-consistent pathways imply rapid reductions in net global anthropogenic CO2 emissions to reach net-zero around mid-century, together with rapid reductions in other anthropogenic emissions, particularly methane. Greater emissions reductions by 2030 lead to a higher chance of limiting global warming to 1.5°C without, or with only limited overshoot (zero to 0.2°C). (high confidence)". Yet, please note that demand-side measures typically involve behaviour change, e.g.. sustainable technology will only reduce energy demand when adopted and used in the intended way by end users
11386	19	9	19	11	This is focused more on achievement of the SDGs as opposed to a specific finding in relation to 1.5°C. Evidence and confidence level? Suggest this is deleted. [United Kingdom (of Great Britain and Northern Ireland)]	Accepted. Text has been removed, SDGs are now covered in section D, and confidence statements are added
19008	19	9	19	11	Bullet is vague, generic and not substantiated by scientific evidence. [Andrea TILCHE, Belgium]	Accepted. Text has been removed, SDGs are now covered in section D, supported by scientific evidence and confidence statement

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44662	19	9	19	11	Re-phrase so that the assessment does not give the impression that equity is not an integral part of sustainable development. There are several places throughout the report where this impression is given. A far stronger case can be made if a clear message is sent that SD necessitates equity, and that most current forms of development have failed to integrate this into their implementation, and thus cannot be termed sustainable. This is not to suggest that the process is simple or static, but rather that it needs to be a constant preoccupation of development - if one is to approach SD. [Penny Urquhart, South Africa]	Accepted. Text has been removed, SDGs are now covered in section D
48616	19	9	19	9	Sustainable development is typed twice [Yamina Saheb, France]	Editorial - copyedit to be completed prior to publication. Text has been removed
49540	19	9	19	11	This para is generic and tautological. What is the message? [Karlheinz ERB, Austria]	Accepted. Text has been removed, SDGs are now covered in section D, message has been clarified
49742	19	9	19	11	The higher the development level (as in the UNDP Human Development Index), the more unsustainable, the higher the emissions and the higher the extraction of natural resources for the consumption of goods and services. The 1.2 billion poorest people account for 1% of the world's natural resource consumption, while the 1 billion richest consume 72% of the world's resources. In consumption emissions per capita, UN Very High Developed (e.g. US, EU) emit 30 times more per capita than Low Developed (e.g. Nigeria and other Africa nations), 7 times more than Medium Developed (e.g. India), 2 times more than High Developed (e.g. China). Including these data about humanity's current development pathway is important for understanding by whom the deepest transformations have to be made. [Birgit van Munster, United Kingdom (of Great Britain and Northern Ireland)]	Noted
38972	19	1	19	11	Re: "such rapid and deep transformation": even if it may seem obvious i think you should relate to temperature target. [Jan Fuglestvedt, Norway]	Accepted. This issues is addressed in C1, stating "All 1.5°C-consistent pathways imply rapid reductions in net global anthropogenic CO2 emissions to reach net-zero around mid-century, together with rapid reductions in other anthropogenic emissions, particularly methane. Greater emissions reductions by 2030 lead to a higher chance of limiting global warming to 1.5°C without, or with only limited overshoot (zero to 0.2°C). (high confidence)". Yet, please note that demand-side measures typically involve behaviour change, e.g.. sustainable technology will only reduce energy demand when adopted and used in the intended way by end users
1094	19	13	19	15	The fact that modeling evidence consistently indicates that SRM (or RMMs) could reduce climate change anomalies (both temperature and precipitation) at the regional scale is at least as important as these methods' possible infeasibility. After all, the purpose of SRM and other RMMs would be reduce these anomalies. [Jesse Reynolds, Netherlands]	Taken into account. Chapter edited for fuller assessment of SRM. However, in light of this and other comments, SPM now only briefly mentions SRM to illustrate how it is not considered in the assessed pathways
4452	19	13	19	15	Though I understand this paragraph, I don't think we should shut R&D of SRM should be shut out, in view of future serious impact as well as the difficulty to limit temperature increase to either 1.5 of 2 degree. Revise the paragraph accordingly. [Mitsutsune Yamaguchi, Japan]	Taken into account. Chapter edited for fuller assessment of SRM. However, in light of this and other comments, SPM now only briefly mentions SRM to illustrate how it is not considered in the assessed pathways
5536	19	13	19	3	I do not find that this section summarizes well the assessment of SRM given in cross chapter box 4.2, nor do I find support for the stark conclusion of infeasibility. It is clear that the issues raised in this section are not currently resolved and that these currently are a roadblock to SRM, but the potential of SRM as described in the box is later in the century and there is no proof of infeasibility given. Suggest this section summarize the assessment of SRM given in the cross chapter box 4.2 [Haroon KHESHGI, United States of America]	Taken into account. Chapter edited for fuller assessment of SRM. However, in light of this and other comments, SPM now only briefly mentions SRM to illustrate how it is not considered in the assessed pathways
7338	19	13	19	15	Add, at the end of the sentence, "though SRM, if implemented successfully, could reduce the global mean temperature and ameliorate some of the temperature-related impacts." [Masahiro Sugiyama, Japan]	Taken into account. Chapter edited for fuller assessment of SRM. However, in light of this and other comments, SPM now only briefly mentions SRM to illustrate how it is not considered in the assessed pathways
9444	19	13	19	15	'Issues related to governance and ethics, public acceptability and impacts on sustainable development could render solar radiation management economically, socially and institutionally infeasible. {4.3.9, 4.4.1, 4.4.4, 4.4.5, Cross-Chapter Box 4.2}' There are also many reasons that could render carbon dioxide removal infeasible, for example, its cost. However, the report does not comment this. Why solar radiation management is commented in such a negative tone? All climate engineering approaches should be presented in this report in equally objective and unbiased manner. [Russian Federation]	Taken into account. Chapter edited for fuller assessment of SRM. However, in light of this and other comments, SPM now only briefly mentions SRM to illustrate how it is not considered in the assessed pathways
19010	19	13	19	15	The title reads: "3.7 Issues related to governance and ethics, public acceptability and impacts on sustainable development could render solar radiation management economically, socially and institutionally infeasible. {4.3.9, 4.4.1, 4.4.4, 4.4.5, Cross-Chapter Box 4.2}". We think this statement extends to other forms of geoengineering, notably ocean fertilisation. Suggestion: "3.7 Solar radiation management and ocean-based carbon absorption could be economically, socially and institutionally infeasible due to issues related to governance and ethics, public acceptability and impacts on sustainable development. {4.3.8, 4.3.9, 4.4.1, 4.4.4, 4.4.5, Cross-Chapter Box 4.2}" [Andrea TILCHE, Belgium]	Taken into account. Chapter edited for fuller assessment of SRM. However, in light of this and other comments, SPM now only briefly mentions SRM to illustrate how it is not considered in the assessed pathways
19012	19	13	19	29	Perhaps on an equal footing with Solar Radition Management in terms of controversiality- can some information be given on the inclusion and role of nuclear energy in scenarios? [Andrea TILCHE, Belgium]	Taken into account. Chapter edited for fuller assessment of SRM. However, in light of this and other comments, SPM now only briefly mentions SRM to illustrate how it is not considered in the assessed pathways

Comment No	From Page	From Line	To Page	To Line	Comment	Response
19150	19	13	19	29	I don't think this (and the exec summary of chapter 4) are a fair summary of the more balanced views expressed in Chapter 4. [Olivier Boucher, France]	Taken into account. Chapter edited for fuller assessment of SRM. However, in light of this and other comments, SPM now only briefly mentions SRM to illustrate how it is not considered in the assessed pathways
19428	19	13	19	15	The headline statement here suggests that it is issues related to governance and ethics, acceptability and sustainable development that are the primary barriers for solar radiation management, where as the summary statement in the underlying para (4, page 8) highlight technological immaturity, lack of physical understanding, efficiency to limit global warming, and ability to scale, govern and legitimise as the main constrain. So there is inconsistency on the key message between the SPM and the Chapter 4 Summary. [Jennifer Morgan, Netherlands]	Taken into account. Chapter edited for fuller assessment of SRM. However, in light of this and other comments, SPM now only briefly mentions SRM to illustrate how it is not considered in the assessed pathways
29186	19	13	19	29	SRM is very different from CDR in terms of understanding, potential and risks. However, the assessment does not provide this information. We suggest build on the information from AR5 SYR: "Solar Radiation Management (SRM) involves large-scale methods that seek to reduce the amount of absorbed solar energy in the climate system. SRM is untested and is not included in any of the mitigation scenarios. If it were deployed, SRM would entail numerous uncertainties, side effects, risks and shortcomings and has particular governance and ethical implications. SRM would not reduce ocean acidification. If it were terminated, there is high confidence that surface temperatures would rise very rapidly impacting ecosystems susceptible to rapid rates of change." Given these statements from the AR5 SYR, we are surprised that the findings of the second bullet are assessed with "low agreement and medium evidence" only. Please strengthen the two bullets under section 3.7 with information from the AR5. The headline statement 3.7 lists "governance, ethics and public acceptability" as reasons that could render SRM infeasible. However, this generic statements is not very meaningful. Please provide more the more concrete reasons drawing on those given in A5 and those mentioned in the two bullets of section 3.7. [Germany]	Taken into account. Chapter edited for fuller assessment of SRM. However, in light of this and other comments, SPM now only briefly mentions SRM to illustrate how it is not considered in the assessed pathways
30120	19	13	19	29	Section 3.7. could be shortened to highlight the risks and physical impacts of Solar Radiation Management (Cross-Chapter Box 2, Chapter 3, p.182, lines 36-45), and the goverance, ethics, public resistance and impacts on sustainable development. [France]	Taken into account. Chapter edited for fuller assessment of SRM. However, in light of this and other comments, SPM now only briefly mentions SRM to illustrate how it is not considered in the assessed pathways
31242	19	13	19	15	The meaning of this paragraph is understandable. However, SRM research and development will still have significance in consideration of the serious future impact and the difficulty to limit temperature increase to either 1.5°C or 2.0°C and SRM can be an option to manage risk of climate change. See Y. Arino, et al. "Estimating option values of solar radiation management assuming that climate sensitivity is uncertain." Proceedings of the National Academy of Sciences 113.21 (2016): 5886-5891. [Japan]	Taken into account. Chapter edited for fuller assessment of SRM. However, in light of this and other comments, SPM now only briefly mentions SRM to illustrate how it is not considered in the assessed pathways
37518	19	13	19	15	Writing about the potential infeasibility of SRM/RMM without acknowledging its potential effectiveness at achieving its core purpose (reducing change in key climate variables) is nonsensical. The fact that modeling evidence consistently indicates that SRM (or RMMs) could reduce climate change anomalies (both temperature and precipitation) at the regional scale is at least as important as these methods' possible infeasibility. After all, the purpose of SRM and other RMMs would be reduce these anomalies. [Matthias Honegger, Germany]	Taken into account. Chapter edited for fuller assessment of SRM. However, in light of this and other comments, SPM now only briefly mentions SRM to illustrate how it is not considered in the assessed pathways
37064	19	13	19	15	Depending on climate sensitivity, future climate risk could be larger while mitigation actions by Parties may fall short of the required level for achieving 1.5-2 degrees stabilzation. SRM could be an option in coping with such climate crunch. The current text is too judgemental ruling out possible role of SRM. It should be revised, for example, "Issues related to governance and ethics, public acceptability and impacts on sustainable development could challenge economic, social and institutional feasibility od SRM. It remains to be seen whether further research and development could alleviate such concerns". [Jun Arima, Japan]	Taken into account. Chapter edited for fuller assessment of SRM. However, in light of this and other comments, SPM now only briefly mentions SRM to illustrate how it is not considered in the assessed pathways

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37344	19	13	19	29	In general, the report tends to characterize RMM in ways that fail to communicate the considerable potential such technologies have to reduce harms from climate change. Multiple passages suggest that the risks of RMM outweigh the benefits, yet the state of knowledge regarding RMM is insufficiently developed to allow for such a conclusion. Specifically, no paper directly compares aggregate direct benefits with risks, where “direct” means the physical impacts rather that indirect social impacts. Risks and benefits are specific to choice of geoengineering scenario, and many of the claims about risk are about scenarios that are manifestly sub-optimal. Recent publications highlight the flexibilities of RMM methods to address multiple climate objectives simultaneously in the context of evolving mitagation and adaptation efforts. Further, the GeoMIP results show temperature and precipitation changes are reduced over a high fraction of the planet, and there are no equivalent papers showing risks. The only basis for the claim that risks outweigh benefits would be “social risks”, but they are ill-defined and no literature compares them directly with physical risks so there is no basis for the claim. Overall, the draft systematically downplays the value RMM might provide in reducing some of the most serious harms from climate change. RMM may be uniquely suited to reduce damages from temperature rise, extreme weather events, sea level rise, and other climate change impacts that will disproportionately affect vulnerable populations. For this and other reasons, we regard the relatively marginal consideration given to RMM in a report dedicated to exploring whether and how the 1.5C target might be achieved as a missed opportunity. While research on RMM is still at a preliminary stage, there is high confidence that RMM, specifically stratospheric aerosols, would be capable of limiting warming to this level, albeit with side effects. Although we do not advocate this approach, we believe that excluding serious consideration of RMM as part of broader efforts to meet the 1.5C target imposes unnecessary limits on our ability to counter climate change, and fails to take account of the full breadth of available scientific research. We recognize the constraints associated with the specific terms of reference for this report, yet we believe it would be greatly improved by a more balanced and comprehensive treatment of RMM. [David W. Keith & Douglas G. MacMartin, A temporary, moderate and responsive scenario for solar geoengineering, Nature Climate Change volume 5, pages 201–206 (2015); Kravitz, Ben, Douglas MacMartin, Alan Robock, Philip Rasch, Katharine Ricke, Jason Cole, Charles Curry, et al. 2014. “A Multi-Model Assessment of Regional Climate Disparities Caused by Solar Geoengineering.” Environmental Research Letters 9. https://doi.org/10.1088/1748-9326/9/7/074013] [Joshua Horton, United States of America]	Taken into account. Chapter edited for fuller assessment of SRM. However, in light of this and other comments, SPM now only briefly mentions SRM to illustrate how it is not considered in the assessed pathways
40762	19	13	19	15	Reword to emphasise the sentence topic. Suggest rewording from “Issues related to governance and ethics, public acceptability and impacts on sustainable development could render solar radiation management economically, socially and institutionally infeasible.” To “Solar radiation management could be rendered economically, socially and institutionally infeasible through issues related to governance and ethics, public acceptability and impacts on sustainable development.” [Liese Coulter, Australia]	Taken into account. Chapter edited for fuller assessment of SRM. However, in light of this and other comments, SPM now only briefly mentions SRM to illustrate how it is not considered in the assessed pathways
40938	19	13	19	15	….could render solar radiation management …infeasible - the use of 'could' is deliberate as in this statement can't be said with any more confidence? Or, can it be phrased as - …impacts of sustainable development render solar radiation…? [Neelam Singh, United States of America]	Taken into account. Chapter edited for fuller assessment of SRM. However, in light of this and other comments, SPM now only briefly mentions SRM to illustrate how it is not considered in the assessed pathways
43814	19	13	19	15	• Sustainable development, the Sustainable Development Goals and well-being for all will be difficult to achieve without sufficient consideration of the equity and ethics of such rapid and deep transformations, as well as their social and political feasibility. [These aspects are all greater with biomass combustion and BECCS which should be ruled out.] and planetary failure] [Peter Carter, Canada]	Taken into account. Chapter edited for fuller assessment of SRM. However, in light of this and other comments, SPM now only briefly mentions SRM to illustrate how it is not considered in the assessed pathways
46212	19	13	19	15	Suggestion to put the topic SRM and the negative message at the beginning of the sentence. Especially after the somewhat similar line 9-11 one would expect a positive message and easily overlooks the grave conclusion. [Netherlands]	Taken into account. Chapter edited for fuller assessment of SRM. However, in light of this and other comments, SPM now only briefly mentions SRM to illustrate how it is not considered in the assessed pathways
46214	19	13	19	29	Downsides of SRM mentioned here are justified, but missing the point that countries or other actors may unilaterally deploy SRM with global consequences, and may be tempted to do so. Specific relevance for 1.5C discussion is not obvious. [Netherlands]	Taken into account. Chapter edited for fuller assessment of SRM. However, in light of this and other comments, SPM now only briefly mentions SRM to illustrate how it is not considered in the assessed pathways
49298	19	13			This assessment is in line with findings in AR5. Parts of the report convey a different message. In particular the cross-chapter box 4.2 that focusses on 'peak shaving' lacking a comprehensive literature base as well as omitting other key issues in relation to SRM that are highlighted here. [Bill Hare, Germany]	Taken into account - text revised. Chapter and SPM edited for fuller assessment of SRM in Chapter SRM now only briefly mentioned
49538	19	13	19	13	issues related to sounds awkward and is unspecific. Reformulate, specify the issues. [Karlheinz ERB, Austria]	Taken into account. Chapter edited for fuller assessment of SRM. However, in light of this and other comments, SPM now only briefly mentions SRM to illustrate how it is not considered in the assessed pathways
50044	19	13	19	29	What is missing in the headline statement is pointing to the possible negative impacts and risks of SRM, which is an important aspect for decision making and is prominently mentioned in the Exec Summary of chapter 4 (page 4-8, line 5-11). Add this to the headline and add a separate bullet to elaborate this point on the basis of the material in ch 4.3.9. The text in lines 20-24 duplicates to a large extent the headline text. [Bert Metz, Netherlands]	Taken into account. Chapter edited for fuller assessment of SRM. However, in light of this and other comments, SPM now only briefly mentions SRM to illustrate how it is not considered in the assessed pathways
52972	19	13	19	15	Are there not primary economic and technical barriers also? [Ireland]	Taken into account. Chapter edited for fuller assessment of SRM. However, in light of this and other comments, SPM now only briefly mentions SRM to illustrate how it is not considered in the assessed pathways

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55814	19	13	19	13	Line 13 applies not just to SRM, but to other options (referencing the enabling environments as 4.4). Which also gives the message of SPM3. [Debora Ley, Guatemala]	Taken into account. Chapter edited for fuller assessment of SRM. However, in light of this and other comments, SPM now only briefly mentions SRM to illustrate how it is not considered in the assessed pathways
56516	19	13	19	15	As phrased it makes it sound like currently SRM is feasible but that it could be made infeasible in the future. This sentence should be oriented to make clear that SRM is not at all feasible right now and given all the issues it appears that it will remain infeasible. [Eleanor Johnston, United States of America]	Taken into account. Chapter edited for fuller assessment of SRM. However, in light of this and other comments, SPM now only briefly mentions SRM to illustrate how it is not considered in the assessed pathways
56946	19	13	19	29	It seems very strange to introduce a term of art like "solar radiation management" with no definition at all. In line with suggested changes higher up in the SPM, I would suggest using "albedo modification" throughout this passage instead. [Oliver Morton, United Kingdom (of Great Britain and Northern Ireland)]	Taken into account. Chapter edited for fuller assessment of SRM. However, in light of this and other comments, SPM now only briefly mentions SRM to illustrate how it is not considered in the assessed pathways
59278	19	13	19	3	Section 3.7 is not framed in the context of 1.5°C. Presumably its relevance is that SRM could be considered as part of the scenarios for 1.5°C, but this link should be made clearer. Otherwise the section would better be moved to a more thorough treatment in AR6. [United States of America]	Taken into account. Chapter edited for fuller assessment of SRM. However, in light of this and other comments, SPM now only briefly mentions SRM to illustrate how it is not considered in the assessed pathways
59280	19	13	19	29	The Summary for Policymakers states that issues related to governance and ethics, public acceptability, and impacts on sustainable development could render solar radiation management economically, socially and institutionally infeasible. While this might be the case, the Summary for Policymakers again obscures the degree to which SRM is being investigated across the planet – in the U.S., Europe, China, and elsewhere. One reflection of the growing SRM global research community is the July 2017 Gordon Research Conference (GRC) on the topic: https://www.grc.org/climate-engineering-conference/2017/ and another is the Climate Engineering Conference held in Berlin in October 2017: http://www.ce-conference.org/cec17-program. Researchers across the planet are engaged in SRM research that is continuously advancing the development of SRM options for consideration for implementation. Therefore, consideration should be given to making the Summary for Policymakers clear rather than obscure with respect to what is in fact happening globally on SRM. [United States of America]	Taken into account. Chapter edited for fuller assessment of SRM. However, in light of this and other comments, SPM now only briefly mentions SRM to illustrate how it is not considered in the assessed pathways
59282	19	13	19	15	The topline message on solar radiation management seems negatively biased, especially in light of the fact that 1.5°C is out of reach without overshoot. All of the factors that may render SRM infeasible are correctly stated; however, IPCC should have a more objective statement about the science and research needed in order to make more informed assessments about the feasibility, costs, risks, and governance challenges of these approaches. [United States of America]	Taken into account. Chapter edited for fuller assessment of SRM. However, in light of this and other comments, SPM now only briefly mentions SRM to illustrate how it is not considered in the assessed pathways
1096	19	14	19	14	There is no evidence to suggest that RMM would be economically infeasible. See section 4.3.9.2 [Jesse Reynolds, Netherlands]	Taken into account. Chapter edited for fuller assessment of SRM. However, in light of this and other comments, SPM now only briefly mentions SRM to illustrate how it is not considered in the assessed pathways
5476	19	14	19	14	While I do see text in chapter 4 that states the possibility of economic infeasibility of SRM, I did not find any basis for that statement. Suggest that "economically, " be removed here and in chapter 4. The literature on the cost of SRM for most concepts shows it to be not so expensive, and the primary issues would be the remaining ones mentioned in this paragraph. [Haroon KHESHGI, United States of America]	Taken into account. Chapter edited for fuller assessment of SRM. However, in light of this and other comments, SPM now only briefly mentions SRM to illustrate how it is not considered in the assessed pathways
6902	19	14	19	14	Given the quite limited costs of SRM compared to mitigation and adaptation it seems to be very unlikely that SRM is economically infeasible. It is therefore suggested to delete "economically" in line 14. [Klaus Radunsky, Austria]	Taken into account. Chapter edited for fuller assessment of SRM. However, in light of this and other comments, SPM now only briefly mentions SRM to illustrate how it is not considered in the assessed pathways
37520	19	14	19	14	There is no evidence to suggest that RMM would be economically infeasible. See section 4.3.9.2 [Matthias Honegger, Germany]	Taken into account. Chapter edited for fuller assessment of SRM. However, in light of this and other comments, SPM now only briefly mentions SRM to illustrate how it is not considered in the assessed pathways
6904	19	17	19	2	Lack of clarity. The following wording is suggested: None of the pathways assessed in the Special Report include solar radiation management. However, solar radiation management has been considered in the context of reducing temperature-related impacts of global warming despite that other impacts, such as those related to ocean acidification would largely remain unaffected. [Klaus Radunsky, Austria]	Taken into account. Chapter edited for fuller assessment of SRM. However, in light of this and other comments, SPM now only briefly mentions SRM to illustrate how it is not considered in the assessed pathways
6908	19	17	19	29	It is suggested to include some additional language reflecting on the assessment of scientists that try to further develop solar radiative management but come to the conclusion that SRM cannot substitute for emissions reductions and/or CO2 removal (see chapter 4.3.9). It would also be helpful to explain the reason for such expert judgement, e.g. the very long time period of several thousands of years for which SRM would have to be implemented before the temperature goal could be met without SRM. [Klaus Radunsky, Austria]	Taken into account. Chapter edited for fuller assessment of SRM. However, in light of this and other comments, SPM now only briefly mentions SRM to illustrate how it is not considered in the assessed pathways
9050	19	17	19	29	We suggest to highlight the finding of the underlying report here that SRM cannot substitute for emission reductions and/or CO2 removal (see chapter 4.3.9). [Luxembourg]	Taken into account. Chapter edited for fuller assessment of SRM. However, in light of this and other comments, SPM now only briefly mentions SRM to illustrate how it is not considered in the assessed pathways
29608	19	17	19	2	The sentence re solar radiative management is unclear. [Finland]	Taken into account. Chapter edited for fuller assessment of SRM. However, in light of this and other comments, SPM now only briefly mentions SRM to illustrate how it is not considered in the assessed pathways

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43816	19	17	19	24	•[While] None of the pathways assessed in the Special Report include solar radiation management, and solar radiation management should [NOT] be considered in the context of reducing temperature-related impacts of global warming, while other impacts, such as those related to ocean acidification, would largely remain unaffected [which rules out the consideration of solar radiation management]..[The evidence is that solar radiation management is far too dangerous and too ineffective in the long term to consider (this report) solar radiation management is the formula for policy and planeary failure. It is a horrid idea. NO planetary solar radiation mangement cooling. [Peter Carter, Canada]	Taken into account. Chapter edited for fuller assessment of SRM. However, in light of this and other comments, SPM now only briefly mentions SRM to illustrate how it is not considered in the assessed pathways
49408	19	17	19	24	Consider to use acronym for 'solar radiation management' (SRM) in this item [Alexander Chernokulsky, Russian Federation]	Taken into account. Chapter edited for fuller assessment of SRM. However, in light of this and other comments, SPM now only briefly mentions SRM to illustrate how it is not considered in the assessed pathways
51174	19	17	19	29	Solar radiation management also carries unacceptable risks for biodiversity, see Trisos, C.H. et al. (2018) Potentially dangerous consequences for biodiversity of solar geoengineering implementation and termination, Nature Ecology & Evolution. [Linda Schneider, Germany]	Taken into account. Chapter edited for fuller assessment of SRM. However, in light of this and other comments, SPM now only briefly mentions SRM to illustrate how it is not considered in the assessed pathways
56948	19	17	19	2	The passive construction "has been considered" is unclear. It could be read as suggesting that SRM has been considered in this way in this report, which I do not take to be the intention. (If that is the intention, then the sentence should be redrafted thus: "...include solar radiation management, the authors have considered solar radiation management in the context of...") If the intention is to say that there is a literature on the use of SRM that the scenarios in this report do not address, it would be more clearly put as follows: "Albedo modification has been suggested as a way of reducing global warming thus dealing with some temperature-related impacts; other impacts, such as those related to ocean acidification, would be largely unaffected by such a course of action. None of pathways assessed in this Special Report inclde albedo modification used in this way." You could add to that last part "This reflects the desire, expressed in the UNFCCC's invitation to the IPCC to prepare this Special Report, that it be concerned with "global greenhouse gas emission pathways". [Decision of COP21, item 21] [Oliver Morton, United Kingdom (of Great Britain and Northern Ireland)]	Taken into account. Chapter edited for fuller assessment of SRM. However, in light of this and other comments, SPM now only briefly mentions SRM to illustrate how it is not considered in the assessed pathways
56956	19	17	19	24	It seems odd to go into this level of detail on the difficulties and obstacles associated with albedo modification while limiting discussion of the difficulties and obstacles associated with 1.5C-enabling levels of emissions reduction to merely saying they "may be challenging" (page 18, line 39) [Oliver Morton, United Kingdom (of Great Britain and Northern Ireland)]	Taken into account. Chapter edited for fuller assessment of SRM. However, in light of this and other comments, SPM now only briefly mentions SRM to illustrate how it is not considered in the assessed pathways
62904	19	17	19	24	Chapter 4 introduces the term Radiation Modification Measures to be used instead of SRM. [Sabine FUSS, Germany]	Taken into account. Chapter edited for fuller assessment of SRM. However, in light of this and other comments, SPM now only briefly mentions SRM to illustrate how it is not considered in the assessed pathways
19248	19	18	19	18	It would be relevant to add here a brief description of solar radiation management. [Spain]	Taken into account. Chapter edited for fuller assessment of SRM. However, in light of this and other comments, SPM now only briefly mentions SRM to illustrate how it is not considered in the assessed pathways
48	19	2	19	2	Might replace 'unaffected' with 'unabated" or 'unmitigated'. [Meinhard Doelle, Canada]	Taken into account. Chapter edited for fuller assessment of SRM. However, in light of this and other comments, SPM now only briefly mentions SRM to illustrate how it is not considered in the assessed pathways
7258	19	2	19	24	True, but not balanced. After reading the rest of the report, I'm basically convinced that we won't be able to avoid catastrophic climate change. If SRM offers the only way out, even if it's imperfect, I can easily see public outcry if politicians try to avoid it. I think you've presented some weak arguments. Just say that it's uncertain, so you have a lot of questions before you can properly assess it like you can with the other methods of addressing climate change. Or you could make the argument that it's not sustainable if it's the only thing you do, so mitigation/CDR are necessary anyway, and that's why you're focusing on them. [Ben Kravitz, United States of America]	Taken into account. Chapter edited for fuller assessment of SRM. However, in light of this and other comments, SPM now only briefly mentions SRM to illustrate how it is not considered in the assessed pathways
34378	19	2		21	The text refers to the possible avoidance of adverse side-effects of SRM, but no side effects have yet been described. I suggest that these should be briefly described. [Nathan Gillett, Canada]	Taken into account. Chapter edited for fuller assessment of SRM. However, in light of this and other comments, SPM now only briefly mentions SRM to illustrate how it is not considered in the assessed pathways
53224	19	2	19	24	This assessment contrary to the use of solar energy is not well justified. Solar energy is one of the most important sources of renewable energy and recent tecnologies has improved a lot their efficiency and cycle of life.I would propose to be more cautelous. [Maria-Carmen Llasat, Spain]	Taken into account. Chapter edited for fuller assessment of SRM. However, in light of this and other comments, SPM now only briefly mentions SRM to illustrate how it is not considered in the assessed pathways
56950	19	2	19	24	Even in the uncertain case that… -- the use of "uncertain" is unnecessary: it is clear that the case in which side effects can be avoide implies the case in which they can't and thus both cases are uncertain. The use of uncertain here seems to be designed to reduce the readers' sense of the likelihood that side effects can be avoided; it is functioning as "unlikely". [Oliver Morton, United Kingdom (of Great Britain and Northern Ireland)]	Taken into account. Chapter edited for fuller assessment of SRM. However, in light of this and other comments, SPM now only briefly mentions SRM to illustrate how it is not considered in the assessed pathways
56952	19	2	19	24	I think "infeasible" is the wrong word. Something can be resisted by the public, or stupidly expensive, or ethically dubious, but still be feasible. If I unerstand the sense of this sentence correctly, I think "unjustifiable" would capture the values at play here rather better than "infeasible" does. [Oliver Morton, United Kingdom (of Great Britain and Northern Ireland)]	Taken into account. Chapter edited for fuller assessment of SRM. However, in light of this and other comments, SPM now only briefly mentions SRM to illustrate how it is not considered in the assessed pathways

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59284	19	2	19	21	This does not appear to be a fair and balanced presentation of the potential for SRM to serve as a complementary approach to mitigation/adaptation/CDR in dealing with global warming, offered with far too little context. The question is not SRM versus no SRM, but GHG with mitigation/adaptation/CDR/SRM versus GHG with mitigation/adaptation/CDR but not SRM (there is no suggestion to have SRM replace mitigation/adaptation/CDR). As to uncertainties relating to model projections, it would seem very hard to argue that model simulations with SRM that are close to the present climate will be more uncertain than model simulations at considerably higher temperatures but without SRM, especially in that virtually all SRM approaches are very close to natural processes and so the simulations do not really introduce large, new types of possible errors (and field tests can help reduce these uncertainties, which is hard to do for the situation where the overall global average temperature is elevated). There would not be any objection from scientists or others were Nature to be the cause (in areas remote from human settlement) for a series of small volcanic eruptions that would have the same influence as the type of peak-shaving cooling that SRM could provide to offset warming over 1.5°C (or some lower value). The uncertainty argument is upside down: Simulations of the climate with SRM might well be better than the simulations of the impacts of global averasge warming on which the world is basing the total transformation of the global energy system. In addition, SRM can be done incrementally and evaluation can be done along the way and quickly ended if there are significant adverse consequences. It is not at all as if one makes one decision and that decision has to remain in effect for centuries; indeed, a plausible approach would involve a slowly initiated buildup with evaluation and adjustment and learning along the way. A much more considered analysis is needed. [United States of America]	Taken into account. Chapter edited for fuller assessment of SRM. However, in light of this and other comments, SPM now only briefly mentions SRM to illustrate how it is not considered in the assessed pathways
59286	19	2	19	2	SRM could increase ocean acidification if it reduces the incentive to reduce CO2 emissions. [United States of America]	Taken into account. Chapter edited for fuller assessment of SRM. However, in light of this and other comments, SPM now only briefly mentions SRM to illustrate how it is not considered in the assessed pathways
44664	19	21	19	24	Greater specificity needed re governance - does the evidence cited support adjusting this to read "… the difficulties of achieving co-ordinated multi-level governance, ethical implications, …"? [Penny Urquhart, South Africa]	Taken into account. Chapter edited for fuller assessment of SRM. However, in light of this and other comments, SPM now only briefly mentions SRM to illustrate how it is not considered in the assessed pathways
59288	19	21	19	24	With respect to governance, ethical, and public acceptance questions, many of the studies that have been done ask about undertaking SRM or not without fully indicating what the impacts for society would be were SRM not to be followed. So, ethical questions can be posed both ways: the ethics of taking an action in addition to the many other interventions in the system humans are making versus not undertaking an action that is designed to offset negative consequences and would be quickly ended or altered if it were instead causing even grester negative consequences (virtually all model simulations indicate that SRM pulls climatic conditions back toward the unperturbed state). On public resistance, given how misleading the general discussions of SRM have been, it might well be the case that there would be public reseistance, but there is also going to be a lot of public resistance and harm associated with the climate changes that occur without SRM. It is hard to understand how SRM would adversely affect the achievement of sustainable development in that it would be keeping the climate from moving into much more stressful conditions. The projected cost is actually far less than other options for seeking to limit climate change, a concern about undertaking SRM possibly slowing mitigation. As to governance, it is not clear why governance would be any more challenging than explaining away the inaction of limiting emissions that will be causing very dramatic changes in climate. The summary here is not a fair and balanced analysis of the potential for SRM to become a possible complementary option to those described in this report. [United States of America]	Taken into account. Chapter edited for fuller assessment of SRM. However, in light of this and other comments, SPM now only briefly mentions SRM to illustrate how it is not considered in the assessed pathways
5478	19	23	19	23	While I do see text in chapter 4 that states the possibility of economic infeasibility of SRM, I did not find any basis for that statement. Suggest that "economically, " be removed here and in chapter 4. The literature on the cost of SRM for most concepts shows it to be not so expensive, and the primary issues would be the remaining ones mentioned in this paragraph. [Haroon KHESHGI, United States of America]	Taken into account. Chapter edited for fuller assessment of SRM. However, in light of this and other comments, SPM now only briefly mentions SRM to illustrate how it is not considered in the assessed pathways
6906	19	23	19	23	It is suggested to delete "economically" given the quite limited costs of SRM compared to mitigation and adaptation. [Klaus Radunsky, Austria]	Taken into account. Chapter edited for fuller assessment of SRM. However, in light of this and other comments, SPM now only briefly mentions SRM to illustrate how it is not considered in the assessed pathways
49542	19	23	19	24	could render is euphemistic. Should read "will render ... Undesirable" [Karlheinz ERB, Austria]	Taken into account. Chapter edited for fuller assessment of SRM. However, in light of this and other comments, SPM now only briefly mentions SRM to illustrate how it is not considered in the assessed pathways
19014	19	26	19	29	Similarly, we suggest "Uncertainties related to solar radiation management and ocean-based carbon absorption include technological maturity, physical understanding, efficiency to limit global warming, and the ability to scale, govern and legitimise their potential implementation. (low agreement, medium evidence). {4.3.8, 4.3.9, Cross-Chapter Box 4.2}" [Andrea TILCHE, Belgium]	Taken into account. Chapter edited for fuller assessment of SRM. However, in light of this and other comments, SPM now only briefly mentions SRM to illustrate how it is not considered in the assessed pathways
19134	19	26	19	26	immaturity in Chapter 4 has become "maturity" here (meaning is ok though). [Olivier Boucher, France]	Taken into account. Chapter edited for fuller assessment of SRM. However, in light of this and other comments, SPM now only briefly mentions SRM to illustrate how it is not considered in the assessed pathways

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33872	19	26	19	28	This statement with low agreement and medium evidence can appear to be rather obvious, and irrelevant as none of the pathways include SRM (page 19 line 17-18). Also the constrains are listed in the previous point. Consider removing the bullet point in line 26-28. [Norway]	Taken into account. Chapter edited for fuller assessment of SRM. However, in light of this and other comments, SPM now only briefly mentions SRM to illustrate how it is not considered in the assessed pathways
43818	19	26	19	29	Uncertainties related to solar radiation management include technological maturity, physical understanding, efficiency to limit global warming, and the ability to scale, govern and legitimise their potential implementation [and so solar radiation management should be ruled out]. [Peter Carter, Canada]	Taken into account. Chapter edited for fuller assessment of SRM. However, in light of this and other comments, SPM now only briefly mentions SRM to illustrate how it is not considered in the assessed pathways
59290	19	26	19	29	It is true that the level of research on SRM to date has been very limited. Virtually all proposed approaches for dealing with climate change are uncertain – CDR being one such area that is indicated as providing a very significant share of the mitigation component of the program. There is no single or pair of approaches that would do all that is needed, and even mitigation/adaptation/CDR combined really are not capable of bringing the temperature back to levels less than 1.5°C, except over a century and more. Picking out SRM for such criticism seems quite unbalanced given other assumptions considered in the report. [United States of America]	Taken into account. Chapter edited for fuller assessment of SRM. However, in light of this and other comments, SPM now only briefly mentions SRM to illustrate how it is not considered in the assessed pathways
56954	19	28	19	28	their should be "its" (referring as it does to solar radiation management, or as I would prefer it "large-scale albedo modification" [Oliver Morton, United Kingdom (of Great Britain and Northern Ireland)]	Editorial - copyedit to be completed prior to publication
19016	19	32	24	29	Like in the impact section, findings from the response section (SPM 4) are rather undifferentiated: the 1.5° mitigation scenarios are merely “more of the same” compared to the 2° response. It would be useful to highlight any major technology/behaviour options that can be part of 2° scenario but have to be foregone in 1.5° scenario (the role of natural gas as a transition fuel comes to mind). In that respect, SPM P21L3-5 suggests counterintuitively that the 1.5° and 2° responses are quite similar for the electricity sector, whereas one would think that 1.5° requires foregoing new natural gas power plants and transitioning straight to near-zero carbon energy sources. [Andrea TILCHE, Belgium]	Taken into account - text revised. Wherever possible this distinction has been made. However, in many cases, a clear focus on 1.5°C has been kept.
29188	19	32	28	24	Chapter SMP 4 is quite long, which is in part due to the fact that the findings of Chapters 2, 4 and 5 are not well integrated but rather placed side-by-side. There is also considerable redundancy between section 4 and earlier sections of the SPM. [Germany]	Accepted. The text has been revised substantially.
29190	19	32	3	2	Five of nine key messages of SPM4 reference the interplay of mitigation and/or adaptation activities for a 1.5°C world with the sustainable development goals (SDGs). Given the international importance of the UN's framework for sustainable development, focusing extensively on the interactions of both the climate and the sustainable development agenda appears justified. However, the importance that is given to it by addressing the issue in more than half of the key messages of SPM4 is not reflected in the substance of these key messages. They remain a bit superficial: SPM 4.3 refers to "... interlinked with....SDGs"; SPM 4.6 "... mostly synergistic with sustainable development" (meant are the SDGs); SPM 4.8 ".... large potential synergies with the SDGs"; and SPM 4.9 "... aim to simultaneously meet the SDGs". If the arguments are spelt out more in detail in the underlying bullet points, the SDGs are mostly reduced to SDG 1 (no poverty), SDG 2 (zero hunger), SDG 3 (good health) and SDG 6 (clean water). These being very important SDGs, in particular for poor countries, the remaining SDGs should be given equal importance. Please, revise both in the SPM and the report itself the parts related to SDGs, (i) spelling out more explicitly what exactly are the effects/synergies/trade-offs, how strong are they and where do they arise; (ii) discussing the possibility of alleviating negative effects e.g. through compensation schemes; (iii) including also the positive and negative effects of the currently not mentioned SDGs, in particular SDGs 8 (decent work and economic growth) and 9 (industry, innovation and infrastructure), SDG 16 (peace and justice, strong institutions), as well as SDG 5 (gender equality). [Germany]	Accepted. Synergies and trade-offs with SDGs are now discussed in D, with reference to synergies and trade-offs with specific SDGs in D6.4. Figure SPM 4 provides an overview of the synergies and trade-offs between climate mitigation measures and the SDGs
29192	19	32	3	2	Given that for the realisation of the transformations necessary for achieving a 1.5°C world not only affect governments, but also the private sector has to participate, economic considerations will be important. Thus, please provide key messages on the economic consequences of the climate transformations, their effect on short term and long term growth and on the susceptibility of economic crises. [Germany]	Rejected. No such information is available in the underlying assessment.
32928	19	32	28	22	Generally, the relevance of gender and the importance of gender-specific considerations (and the role of women) in facilitating climate mitigation in line with 1.5°C is missing from the analysis and narrative bullets of section SPM 4 (a small reference is made on p. 27). More specific points on this topic would be a good addition to the SPM. [Thomas Damassa, United States of America]	The revised draft changed substantially. In new draft based on available literature assessment is made and shown in Fig SPM 4 dedicated specifically to all the SDGs of which one is SDG 5 (Gender equality) and their links to various mitigation options compatible with 1.5C pathways . The lack of sufficient literature/lack of interlinkage studied gets reflected in white boxes. D3.3 also mentions of gender equality in revised draft.
33874	19	32			Although SPM 4 is comprised of both Chapter 4 and 5 it is in our view too long and lacks structure. Some of the content and messages are repetitive and somewhat general and wordy. A suggestion would be to concentrate each bullet point to a single or a few topics instead of covering too wide. Please also consider strengthening cooperation between authors engaged in writing SPM 3 to reduce redundancy. [Norway]	Taken into account - text has been revised and substantially shortened
49300	19	32			This part of the SPM as well as the underlying chapter lacks an assessment of the extremely rapid changes in RE prices on the potentials for rapid near term action and emission reductions. The SPM could, for example, include a figure following the analysis presented in Creutzig et al. 2017 illustrating the rapid change in the PV sector. In any case, the literature base for all high level statements on mitigation need to be assessed in the light of these rapid developments. If the underlying literature is based on outdated assumptions (i.e. about costs in IAMs) than this needs to be made transparent and potential implications need to be discussed. [Bill Hare, Germany]	Partially taken into account - although we do not include a figure similar to the suggestion in the comment we strength text on renewable energy in section C3.2 and in the new figure SPM4

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8616	19	35	19	35	If this is a use of calibrated likelihood language, it should be marked as such by italicisation, probably rewritten to: "It is very likely that ..." [Pauline Midgley, Germany]	Noted. The use of calibrated language has been made consistent throughout the SPM and italicized in every instance.
29194	19	35	19	4	In this section, we would expect information on the options for strengthened responses to meet 1.5°C, building on the bullet points that follow (raising ambition, upscale and accelerate, implications and risks of delay). The first two sentences in Section 4.1., however, address the detail in mitigation action. This information should rather be provided in SPM 3 (and please be more specific about the warming to be expected from current NDCs). [Germany]	Taken into account - text revised. Section SPM D has been restructured, now starting with the summary of the NDC assessment (D1) and continuing with various insights informing strengthening of adaptation and mitigation action in the context of sustainable development.
29536	19	35	19	43	This box contains one of the most important messages. The first part is included in the high level statements. The message of the last sentence should also be kept among the key messages. [Finland]	Noted. The encouragement for keeping these messages in the SPM has been noted.
31244	19	35	19	43	Uncertainty of NDCs must be described clearly. Some countries have not set total national emissions targets. They submit NDCs only with carbon intensity (the amount of CO2 emitted per unit of economic output) targets. So the change in GDP growth rate causes a great deal of deviation in prospects of global emissions based on the accumulat+N9ion of NDCs of all countries. Therefore, when discussing the gap between 2 ° C and1.5 ° C pathways and NDCs, it is crucial to discuss not only the difference in emission pathway due to the achieving probabilities for the temperature target (uncertainty of climate sensitivity) etc., but also huge uncertainty of total GHG emission from large emitter. NDCs with intensity targets have large uncertainties and it is important to discuss them together (see and do mention the following papers in this report). However, the draft has barely mentioned the subject. It should be specified in the Entire Report and SPM. Rogelj J, Fricko O, Meinshausen M, et al., Nature Communications 8 (2017) https://www.nature.com/articles/ncomms15748 [Japan]	Taken into account - text revised. The revised text reports the ranges of potential emissions outcomes for both conditional and unconditional interpretations of the NDCs. More detailed description of this issue would require too much space for the SPM.
33876	19	35	19	43	This is a strong, well-written message and deserves the emphasis its given. [Norway]	Noted. The encouragement for keeping these messages in the SPM has been noted.
37068	19	35	19	43	The last sentence "More ambitious pledges would imply higher mitigtion costs in the short term, albeit offset by a variety of co-benefits, but would lower both mitigation and adaptation costs in the long-term" is too generic. It does not present any quantitative information and therefore is not relevant for policy makers. It should be presented how much additional cost would be necessary for shifting from trajectories in line with the current national pledges to 1.5 degree pathway in the short term and how much cost would be saved in the longer term. [Jun Arima, Japan]	Rejected. The underlying assessment does not provide the information required to provide more quantitative information.
38974	19	35	19	43	This headline statement contains one of the most important messages in the current SPM. But as it is presented now it does not convey the messages clear enough, in my view. This due to several factors: i) it may be percieved as a repetition because of its similarity with what has been said about scenarios on page 14. Therefore I encourage the authors to make the difference more clear; i.e., using words that contrasts this more to the models and scenario calculations. You alread use words that connects to the actual situation, but I hope more can be done (e.g. words like actual planned, implementation, decided....). But more importantly, I suggest splitting the headlinestatment into two; from "More ambitous..." [Jan Fuglestvedt, Norway]	Accepted - text revised. The text has been revised by grouping the messages related to NDCs in message D1. The revised message also speaks about the fulfilment of current NDCs.
43820	19	35	19	43	There is very high likelihood that under current emission trajectories and current national pledges the Earth will warm globally more than 1.5°C above preindustrial levels, [which is estimated to be over 3° C by 2100 (Climate Action Tracker 2017) which would be much higher at equilibrium after 2100 and would cause a devastating catastrophic impacts to the human population and planet with existential causing] associated risks. The nationally determined contributions submitted under the Paris Agreement will result, in aggregate, in global greenhouse emissions in 2030 which are [substantially] higher than those in scenarios (at 16% increase from 2010 by 2030 UN climate Secretariat INDC update May 2016) compatible with limiting global warming to 1.5° or 2°C by 2100 [and far higher at equilibrium after 2100]. [Peter Carter, Canada]	Noted. No action taken.
46216	19	35	19	4	It would be useful to also say something on the likelyhood of meeting the well below 2 degrees target with current NDCs [Netherlands]	Rejected. The SPM still focusses on 1.5°C.
49744	19	35	19	43	When the cost of sufficient stringent mitigation seem greater than the cost of damage, adaptation and less stringent mitigation, any policymaker will choose the latter. It is very important to make clear (preferably in estimates in triillions of dollars) what mitigation, damage, adaptation costs are to be expected for the different pathways. [Birgit van Munster, United Kingdom (of Great Britain and Northern Ireland)]	Rejected. It is impossible to carry out a useful cost-benefit analysis without making very strong value judgments about the relative value of human life, development, bio-diversity, etc.
52712	19	35	19	36	Consider replacing "current" pledges with "initial" pledges. This will indicate that the Paris Agreement has at its core an ambition/ratchet cycle and, by design, the ambition of the NDCs is expected to increase over time [Iulain Florin VLADU, Germany]	Rejected. We decided to stick with "current" because we think this also communicates that they can still change.
50046	19	35	2	2	This headline duplicates the messages about the inadequacy of the current NDCs in section 1.3 and 3.1 of the SPM. It needs to be determined what the best place is and duplication should be avoided. The exact wording needs to be scrutinised carefully, as the messages is given in different way in the places referred to. In section 1.3 and 3.1 the text is "NDCs will lead to higher temperaturees than those in scenarios compatible to 2oC" (a fairly technical way to phrase it). In section 4.1 the first bullet under the headline, the text is much more direct: "Following current NDC, no scenario can be produced ...to limit warming to below 1.5oC" I strongly suggest to use that language to make the point on the inadequacy of the current NDCs, wherever the issue woill be placed in the SPM. [Bert Metz, Netherlands]	Taken into account - text revised. The text has been revised by grouping the messages related to NDCs in message D1.

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52714	19	35	19	36	The sentence could be made more precise and give the range of global warming under the current pledges [Iulain Florin VLADU, Germany]	Not Applicable - no longer included in the chapter. This entire section has been edited and the statement does not appear anymore as such.
52974	19	35	19	43	This box text can be shortened [Ireland]	Noted. And it has been shortened in line with a streamlining of the entire SPM.
56518	19	35	19	37	Suggest rewording to put subject first to make emphasis of sentence more clear: "Under current emission trajectries and current national pledges there is a very high likelihood that the Earth will warm globally more than 1.5°C…." [Eleanor Johnston, United States of America]	Taken into account - text revised. The section was reworded, and the message now starts with "Fulfilling the current pledges under the Paris Agreement (known as Nationally-Determined Contributions or NDCs) will still result in global warming"
59292	19	35	19	43	Very important statement. [United States of America]	Noted. The messages of the statement were kept.
62258	19	35	19	43	Key Message 4.1 (that there is a “very high likelihood that under current emission trajectories and current national pledges until 2030, global warming will reach 1.5°C above preindustrial levels by mid-century and remain above that level even in 2100, causing associated risks”) should be strengthened and made more transparent by acknowledging that current emission trajectories and national pledges would lead to warming well above 1.5C. Current pledges and policies are nowhere near that needed to meet a 1.5C target, and much more innovation and transformational change is needed. [Shaye Wolf, United States of America]	Taken into account - text revised. The full revised messages now reads: "D1. Fulfilling the current pledges under the Paris Agreement (known as Nationally-Determined Contributions or NDCs) will still result in global warming of more than 1.5°C, with associated risks and adaptation challenges. Emissions reductions and action in addition to current NDCs lead to lower overshoot and lower transitional challenges after 2030 and can contribute to the achievement of the UN Sustainable Development Goals (SDGs) (high confidence) {1.2, 2.3, 3.3, 3.4, 4.2, 4.4, Cross-Chapter Box 11 in Chapter 4} D1.1. Implementation of the conditional and unconditional NDCs is projected to result in global GHG emissions in 2030 of 50-54 GtCO2eq/yr and 52-58 GtCO2eq/yr, respectively (high confidence). {Cross-Chapter Box 11 in Chapter 4} D1.2. Collectively meeting the current conditional or unconditional NDCs would imply pursuing an overshoot trajectory to return global warming to 1.5°C. This would result in higher impacts and adaptation challenges, higher transitional challenges to reduce GHG emissions after 2030 and a higher reliance on CDR compared to pathways that are consistent with limited or no overshoot and which have deeper GHG emissions reductions until 2030 (high confidence) {1.3.3, 2.3.4, 2.3.5, 2.5.1, Cross-28 Chapter Box 8 in Chapter 3 and 11 in Chapter 4}"
19018	19	37	19	4	This text is largely identical to the one on p. 4, ll. 41-43. [Andrea TILCHE, Belgium]	Accepted - text revised. The text has been revised by grouping the messages related to NDCs in message D1. The revised message also speaks about the fulfilment of current NDCs.
31246	19	37	19	4	The nationally determined contributions submitted under the Paris Agreement will result (…) to 1.5°C by 2100. should be changed to "(…) to 1.5°C by 2100 as well as 2.0°C." [Japan]	Rejected. The text continues to focus on 1.5°C, as the assessment for 2°C has not been carried out explicitly.
36928	19	37	19	4	The nationally determined contributions submitted under the Paris Agreement will result (…) to 1.5 C by 2100. should be changed to "(…) to 1.5 C by 2100 as well as 2.0 C." [Keigo Akimoto, Japan]	Rejected. The text continues to focus on 1.5°C, as the assessment for 2°C has not been carried out explicitly.
39330	19	37	19	4	The aggregate result of the INDCs presented by state parties before Paris are tracking toward a warming of 3–4°C above preindustrial temperatures by 2100, with the potential for further warming thereafter (Rogelj et al., 2016; UNFCCC, 2016). So, we propose to add this information provided in chapter 1 of this SR1.5 after the first part of line 40 (after the full stop). [Olga Alcaraz, Spain]	Rejected. Due to space limitations this information has not been included in this version of the SPM.
59294	19	37	19	4	Edit to read: "...will result, by 2030, in cumulative global emissions since preindustrial that are higher..." The term "aggregate" is not defined, and needs to be for this finding to be understood if read in isolation. [United States of America]	Taken into account - text revised. The full revised messages now reads: "D1. Fulfilling the current pledges under the Paris Agreement (known as Nationally-Determined Contributions or NDCs) will still result in global warming of more than 1.5°C, with associated risks and adaptation challenges. Emissions reductions and action in addition to current NDCs lead to lower overshoot and lower transitional challenges after 2030 and can contribute to the achievement of the UN Sustainable Development Goals (SDGs) (high confidence) {1.2, 2.3, 3.3, 3.4, 4.2, 4.4, Cross-Chapter Box 11 in Chapter 4} D1.1. Implementation of the conditional and unconditional NDCs is projected to result in global GHG emissions in 2030 of 50-54 GtCO2eq/yr and 52-58 GtCO2eq/yr, respectively (high confidence). {Cross-Chapter Box 11 in Chapter 4} D1.2. Collectively meeting the current conditional or unconditional NDCs would imply pursuing an overshoot trajectory to return global warming to 1.5°C. This would result in higher impacts and adaptation challenges, higher transitional challenges to reduce GHG emissions after 2030 and a higher reliance on CDR compared to pathways that are consistent with limited or no overshoot and which have deeper GHG emissions reductions until 2030 (high confidence) {1.3.3, 2.3.4, 2.3.5, 2.5.1, Cross-28 Chapter Box 8 in Chapter 3 and 11 in Chapter 4}"

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19430	19	39	19	39	The current pledges are incompatible with both 1.5°C and 2 °C goals. Please add here a reference to 2°C too. A good example of a clear, reader-friendly message can be found in the UNEP Emission Gap Report 2017 Executive Summary: "Looking beyond 2030, it is clear that if the emissions gap is not closed by 2030, it is extremely unlikely that the goal of holding global warming to well below 2°C can still be reached. Even if the current NDCs are fully implemented, the carbon budget for limiting global warming to below 2°C will be about 80 percent depleted by 2030. Given currently available carbon budget estimates, the available global carbon budget for 1.5°C will already be well depleted by 2030." [Jennifer Morgan, Netherlands]	Rejected. The text continues to focus on 1.5°C, as the assessment for 2°C has not been carried out explicitly. The UNEP Gap uses an extrapolation of emissions trajectories beyond 2030 in line with the efforts implied by the NDCs. Here, we base the assessment for 1.5°C on the implied carbon budget and the impossibly high reduction rates that would be implied post-2030 in case NDCs are followed.
4454	19	4	19	42	This is a desirable situation but unproven by literatures. We need caveat here. Example is the paragraph appears in page 23, 4th dot beginning with "transitioning from climate change mitigation --- to strategically deploy available knowledge and resources". [Mitsutsune Yamaguchi, Japan]	Taken into account - text revised. There is some literature that shows that transitional challenges and costs would be lower if action is phased in in the next decade already compared to a case in which action is delayed until after 2030. The revised text now makes this point a bit more general.
30122	19	4	19	43	Is there a way to say the same thing, but with a more positive tone? [France]	Rejected. It's possible, but the authors decided to highlight the risks of inaction here.
31248	19	4	19	42	This seems to be a desirable situation. Please clearly state the section (literature information) as the basis of this description. It should be described carefully. Hence this sentence is not generalized without preconditions. An example paragraph is in page 23, 4th dot, starting with "Transitioning from climate change mitigation --- to strategically deploy available knowledge and resources". [Japan]	Taken into account - text revised. There is some literature that shows that transitional challenges and costs would be lower if action is phased in in the next decade already compared to a case in which action is delayed until after 2030. The revised text now makes this point a bit more general.
32924	19	4	19	42	This strikes me as a misleading statement. What are the calculated costs of higher mitigation based upon? And are these gross or net? Has an economic assessment of the "co-benefits" also been done? None of this has been made clear in the bullets which follow. [Thomas Damassa, United States of America]	Rejected. It is impossible to carry out a useful cost-benefit analysis without making very strong value judgments about the relative value of human life, development, bio-diversity, etc.
36314	19	4	19	43	SPM 3: Sentence may be deleted. Focus on near term mitigation is sought to be justified through co-benefits, although all following discussion of co-benefits in the report itself suggests inadequate information and uncertainty. [India]	Taken into account - text revised. This sentence has been edited with an explicit link to the achievement of SDGs.
55816	19	4	19	41	Perhaps add that adaptation costs will also be lower [Debora Ley, Guatemala]	Taken into account - text revised. Costs have not been mentioned explicitly but are included in the notion of transitional challenges, which are included in message D1.
59296	19	4	19	43	“More ambitious pledges would imply higher mitigation costs in the short term, ... but would lower both mitigation and adaptation costs in the long-term.” This is not quite true. Compared to a scenario with more ambitious near-term pledges, a scenario with less ambitious near-term pledges AND less ambitious long-term pledges will result in higher cumulative carbon emissions and higher adaptation costs, but lower mitigation costs in the near- and long-term. The point this sentence is trying to make is that, for scenarios that result in the same cumulative carbon emissions, a scenario with more ambitious near-term pledges can result in lower mitigation costs in the long term, because the scenario with less ambitious near-term pledges will require steeper reductions in the long term in order to meet the carbon budget constraint, resulting in higher long-term mitigation costs. [United States of America]	Taken into account - text revised. The text has been revised highlighting the implications of current NDCs for the challenges post-2030.
38976	19	41	19	41	I suggest "but" --> "and" [Jan Fuglestvedt, Norway]	Editorial - copyedit to be completed prior to publication. Sentence has been entirely reworded.
29196	19	45	2	7	This information is redundant with other sections of the SPM. [Germany]	Taken into account - text revised. The text has been revised by grouping the messages related to NDCs in message D1.
29198	19	45	2	2	Reference to Cross Chapter Box 4.1 (4 Multi-level governance in the EU Covenant of Mayors: Example of the Provincia di Foggia): significance of this Chapter Box to the statement "Following current .....limit global warming to below 1.5°C. {2.3.1.1, 2.3.5, 1 Table 2.7, Cross- Chapter Box 4.1}" is not clear - (possibly reference refer to Chapter 4 Supp. Material?) [Germany]	Accepted - text revised. The references to the line of sight in the chapter have been double-checked and corrected where appropriate.
29402	19	45	19	45	as above: replace "current"? [Susanne Droege, Germany]	Rejected. The use of the word "current" has been maintained, as it equally communicates that NDCs are not set in stone.

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36316	19	45	2	2	This should be expressed more simply to say that "Based on current NDC's, there is no scenario that can limit warming to 1.5 C" [India]	Taken into account - text revised. The text has been simplified, and now reads: "D1. Fulfilling the current pledges under the Paris Agreement (known as Nationally-Determined Contributions or NDCs) will still result in global warming of more than 1.5°C, with associated risks and adaptation challenges. Emissions reductions and action in addition to current NDCs lead to lower overshoot and lower transitional challenges after 2030 and can contribute to the achievement of the UN Sustainable Development Goals (SDGs) (high confidence) {1.2, 2.3, 3.3, 3.4, 4.2, 4.4, Cross-Chapter Box 11 in Chapter 4} D1.1. Implementation of the conditional and unconditional NDCs is projected to result in global GHG emissions in 2030 of 50-54 GtCO2eq/yr and 52-58 GtCO2eq/yr, respectively (high confidence). {Cross-Chapter Box 11 in Chapter 4} D1.2. Collectively meeting the current conditional or unconditional NDCs would imply pursuing an overshoot trajectory to return global warming to 1.5°C. This would result in higher impacts and adaptation challenges, higher transitional challenges to reduce GHG emissions after 2030 and a higher reliance on CDR compared to pathways that are consistent with limited or no overshoot and which have deeper GHG emissions reductions until 2030 (high confidence) {1.3.3, 2.3.4, 2.3.5, 2.5.1, Cross-28 Chapter Box 8 in Chapter 3 and 11 in Chapter 4}"
51362	19	45	2	2	This should be expressed more simply to say that "Based on current NDC's, there is no scenario that can limit warming to 1.5 C" [Anand Patwardhan, United States of America]	Taken into account - text revised. The text has been simplified, and now reads: "D1. Fulfilling the current pledges under the Paris Agreement (known as Nationally-Determined Contributions or NDCs) will still result in global warming of more than 1.5°C, with associated risks and adaptation challenges. Emissions reductions and action in addition to current NDCs lead to lower overshoot and lower transitional challenges after 2030 and can contribute to the achievement of the UN Sustainable Development Goals (SDGs) (high confidence) {1.2, 2.3, 3.3, 3.4, 4.2, 4.4, Cross-Chapter Box 11 in Chapter 4} D1.1. Implementation of the conditional and unconditional NDCs is projected to result in global GHG emissions in 2030 of 50-54 GtCO2eq/yr and 52-58 GtCO2eq/yr, respectively (high confidence). {Cross-Chapter Box 11 in Chapter 4} D1.2. Collectively meeting the current conditional or unconditional NDCs would imply pursuing an overshoot trajectory to return global warming to 1.5°C. This would result in higher impacts and adaptation challenges, higher transitional challenges to reduce GHG emissions after 2030 and a higher reliance on CDR compared to pathways that are consistent with limited or no overshoot and which have deeper GHG emissions reductions until 2030 (high confidence) {1.3.3, 2.3.4, 2.3.5, 2.5.1, Cross-28 Chapter Box 8 in Chapter 3 and 11 in Chapter 4}"
56520	19	45	2	2	Suggest rewording sentence to put emphasis first "There are no scenarios available that limit warming to 1.5 and follow current NDCs and allow for the interactions between….." [Eleanor Johnston, United States of America]	Taken into account - text revised. The text has been simplified, and now reads: "D1. Fulfilling the current pledges under the Paris Agreement (known as Nationally-Determined Contributions or NDCs) will still result in global warming of more than 1.5°C, with associated risks and adaptation challenges. Emissions reductions and action in addition to current NDCs lead to lower overshoot and lower transitional challenges after 2030 and can contribute to the achievement of the UN Sustainable Development Goals (SDGs) (high confidence) {1.2, 2.3, 3.3, 3.4, 4.2, 4.4, Cross-Chapter Box 11 in Chapter 4} D1.1. Implementation of the conditional and unconditional NDCs is projected to result in global GHG emissions in 2030 of 50-54 GtCO2eq/yr and 52-58 GtCO2eq/yr, respectively (high confidence). {Cross-Chapter Box 11 in Chapter 4} D1.2. Collectively meeting the current conditional or unconditional NDCs would imply pursuing an overshoot trajectory to return global warming to 1.5°C. This would result in higher impacts and adaptation challenges, higher transitional challenges to reduce GHG emissions after 2030 and a higher reliance on CDR compared to pathways that are consistent with limited or no overshoot and which have deeper GHG emissions reductions until 2030 (high confidence) {1.3.3, 2.3.4, 2.3.5, 2.5.1, Cross-28 Chapter Box 8 in Chapter 3 and 11 in Chapter 4}"
58164	19	45			It is crucial to add here that this refers to the NDCs up until 2030. [Nico Bauer, Germany]	Taken into account - text revised. It has been clarified that these are the current pledges (NDCs), which are at most defined until 2030.
59298	19	45	2	2	This statement needs to be less strong. Such scenarios can indeed be produced. Even if not considered in the assessment, SRM could potentially limit warming below 1.5°C although there might be significant side effects. Faster CO2 uptake from the atmosphere is another option. While unlikely to be cost effective, or even feasible, it is not accurate to say 'no scenario can be produced.' [United States of America]	Rejected. SRM is not considered a mitigation option and the suggestion would therefore not be consistent with the available literature.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
59300	19	45	2	24	Excellent set of points. Really too bad that they are stuck so far back in the SPM. [United States of America]	Noted. Still, they remain in section D1 of the SPM
29628	2		27		The concepts that are related to 'behavioural change' and 'consumption' are relevant. Please make sure that these relevant concepts are opened to the reader. [Finland]	Taken into account. Behaviour change is included as an enabling condition enhancing the feasibility of limiting warming to 1.5C under A5.1, D2 and D2.6. See also definition of enabling conditions in Box SPM 1
11388	2	1	2	1	Presumably this is by 2100? [United Kingdom (of Great Britain and Northern Ireland)]	Rejected. The statement is true at any given point in time, if no overshoot (that is, first exceeding 1.5°C) is considered.
19020	2	1	2	2	Would there be a plausible chance for 2 degrees? If not, it should also be mentioned. Otherwise the reference to the non-attainment of 1-5 degrees is misleading. See comment on p.4 l. 43. [Andrea TILCHE, Belgium]	Rejected. The SPM focusses on the implications for 1.5°C as the underlying assessment does not provide detailed evidence to discuss the issue of 2°C.
43822	2	1	2	2	Following current nationally determined contribution pledges [INDCs], no scenario can be produced that allows for the interactions between the energy, economic, and land-use systems that would be required to limit global warming to below 1.5°C [and they would be over 3° C by 2100 and much higher at equilibrium after 2100. The current INDCs are the ultimate in unethical grossly immoral government policymaking]. [Peter Carter, Canada]	Rejected. The suggestions are not supported by evidence available in the underlying chapter.
11126	2	4	2	7	the words "even in 2100" may be more confusing than helpful. Consider deleting. [Denmark]	Accepted - text revised
11390	2	4	2	5	It would also be more impactful here to indicate by how much current emissions trajectories will lead us to exceed 1.5C [United Kingdom (of Great Britain and Northern Ireland)]	Rejected. At present, the SPM continues to focus on the attainability of 1.5°C under current NDCs.
15574	2	4	2	7	This bullet point is a repeat of the accomanying headline. [Australia]	Taken into account - text revised. The text has been revised by grouping the messages related to NDCs in message D1.
31250	2	4	2	6	Uncertainty of NDCs should be described. Rogelj J, Fricko O, Meinshausen M, et al., Nature Communications 8 (2017) discuss the ambiguity of NDCs that are expressed as emissions intensity due to uncertain GDP development. Referring this article, it is necessary to explicitly state that there is some uncertainty in assessing the gap between the NDCs and emission trajectories toward specific climate target. [Japan]	Taken into account - text revised. The uncertainty of NDC projections is now highlighted by reporting both the ranges for conditional and unconditional interpretations of the NDCs. A more technical discussion of this issue would be outside the scope of an SPM.
36318	2	4	2	7	What will be the level of global warming reached in 2100 may be added. [India]	Rejected. At present, the SPM continues to focus on the attainability of 1.5°C under current NDCs.
38474	2	4	2	7	The reference to global warming by mid-century: please see chapter 1:1-5: lines 11-18, it states "by 2040 or earlier", and here it states by mid-century. The change from absolute date to a relative date can be an argument for delay in action as it gives a lay away for good 10 years. [Linah Ababneh, United States of America]	Taken into account - text revised. The statement in Chapter 1 is based on a simple arbitrary continuation of current emissions. This statement is based on assessments of where NDCs would lead to. In any case, the wording has been revised to avoid confusion.
38978	2	4	2	7	I feel that this is a repetition. If it is meant as text supporting the headline, then it could include some more info and nuances. And "associated risks" is vague too me. [Jan Fuglestvedt, Norway]	Taken into account - text revised. The text has been revised by grouping the messages related to NDCs in message D1.
43824	2	4	2	6	There is very high likelihood that under current emission trajectories and current national pledges until 2030, global warming will reach 1.5°C above preindustrial levels by mid-century and [be over double] above that level in 2100 and much higher after 2100 to equilibrium], [causing associated devastating impacts to the human population and planet at equilibrium after 2100 and existential risks (V. Rsamanthan 2017 Scripps New Climate Risk Classification Created to Account for Potential “Existential” Threats(] [Peter Carter, Canada]	Rejected. The suggestions are not supported by specific evidence available in the underlying chapter.
46218	2	4	2	7	move this para up to just after the main message 4.1 [Netherlands]	Taken into account - text revised. The text has been revised by grouping the messages related to NDCs in message D1.
51364	2	4	2	7	What will be the level of global warming reached in 2100? [Anand Patwardhan, United States of America]	Rejected. At present, the SPM continues to focus on the attainability of 1.5°C under current NDCs.
53222	2	4	2	7	Some paragraphs of 4.1 are very similar to those of 3.1. Both of them speak about the Paris Agreement and the NDCs. Perhaps the paragraphs of 3.1 could be integrated with those of 4.1 [Maria-Carmen Llasat, Spain]	Taken into account - text revised. The text has been revised by grouping the messages related to NDCs in message D1.
56958	2	4	2	6	Again, the statement is too absolute as it stands, given the possibility of albedo modification. I suggest clarifiying this with the following insertion: "...current national pledges until 2030, and in the absence of large-scale albedo modification, global warming will reach..." [Oliver Morton, United Kingdom (of Great Britain and Northern Ireland)]	Rejected. No evidence on albedo modification is available in the underlying assessment.
59302	2	4	2	7	This statement should include confidence language and an estimate range. [United States of America]	Taken into account - text revised. Confidence language has been added in each statement in the revised SPM. No range was included in the revised text, as this statement was strongly modified so that it doesn't apply anymore.
52976	2	5	2	5	Check timing with earlier statements [Ireland]	Taken into account - text revised. The statement in Chapter 1 is based on a simple arbitrary continuation of current emissions. This statement is based on assessments of where NDCs would lead to. In any case, the wording has been revised to avoid confusion.
11392	2	6	2	6	remain above that level' underplays just how high it could go - NDCs as they currently stand would result, even if fully delivered and held firm post 2030, 3 degrees or so of warming. [United Kingdom (of Great Britain and Northern Ireland)]	Noted
6910	2	9	2	13	This wording is only understandable for a reader who is well aware of the climate change impacts even if warming has been limited to 1.5oC above pre-industriual level. Therefore the following wording is suggested: The transition to a world in which global warming is limited to 1.5oC can only be realized by upscaling and accelerating the implementation of rapid, far-reaching, multi-level and cross-sectoral climate mitigation actions; given the significant climate change impacts even at such low global warming level in addition also upscaled and accelerated adaptation actions are required and both, mitigation and adaptation actions need to be integrated with sustainable development initiatives. [Klaus Radunsky, Austria]	Noted. The language will be made more accessible.

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10662	2	9	2	13	Suggested edit to "strengthen capacities, including traditional knowledge" because it does not read correctly. The call is for accepting plural knowledge systems for climate action - traditional knowledge does not need to be strengthened, it needs to be recognised as a valid form of knowledge that can inform action. [Chandni Singh, Myanmar]	Taken into account. language revised but in further editing was revised again to refer more to Indigenous people.
11394	2	9	2	9	Change to: "in which global warming is limited to 1.5 degC or 2 degC can only…" [United Kingdom (of Great Britain and Northern Ireland)]	Rejected. The assessment has focussed on 1.5°C, and without an indication of the evidence available for 2°C this cannot be supported.
19022	2	9	2	24	These paragraphs should be merged with the others elsewhere in the SPM that make the same points. [Andrea TILCHE, Belgium]	Noted
15576	2	9			Here and in many other parts in this document, saying eg “accelerating the implementation of rapid, far-reaching, multi-level and cross-sectoral climate mitigation and adaptation actions” doesn’t tell the policy maker how much more far-reached and rapid implementation is required from what we have now. Is the rapidly growing roof solar panels enough, and is the current growing electric car fleet enough? Given that most of statements on rapid and how much come from the use of IAMs, one could be more concrete, eg. that the changes required would need to be comparable to those in the idealized world of IAM requiring a global carbon market that reaches $XXX /tonCO2 by 2050. [Australia]	Taken into account - text revised. The revised SPM provides more examples of quantitative changes in pathways consistent with 1.5°C.
19250	2	9	2	11	delete the words and adaptation [Spain]	Taken into account - text revised. The revised text now speaks about responses to climate change in more general terms.
29200	2	9	2	13	Could you quantify "upscaling and accelerating", for example with reference to the NDCs. [Germany]	Taken into account, it is reflected for 2030 in the NDCs and for the longer term (2050 and 2100) in the sections in the SPM reflecting the IAM results.
29202	2	9	2	13	Please add the lines: This "will require a greater scale and pace to be transformational. Current national pledges on mitigation and adaptation are inadequate to stay below the Paris Agreement temperature limits and achieve its adaptation goals." (from Chapter 4 ES p5 ln 3-9) to the current statement in order to highlight the need for more ambitious action as well as the need for transformational change. [Germany]	Taken into account. This is done elsewhere in the SPM in section D in the FGD of the SPM
34380	2	9		13	This text describes the challenge of transition *and* adaptation to a world in which global warming is limited to 1.5C. But is it really the case that adaptation to 1.5C warming requires 'upscaling and accelerating the impliementation of rapid and far-reaching... adaptation actions'? I would have thought that a world in which warming is limited to 1.5C would require less rapid and far-reaching adaptation actions that a world in which warming was limited to 2C or higher. I would recommend separating conclusions regarding the challenge of transition to a 1.5C-limited world, with conclusions on adaptation to a 1.5C warmer world, which must be easier than adaptation to a world with larger warming. [Nathan Gillett, Canada]	Taken into account - text revised. Even at present, communities are ill-adapted to present climate conditions. The statement, however, mainly applies to the mitigation part of the challenge.
44666	2	9	2	12	Should this not be the high-level statement for SPM section 4.2? [Penny Urquhart, South Africa]	Noted. It has not been elevated, but is nevertheless retained in the revised SPM.
55400	2	9	2	13	This statement strikes me as a candiate for a headline statement, it has far more substance that some of the other statements in this section and sums up the challenge nicely. [Andy Reisinger, New Zealand]	Noted. As the text was heavily restructured in the FGD, this did not make the cut but the core message is included elsewhere.
59304	2	9	2	24	This section could be targeted for streamlining, as it is somewhat repetitive of information contained in SPM section 3.4 (page 17). [United States of America]	Accept. Although this section provided further detail, these para's are indeed streamlined into other parts.
48618	2	11	2	12	The authors state climate actions should be "integrated with SD initiatives". I think aligned with SDGs would be strenghen more the link between CC and SDGs [Yamina Saheb, France]	Accept. New language includes "can contribute to the achievement of the SDGs".
11128	2	15	2	18	Very important point, but there is some repetition with SPM-7 lines 34-36 [Denmark]	Rejected. The statements on page SPM-7 are about a small subset of the impacts cited here.
16576	2	15	2	15	Replace "greenhouse gas"emissions by "CO2 and non-CO2 emissions that are creating global warming" [Valentin Foltescu, France]	Accept, indeed black carbon is also part of this. However the text was revised which made this comment redundant.
17680	2	15	2	15	Suggest adding "lock-in into carbon intensive infrastructure such as coal-fired power plants," after "cost escalation,". [Sai Ming Lee, China]	Taken into account. This is summarised in "higher transitional challenges" in the SPM FGD.
31252	2	15	2	18	The degree of increasing these risk depends on how much delay there is in climate actions. Also delaying actions to reduce greenhouse gas emissions may increase the risk in many aspects if stringent climate target is pursued. Therefore, more precise definition on "delayed action" is necessary. [Japan]	Accept. This is more precisely discussed in section D1 in the SPM FGD.
36930	2	15	2	18	Delaying actions to reduce greenhouse gas emissions may increase the risk in many aspects if stringent climate target is pursued. Clear notification of such precondition is necessary. [Keigo Akimoto, Japan]	Noted. Comment is not clear. reducing GHG emissions is implied by stringent climate targets.
37070	2	15	2	24	While these bullet points emphasize the risk of delaying action and the need of strentgening actions, there is no meaningful quantiative information with regard to risk of delaying action and cost of strengtehing action, which substantially reduce the utility for policy makers. [Jun Arima, Japan]	Accept. Text is indeed revised significantly which essentially means the bullet is dissolved.
42874	2	15	2	18	Consider reframing as follows: “Fast actions to reduce greenhouse gas emissions increases the potential of cost containment and job retention, reduces stranded assets, and increases flexibility in future response options in the medium to long-term. Delayed action may increase uneven distributional impacts between countries at different stages of development (medium evidence, high agreement). {5.4.2}” See Hansen et al (2017) “Young people’s burden: requirement of negative CO2 emissions” [Kristin Campbell, United States of America]	Noted. Text was heavily revised, though the suggestion for a positive framing is appreciated!

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42926	2	15	2	18	Consider reframing as follows: “Fast actions to reduce greenhouse gas emissions increases the potential of cost containment and job retention, reduces stranded assets, and increases flexibility in future response options in the medium to long-term. Delayed action may increase uneven distributional impacts between countries at different stages of development (medium evidence, high agreement). {5.4.2}” See Hansen et al (2017) “Young people’s burden: requirement of negative CO2 emissions” [Durwood Zaelke, United States of America]	Noted. Text was heavily revised, though the suggestion for a positive framing is appreciated!
43826	2	15	2	18	• Delaying actions [past immediate global decline in emissions] to reduce greenhouse gas emissions increases the risk of cost escalation, stranded [fossil fuel] assets, [no job losses and properly managed conversion to new clean energy significantly increased employment], and reduced flexibility in future response options in the medium to long-term. [Peter Carter, Canada]	Taken into account. This text is indeed removed.
50048	2	15	2	18	The text in this bullet is contradicting the first bullet and the headline. While the headline and the first bullet say that current NDCs, if retained, will make it impossible to meet the 1.5oC limit, the tekst in this bullet just says that delays increase the risk. That undermines the earlier message. I suggest to delete the bullet. [Bert Metz, Netherlands]	Accept. Delayed action is still in there but it needs to be clear that it's not delayed compared to the NDCs.
59308	2	15	2	18	The statement is too weak. It needs to begin with the observation that limiting global average surface temperature change to 1.5°C inevitably creates stranded assets. There is no way to achieve a 1.5°C limit without stranding fossil fuel assets or physical capital assets. [United States of America]	Rejected. This is not in line with the literature.
59310	2	15	2	15	This reference might also include black carbon. [United States of America]	Accept, indeed black carbon is also part of this. However the text was revised which made this comment redundant.
59306	2	15	2	18	This statement misses the core question at hand and should be deleted or revised. All of these negative impacts could also be the byproduct of the type of urgent action needed to achieve 1.5°C pathways. For example, electively "stranding" assets compatible with 2 but not 1.5°C; job losses resulting from such stranding of assets/ industries, significant reduction in global economic growth projected by many models from reduced consumption, and transitioning away from higher-return, short-term investments towards longer-terms ones; and reducing flexibility of future generations in dealing with non-climate issues by locking up capital over the long-term through decisions in the present day that forgo current and future economic growth. The key question is what the net effects will be and whether they are justified (economically, socially, ethically, environmentally, etc.). At least in the economic dimension, this depends on discount rate assumed, actual avoided losses (where significant uncertainty currently exists), and other macroeconomic assumptions (e.g., growth, long-term return on capital.) Depending on the actual impacts, as well as success in avoiding them, these may or may not be justified from an economic standpoint, and could lead to socially inefficient allocation of capital over the long run (e.g., jeopardizing SDGs, worsening equity across space and time). Given the inherent uncertainties in evaluating these questions, this spectrum of possibilities must be laid out in any serious analysis and should be included here. [United States of America]	Accept. Text is indeed revised significantly which essentially means the bullet is dissolved.
8058	2	16	2	16	There is an ambiguity in the term "job losses". Are we takling about net job losses or gross job losses? I think there is quite a high agreement on the latter, which will imply shifting activities and retraining. However, the net impact of the energy transition is still quite debated. [Quentin Perrier, France]	Accept. The text is removed.
13300	2	16	2	16	Delete the text "stranded assets, job losses,". [Eleni Kaditi, Austria]	Partly accept. Job losses removed - see comment 8058. Stranded assets is retained as there is a basis for this in the report.
30124	2	16	2	16	« job losses » Ambiguous formulation. There seem to be high agreement of risks of gross job losses (e.g. if shutting down coal plants) which will require retraining. However, the net job losses is not obvious. The macroeconomic policy (e.t. interest rate) is a much bigger driver of employment impacts (see Krugman for example). [France]	Accept. Job losses removed - see comment 8058.
11396	2	17	2	17	And within countries? [United Kingdom (of Great Britain and Northern Ireland)]	Noted. We have not found clear literature on this within countries.
6912	2	2	2	21	The following wording is suggested: To strengthen implementation of the global response, all countries would have to significantly raise their level of ambition, … [Klaus Radunsky, Austria]	Editorial
11096	2	2	2	24	Should be included in section with high-level statements [Denmark]	Noted. Editorial
29204	2	2	2	24	Could you quantify "upscaling and accelerating", for example with reference to the NDCs. [Germany]	Accept. This is done in the FGD of the SPM.
30128	2	2	2	24	Maybe a few words regarding "long term low greenhouse gas developpment strategies" as asked by the Paris Agreement (article 4.19) and already produced by a few countries could have a nice place here. [France]	Rejected. There was no peer-reviewed literature on this.
31254	2	2	2	24	We would liked to request that more quantitative information should be added to this paragraph since there is no quantitative information. [Japan]	Accept. In the next draft, the NDC information is more quantitative. As for the financial flows and other parameters, it's more difficult.
36320	2	2	2	24	It is mentioned that all countries would need to significantly raise their level of ambition, shift financial flows and investment patterns, improve coherence in governance, address equity across and between generations and regions, and strengthen capacities, including traditional knowledge. Use of 'all' in this statement is misleading since what follows is not applicable uniformly to all countries but is applicable differently to different countries. This needs to be clarified. [India]	Accept. Although some increase of ambition is needed in all countries. Text is modified in a next draft anyway.
36932	2	2	2	24	This paragraph should be removed because there is no quantitative information. [Keigo Akimoto, Japan]	Taken into account. The paragraph is dissolved into other sections. The lack of quantitative information is not a problem.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
38980	2	2	2	2	The sentence "To strengthen the implementation of the global response" sounds general as it is now and you could add "in order to achieve....". If you mean implementation of carbon pricing accross all countries, or governance or something more specific than just ambitions then you could write that. You may also just write "countries would need...." [Jan Fuglestvedt, Norway]	Accepted, phrasing revised.
43828	2	2	2	24	• To strengthen implementation of the global response, all countries would need to significantly raise their level of ambition [and ethics, correction to GHG polluting market failures by which they would terminate in short order perverse and efficient subsidies encouraging fossil fuel energy exploitation and other subsidized sources of greenhouse gas pollution, charge of full cost pollution charges to large central polluters, in the case of global climate change and reply zero future discounting in the case of global climate change (Stern commission 2016)] [Peter Carter, Canada]	Rejected, this is getting really long text!
48620	2	2	2	24	Investing in R&D is missing. Existing technologies will lock us in carbon. [Yamina Saheb, France]	Accept. Taken into account in next version.
49746	2	2	2	24	Without differentiation between Very High Developed countries with very high per capita emissions and resource use, which need to raise their ambition significantly more than the Very Low Developed with very low per capita emissions and resource use, it is unlikely that sufficient global response will be achieved. [Birgit van Munster, United Kingdom (of Great Britain and Northern Ireland)]	Accept. See response to comment 36320.
49748	2	2	2	24	..strengthen capacities including traditional knowledge', it is not clear what is meant. 'Traditional knowledge' is likely to be out of date with the current and committed warming and other envirooronmental and societal changes. [Birgit van Munster, United Kingdom (of Great Britain and Northern Ireland)]	Rejected. There is a lot of peer-reviewed literature indicating the value of traditional knowledge.
55402	2	2	2	21	avoid policy-prescriptive language. Rephrase "Strengthened implementation would imply an increased level of ambition by all countries, …" [Andy Reisinger, New Zealand]	Accept, nice suggestion. Text modified in the next draft, and this phrasing was removed.
59312	2	2	2	23	It seems too strong to say that 'all countries' must do this. This sounds less like a factual statement and more like policy prescription. [United States of America]	Accept; it needs to be a conditional statement (for 1.5C…). Text modified.
30126	2	21	2	21	« investment » : investment and consumption [France]	Noted. Editorial
54522	2	21	2	21	add "adopt and implement effective policies" [Paolo BERTOLDI, Italy]	Accept, but text removed.
34382	2	22			Isn't addressing equity across and between generations and regions a benefit of strengthening the global response to climate change, not a requirement for strengthening the global response to climate change? [Nathan Gillett, Canada]	Taken into account - text revised. The relationship with equity has been clarified.
15578	2	23	2	23	This sentence implies that traditional knowledge needs to be strengthened. What does this mean? Is the intention to state that capacity needs to better include traditional knowledge? [Australia]	Taken into account. Indeed, that is what it is.
46220	2	23	2	23	Please explain traditional knowledge. Is for instance knowledge about sustainable use of agricultural soils meant? [Netherlands]	Noted. Unfortunately, not enough room to handle it all.
54524	2	23	2	23	change medium agreement to high agreement, all the reviewed literature agree on the these actions. [Paolo BERTOLDI, Italy]	Rejected. They don't agree on everything in this para.
10224	2	26	2	3	It seems implicit that demand reduction would be on fossil fuels. focus should be on emissions, not energy demand. Electrification benefits is subject to the fuel mix and CO2 capture [Saudi Arabia]	Noted. CCS is critical for the continued use of fossil fuels under a 1.5C compatible scenario as indicated on lines 13-17 of page 21.
10952	2	26	2	3	It seems implicit that demand reduction would be on fossil fuels. focus should be on emissions, not energy demand. Electrification benefits is subject to the fuel mix and CO2 capture [Nedal KATBEHBADER, Switzerland]	Noted. CCS is critical for the continued use of fossil fuels under a 1.5C compatible scenario as indicated on lines 13-17 of page 21.
15580	2	26	2	31	Section 4.2 is excellent. It is concise and practical - perfect for Policymakers/CEOs. [Australia]	Noted
29206	2	26	2	31	Please keep headline statement 4.2; this passage is clearly lining out energy transition options and pathways that many countries in the world are already undergoing. It moreover clearly lines out the difference between a 1.5°C and a 2.0°C pathway. [Germany]	Taken into account. The statement of 4.2 is streamlined in the revised version and now reflected under C3, D2, and D5.
29208	2	26	21	29	Please keep this section; it is well written and lines out most important highlights for the energy sector. [Germany]	Noted. The statement 4.2 has been revised and streamlined taking on board other comments (now C3 and some aspects included in D2 and D4).
30130	2	26	2	31	Other requirement for 1,5°C than energy transition should be also highlighted such as the substantial decrease in per capita livestock demand, the demand for private vechicle transportation, food waste and deforestation (lignes 45-46 of this page). [France]	Taken into account. The other requirements beside energy transition are now better captured and reflected in revision particularly SPM 4.2 is now represented by statement C3 and some elements by statements D2 and D5.
30132	2	26			Section SPM 4.2 : do not address on CO2 emissions from non-energetic industries. cf. Chapter 2, 2.4.3.1.5., p.71, lines 28-30 and 54-55, p.72 l1-6. [France]	Taken into account. Emissions from non-energy uses of fossil fuel are covered under the industry subsection of chapter 2 referred to in the statement as section 2.4.3
30134	2	26	2	29	Enumerate firstly reductions in energy demand : "[….] by 2100 involve reductions in energy demand, end-use efficiency improvements [….]" [France]	Taken into account. Breakdown of sources of energy demand reduction are provided in Table SPM 2
30136	2	26	2	31	Another point to highlight should be the differences of discounted carbon prices between 1,5°C and 2°C : "Discounted carbon prices for limiting warming to 1.5°C are three to seven times higher compared to 2°C, depending on models and socioeconomic assumptions" (lines 22-23 page SPM-21). [France]	Taken into account. The difference in carbon price between 1.5C and 2.0C warmings is now both updated and clearly stated on statement D2.1 of the revised SPM.
48622	2	26	2	31	Energy transitions require energy sufficiency measures in addition to those related to end-use efficiency to reduce the demand. See my comments on Chapter 4 on the need to mention sufficiency as a policy to reduce the demand. [Yamina Saheb, France]	Rejected - no scientific evidence/publication provided to support changes suggested by the reviewer. It is not clear what the reviewer meant by sufficiency in the context of 4.2.
52716	2	26	2	29	The list in the first sentence looks rather random. Suggest to group the options around energy supply and energy demand and also add transport explicitely. [Iulain Florin VLADU, Germany]	Noted. The list is framed to fit the sources of emissions reduction in the energy transitions for the pathways compatible with 1.5C as assessed by the literature in sections 2.3, 2.4, and 2.5.

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50050	2	26	23	46	The headline of 4.2 overlaps significantly with the headlines in 3.4. As I indicated in my comments on that section, the different components of a transition strategy (reducing demand, decarbonising supply and CO2 removal) should be covered in section 3.4 by adding two additional headlines. It would then be more logical to reserve section 4.2. of the SPM to the specific technologies that are needed for the energy transition in the 1.5oC scenario's and to use the other elements of section 4 for discussing technologies for land-use transition (4.3), policy instruments to realise lower demand, zero carbon energy supply, etc.(4.4) and policies to influence behaviour and lifestyles (separate headline plus bullets after 4.4) [Bert Metz, Netherlands]	Accepted. The statement 4.2 has been revised and streamlined to address in details changes in energy systems (C3.2), land and agricultural systems (C3.3), Industry (C3.4), and transport and buildings (C3.5), with some elements moved to sections on enablers such as D2 and D4.
55818	2	26	22	2	This section should include the mitigation and adaptation options assessed in 4.3.2. Assessment figures of 4.5.3 can then be placed to compare options (using figures in 4.5.3). [Debora Ley, Guatemala]	Accepted. The statement 4.2 has been revised and streamlined to address in details changes in energy systems (C3.2), land and agricultural systems (C3.3), Industry (C3.4), and transport and buildings (C3.5), with some elements moved to sections on enablers such as D2 and D4.
59314	2	26	2	31	Box SPM 4.2 should include the critical point on p. 21, lines 22-24, about the significant cost difference between 1.5 and 2°C scenarios. This should also be brought forward into the high-level statements in SPM 1.2. [United States of America]	Taken into account. The comment is taken into account along with other comments on updating and streamlining 4.2. The carbon pricing implication in the revised SPM is stated on SPM D2.1.
62260	2	26	2	31	Key Message 4.2 and its subpoints should include the critical policy measures and characteristics that 1.5C pathways require, specifically: (1) a rapid decrease in fossil fuel use, as in lines 1-3: “1.5°C scenarios include rapid electrification of energy end use (about 1 two thirds of final 2 energy by 2100), and rapid decreases in the carbon intensity of electricity and of remaining 3 fossil fuel use (high confidence).” (2) The electricity sector is fully decarbonized by mid-century in both 1.5°C and 2°C pathways. [Shaye Wolf, United States of America]	Taken into account. The comment is taken into account along with other comments on updating and streamlining 4.2. The details of the energy transition and requirements are provided under substatement C3.2 in the revised SPM. The observations in the comment are well reflected in C3.2.
35464	2	27	2	27	Reductions in energy demand at a global level may not be desirable or feasible, though it may be highly desirable for some regions / countries. The sentence should perhaps be qualified accordingly. [Ashok Sreenivas, India]	Taken into account. The comment is taken into account along with other comments on updating and streamlining 4.2. The reduction in energy demand and its implications and feasibility/desirability is now reflected on substatements 3.1 and C3.2 in the revised SPM, where some of reviewer concerns are addressed.
53362	2	28	2	28	growing share of renewable energy "and other low carbon energy supplies" - Should be spelled out which energies are. Else it may be understood that fossil gas is included here. [Kjell Kühne, Mexico]	Accepted - text revised. In the revised SPM the components of renewable energy along 1.5C-consistent pathways are spelled out clearly under substatement C3.2.
52978	2	29	2	31	Can rates and scales be stated for 1.5 and 2C [Ireland]	Taken into account. The comment is taken into account along with other comments on updating and streamlining 4.2. Rates and scales for 1.5c compared to 2.0C for energy system transitions are spelled more clearly in the revised SPM under substatement C3.2 .
49544	2	3	2	3	shouldn't it read "each element of the energy transition will have to occur more rapidly..." [Karlheinz ERB, Austria]	Rejected. The requirement for 1.5C compared to 2.0C that under the particular energy transition pathway each element "occurs" more rapidly and at a greater scale.
6982	2	33	2	33	Add a word - "Green" energy transitions are currently… [Flintull Annica Eriksson, Sweden]	Rejected - not supported by the peer-reviewed published literature. The cited literature in sections 4.3 does not specify the word "green" in relation to the undergoing or the required energy transitions.
29210	2	33	2	35	The text states that the energy transition is taking place at a “slower pace in energy-intensive industry and international transport”. In order to prevent the reader from drawing own conclusions why that might be the case, the actual reasons (i.e., limitations by institutional, economic and technical constraints) listed in Chapter 4, page 6, line 34 ff., should be named. [Germany]	Taken into account. The comment is taken into account along with other comments on updating and streamlining 4.2. Now more specific substatements are provided for industry (C3.4) and transport (C3.5) that take on board the comment.
44064	2	33		35	include: Energy transitions "in the electricity sector"…but at a slower pace "in heating sector", ….. [Stephan Singer, Belgium]	Rejected. The transition taking place in many sectors mentioned on line 33 will include transition in the electricity sector plus the mentioning of rapid electrifications of energy end-use on line 1 of page 21.
45898	2	33	2	35	Please clarify whether international transport also includes road freight, if not I suggest this is included. [Deger Saygin, Turkey]	Taken into account. The comment is taken into account along with other comments on updating and streamlining 4.2. Now more specific substatement is provided for transport (C3.5) that take on board the comment.
48624	2	33	2	35	what do you mean by "at slower pace in energy-intensive-industries and international transport"? Is it a slower pace than other sectors? Or slower pace than what is needed to be at 1,5C? I would suggest making it clear that energy transition is taking place in all sectors at slower pace than what is needed for the 1.5C but the highly lagging sectors are international transport and energy intensive industries. Otherwise, polic makers may think we are doing well in other end-use sectors. [Yamina Saheb, France]	Taken into account. The comment is taken into account along with other comments on updating and streamlining 4.2. Now more specific substatements are provided for industry (C3.4) and transport (C3.5) that take on board the comment.
49302	2	33	2	35	Add the following statement from the executive summary of chapter 4 (as this is the most important development in recent years in terms of technology development, since IPCC AR5): "with a transformation under way in solar energy, onshore wind energy and energy storage systems, with dramatically improved feasibility over the past few years". (See chapter 4, Executive summary, page 6, lines 34-39 [Bill Hare, Germany]	Taken into account. The comment is taken into account along with other comments on updating and streamlining 4.2. Now more specific substatement is provided on energy systems and the role of renewables and their improved feasibility (see C3.2 in the revised SPM document).

Comment No	From Page	From Line	To Page	To Line	Comment	Response
50052	2	33	21	31	In light of my comment on the 4.2 headline, the bullets under the revised 4.2 headline should be solely focused on technologies to achieve the energy transition (both demand and supply, but then grouped by demand and supply). The third bullet includes land-use related elements (livestock, food waste, deforestation); these are better moved to section 4.3. On the fourth bullet the conclusion that zero carbon electricty is reached by 2050, for 2oC and 1.5oC scenario's looks strange in light of the notion that end-use emissions are the ones that are reduced more deeply in 1.5oC scenario's. That would suggest to have earlier decarbonisation of electricty supply. The 7th bullet is on policy instruments. As I suggested in my comments on the structure of section 4 of the SPM, it would be best to move this bullet to a separate item on policy (4.4), while moving the behavioural issues from this bullet to yet another separate item (4.4.bis) [Bert Metz, Netherlands]	Accepted. The statement 4.2 has been revised and streamlined to address in details changes in energy systems (C3.2), land and agricultural systems (C3.3), Industry (C3.4), and transport and buildings (C3.5), with some elements moved to sections on enablers such as D2 and D4.
59316	2	33	2	35	It would seem helpful to indicate slower than what other sectors. [United States of America]	Taken into account. The comment is taken into account along with other comments on updating and streamlining 4.2. Now more specific substatements are provided for industry (C3.4) and transport (C3.5) that take on board the comment.
19024	2	34	2	34	Instead of "international" use "long-range". [Andrea TILCHE, Belgium]	Taken into account. The comment is taken into account along with other comments on updating and streamlining 4.2. Now more specific substatement is provided for transport (C3.5) that takes on board the comment.
15582	2	35	2	44	Suggest replace agreement/evidence with a confidence rating [Australia]	Accepted - text revised. Only confidence rating is used in the revised SPM document (see C3).
6914	2	37	2	37	Poor logic in this paragraph. The following wording is suggested: Final energy demand in 2100 is generally 20-60% higher relative to 2014 levels across most available 1.5oC scenarios. [Klaus Radunsky, Austria]	Taken into account. The comment is taken into account along with other comments on updating and streamlining 4.2. The revised statement on energy systems (C3.2) takes on board the comment.
30138	2	37	2	4	This paragraph could be clearer, e.g. by comparing the energy demand in scenarios compatible with the 1.5 objective VS scenarios not compatible. The reference to scenarios with shift to more sustainable energy needs to be either completed or removed. [France]	Taken into account. The comment is taken into account along with other comments on updating and streamlining 4.2. The revised statement on energy systems (C3.2) takes on board the comment by improving the wording and straightening the comparisons.
44062	2	37		4	include: "..technological innovation, materal changes and rapidly improving annual energy intensity (energy use/GDP) to about 2 to 3 times of presently observed rates"… [Stephan Singer, Belgium]	Rejected - no scientific evidence/publication provided to support changes suggested by the reviewer. The paragraph line 37-40 is supported by material provided in section 2.4.3
48626	2	37	2	4	Suggest rephrasing. I had to read the sentence 3 times to understand what you meant. [Yamina Saheb, France]	Taken into account. The comment is taken into account along with other comments on updating and streamlining 4.2. The revised statement on energy systems (C3.2) takes on board the editorial suggested
53364	2	37	2	4	Contradictory paragraph. The word "generally" should be replaced by "on average" or "Final energy demand in 2100 is 20-60% higher relative to 2014 levels for the majority of available 1.5°C scenarios." [Kjell Kühne, Mexico]	Taken into account. The comment is taken into account along with other comments on updating and streamlining 4.2. The revised statement on energy systems (C3.2) provides both an update as well as an improved comparison.
59318	2	37	2	37	Needs to say "is generally projected to be 20-60%" [United States of America]	Taken into account. The comment is taken into account along with other comments on updating and streamlining 4.2. The revised statement on energy systems (C3.2) takes on board the comment by updating the numbers and linking to 1.5C-consistent pathways, which are projections.
21634	2	38	2	4	What is the difference between "across available 1.5 deg scenarios" (all?) and "scenarios with shifts to more sustainable…"? The wording would seem to suggest that the two are incompatible. [Sweden]	Taken into account. The comment is taken into account along with other comments on updating and streamlining 4.2. The revised statement on energy systems (C3.2) takes on board the fixing of the wording suggested. Now the term 1.5C-consistent pathways is used throughout the SPM as defined in Box SPM1 in the revised SPM document.
11398	2	4	2	4	Change to: "material and food consumption patterns, all of which would require behaviour change at a global scale." [United Kingdom (of Great Britain and Northern Ireland)]	Taken into account. The comment is taken into account along with other comments on updating and streamlining 4.2. The revised statements on energy systems and food systems (C3.2 and C3.3) try to improve wording but the enablers of 1.5C-consistent pathways including behaviour changes are addressed more in details by section SPM D of the revised document, see D2, D4, and D5.
45900	2	4	2	4	What does sustainable food consumption mean? Is it environmentally friendly agriculture practices or reducing food waste. [Deger Saygin, Turkey]	Taken into account. The comment is taken into account along with other comments on updating and streamlining 4.2. The revised statements on energy systems and food systems (C3.2 and C3.3) try to improve wording but the enablers of 1.5C-consistent pathways including behaviour changes are addressed more in details by section SPM D of the revised document, see D2, D4, and D5.
19252	2	42	2	42	please give examples of areas with high consumption [Spain]	Taken into account. The comment is taken into account along with other comments on updating and streamlining 4.2. The revised statements on energy systems and food systems (C3.2 and C3.3) try to improve wording but the enablers of 1.5C-consistent pathways including behaviour changes are addressed more in details by section SPM D of the revised document, see D2, D4, and D5.
45902	2	42	2	43	Why is renewable energy technology applications are excluded here? [Deger Saygin, Turkey]	Taken into account. The comment is taken into account along with other comments on updating and streamlining 4.2. The revised statement on energy systems (C3.2) provides details of rate of changes for renewable technology applications.

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48628	2	42	2	46	Again, this is another place where sufficiency as a policy to reduce demand should be referenced. Enduse efficiency alone does not necessarily reduce the demand. [Yamina Saheb, France]	Rejected - no scientific evidence/publication provided to support changes suggested by the reviewer. It is not clear what the reviewer meant by sufficiency in the context of the paragraph. Yet, note that the whole statement 4.2 has been revised and streamlined to address in details changes in energy systems (C3.2), land and agricultural systems (C3.3), Industry (C3.4), and transport and buildings (C3.5).
30140	2	43	2	46	Can these choices be explained here ? What about international flight and business, IT, urbanism etc ? [France]	Taken into account. The comment is taken into account along with other comments on updating and streamlining 4.2. The revised substatements on energy systems (C3.2), Land and food systems (C3.3), Industry (C3.4), and transport and buildings (C3.5) provide more details addressing the concerns raised in the comment
33878	2	43	2	47	The last sentence about decreases in per capita demand can be interpreted as the decrease in deforestations and food waste is also per capita. The part about what is per capita is somewhat unclear. We think deforestation, food waste, and perhaps also demand for private vehicle transportation, are better referred to in absolute terms and not relative to population. Please consider to rephrase to "substantial decreases in deforestation, food waste, demand for private vehicle transportation and per capita livestock demand." or something similar. [Norway]	Taken into account. The comment is taken into account along with other comments on updating and streamlining 4.2. The revised substatements on energy systems (C3.2), Land and food systems (C3.3), Industry (C3.4), and transport and buildings (C3.5) provide more details addressing the concerns raised in the comment
30142	2	44	2	44	« insulation » add: Building insulation [France]	Not Applicable - no longer included in the chapter. The statement 4.2 has been revised and streamlined to address in details changes in energy systems (C3.2), land and agricultural systems (C3.3), Industry (C3.4), and transport and buildings (C3.5). Insulation is now mentioned in the substatement related transport and buildings.
54526	2	44	2	44	change "insulation" to "buildings", energy efficiency in buildings includes insulation, but also other measures such as natural ventilation, solar heating/cooling, control systems, etc. [Paolo BERTOLDI, Italy]	Taken into account. The statement 4.2 has been revised and streamlined to address in details changes in energy systems (C3.2), land and agricultural systems (C3.3), Industry (C3.4), and transport and buildings (C3.5). Insulation is now mentioned in the substatement related transport and buildings.
30144	2	45	2	46	« food waste » ? "Food consumption patterns" is more general [France]	Taken into account. The comment is taken into account along with other comments on updating and streamlining 4.2. Transitions related to land and food systems are now addressed by substatement C3.3
38548	2	45	2	45	demand for private vehicle transportation should become "demand for private fossil-fueled vehicle transportation". [Valentino Piana, Italy]	Taken into account. The comment is taken into account along with other comments on updating and streamlining 4.2. Transport and buildings now covered by substatement (C3.5)
49546	2	45	2	45	reformulate to "per capita demand for livestock products and services" [Karlheinz ERB, Austria]	Taken into account. The comment is taken into account along with other comments on updating and streamlining 4.2. transitions related to livestock are now addressed by substatement C3.3.
49548	2	46	2	46	reduce deforestation is probably not sufficient. Reduce forest degradation and harvest induced carbon stock reductions in forest is important, see Erb et al., 2018, nature 553, 73-76, doi: 10.1038/nature25138. [Karlheinz ERB, Austria]	Taken into account. The comment is taken into account along with other comments on updating and streamlining 4.2. Transitions related to land are addressed by C3.3
54528	2	46	2	46	I propose to add also high evidence [Paolo BERTOLDI, Italy]	Not Applicable - no longer included in the chapter. The statement 4.2 has been revised and streamlined. Now throughout the SPM only confidence rating is used to describe evidence and agreement.
11098	21		21		Difficult to understand what constitutes the reference scenario in Table SPM 2 [Denmark]	Noted. The statement 4.2 has been revised and the table is removed. Scale and rates of change are now included in the text of the corresponding substatements C3.2, C3.3, C3.4, and C3.5 that replace statement 4.2
19256	21		21		table SPM 2, in the two right columns: Decreased energy use in a 1.5ºC pathway compared to... [Spain]	Not Applicable - no longer included in the chapter. Table SPM2 is removed in the revised version. Statement 4.2 has been revised and streamlined to address in details changes in scales and rates related to energy systems (C3.2), land and food systems (C3.3), Industry (C3.4), and transport and building (C3.5), where numbers from Table SPM2 are revised and updated.
19440	21				The SPM2 is not very informative. It is not clear what it is trying to communicate. What is the reference scenario in question? [Jennifer Morgan, Netherlands]	Taken into account. The statement 4.2 has been revised and streamlined to address in details changes in rates and scales related to energy systems (C3.2), land and agricultural systems (C3.3), Industry (C3.4), and transport and buildings (C3.5), where numbers are updated and concerns related to reference periods and scenarios raised in the comment are addressed.
31260	21		21		Uncertainty range should be included in the Table SPM2. Information on mitigation cost or the impact on GDP may be also useful. [Japan]	Taken into account - text revised. Table SPM2 is removed in the revised version. Statement 4.2 has been revised and streamlined to address changes in energy systems (C3.2), land and food systems (C3.3), Industry (C3.4), and transport and building (C3.5), and where numbers are revised and updated with ranges used when available. Unfortunately, mitigation costs or GDP impacts at sectoral levels are not available from the reviewed literature.

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36324	21				Table 2: Add a caption on the "reference scenario" for more clarity [India]	Not Applicable - no longer included in the chapter. The statement 4.2 has been revised and the table is removed. Scale and rates of change are now included in the text of the corresponding substatements C3.2, C3.3, C3.4, and C3.5 that replace statement 4.2
1678	21	1	21	5	1.5DS must required much more BECCS in both power and end use sectors than 2DS. It is not correct to say "additional reductions compared to 2DS come predomintaly from energy end use sectors" [Wenying Chen, China]	Taken into account - text revised. The statement 4.2 has been revised. Scale and rates of change for the energy systems including electrification are now provided in substatement C3.2. The role of CDR in 1.5C-consistent pathways as compared to 2C pathways is addressed in SPM statement C2, particularly C2.2.
8280	21	1	21	35	While enumerating the conditions of achieving 1.5?, this section should give the feasibility and economic cost of its achievement to provide policymakers with more comprehensive information. For example, the 4-5% decline per year of coal mentioned in lines 13-14 in this section is a very difficult rate for most countries, while according to Thomas, et al, 2017, such a deceleration does not exist in reality, the realization of which will be faced with enormous challenges. [China]	Taken into account. The statement 4.2 has been revised and numbers are updated. Scale and rates of change for the energy systems including the use of coal are now provided in substatement C3.2. Abatement costs and barriers are addressed by SPM D2 in the revised SPM document.
36322	21	1	21	3	It is mentined that 1.5°C scenarios include rapid electrification of energy end use and rapid decrese in the carbon intensity of electricity and of remaining fossil fuel use. The report should also mention that reduction in carbon footprint by countries should be based on climate justice and the principles of Equity and Common But Differentiated Responsibilities and Respective Capabilities. Genuine requirements of developing countries for an equitable carbon and development space to achieve sustainable development and eradication of poverty needs to be safeguarded. It would be better if the required reduction in carbon footprints are distributed amongst the countries/Zones on the principles of Equity and Common But Differentiated Responsibilities and Respective Capabilities. Additonal text to be added to elaborate upon this. [India]	Taken into account. Sustainable development and equity aspects of mitigation efforts including transformation of the energy system are addressed in sections D of the revised SPM. See for example D2 and D5.
43830	21	1	21	3	1.5°C scenarios include rapid electrification of energy end use (about two thirds of final energy by 2100), and rapid decreases in the carbon intensity of electricity [and 100% replacement conversion of fossil fuel energy and of remaining fossil fuel use](high confidence). [Peter Carter, Canada]	Taken into account. The statement 4.2 has been revised. Scale and rates of change for the energy systems including electrification are now provided in substatement C3.2, where details of transitions along 1.5C-consistent pathways are provided including ranges.
59320	21	1	21	1	Do 1.5°C scenarios "require" rather than "include" rapid electrification of end use sectors? [United States of America]	Taken into account. The statement 4.2 has been revised. Scale and rates of change for the energy systems including electrification are now provided in substatement C3.2.Again the word "include" is used and not "require" since "require" is more prescriptive.
11400	21	2	21	2	would be useful to express relative to now as well, for clarity [United Kingdom (of Great Britain and Northern Ireland)]	Taken into account. The statement 4.2 has been revised. Scale and rates of change for the energy systems including electrification are now provided in substatement C3.2, where details of transitions along 1.5C-consistent pathways are provided including ranges and comparisons relative to 2020.
19432	21	3	21	4	Very good to have the 2°C comparison here too which acknowledges the need for a fully decarbonised electricity system in both 1.5°C and 2°C scenarios. Important to keep this! [Jennifer Morgan, Netherlands]	Taken into account. The comment is taken into account along with other comments on updating and streamlining 4.2. The revised substatements addressing transition of energy system including electricity and comparison to 2C pathways are C3.1 and C3.2.
52980	21	3	21	4	The message on electricity is key, and should have a higher profile,also what difference between 1.5 and 2C [Ireland]	Taken into account. The comment is taken into account along with other comments on updating and streamlining 4.2. The revised substatements addressing transition of energy system including electricity and comparison to 2C pathways are C3.1 and C3.2.
30146	21	4	21	5	Can it be clearer? This seem a critical aspect of the limitation to 1.5°C. [France]	Taken into account. The comment is taken into account along with other comments on updating and streamlining 4.2. The revised substatements addressing transition of energy system including electricity and comparison to 2C pathways are C3.1 and C3.2.
54530	21	5	21	5	section 4.3 shall be added inside the bracket [Paolo BERTOLDI, Italy]	Not Applicable - no longer included in the chapter. The statement 4.2 has been revised and streamlined to address in details changes in rates and scales related to energy systems (C3.2), land and agricultural systems (C3.3), Industry (C3.4), and transport and buildings (C3.5).
11406	21	7	21	17	How does this compare with 2°C? [United Kingdom (of Great Britain and Northern Ireland)]	Taken into account. The comment is taken into account along with other comments on updating and streamlining 4.2. The revised substatements addressing scales and rate of changes are C3.2 for energy systems, C3.3 for land and food system, C3.4 for industry, and C3.5 for transport and buildings. Comparisons relative to 2C is provided in C3.1.
29212	21	7	21	11	No reference to any chapter/{2.3.3} [Germany]	Taken into account. The statement 4.2 has been revised and numbers updated . Scale and rates of change for the energy systems are provided in C3.2, Land and food system (C3.3), industry (C3.4), and transport and buildings (C3.5).
29214	21	7	21	17	References are missing to underlying chapter sections for these statements. [Germany]	Taken into account. The comment is taken into account along with other comments on updating and streamlining 4.2. The revised substatements addressing scales and rate of changes are C3.2 for energy systems, C3.3 for land and food system, C3.4 for industry, and C3.5 for transport and buildings.
30148	21	7	21	11	This paragraph may be checked with the IEA WEO2017 [France]	Not Applicable - no longer included in the chapter. The statement 4.2 has been revised and numbers updated . Scale and rates of change for the energy systems are provided in C3.2, Land and food system (C3.3), industry (C3.4), and transport and buildings (C3.5).

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33880	21	7	21	17	Please add references to the report for these statements. [Norway]	Not Applicable - no longer included in the chapter. The statement 4.2 has been revised and numbers updated . Scale and rates of change for the energy systems are provided in C3.2, Land and food system (C3.3), industry (C3.4), and transport and buildings (C3.5).
43832	21	7	21	8	• The share of primary energy from renewables increases rapidly in most 1.5°C pathways, with renewables becoming the dominant source [and replaces fossil fuel energy 100% by 2050] [Peter Carter, Canada]	Not Applicable - no longer included in the chapter. The statement 4.2 has been revised. Scale and rates of change for the energy systems including electrification and renewables are now provided in substatement C3.2.
46476	21	7	21	11	It would be appropriate to add in this section information that some studies also show pathways towards 100% renewables by 2050, and that e.g. real-world costs for solar have been lower than anticipated , aspects which, as I understand, are not reflected in the modelling results presented in relation to 1.5C pathways, see chapter 2 page 92 lines 33-38 [Sven Harmeling, Germany]	Taken into account. The comment is taken into account along with other comments on updating and streamlining 4.2. The revised substatement addressing transition of energy system including electricity and the role of renewables is C3.2.
49750	21	7	21	11	To put the required increase in low carbon energy supply in historical context: low carbon energy was and still is only about 19% of total energy for 26 years, since UNFCCC began. To increase to on average one third (15-87%) in just 13 years of total energy supply requires an indeed unprecedented change. [Birgit van Munster, United Kingdom (of Great Britain and Northern Ireland)]	Taken into account. The comment is taken into account along with other comments on updating and streamlining 4.2. The revised substatements addressing scales and rate of changes are C3.2 for energy systems, C3.3 for land and food system, C3.4 for industry, and C3.5 for transport and buildings. The strengthening of global responses to be consistent with these rates of changes is addressed in section D of the revised SPM document.
5480	21	8	21	8	Looking at table 2.10 which appears to be the source of this statement, renewables is greater than fossil energy in 2050 in the mean pathway and not in general. Suggest adding "averaging across 1.5C pathways." to the end of the first sentence, and adding the source of these numbers at the end of the paragraph. [Haroon KHESHGI, United States of America]	Taken into account. The comment is taken into account along with other comments on updating and streamlining 4.2. The revised substatements providing updated statistics on scales and rate of changes are C3.2 for energy systems, C3.3 for land and food system, C3.4 for industry, and C3.5 for transport and buildings.
9090	21	8	21	1	About nuclear power, it should be noted that world uranium reserves at present consumption (3% of final energy) is evaluated at 70-100 years by IAEA. If nuclear power was to amount to 30% of world final energy, there would be only 10 years of uranium left. In that sense nuclear power is only a very short term alternative. [Frédéric Durand, France]	Not Applicable - no longer included in the chapter. The statement 4.2 has been revised and numbers updated . Scale and rates of change for the energy systems are provided in C3.2, Land and food system (C3.3), industry (C3.4), and transport and buildings (C3.5).
10226	21	8	21	9	Low carbon energy shall include fossil based energy with CCS (i.e. Natural gas with CCS) [Saudi Arabia]	Taken into account. The comment is taken into account along with other comments on updating and streamlining 4.2 and fixing the wording. The revised substatements providing updated statistics on scales and rate of changes are C3.2 for energy systems, C3.3 for land and food system, C3.4 for industry, and C3.5 for transport and buildings.
10954	21	8	21	9	Low carbon energy shall include fossil based energy with CCS (i.e. Natural gas with CCS) [Nedal KATBEHBADER, Switzerland]	Taken into account. The comment is taken into account along with other comments on updating and streamlining 4.2 and fixing the wording. The revised substatements providing updated statistics on scales and rate of changes are C3.2 for energy systems, C3.3 for land and food system, C3.4 for industry, and C3.5 for transport and buildings.
40008	21	8	21	9	Is CCS included in the low-carbon energy category? [Kornelis Blok, Netherlands]	Taken into account. The comment is taken into account along with other comments on updating and streamlining 4.2 and fixing the wording. The revised substatements providing updated statistics on scales and rate of changes are C3.2 for energy systems, C3.3 for land and food system, C3.4 for industry, and C3.5 for transport and buildings.
53376	21	8	21	11	Concept of "low-carbon" energy is misleading. "Energy other than fossil fuels" could be an alternative. Renewables are zero carbon, not low carbon. [Kjell Kühne, Mexico]	Taken into account. The comment is taken into account along with other comments on updating and streamlining 4.2 and fixing the wording. The revised substatements providing updated statistics on scales and rate of changes are C3.2 for energy systems, C3.3 for land and food system, C3.4 for industry, and C3.5 for transport and buildings.
19434	21	11	21	11	Add to the end: Sector-based analyses on energy demand and supply options explore in greater detail some options for deep reductions in GHG emissions, such as 100 % renewable energy systems, where a growing body of literature has emerged. (Source: Chapter 2. 62. lines 27-29; and Chapter 2. page 107. lines 34-35) [Jennifer Morgan, Netherlands]	Taken into account. The comment is taken into account along with other comments on updating and streamlining 4.2. The revised substatement addressing transition of energy system including electricity and the role of renewables is C3.2.
44104	21	11	21	11	his paragraph does not have any forward citation as all other have at their end [Moshe Kinn, United Kingdom (of Great Britain and Northern Ireland)]	Not Applicable - no longer included in the chapter. The statement 4.2 has been revised and numbers updated . Scale and rates of change for the energy systems are provided in C3.2, Land and food system (C3.3), industry (C3.4), and transport and buildings (C3.5).
54532	21	11	21	11	this paragraph does not contains at the end the link to any chpater/section of the report, is this on purpose? [Paolo BERTOLDI, Italy]	Not Applicable - no longer included in the chapter. The statement 4.2 has been revised and numbers updated . Scale and rates of change for the energy systems are provided in C3.2, Land and food system (C3.3), industry (C3.4), and transport and buildings (C3.5).
11402	21	13	21	13	coal use is phased out rapidly? [United Kingdom (of Great Britain and Northern Ireland)]	Taken into account. The comment is taken into account along with other comments on updating and streamlining 4.2. The revised substatement addressing transition of energy system including the use of coal is C3.2.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
19436	21	13	21	17	This summary statement is not balanced, as it includes only pathways that rely heavily on BECCS. Given the broad sustainability concerns and feasibility issues related to BECCS, this paragraph must be amended to reflect also those scenarios and sectoral analysis that assume much faster coal and fossil fuel phase out trajectories instead of relying on BECCS. See for example the IIASA LED (MESSAGEix), which the Chapter 2 consideres as "an example of the important class of 1.5°C pathways characterised by deep fossil fuel emissions reductions, very limited CDR deployment and only marginal net negative CO2 emissions and overshoot" (Chapter 2, page 29, 49-52); the findings presented in the Table 2.14 (of Chapter 2) on pages 93-95 on "Transitions and enabling conditions that need to take place in key sectors in the short term for a 1.5°C pathway" that include much faster coal phase/out options, as well as those 100% scenarios described on Chapter 2, page 62, lines 28-30. [Jennifer Morgan, Netherlands]	Taken into account. The comment is taken into account along with other comments on updating and streamlining 4.2. The revised substatement addressing transition of energy system including the use of coal is C3.2. The role of CDR including BECCS is addressed by statement C2 in the revised SPM document.
36326	21	13	21	17	The report states that coal use would be phased out rapidly in most 1.5°C pathways with annual reduction rates of 4-5%. In pathways where coal use is not entirely phased out by 2050, it is combined with carbon capture and storage and there is virtually no unabated coal use. The use of carbon capture and storage potentiality by the coal users needs to be identified and estimate made accordingly in the SPM. [India]	Not Applicable - no longer included in the chapter. The statement 4.2 has been revised and numbers updated . Scale and rates of change for the energy systems are provided in C3.2, Land and food system (C3.3), industry (C3.4), and transport and buildings (C3.5). The use of coal is addressed in C3.2.
43834	21	13	21	17	Coal use would be phased out rapidly in most 1.5°C pathways with annual reduction rates of 4-5% : [Coal use is entirely phased out by 2050 with no consideration of carbon capture and storage by policymaking. Most 1.5°C pathways with a high level of certainty require indicate [fast[declining use of oil, [and reduction]of natural gas use[with no consideration of carbon capture and storage by policy making] [Peter Carter, Canada]	Not Applicable - no longer included in the chapter. The statement 4.2 has been revised and numbers updated . Scale and rates of change for the energy systems are provided in C3.2, Land and food system (C3.3), industry (C3.4), and transport and buildings (C3.5). The use of coal is addressed in C3.2.
51178	21	13	21	17	Highly problematic that the SPM implies a slow decline in oil and more gas! Instead, not just an early phaseout of coal, but also of oil and gas yields great additional mitigation potential to allow for a consistent 1.5 pathway. [Linda Schneider, Germany]	Taken into account. The comment is taken into account along with other comments on updating and streamlining 4.2. The revised substatement addressing transition of energy system including the use of coal is C3.2.
52718	21	13	21	17	This para is very important and in a succinct way could be reflected in the high-level statement on page 3. Particularly important are the notions of coal phase-out and only slow decline in oil use. [Iulain Florin VLADU, Germany]	Taken into account. The comment is taken into account along with other comments on updating and streamlining 4.2. The revised substatement addressing transition of energy system including the use of coal is C3.2.
52982	21	13	21	13	Timing for phase out? [Ireland]	Taken into account. The comment is taken into account along with other comments on updating and streamlining 4.2. The revised substatement addressing transition of energy system including the use of coal is C3.2.
59322	21	13	21	14	Revise to read: "Coal use must be phased out rapidly..." And "rates of at least 4-5%". Doing this would help provide a bit more flexibility for other sectors. [United States of America]	Taken into account. The comment is taken into account along with other comments on updating and streamlining 4.2. The revised substatement addressing transition of energy system including the use of coal is C3.2.
62148	21	13	21	17	The keyword "stranded assets" should be used here for the energy and transport industries, because it is both being observed but also a key character of 1,5°C scenarios, as shown in chapter 4. [Antoine Bonduelle, France]	Not Applicable - no longer included in the chapter. The statement 4.2 has been revised and numbers updated . Scale and rates of change for the energy systems are provided in C3.2, Land and food system (C3.3), industry (C3.4), and transport and buildings (C3.5). The use of coal is addressed in C3.2.
62150	21	13	21	17	The use of gas in the "successful" scenarios is linked in part to the low carbon methane, but also with substitutions in transport. The sentence can be misleading, because electric gas production has to decline, and not only coal power production. [Antoine Bonduelle, France]	Not Applicable - no longer included in the chapter. The statement 4.2 has been revised and numbers updated . Scale and rates of change for the energy systems are provided in C3.2, Land and food system (C3.3), industry (C3.4), and transport and buildings (C3.5). The rate of change in the use of coal is addressed in C3.2.
62262	21	13	21	17	This section must acknowledge and make clear the significant risks of CCS since CCS is not a proven technology to keep CO2 sequestered for millennia, with potentially catastrophic consequences in event of failure (leakage). [Shaye Wolf, United States of America]	Not Applicable - no longer included in the chapter. The statement 4.2 has been revised and numbers updated . Scale and rates of change for the energy systems are provided in C3.2, Land and food system (C3.3), industry (C3.4), and transport and buildings (C3.5). The rate of change in the use of coal is addressed in C3.2.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
62264	21	13	21	17	The statement that “Most 1.5°C pathways indicate slowly declining use of oil, and a wide range of natural gas use with varying levels of carbon capture and storage” seems oddly inconsistent with the scientific literature on this topic, which indicates the necessity for a rapid phase-out of fossil fuel production and use. If this “slow decline” is dependent on CCS --a risky, unproven technology -- the section should clearly spell out this limitation. The section should also include the requirement for fossil fuel phase-out in pathways that do not rely on CCS. For example, scientific research has established that the vast majority of global and U.S. fossil fuels must stay in the ground in order to hold temperature rise to well below 2°C to avoid the worst dangers of climate change. The IPCC estimates that global fossil fuel reserves exceed the remaining 275 GtC carbon budget (from 2011 onward) for staying below 2°C by 4 to 7 times, while fossil fuel resources exceed the carbon budget for 2°C by 31 to 50 times. [See Bruckner, Thomas et al., 2014: Energy Systems. In: Climate Change 2014: Mitigation of Climate Change. Contribution of Working Group III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change, Cambridge University Press (2014), http://ipcc.ch/pdf/assessment-report/ar5/wg3/ipcc_wg3_ar5_chapter7.pdf at Table 7.2.] Studies estimate that 68 to 80 percent of global fossil fuel reserves must not be extracted and burned to limit temperature rise to 2°C, based on a 1,000 GtCO2 carbon budget. To limit temperature rise to 2°C based on a 1,000 GtCO2 carbon budget from 2011 onward, studies indicate variously that 80 percent (Carbon Tracker Initiative, Unburnable Carbon 2013), 76 percent (Raupach, Michael et al. 2014), and 68 percent (Oil Change International, The Sky’s Limit 2016) of global fossil fuel reserves must stay in the ground. [See Carbon Tracker Initiative, Unburnable Carbon – Are the world’s financial markets carrying a carbon bubble? (2013), http://www.carbontracker.org/wp-content/uploads/2014/09/Unburnable-Carbon-Full-rev2-1.pdf; Raupach, Michael et al., Sharing a quota on cumulative carbon emissions, 4 Nature Climate Change 873 (2014); Oil Change International, The Sky’s Limit: Why the Paris Climate Goals Require a Managed Decline of Fossil Fuel Production (September 2016), http://priceofoil.org/2016/09/22/the-skys-limit-report/.] For a 50 percent chance of limiting temperature rise to 1.5°C, 85 percent of known fossil fuel reserves must stay in the ground. [See Oil Change International, The Sky’s Limit: Why the Paris Climate Goals Require a Managed Decline of Fossil Fuel Production (September 2016) at 6.] Effectively, fossil fuel emissions must be phased out globally within the next few decades to keep global temperature rise well below 2°C. Rogelj et al. (2015) estimated that a reasonable likelihood of limiting warming to 1.5° or 2°C requires global CO2 emissions to be phased out by mid-century and likely as early as 2040-2045. [See Rogelj, Joeri et al., Energy system transformations for limiting end-of-century warming to below 1.5°C, 5 Nature Climate Change 519 (2015).] A 2016 global analysis found that the potential carbon emissions from extracting fossil fuel reserves in currently operating oil and gas fields and coal mines would lead to global temperature rise beyond 2°C. [See Oil Change International, The Sky’s Limit: Why the Paris Climate Goals Require a Managed Decline of Fossil Fuel Production (September 2016).] Even excluding coal, extracting oil and gas from currently operating fields would result in warming beyond 1.5°C. To stay well below 2°C, the analysis concluded that no new fossil fuel extraction or transportation infrastructure should be built, and governments should grant no new permits for new fossil fuel extraction and infrastructure. Moreover, some fields and mines, primarily in rich countries, must be closed before fully exploiting their resources. The analysis concluded that, because existing fossil fuel reserves considerably exceed carbon budgets for staying below 2°C, “[i]t follows that exploration for new	Not Applicable - no longer included in the chapter. The statement 4.2 has been revised and numbers updated . Scale and rates of change for the energy systems are provided in C3.2, Land and food system (C3.3), industry (C3.4), and transport and buildings (C3.5). The rate of change in the use of coal is addressed in C3.2.
11404	21	14	21	14	4-5%: from when until when? [United Kingdom (of Great Britain and Northern Ireland)]	Not Applicable - no longer included in the chapter. The statement 4.2 has been revised and numbers updated . Scale and rates of change for the energy systems are provided in C3.2, Land and food system (C3.3), industry (C3.4), and transport and buildings (C3.5). The rate of change in the use of coal is addressed in C3.2.
44106	21	17	21	17	his paragraph does not have any forward citation as all other have at their end [Moshe Kinn, United Kingdom (of Great Britain and Northern Ireland)]	Not Applicable - no longer included in the chapter. The statement 4.2 has been revised and numbers updated . Scale and rates of change for the energy systems are provided in C3.2, Land and food system (C3.3), industry (C3.4), and transport and buildings (C3.5).
54534	21	17	21	17	his paragraph does not contains at the end the link to any chpater/section of the report, is this on purpose? [Paolo BERTOLDI, Italy]	Not Applicable - no longer included in the chapter. The statement 4.2 has been revised and numbers updated . Scale and rates of change for the energy systems are provided in C3.2, Land and food system (C3.3), industry (C3.4), and transport and buildings (C3.5).
1680	21	19	21	24	Discounted carbon price should be explained (discount rate? Discounted to which year? And which year's caron price?). [Wenying Chen, China]	Taken into account. The statement 4.2 has been revised and numbers updated . Scale and rates of change for the energy systems are provided in C3.2, Land and food system (C3.3), industry (C3.4), and transport and buildings (C3.5). Policy responses and regulations are now addressed in section D of the revised SPM in the context of strengthening the global response, see SPM D.2. The relevant substatement SPM D2.1 mention abatement costs without linking to discounting, referring the details to the chapter sections 2.5.1 and 2.5.2.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
13302	21	19	21	2	Delete the text ", including carbon pricing mechanisms and regulation,". [Eleni Kaditi, Austria]	Not Applicable - no longer included in the chapter. The statement 4.2 has been revised and numbers updated . Scale and rates of change for the energy systems are provided in C3.2, Land and food system (C3.3), industry (C3.4), and transport and buildings (C3.5). Policy responses and regulations are now addressed in section D of the revised SPM in the context of strengthening the global response, see SPM D.2
29216	21	19	21	21	The Executive Summary of Chapter 2 states with high confidence that a "strong carbon pricing mechanism" is necessary for 1.5C pathways. The current wording "A broad portfolio of different mitigation policy options, including carbon pricing mechanisms..." does not express the same priority or necessity. While mechanisms other than carbon pricing should not be underestimated or neglected, the findings of chapter 2 suggest that a strong price signal on carbon is a necessary (if not sufficient) condition for transformational change. We'd appreciate if the authors could highlight this finding from chapter 2 more clearly. This should also be aligned with the statements on carbon pricing and other instruments on p 23 ln 13-23 [Germany]	Taken into account. The statement 4.2 has been revised and numbers updated . Scale and rates of change for the energy systems are provided in C3.2, Land and food system (C3.3), industry (C3.4), and transport and buildings (C3.5). Policy responses and regulations are now addressed in section D of the revised SPM in the context of strengthening the global response, see SPM D.2
29218	21	19	23	23	Several paragraphs of this chapter mention that a portfolio of mitigation policy options is necessary (a) to achieve limiting global average temperature increase to 1,5°C above pre-industrial levels, (b) to ensure cost-effectiveness and (c) to accelerate deployment of carbon-neutral technologies. What seems to be lacking is a note of caution that policy packages require careful coordination to ensure that they work together and do not (partially) neutralize or even undermine one another. This appears particularly relevant for policies targeting emissions that are covered by cap and trade systems to avoid “waterbed effects”. [Germany]	Accepted. D2.2 states "transitions required to limit warming to 1.5°C are more effective when integrated policy packages are used, involving innovative non-price and price instruments. {1.3.3, 2.3.4, 2.3.5, 2.5.1, Cross-Chapter Box 8 in Chapter 3 and 11 in Chapter 4}
31256	21	19	21	2	A broad portfolio of different mitigation policy options would be necessary in 1.5°C pathway, but theoretically the most cost-effective solution is the universal carbon pricing. This sentence sends mixed message and should be revised as "A broad portfolio of different mitigation policy options, including carbon pricing mechanisms and regulation, would be necessary in 1.5°C pathways" if this modification does not change the original assessment by the authors. [Japan]	Taken into account. The statement 4.2 has been revised and numbers updated . Scale and rates of change for the energy systems are provided in C3.2, Land and food system (C3.3), industry (C3.4), and transport and buildings (C3.5). Policy responses and regulations are now addressed in section D of the revised SPM in the context of strengthening the global response, see SPM D.2
36934	21	19	21	2	This sentence is not clear. Should be revised. [Keigo Akimoto, Japan]	Taken into account. The statement 4.2 has been revised and numbers updated . Scale and rates of change for the energy systems are provided in C3.2, Land and food system (C3.3), industry (C3.4), and transport and buildings (C3.5). Policy responses and regulations are now addressed in section D of the revised SPM in the context of strengthening the global response, see SPM D.2
40972	21	19	21	24	Carbon price should be more clearly defined taking into accounts of the policy debate. Carbon price is defined at the Glossary as “The price for avoided or released carbon dioxide ..” therefore all possible policy, including emission trading, tax and numerical standard, shall be included. Carbon price/carbon pricing is a crucial for reducing emission this is the reason its definition itself is an argument. I recommend that the difference of definition and its implication approach should be analyzed and introduced. An example of the definition is at P18 of the following document. https://www.belfercenter.org/sites/default/files/files/publication/harvard-project-east-asia.pdf [Takashi Hongo, Japan]	Taken into account. The statement 4.2 has been revised and numbers updated . Scale and rates of change for the energy systems are provided in C3.2, Land and food system (C3.3), industry (C3.4), and transport and buildings (C3.5). Policy responses and regulations are now addressed in section D of the revised SPM in the context of strengthening the global response, see SPM D.2. The relevant substatement SPM D2.1 mention abatement costs without linking to carbon pricing or discounting, referring the details to the chapter sections 2.5.1 and 2.5.2.
43836	21	19	21	2	A broad portfolio of different mitigation policy options,[including complete termination of fossil fuel subsidies in short order, and full cost accounting of fossul fuel air water and GHG pollution prevention carbon pricing [Peter Carter, Canada]	Taken into account. The statement 4.2 has been revised and numbers updated . Scale and rates of change for the energy systems are provided in C3.2, Land and food system (C3.3), industry (C3.4), and transport and buildings (C3.5). Policy responses and regulations are now addressed in section D of the revised SPM in the context of strengthening the global response, see SPM D.2
53226	21	19	21	24	Contrary to the comments on solar energy, this paragraph encourages the use of carbon, which is a fossil energy. I think you have to be cautious with some affirmations, because considering the worldwide distribution (current or potential) of coal production and solar energy, both statements seem to respond to political interests. [Maria-Carmen Llasat, Spain]	Taken into account. The comment is taken into account along with other comments on updating and streamlining 4.2. Policy responses and regulations in the context of strengthening the global response are now addressed by SPM D2, where D2.1 deals with abatement costs broadly than linking to carbon or carbon pricing.
62908	21	19	23	13	Duplication: "A broad portfolio of different mitigation policy options, including carbon pricing mechanisms and regulation…" [Sabine FUSS, Germany]	Taken into account. The statement 4.2 has been revised and numbers updated . Scale and rates of change for the energy systems are provided in C3.2, Land and food system (C3.3), industry (C3.4), and transport and buildings (C3.5). Policy responses and regulations are now addressed in section D of the revised SPM in the context of strengthening the global response, see SPM D.2. In particular, options for policy interventions are provided in substatement D2.3.
63078	21	19	21	22	This statement is important, we think that it could be integrated into a headline statement box [Belgium]	Noted. The statement 4.2 has been revised and numbers updated . Scale and rates of change for the energy systems are provided in C3.2, Land and food system (C3.3), industry (C3.4), and transport and buildings (C3.5). Policy responses and regulations are now addressed in section D of the revised SPM in the context of strengthening the global response, see SPM D.2

Comment No	From Page	From Line	To Page	To Line	Comment	Response
31258	21	2	21	2	cost-effective should be changed to "cost efficient". "cost efficient" would be more appropriate instead of "cost-effective" in the context of analysis of policy efficiency. [Japan]	Not Applicable - no longer included in the chapter. The statement 4.2 has been revised and numbers updated . Scale and rates of change for the energy systems are provided in C3.2, Land and food system (C3.3), industry (C3.4), and transport and buildings (C3.5). Policy responses and regulations are now addressed in section D of the revised SPM in the context of strengthening the global response, see SPM D.2. In particular, the emphasis now is on effectiveness in terms of policy integration as stated in substatement D2.2.
59324	21	2	21	2	Is it really factual to say that 'carbon pricing mechanisms' are necessary? Is it not more accurate to say they are estimated to be the most likely way to achieve the most cost-effective reductions? [United States of America]	Taken into account. Statement 4.2 has been revised and streamlined. Policy responses and regulations are addressed now by section D of the revised SPM in the context of strengthening the global response. D2.1 mention abatement costs broadly rather than carbon pricing, while D2.2 emphasizes effectiveness in terms of policy integration.
3682	21	21	21	22	It is stated that reduction in energy demand can also be achieved through behaviour change, which is regarded as one of main options to achieve 1.5 ? target. Since the increasing disparities between the rich and the poor, it needs more imformation to discuss the implications for developed and developing countries. [Ying Chen, China]	Taken into account. Statement 4.2 has been revised and streamlined. Policy responses and regulations are addressed now by section D of the revised SPM in the context of strengthening the global response. Statement D2 emphasizes the role of behaviour change for limiting global warming to 1.5C, whereas D4 and D5 addresses distributional and equity issues involved.
30150	21	21	21	22	Would it be possible to underline the critical role of behaviour change better ? "Behaviour change is also essential for reducing energy demand" cf SPMp.19, line 6 [France]	Taken into account. Statement 4.2 has been revised and streamlined. Policy responses and regulations are addressed now by section D of the revised SPM in the context of strengthening the global response. Statement D2 emphasizes the role of behaviour change for limiting global warming to 1.5C, referring to specific sections of the chapter relevant to the issue such as 4.2 and 4.4.
40010	21	21	21	22	What does "also" mean here? Is that next to carbon pricing and regulation? But how will behaviour change occur if there are no such incentives? [Kornelis Blok, Netherlands]	Not Applicable - no longer included in the chapter. Statement 4.2 has been revised and streamlined. Policy responses and regulations including behavioural changes are addressed now by section D of the revised SPM in the context of strengthening the global response (refer to D2).
51288	21	21	21	22	Reduction in energy demand can also be achieved through behaviour change does not look suitable here. It is covered in Section 4.4, page SPM-23 (Line 37-40) "Mitigation actions in the energy demand sectors and behavioural response options.....". [Muhammad Latif, Pakistan]	Taken into account. Statement 4.2 has been revised and streamlined. Policy responses and regulations are addressed now by section D of the revised SPM in the context of strengthening the global response. Statement D2 emphasizes the role of behaviour change for limiting global warming to 1.5C, referring to specific sections of the chapter relevant to the issue such as 4.2 and 4.4.
6916	21	22	21	24	The last part includes an important and policy relevant message: Discounted carbon prices for limiting warming to 1.5oC are three to seven times higher compared to 2oC. However, this statement is misleading because it does not consider the benefits of a 1.5 warming compared to 2.0 warming, e.g. because of avoided loss and damage in the period 2050 to 2100 and beyond. As the report had no focus on such assessment it is suggested not to include such information in the SPM but to address it in the AR6. [Klaus Radunsky, Austria]	Noted. Statement 4.2 has been revised and updated. The new substatement dealing with mitigation costs and options is D2 in the revised SPM, with D2.1 focusing on abatement costs more broadly refraining from being specific on carbon pricing while providing references to the specific sections of the chapter (2.5.1 and 2.5.2) to provide more details on how these costs are calculated and interpreted and to avoid confusion.
8060	21	22	21	23	Comparing carbon prices to 2°C is not so useful, as we don't know the prices in the 2°C scenarios. Please mention price levels (with their uncertainty) for 1,5°C and 2°C scenarios. [Quentin Perrier, France]	Rejected. Statement 4.2 has been revised and updated. The new substatement dealing with mitigation costs and options is D2 in the revised SPM, with D2.1 focusing on abatement costs. Comparing the order of magnitudes of abatement costs or carbon prices is more useful than the numerical value since the message here is how more costly 1.5C compared to 2C. The level of uncertainty is expressed by stating the level of confidence at the end of the substatement.
9052	21	22	21	24	We find this statement is misleading because it does not consider the benefits of a 1.5 warming compared to 2.0 warming. As this special report does not focus on such assessment we suggest to address this in detail in the AR6. [Luxembourg]	Noted. Statement 4.2 has been revised and updated. The new substatement dealing with mitigation costs and options is D2 in the revised SPM, with D2.1 focusing on abatement costs more broadly refraining from being specific on carbon pricing while providing references to the specific sections of the chapter (2.5.1 and 2.5.2) to provide more details on how these costs are calculated and interpreted and to avoid confusion.
11408	21	22	21	24	Though overall costs of 2 degrees would be higher (i.e. factoring in social costs of the eventual impacts)? Otherwise it could look like endorsement to just hang back on effort because it's cheaper - when it isn't for society globally, in the long run. [United Kingdom (of Great Britain and Northern Ireland)]	Noted. Statement 4.2 has been revised and updated. The new substatement dealing with mitigation costs and options is D2 in the revised SPM, with D2.1 focusing on abatement costs more broadly refraining from being specific on carbon pricing while providing references to the specific sections of the chapter (2.5.1 and 2.5.2) to provide more details on how these costs are calculated and interpreted and to avoid confusion.
13304	21	22	21	24	Delete the text "Discounted carbon prices for limiting warming to 1.5°C are three to seven times higher compared to 2°C, depending on models and socioeconomic assumptions (medium confidence).". [Eleni Kaditi, Austria]	Not Applicable - no longer included in the chapter. Statement 4.2 has been revised and updated. The new substatement dealing with mitigation costs and options is D2 in the revised SPM, with D2.1 focusing on abatement costs more broadly refraining from being specific on carbon pricing while providing references to the specific sections of the chapter (2.5.1 and 2.5.2) to provide more details on how these costs are calculated and interpreted and to avoid confusion.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
19438	21	22	21	23	The sentence here on carbon prices being multiple times higher for 1.5°C than for 2°C should be deleted from the SPM, because without giving it broader context, it is likely to create more confusion than clarity. This is one of those sentences that will get a life of its own and be used out of context to argue how following a 1.5°C pathway would be multiple time more expensive than a 2°C pathway, when this would obviously be a false intepretation, given that the carbon price comparison tells nothing about the avoided costs related to impacts or of the gains achieved through co-benefits for health etc. [Jennifer Morgan, Netherlands]	Taken into account. Statement 4.2 has been revised and streamlined. Policy responses and regulations are addressed now by section D of the revised SPM in the context of strengthening the global response. D2.1 mentions abatement costs broadly and referring to relevant sections from the chapter (2.5.1 and 2.5.2) to provide more details on how these abatement costs are calculated.
29220	21	22	21	24	Please reformulate the sentence "Discounted carbon prices for limiting warming to 1.5°C are three to seven times higher compared to 2°C…" as this formulation is not economically correct. The carbon prices in the two different specifications are given as intervals with a certain variance without further information about the distribution within the interval. Thus, the difference between the different scenarios might as well be as small as the highest value of the first interval and the lowest value of the second interval, which would be much less than a tripling. Thus, the correct range according to Chapter 2.5.2.1 is from 1.2 times to 8 times higher, without any information about probabilities. Given this incertitude please focus in the key message not on this vague numbers, but on the impact higher carbon prices and carbon markets can have for steering investments, consumption and production behaviour. [Germany]	Taken into account. Statement 4.2 has been revised and updated. The new substatement dealing with mitigation costs and options is D2 in the revised SPM, with D2.1 focusing on abatement costs more broadly refraining from being specific on carbon pricing or discounting while providing references to the specific sections of the chapter (2.5.1 and 2.5.2) to provide more details on how these costs are calculated and interpreted and to avoid confusion.
30152	21	22	21	23	Carbon prices are an important indicator. Could we get values? This sentence currently refers to an unknown reference point (for a normal reader at least) [France]	Taken into account. Statement 4.2 has been revised and updated. The new substatement dealing with mitigation costs and options is D2 in the revised SPM, with D2.1 focusing on abatement costs more broadly refraining from being specific on carbon pricing while providing references to the specific sections of the chapter (2.5.1 and 2.5.2) to provide more details and avoid confusion.
38982	21	22	21	24	I don't think this sentence is clear to all readers: "Discounted carbon prices…", and could be reformulated. [Jan Fuglestvedt, Norway]	Taken into account. Statement 4.2 has been revised and updated. The new substatement dealing with mitigation costs and options is D2 in the revised SPM, with D2.1 focusing on abatement costs more broadly refraining from being specific on carbon pricing or discounting while providing references to the specific sections of the chapter (2.5.1 and 2.5.2) to provide more details on how these costs are calculated and interpreted and to avoid confusion.
40016	21	22	21	22	What are discounted carbon prices? [Kornelis Blok, Netherlands]	Taken into account. Statement 4.2 has been revised and streamlined. Policy responses and regulations are addressed now by section D of the revised SPM in the context of strengthening the global response. D2.1 mentions abatement costs broadly rather than being specific to carbon pricing or discounting.
40018	21	22	21	22	Readers may misinterpret this as total costs begin 3 - 7 times higher, whereas only the marginal cost level is so much higher. Can something be added on the increase in total mitigation costs going from 2 to 1.5? [Kornelis Blok, Netherlands]	Taken into account - text revised. Statement 4.2 has been revised and streamlined. Policy responses and regulations are addressed now by section D of the revised SPM in the context of strengthening the global response. D2.1 mentions abatement costs broadly and referring to relevant sections from the chapter (2.5.1 and 2.5.2) to provide more details on how these abatement costs are calculated.
40020	21	22	21	22	Why not report absolute carbon price levels here? [Kornelis Blok, Netherlands]	Taken into account. Statement 4.2 has been revised and streamlined. Policy responses and regulations are addressed now by section D of the revised SPM in the context of strengthening the global response. D2.1 mentions abatement costs broadly rather than being specific to carbon pricing or discounting.
46222	21	22	21	23	Is the statement about discounted prices or discounted costs? discounted prices is an unclear term; if the statement refers to prices; can some information on discounted costs be added? [Netherlands]	Taken into account. Statement 4.2 has been revised and updated. The new substatement dealing with mitigation costs and options is D2 in the revised SPM, with D2.1 focusing on abatement costs more broadly refraining from being specific on carbon pricing while providing references to the specific sections of the chapter (2.5.1 and 2.5.2) to provide more details on how these costs are calculated and interpreted.
50422	21	22	21	24	Could redistribute effects of this price difference be briefly mentionned? [Switzerland]	Taken into account. Statement 4.2 has been revised and updated. Policy responses and mitigation costs are addressed in section D of the revised SPM. Distributional implications of mitigation costs are addressed by substatements D4.3 and D4.4.
56072	21	22	21	24	Three times higher price for carbon under 1.5 vs 2 does not consider learning effects that could increase efficiency of substitution and carbon removal because of early action.Discount rate considerations may easily turn results one way or other [alberto pedace, Argentina]	Taken into account. Statement 4.2 has been revised and updated. The new substatement dealing with mitigation costs and options is D2 in the revised SPM, with D2.1 focusing on abatement costs more broadly refraining from being specific on carbon pricing or discounting while providing references to the specific sections of the chapter (2.5.1 and 2.5.2) to provide more details on how these costs are calculated and interpreted and to avoid confusion.
58168	21	22			For the multiples of carbon prices, it is not important that these are measured as discounted (present value) carbon prices. The word carbon price can be skipped. [Nico Bauer, Germany]	Taken into account - text revised. In the revised SPM, carbon prices are replaced by abatement costs and now shown as SPM substatement D2.1

Comment No	From Page	From Line	To Page	To Line	Comment	Response
59326	21	22	21	24	Discounted carbon prices for limiting warming to 1.5°C are three to seven times higher compared to 2°C, depending on models and socioeconomic assumptions. Suggest that this conclusion does not rise to the level of 'medium confidence' due to the sampling bias in the scenarios that achieve 1.5°C. Compared to the literature on 2°C scenarios, there are fewer models that have run 1.5°C scenarios. Furthermore, though scenarios in the 2°C literature with limited technology options (e.g., no CCS, limited bioenergy, no BECCS or CDR) may resolve with high carbon prices, the equivalent limited technology scenarios for a 1.5°C carbon budget may be infeasible (or be reported as infeasible due to excessively high carbon prices). Excluding these types of limited technology scenarios from the 1.5°C scenarios used to make the comparison here will bias these results downward. [United States of America]	Taken into account. Statement 4.2 has been revised and updated. The new substatement dealing with mitigation costs and options is D2 in the revised SPM, with D2.1 focusing on abatement costs more broadly refraining from being specific on carbon pricing or discounting while providing references to the specific sections of the chapter (2.5.1 and 2.5.2) to provide more details on how these costs are calculated and interpreted and to avoid confusion.
62266	21	22	21	24	The meaning of the following statement is unclear and needs more explanation: “Discounted carbon prices for limiting warming to 1.5°C are three to seven times higher compared to 2°C, depending on models and socioeconomic assumptions (medium confidence).” [Shaye Wolf, United States of America]	Taken into account. Statement 4.2 has been revised and updated. The new substatement dealing with mitigation costs and options is D2 in the revised SPM, with D2.1 focusing on abatement costs more broadly refraining from being specific on carbon pricing or discounting while providing references to the specific sections of the chapter (2.5.1 and 2.5.2) to provide more details on how these costs are calculated and interpreted and to avoid confusion.
1682	21	23	21	23	Add "technolgies assumption", revised to "depending on models, technologies and socialeconomic assumptions". [Wenying Chen, China]	Not Applicable - no longer included in the chapter. Statement 4.2 has been revised and updated. The new substatement dealing with mitigation costs and options is D2 in the revised SPM, with D2.1 focusing on abatement costs more broadly refraining from being specific on carbon pricing or discounting while providing references to the specific sections of the chapter (2.5.1 and 2.5.2) to provide more details on how these costs are calculated and interpreted and to avoid confusion.
32628	21	23	21	23	socio-economic (with hyphen) [Jonathan Lynn, Switzerland]	Not Applicable - no longer included in the chapter. Statement 4.2 has been revised and updated. The new substatement dealing with mitigation costs and options is D2 in the revised SPM, with D2.1 focusing on abatement costs more broadly refraining from being specific on carbon pricing or discounting while providing references to the specific sections of the chapter (2.5.1 and 2.5.2) to provide more details on how these costs are calculated and interpreted and to avoid confusion.
5492	21	3	21	35	Since the ranges are so large across pathways, suggest giving both the median and range for entries in the table. [Haroon KHESHGI, United States of America]	Not Applicable - no longer included in the chapter. Table SPM2 is removed in the revised version. Statement 4.2 has been revised and streamlined to address in details changes in scales and rates related to energy systems (C3.2), land and food systems (C3.3), Industry (C3.4), and transport and building (C3.5), where numbers from Table SPM2 are revised and updated and ranges provided when available.
5786	21	3	21	32	Table 2: What is the "reference scenario"? Is the warming more than 2 deg in this reference scenario? The caption should discuss this. [Govindasamy Bala, India]	Not Applicable - no longer included in the chapter. Table SPM2 is removed in the revised version. Statement 4.2 has been revised and streamlined to address in details changes in scales and rates related to energy systems (C3.2), land and food systems (C3.3), Industry (C3.4), and transport and building (C3.5), where numbers from Table SPM2 are revised and updated.
6918	21	3	21	31	Table SPM2: Please, include in the caption to this important table also a short description of the REF (the reference scenario - including its relationship with NDCs). [Klaus Radunsky, Austria]	Not Applicable - no longer included in the chapter. Table SPM2 is removed in the revised version. Statement 4.2 has been revised and streamlined to address in details changes in scales and rates related to energy systems (C3.2), land and food systems (C3.3), Industry (C3.4), and transport and building (C3.5), where numbers from Table SPM2 are revised and updated.
11016	21	3	21	31	Almost zero-emission by 2050 (coal/gas with CCS still allowed x-y GTCO2 avoided yr-1 (w.r.t. table 2.7 numbers such that 6.4/10.8/15.5GTCO2 match | [Wilfried Maas, Netherlands]	Not Applicable - no longer included in the chapter. Table SPM2 is removed in the revised version. Statement 4.2 has been revised and streamlined to address in details changes in scales and rates related to energy systems (C3.2), land and food systems (C3.3), Industry (C3.4), and transport and building (C3.5), where numbers from Table SPM2 are revised and updated.
11018	21	3	21	31	[36%] share of low-emission energy (electricity, hydrogen, biofuels) x-y GTCO2 offset yr-1 with BECCS and Forestry. (w.r.t. table 2.7 numbers such that 1.5/3.8/8.4 match) [Wilfried Maas, Netherlands]	Not Applicable - no longer included in the chapter. Table SPM2 is removed in the revised version. Statement 4.2 has been revised and streamlined to address in details changes in scales and rates related to energy systems (C3.2), land and food systems (C3.3), Industry (C3.4), and transport and building (C3.5), where numbers from Table SPM2 are revised and updated.
9142	21	3	21	35	This table should be labeled clearly to indicate that these figures represent the median for only the 1.5 degree scenarios run by IAM models. There is lots of other literature that would yield different percentage changes. Thus, these figures all assume that negative emissions technologies are relied on - namely they do not represent appropriate results for 1.5 degree non-overshoot scenarios. [Richard Rosen, Germany]	Not Applicable - no longer included in the chapter. Table SPM2 is removed in the revised version. Statement 4.2 has been revised and streamlined to address in details changes in scales and rates related to energy systems (C3.2), land and food systems (C3.3), Industry (C3.4), and transport and building (C3.5), where numbers from Table SPM2 are revised and updated and ranges provided when available.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
11410	21	3	21	3	Table: 'reference scenario' (in column heading) needs to be defined - i.e. what temp rise this equates to etc [United Kingdom (of Great Britain and Northern Ireland)]	Not Applicable - no longer included in the chapter. Table SPM2 is removed in the revised version. Statement 4.2 has been revised and streamlined to address in details changes in scales and rates related to energy systems (C3.2), land and food systems (C3.3), Industry (C3.4), and transport and building (C3.5), where numbers from Table SPM2 are revised and updated.
19026	21	3	21	3	Not clear what is the reference scenario- it is not discussed in the bullets. [Andrea TILCHE, Belgium]	Not Applicable - no longer included in the chapter. Table SPM2 is removed in the revised version. Statement 4.2 has been revised and streamlined to address in details changes in scales and rates related to energy systems (C3.2), land and food systems (C3.3), Industry (C3.4), and transport and building (C3.5), where numbers from Table SPM2 are revised and updated.
19254	21	3	21	31	In table header, last column, incorrect degree symbol [Spain]	Not Applicable - no longer included in the chapter. Table SPM2 is removed in the revised version. Statement 4.2 has been revised and streamlined to address in details changes in scales and rates related to energy systems (C3.2), land and food systems (C3.3), Industry (C3.4), and transport and building (C3.5), where numbers from Table SPM2 are revised and updated.
29222	21	3	22	2	Table SPM 2: Can these figures be complemented by the corresponding ranges for 2030, as this would provide important insights for near term policy. Also, no reference in the text is given. The aforementioned Chapter 2.4 does not contain this table. Figures given might be indicated somewhere in text passages of chapter 2.4, but possibly not easy to find. Please improve the referencing. [Germany]	Taken into account. Table SPM2 is removed in the revised version. Statement 4.2 has been revised and streamlined to address in details changes in scales and rates related to energy systems (C3.2), land and food systems (C3.3), Industry (C3.4), and transport and building (C3.5), where numbers from Table SPM2 are revised and updated and ranges provided when available.
30154	21	3	22	2	Table SPM2 : Add "consistent with 1.5ºC pathways" after "Changes by 2050 compared to 2010 in Chapter 2. [France]	Not Applicable - no longer included in the chapter. Table SPM2 is removed in the revised version. Statement 4.2 has been revised and streamlined to address in details changes in scales and rates related to energy systems (C3.2), land and food systems (C3.3), Industry (C3.4), and transport and building (C3.5), where numbers from Table SPM2 are revised and updated.
30156	21	3	22	2	Table SPM2 : Could you precise in Table 2 what does "electrification" refer to ? [France]	Not Applicable - no longer included in the chapter. Table SPM2 is removed in the revised version. Statement 4.2 has been revised and streamlined to address in details changes in scales and rates related to energy systems (C3.2), land and food systems (C3.3), Industry (C3.4), and transport and building (C3.5), where numbers from Table SPM2 are revised and updated.
30158	21	3	22	2	Table SPM2 : There is no reference in the text for Table SPM2. [France]	Not Applicable - no longer included in the chapter. Table SPM2 is removed in the revised version. Statement 4.2 has been revised and streamlined to address in details changes in scales and rates related to energy systems (C3.2), land and food systems (C3.3), Industry (C3.4), and transport and building (C3.5), where numbers from Table SPM2 are revised and updated.
30160	21	3	22	2	Table SPM2 : Could you please report agriculture to be consistent with Table 4.1 ? [France]	Not Applicable - no longer included in the chapter. Table SPM2 is removed in the revised version. Statement 4.2 has been revised and streamlined to address in details changes in scales and rates related to energy systems (C3.2), land and food systems (C3.3), Industry (C3.4), and transport and building (C3.5), where numbers from Table SPM2 are revised and updated.
32632	21	3	21	3	is the refernce scenario in the table defined? [Jonathan Lynn, Switzerland]	Not Applicable - no longer included in the chapter. Table SPM2 is removed in the revised version. Statement 4.2 has been revised and streamlined to address in details changes in scales and rates related to energy systems (C3.2), land and food systems (C3.3), Industry (C3.4), and transport and building (C3.5), where numbers from Table SPM2 are revised and updated.
33882	21	3	22	3	We find the information in this table to be somewhat under explained and leaves us uncertain about the interpretation. For example "60% electrification" in buildings, does this mean that 60% of building use electricity for energy use or 60% increase in electrification? [Norway]	Taken into account. Table SPM2 is removed in the revised version. Statement 4.2 has been revised and streamlined to address in details changes in scales and rates related to energy systems (C3.2), land and food systems (C3.3), Industry (C3.4), and transport and building (C3.5), where numbers from Table SPM2 are revised and updated.
35466	21	3	21	31	The buildings row in the table is a little confusing. Is the total buildings energy demand in 2050 20% lower than 2010 for the 1.5 pathway across the world? If so, and it is only 22% lower than the reference scenario in 2050, it implies that the reference scenario buildings energy consumption in 2050 is only 2% higher than in 2010. That seems a little hard to believe. [Ashok Sreenivas, India]	Not Applicable - no longer included in the chapter. Table SPM2 is removed in the revised version. Statement 4.2 has been revised and streamlined to address in details changes in scales and rates related to energy systems (C3.2), land and food systems (C3.3), Industry (C3.4), and transport and building (C3.5), where numbers from Table SPM2 are revised and updated.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
38550	21	3	21	31	This very useful table show a structural bias present in the models covered. Electrification in buildings (i.e. of heating and cooking) is seen as almost double as "easy" as in transport (60% instead of 36%). This is quite strange. In terms of variable costs, electricity is more expensive for heating purposes than gas, while electricity is less expensive than gasoline or diesel fuel in transport. In terms of upfront investment, the difference in prices between the fossil-fuel and the electric option is much smaller in the latter sector (and quickly falling). So it would be good to put the text currently in the note as the title of the table and be more precise, if possible, about what is meant for building and/or signal somehow to the reader this discrepancy. [Valentino Piana, Italy]	Not Applicable - no longer included in the chapter. Table SPM2 is removed in the revised version. Statement 4.2 has been revised and streamlined to address in details changes in scales and rates related to energy systems (C3.2), land and food systems (C3.3), Industry (C3.4), and transport and building (C3.5), where numbers from Table SPM2 are revised and updated.
40588	21	3	21	3	There is a missing closing square bracket (]) in the second column, third row of this table. In the second column, fourth row, the electrification (36%) is not specified as an increase or decrease; this should be made clear since there are increases and decreases throughout this table. [Jonny Williams, New Zealand]	Not Applicable - no longer included in the chapter. Table SPM2 is removed in the revised version. Statement 4.2 has been revised and streamlined to address in details changes in scales and rates related to energy systems (C3.2), land and food systems (C3.3), Industry (C3.4), and transport and building (C3.5), where numbers from Table SPM2 are revised and updated.
46224	21	3	21	31	Could also be indicated what the level of emission reduction cpt 2010 is for the various sectors by 2050? [Netherlands]	Not Applicable - no longer included in the chapter. Table SPM2 is removed in the revised version. Statement 4.2 has been revised and streamlined to address in details changes in scales and rates related to energy systems (C3.2), land and food systems (C3.3), Industry (C3.4), and transport and building (C3.5), where numbers from Table SPM2 are revised and updated.
46426	21	3	21	31	Could also be indicated what the level of emission reduction compared to 2010 is for the various sectors by 2050? [Netherlands]	Not Applicable - no longer included in the chapter. Table SPM2 is removed in the revised version. Statement 4.2 has been revised and streamlined to address in details changes in scales and rates related to energy systems (C3.2), land and food systems (C3.3), Industry (C3.4), and transport and building (C3.5), where numbers from Table SPM2 are revised and updated.
50424	21	3	21	31	Instead of "Not Available" could a more quantitative indication be given, eg. 100%? [Switzerland]	Not Applicable - no longer included in the chapter. Table SPM2 is removed in the revised version. Statement 4.2 has been revised and streamlined to address in details changes in scales and rates related to energy systems (C3.2), land and food systems (C3.3), Industry (C3.4), and transport and building (C3.5), where numbers from Table SPM2 are revised and updated.
54536	21	3	21	3	buildings are predicted to increase energy consumption up to 2050 due to lincrease in population and floor area (linked to GDP growth) and indoor comfort; only with effective policies introducing advanced technologies (heat pumps, SSL, building control systems, etc) and limititation in floor area, the energy can be reduced. Depeding on the stringecy of policies the decrease in 2050 could be substantila and well above the 22% cliamed in the Table SPM 2 [Paolo BERTOLDI, Italy]	Not Applicable - no longer included in the chapter. Table SPM2 is removed in the revised version. Statement 4.2 has been revised and streamlined to address in details changes in scales and rates related to energy systems (C3.2), land and food systems (C3.3), Industry (C3.4), and transport and building (C3.5), where numbers from Table SPM2 are revised and updated.
57888	21	3			Almost zero emission by 2050, (some coal / gas with CCS still allowed) This line is stupid, there is nothing worng with fossil fuel, as long as it is burned with mandatory CCS or CCS2 or CCU. Just mak,CO2 capture and permanent sequestration mandatory technology as soon as possible. This mandatory, is a example of government regulations, that can be decided quickly, and should be advised much more than relaying on markets forces, at least signal the sensitivity of politicians for regulations as a knowledge gap, BECAUSE regulations is what politicians do [Henk Daalder, Netherlands]	Taken into account. Table SPM2 is removed in the revised version. Statement 4.2 has been revised and streamlined to address in details changes in scales and rates related to energy systems (C3.2), land and food systems (C3.3), Industry (C3.4), and transport and building (C3.5), where numbers and components from Table SPM2 are updated.
59328	21	3	22	2	The caption in Table SPM 2 referring to "reference scenario" is not clear. What is the reference (1.5°C warming?)? [United States of America]	Not Applicable - no longer included in the chapter. Table SPM2 is removed in the revised version. Statement 4.2 has been revised and streamlined to address in details changes in scales and rates related to energy systems (C3.2), land and food systems (C3.3), Industry (C3.4), and transport and building (C3.5), where numbers from Table SPM2 are revised and updated.
59330	21	3	21	31	The headings of the Table SPM 2 columns are not clear. Does the second column mean projections with just Paris Agreement and commitments or what? Does the third column refer to what is needed to limit warming below 1.5°C, and then the third column for below 2°C? And the reference scenario? The caption does not answer the questions, especially as to what the fourth column heading means. Is it not 2°C compared to reference scenario--and if so, what is meant by text on page 22, lines 1-2? [United States of America]	Not Applicable - no longer included in the chapter. Table SPM2 is removed in the revised version. Statement 4.2 has been revised and streamlined to address in details changes in scales and rates related to energy systems (C3.2), land and food systems (C3.3), Industry (C3.4), and transport and building (C3.5), where numbers from Table SPM2 are revised and updated.
63090	21	3	21	35	The table SPM2 is confusing. It refers to Chapter 2: of what? 1,5°C pathway is missing; what is the reference pathway. Probably ths tabel needs to be updated and adapted to the focus of the report: 1,5°C [Belgium]	Not Applicable - no longer included in the chapter. Table SPM2 is removed in the revised version. Statement 4.2 has been revised and streamlined to address in details changes in scales and rates related to energy systems (C3.2), land and food systems (C3.3), Industry (C3.4), and transport and building (C3.5), where numbers from Table SPM2 are revised and updated.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
5922	21	31			Use of [] around numbers in the table is distracting and feels unnecessary here? [Peter Thorne, Ireland]	Not Applicable - no longer included in the chapter. Table SPM2 is removed in the revised version. Statement 4.2 has been revised and streamlined to address in details changes in scales and rates related to energy systems (C3.2), land and food systems (C3.3), Industry (C3.4), and transport and building (C3.5), where numbers from Table SPM2 are revised and updated.
43838	21	31	21	35	Change Table SPM 2 No biofuels No CCS assumption Electrification has to be by zero to low carbon energy sources which should include nuclear fission. Buildings: Built in by design automatic energy efficiency and conservation All energy neutral or energy producing. Large buildings and dense communities : Compact safe fission Transport: compact fission for all marine transport (US navy) Air transport: Lighter than air for goods. All passenger planes electric. High speed small fission reactors Industry and electricity: Large increase in energy dense nuclear fission including compact modular fission for large industry. [Peter Carter, Canada]	Not Applicable - no longer included in the chapter. Table SPM2 is removed in the revised version. Statement 4.2 has been revised and streamlined to address in details changes in scales and rates related to energy systems (C3.2), land and food systems (C3.3), Industry (C3.4), and transport and building (C3.5), where numbers from Table SPM2 are revised and updated.
46226	21	31	22	2	Table SPM-2 is hard to read and interpret, it single [%] change numbers suggest only 1 pathway, whereas many different can be feasible, see f.e. the Figure SPM-1. [Netherlands]	Taken into account. Table SPM2 is removed in the revised version. Statement 4.2 has been revised and streamlined to address in details changes in scales and rates related to energy systems (C3.2), land and food systems (C3.3), Industry (C3.4), and transport and building (C3.5), where numbers from Table SPM2 are revised and updated.
59332	21	31	21	31	Since the figures included in this table are median values, it would be necessary and fairly straightforward to include a standard deviation in the range of estimates. The source of uncertainty should be specified – whether due to a range of possible scenarios, or uncertainties in each of those scenarios. [United States of America]	Not Applicable - no longer included in the chapter. Table SPM2 is removed in the revised version. Statement 4.2 has been revised and streamlined to address in details changes in scales and rates related to energy systems (C3.2), land and food systems (C3.3), Industry (C3.4), and transport and building (C3.5), where numbers from Table SPM2 are revised and updated and ranges provided when available.
62268	21	31	21	35	The sectoral changes should also be provided when not relying on CCS. [Shaye Wolf, United States of America]	Not Applicable - no longer included in the chapter. Table SPM2 is removed in the revised version. Statement 4.2 has been revised and streamlined to address in details changes in scales and rates related to energy systems (C3.2), land and food systems (C3.3), Industry (C3.4), and transport and building (C3.5), where numbers from Table SPM2 are revised and updated.
32630	21	33	21	34	section 2.4 doesn't exist in SPM. Would Chapter 2.4 be better to clarify in underlying report?(could be confused with headline statement 2.4 on p9) [Jonathan Lynn, Switzerland]	Taken into account. Table SPM2 is removed in the revised version. Statement 4.2 has been revised and streamlined to address in details changes in scales and rates related to energy systems (C3.2), land and food systems (C3.3), Industry (C3.4), and transport and building (C3.5), where numbers from Table SPM2 are revised and updated.
45904	21	33	21	33	Could you please define what reference scenario is? [Deger Saygin, Turkey]	Not Applicable - no longer included in the chapter. Table SPM2 is removed in the revised version. Statement 4.2 has been revised and streamlined to address in details changes in scales and rates related to energy systems (C3.2), land and food systems (C3.3), Industry (C3.4), and transport and building (C3.5), where numbers from Table SPM2 are revised and updated.
45906	21	33	21	33	What exactly is it meant with allowed? Who allows this? Governments, modelers, power plant owners? [Deger Saygin, Turkey]	Not Applicable - no longer included in the chapter. Table SPM2 is removed in the revised version. Statement 4.2 has been revised and streamlined to address in details changes in scales and rates related to energy systems (C3.2), land and food systems (C3.3), Industry (C3.4), and transport and building (C3.5), where numbers from Table SPM2 are revised and updated.
30162	21	35	21	35	Decreased energy use compared to the reference scenario' [to be consistent with the corresponding column title of the table] [France]	Not Applicable - no longer included in the chapter. Table SPM2 is removed in the revised version. Statement 4.2 has been revised and streamlined to address in details changes in scales and rates related to energy systems (C3.2), land and food systems (C3.3), Industry (C3.4), and transport and building (C3.5), where numbers from Table SPM2 are revised and updated.
59334	21	35	21	35	Column in table is not consistent with description "REF" in table caption. [United States of America]	Not Applicable - no longer included in the chapter. Table SPM2 is removed in the revised version. Statement 4.2 has been revised and streamlined to address in details changes in scales and rates related to energy systems (C3.2), land and food systems (C3.3), Industry (C3.4), and transport and building (C3.5), where numbers from Table SPM2 are revised and updated.
55824	22		22		Before 4.4 there should be sections describing urban (4.3.4) and industrial (4.3.5) transitions including mitigation and adaptation options for both and the assessment figures of 4.5.2 and 4.5.3. Or maybe provide an explanation as to why only energy and land-use are ecplicity esplained? [Debora Ley, Guatemala]	Taken into account. Table SPM2 is removed in the revised version. Statement 4.2 has been revised and streamlined to address in details changes in scales and rates related to energy systems (C3.2), land and food systems (C3.3), Industry (C3.4), and transport and building (C3.5), where numbers from Table SPM2 are revised and updated.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
152	22	1	22	18	This headline and the related bullets are singularly uninformative about exactly how challenging the food crop/energy crop tradeoffs become in 1.5C pathways. This is a critically important issue that deserves, if the literature allows, a clear and definitive statement. In fact, if I read Figure SPM 6 correctly, a very large tradeoff is indicated. [Michael Oppenheimer, United States of America]	Taken into account. Table SPM2 is removed in the revised version. Statement 4.2 has been revised and streamlined to address in details changes in scales and rates related to energy systems (C3.2), land and food systems (C3.3), Industry (C3.4), and transport and building (C3.5), where numbers from Table SPM2 are revised and updated. Synergies and trade-offs in relation to mitigation options including the food/energy trade-offs is addressed by SPM statement D4 in the revised SPM (see D4.1 and D4.2).
39314	22	1	22	47	Again, disappointing in capturing the findings in the full chapters. This is a real loss for policy makers, who are unlikely to read the chapters in depth and will therefore lose out with the limited SPM summaries. [Lindsey Cook, Germany]	Taken into account. Table SPM2 is removed in the revised version. Statement 4.2 has been revised and streamlined to address in details changes in scales and rates related to energy systems (C3.2), land and food systems (C3.3), Industry (C3.4), and transport and building (C3.5), where numbers from Table SPM2 are revised and updated.
11412	22	2	22	2	Same as above comment - reference scenario needs defining. [United Kingdom (of Great Britain and Northern Ireland)]	Not Applicable - no longer included in the chapter. Table SPM2 is removed in the revised version. Statement 4.2 has been revised and streamlined to address in details changes in scales and rates related to energy systems (C3.2), land and food systems (C3.3), Industry (C3.4), and transport and building (C3.5), where numbers from Table SPM2 are revised and updated.
32634	22	2	22	2	is the refernce scenario defined? [Jonathan Lynn, Switzerland]	Not Applicable - no longer included in the chapter. Table SPM2 is removed in the revised version. Statement 4.2 has been revised and streamlined to address in details changes in scales and rates related to energy systems (C3.2), land and food systems (C3.3), Industry (C3.4), and transport and building (C3.5), where numbers from Table SPM2 are revised and updated.
11100	22	4	22	6	Consider including the first line in section with high-level statements [Denmark]	Not applicable - This text has been removed during shortening.
15584	22	4	22	35	SPM section 4.3 refers to the use of land for carbon storage. It states "there is also a need for large volumes of sub-surface carbon storage" and refers to "land use mitigation and adaptation options". This is good, but there appears to be inadequate detail about this important issue throughout the entire report. [Australia]	Not applicable - The headline statement has been dropped. Also, the whole paragraph has been completely rewritten. New section C3.3 now says: "Transitions in global and regional land use are required to limit warming to 1.5°C. Such transitions require integrative policies to sustainably manage competing demands on land for human settlements, food, livestock feed, fibre, bioenergy, carbon storage, biodiversity and ecosystem services. This may include sustainable intensification of land use practices, enhanced agricultural productivity and diet changes. Such options are often limited by institutional, environmental and socio-cultural feasibility, though experiences show that these constraints can be overcome (high confidence)."
19442	22	4	22	6	For comparability, please add a corresponding conclusion also for below 2°C pathways. [Jennifer Morgan, Netherlands]	Do not understand - 1.5°C is below 2°C?
29224	22	4	22	1	Please add more quantitative information to this headline statement regarding "increasing use of land" and "large volumes of sub-surface carbon storage". [Germany]	Not applicable - Because we agree that this was an unfortunately formulated paragraph, the whole text has been substantially changed and the volumes of land and subsurface storage dropped from the text.
29226	22	4	22	6	Please rephrase this statement in order to express more clearly that the first sentence refers to carbon stored in soils and ecosystems (e.g. afforestation, soil carbon sequestration), whereas the second phrase refers to sub-surface carbon storage (CCS). The current wording is not intuitively clear. Also, the land requirement for sub-surface carbon storage is qualitatively very different from that for landuse-measures such as bioenergy production. It is not clear why the carbon storage (CCS) topic is linked here with the statement on bioenergy and terrestrial CDR. [Germany]	Taken into account - The reference to sub-surface storage has been removed and new section C3.3 focuses on land transitions exclusively.
29228	22	4	22	1	The headline statement 4.3 should be amended to not only point to the link between mitigation and adaptation options and SDGs but also point out the conclusions of the third bullet below the box: that there are synergies when taking biodiversity and SDGs into account. [Germany]	Accepted - text revised. Text to be strengthened in the SPM FGD
29230	22	4	22	1	The text suggests that the only possible way to reach the 1,5°C-goal is by transformation of landuse in favour of bioenergy production and biocarbon storage in vegetation and soil (additional to subsurface carbon storage). The problem of this pathway is the huge amount of land needed, which leads to severe conflicts with food production and biodiversity (as illustrated in figure SPM 6 on page SPM-29). It is true that most actual literature still has a focus on renewable energy-production by biomass thereby insufficiently taking into account the low landuse-efficiency of bioenergy compared to the landuse efficiency of wind-power or photovoltaic power. There is still a large gap of research on the possible contribution of the other renewables (wind-power, photovoltaic) to energy production and even to carbon-sequestration (power to gas (CH4)/ power to liquid). In short, there is still a need of further research / further scenarios on alternative pathways, relying much less on bioenergy and giving more importance to other kinds of renewal energies in order to reduce the conflicts related to landuse. The need of further research / further scenarios in order to find land-efficient paths of transformation should be mentioned in the SPM and emphasised in Chapter 2 of the report. [Germany]	Taken into account - Because we agree that this was an unfortunately formulated paragraph, the whole text has been substantially changed actively considering the concerns expressed by the reviewer. In addition, chapter 2 has taken up some papers published since the SOD, which try and minimize the amount of BECCS, acknowledging/warning in the SPM that these can still entail substantial bioenergy deployment. Finally, the following sentence has been added to C3.3 in order to take into account the trade-offs mentioned by the reviewer: "Such transitions require integrative policies to sustainably manage competing demands on land for human settlements, food, livestock feed, fibre, bioenergy, carbon storage, biodiversity and ecosystem services."
30164	22	4	22	5	« land transition » : Some quantitative figures of the areas involved by land transitions should be indicated. [France]	Noted. 1.5 C relevant literature to quantify this transition is thin

Comment No	From Page	From Line	To Page	To Line	Comment	Response
33884	22	4	22	1	Please consider including the following sentence in this headline statement: "Land transition at necessary scale creates risks to ecosystems, biodiversity and food production systems." Please recall from AR5, WG3, SPM, page 26: "Bioenergy can play a critical role for mitigation, but there are issues to consider, such as the sustainability of practices and the efficiency of bioenergy systems (robust evidence, medium agreement) [11.4.4, Box 11.5, 11.13.6, 11.13.7]. Barriers to large-scale deployment of bioenergy include concerns about GHG emissions from land, food security, water resources, biodiversity conservation and livelihoods. The scientific debate about the overall climate impact related to land-use competition effects of specific bioenergy pathways remains unresolved (robust evidence, high agreement)? If not, please also consider statements about this topic in Chapter 4.3.3 and 4.5.2.1." The proposed headline statement in this FOD SPM can be misinterpreted as if these key issues on risks related to increased biomass use at scale, have been resolved. [Norway]	Taken into account - Because we agree that this was an unfortunately formulated paragraph, the whole text has been substantially changed actively considering the concerns expressed by the reviewer. The following sentence has furthermore been added to C3.3 in order to take into account the trade-offs mentioned by the reviewer: "Such transitions require integrative policies to sustainably manage competing demands on land for human settlements, food, livestock feed, fibre, bioenergy, carbon storage, biodiversity and ecosystem services."
38984	22	4	22	1	The first part here is very important, and it would be good if it was possible to add something more (semi)quantitative. I also suggest splitting into two parts. [Jan Fuglestvedt, Norway]	Noted. To be addressed in the SPM FGD
38986	22	4	22	1	The second part of this statement is in my view too general and does not work very well as it is formulated now. The interlinkages are very important , but it would strengthen the message if you could add why these are important, and what the implictaions are (competition, difficult choices, potenial for political conflicts etc). I also suggest that you split out this part in a separate statement. This represents one of the core elements in the 1.5 challenge and needs a clear and visible communication. [Jan Fuglestvedt, Norway]	Noted. See response to Comment 3894
43840	22	4	22	6	Pathways compatible with limiting global warming to 1.5°C by 2100 [do not involve any bioenergy production] for carbon storage. [Peter Carter, Canada]	Not Applicable - no longer included in the chapter. The sentence does not exist anymore in this form
39332	22	4	22	1	In our understanding this one, is another controversial box. We believe that in the world there are two big challenges that humankind has to face in this century: to stop the climate change and to feed an increasing human population. Of course it's necessary, at the level of climate agenda, to diversify and to increase the use of renewable and clean energies. But when we arrive to the point of increase the use of land for bioenergy crops we are entering in a strong contradiction. Because of that we propose to introduce this sentence after the first full stop of line 6: “This transitions have to be done carefully, without compromising food security and avoiding some undesirable side effects”. Doing this we are much more coherent with the box 4.9. [Olga Alcaraz, Spain]	Noted. The first bullet point outlines this concern
50054	22	4	22	1	The headline message is too complicated, needs to be simplified and focused more on key messages. The first sentence could read "Pathways ….carbon storage in soils and forests." Drop the second and third sentence and replace by "They also imply a shift away from meat- and dairy production, which could free up pasture land and land used for growing animal feed, and emphasis on productivity increase of crops, limiting the need for additional land for food prodcuction, while maintaining food security, biodiversity and ecosystem services and strengthening climate resilience." This is a key message I think that needs to be in the headline. [Bert Metz, Netherlands]	Not applicable - The headline statement has been dropped. Also, the whole paragraph has been completely rewritten. New section C3.3 now says: "Transitions in global and regional land use are required to limit warming to 1.5°C. Such transitions require integrative policies to sustainably manage competing demands on land for human settlements, food, livestock feed, fibre, bioenergy, carbon storage, biodiversity and ecosystem services. This may include sustainable intensification of land use practices, enhanced agricultural productivity and diet changes. Such options are often limited by institutional, environmental and socio-cultural feasibility, though experiences show that these constraints can be overcome (high confidence)."
53470	22	4	22	6	the sentence should be restructured to reflect the uncertainty of the land-use for bioenergy and the sub-surface storage components of the statement. Chapter 2 discusses BECCS-free pathways (e.g. using other CDR approaches) as well as pathways without the need for sub-surface storage. [Christian Holz, Canada]	Taken into account - The reference to sub-surface storage has been removed and new section C3.3 focuses on land transitions exclusively. BECCS-free pathways are now taken up in the headline statement of new section C2 and reflected in new Figure SPM 3 as well (first pathway type).
55590	22	4	22	6	To be more complete: "… land trasnitions that imply increasing use of land for affotrestation, reforestation and ecosystem restoration and/or bioenergy production (with carbon stroage)." I would omiit the qualifier "sustainable" for bioenergy production since this is contested. [David Cooper, Canada]	Taken into account - Because we agree that this was an unfortunately formulated paragraph, the whole text has been substantially changed and "sustainable" dropped in the process.
56074	22	4	22	6	Improved use of land for bioenergy and carbon storage in soils and plants and improved use of water including oceans for enhanced carbon uptake during the transtions would help fulfill other needs sustainably and raise biodiversity , food production and other SDG targets according to sustainability criteria. [alberto pedace, Argentina]	Taken into account - to the CDR statements, C2.4 has been added: "Some AFOLU measures have potential other benefits, for example, improved biodiversity and soil quality, when combined with policies to conserve and restore land carbon stocks and protect natural ecosystems". Oceans will be dealt with in more depth in the Special Report on the Cryosphere.
51068	22	4	22	6	In the first sentence, insert the word SOME at the beginning. Remove the sentence "There is also a need for large volumes of sub-surface storage." These statements ignore pathways in the underlying report (for example, Grubler et al, Holz et al) that reach 1.5C without using BECCS, therefore without need for ANY sub-surface storage, let alone LARGE VOLUMES. Add a sentence here that illustrates the biogeophysical infeasibility of the amounts of land that SOME models suggest would be necessary. Please avoid policy prescription. [Doreen Stabinsky, United States of America]	Taken into account - The reference to sub-surface storage has been removed and new section C3.3 focuses on land transitions exclusively. The suggested references that have been published in the meantime have been taken up as well in the chapters and their conclusions are reflected in the new version of the SPM.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
54916	22	4	22	1	The head statement mentions the need for large volumes of carbon storage, while the underlying conclusions do not mention carbon storage.Moreover, the document should more clearly emphasize the poor feasibility of applying large volume carbon storage. [Bram Bregman, Netherlands]	Not applicable - The headline statement has been dropped. Also, the whole paragraph has been completely rewritten. New section C3.3 now says: "Transitions in global and regional land use are required to limit warming to 1.5°C. Such transitions require integrative policies to sustainably manage competing demands on land for human settlements, food, livestock feed, fibre, bioenergy, carbon storage, biodiversity and ecosystem services. This may include sustainable intensification of land use practices, enhanced agricultural productivity and diet changes. Such options are often limited by institutional, environmental and socio-cultural feasibility, though experiences show that these constraints can be overcome (high confidence)."
56524	22	4	22	1	There should be mention of stopping deforestation and forest degradation, and mention of land use transitions that promote natural sequestration (e.g., Griscom et al 2017, Natural Climate Solutions). See Fig SPM 5 and incorporate the strategies mentioned under "land" for this section of the text. [Eleanor Johnston, United States of America]	Noted - however, this specific headline statement is gone due to shortening and due to the same reason, we could not replicate all options of SPM5 (now SPM4) in the text. Griscom et al 2017 features prominently in chapter 4 and partially chapter 3 as well, however, and the point is well taken.
57650	22	4		1	While biomass may be prominent in available scenarios the text is misleading in suggesting that this is the only or prominent or only feasible option. Chemical means of CO2 removal from the atmosphere and technologies recycling CO2 exist but have been poorly explored in scale and feasibility. This should be said here as well. [WGII TSU, Germany]	Taken into account - These sentences were neither meant to imply that bioenergy is the only feasible mitigation option, nor were they talking about CO2 removal. To avoid further misunderstandings, this part has been restructured and reformulated, see new section C3.3: "Transitions in global and regional land use are required to limit warming to 1.5°C. Such transitions require integrative policies to sustainably manage competing demands on land for human settlements, food, livestock feed, fibre, bioenergy, carbon storage, biodiversity and ecosystem services. This may include sustainable intensification of land use practices, enhanced agricultural productivity and diet changes. Such options are often limited by institutional, environmental and socio-cultural feasibility, though experiences show that these constraints can be overcome."
59336	22	4	22	9	The reference to the SDGs is unnecessary in this context. SDGs are broader than the use of land that is the focus of Box 4.3, and the relevant SDGs are well captured in the preceding text. Suggest deleting the reference to SDGs. [United States of America]	Noted. Some SDGs have a direct relationship to land transformation as outlined by Ch 5 especially in relation to SDGs 1, 2 & 15
62270	22	4	22	1	This message implies that bioenergy production will be “sustainable” when, as made clear by other parts of the report, large-scale bioenergy has many negative impacts that make it likely not to be “sustainable.” [Shaye Wolf, United States of America]	Taken into account - Because we agree that this was an unfortunately formulated paragraph, the whole text has been substantially changed and "sustainable" dropped in the process.
62272	22	4	22	1	Key Message 4.3 and the SOD in general should distinguish between CDR and negative emissions technologies that carry lower and higher risks. [Shaye Wolf, United States of America]	Not applicable - This headline statement was not meant to be about carbon removal. To avoid further misunderstandings, this part has been restructured and reformulated, see new section C3.3: "Transitions in global and regional land use are required to limit warming to 1.5°C. Such transitions require integrative policies to sustainably manage competing demands on land for human settlements, food, livestock feed, fibre, bioenergy, carbon storage, biodiversity and ecosystem services. This may include sustainable intensification of land use practices, enhanced agricultural productivity and diet changes. Such options are often limited by institutional, environmental and socio-cultural feasibility, though experiences show that these constraints can be overcome."
62906	22	4	22	1	This sounds like BECCS is the only way to remove CO2 from the atmosphere, yet chapter 4 assesses many more options to do that and finds that a portfolio of options could improve tradeoffs, even if not yet implemented in IAMs. A qualifying statement would balance this part of the SPM better. [Sabine FUSS, Germany]	Not applicable - This headline statement was not meant to be about carbon removal. To avoid further misunderstandings, this part has been restructured and reformulated, see new section C3.3: "Transitions in global and regional land use are required to limit warming to 1.5°C. Such transitions require integrative policies to sustainably manage competing demands on land for human settlements, food, livestock feed, fibre, bioenergy, carbon storage, biodiversity and ecosystem services. This may include sustainable intensification of land use practices, enhanced agricultural productivity and diet changes. Such options are often limited by institutional, environmental and socio-cultural feasibility, though experiences show that these constraints can be overcome." Other CDR options than BECCS are now mentioned explicitly on C2.
19028	22	5	22	6	Imply increasing use of land for sustainable bioenergy production and carbon storage: This is confusing, as the two stated aims are diametrically opposite. If bioenergy is increased, storage is reduced (all else considered equal). [Andrea TILCHE, Belgium]	Not applicable - The headline statement has been dropped. Also, the whole paragraph has been completely rewritten. New section C3.3 now says: "Transitions in global and regional land use are required to limit warming to 1.5°C. Such transitions require integrative policies to sustainably manage competing demands on land for human settlements, food, livestock feed, fibre, bioenergy, carbon storage, biodiversity and ecosystem services. This may include sustainable intensification of land use practices, enhanced agricultural productivity and diet changes. Such options are often limited by institutional, environmental and socio-cultural feasibility, though experiences show that these constraints can be overcome (high confidence)."

Comment No	From Page	From Line	To Page	To Line	Comment	Response
49550	22	5	22	6	As said above, it is important to state explicitly the additionality criterion of bioenergy provision, otherwise it will counteract the carbon storage increases. [Karlheinz ERB, Austria]	Not applicable - The headline statement has been dropped. Also, the whole paragraph has been completely rewritten. New section C3.3 now says: "Transitions in global and regional land use are required to limit warming to 1.5°C. Such transitions require integrative policies to sustainably manage competing demands on land for human settlements, food, livestock feed, fibre, bioenergy, carbon storage, biodiversity and ecosystem services. This may include sustainable intensification of land use practices, enhanced agricultural productivity and diet changes. Such options are often limited by institutional, environmental and socio-cultural feasibility, though experiences show that these constraints can be overcome (high confidence)."
10228	22	6	22	6	There is no link between sub-surface carbon storage and the information in this section [Saudi Arabia]	Accepted - The headline statement has been dropped. Also, the whole paragraph has been completely rewritten. New section C3.3 now says: "Transitions in global and regional land use are required to limit warming to 1.5°C. Such transitions require integrative policies to sustainably manage competing demands on land for human settlements, food, livestock feed, fibre, bioenergy, carbon storage, biodiversity and ecosystem services. This may include sustainable intensification of land use practices, enhanced agricultural productivity and diet changes. Such options are often limited by institutional, environmental and socio-cultural feasibility, though experiences show that these constraints can be overcome (high confidence)."
10956	22	6	22	6	There is no link between sub-surface carbon storage and the information in this section [Nedal KATBEHBADER, Switzerland]	Accepted - The headline statement has been dropped. Also, the whole paragraph has been completely rewritten. New section C3.3 now says: "Transitions in global and regional land use are required to limit warming to 1.5°C. Such transitions require integrative policies to sustainably manage competing demands on land for human settlements, food, livestock feed, fibre, bioenergy, carbon storage, biodiversity and ecosystem services. This may include sustainable intensification of land use practices, enhanced agricultural productivity and diet changes. Such options are often limited by institutional, environmental and socio-cultural feasibility, though experiences show that these constraints can be overcome (high confidence)."
30166	22	6	22	6	« a need for a large volumes » : Quantitative figures of the need for large volumes of sub-surface carbon storage should be indicated. [France]	Not applicable - Because we agree that this was an unfortunately formulated paragraph, the whole text has been substantially changed and the volumes of land and subsurface storage dropped from the text.
30168	22	6	22	6	Carbon storage is not defined, but in the sequestration definition, it looks like it includes the agricultural practices that increase soil carbon. Why not use "sequestration" instead? [France]	Noted - however, storage of carbon (whether geologically or biogenically) is used in the context of CDR throughout the literature.
34800	22	6	22	6	The sentence which states 'There is also a need for large volumes of sub-surface carbon storage' appears to be inaccurate and does not align with other parts of the SPM and the wider IPCC report, which states that carbon storage can be afforestation (above surface) and/or BECCS (sub-surface). The words 'sub-surface' must be removed in order for this sentence to be accurate. For example page 18 of the SPM states: 'All 1.5oC pathways include the option of CO2 removal measures such as afforestation and/or biomass energy with carbon capture and storage (BECCS).' Page 18 of the SPM also notes that some scenarios do not deploy BECCS at all. Chapter 2 (page 6 and 117) also covers this topic and notes that the scenarios without BECCS focus on forests. For example, Chapter 2 states that 'Scenarios without BECCS instead focus on land-based CDR methods, such as afforestation' (page 6). The sentence should either be edited to remove 'sub-surface' or afforestation should be mentioned. [Helena Wright, United Kingdom (of Great Britain and Northern Ireland)]	Accepted - Because we agree that this was an unfortunately formulated paragraph, the whole text has been substantially changed and subsurface storage has been dropped from the text.
46472	22	6	22	6	the statement that large volumes of sub-surface carbon storage would be needed does not seem to be consistent with the statement on page 18 SPM line 30 that some scenarios do not use BECCS [Sven Harmeling, Germany]	Accepted - Because we agree that this was an unfortunately formulated paragraph, the whole text has been substantially changed and subsurface storage has been dropped from the text.
49552	22	6	22	6	Can the "large volumes" be specified, or some indication given (e.g. x% of current annual emissions from fossil fuels)? [Karlheinz ERB, Austria]	Not applicable - Because we agree that this was an unfortunately formulated paragraph, the whole text has been substantially changed and the volumes of land and subsurface storage dropped from the text.
46228	22	6	22	7	Why is underground storage included under land-use change? Suggest to drop here as irrelevant, not consistent with (avoided) extraction of fossil energy (coal, oil, gas). [Netherlands]	Accepted - subsurface storage has been dropped from the land HS.
50426	22	6	22	6	The headline statements of 3.4 need to mention serious problems posed by BECCS. Therefore, write: "carbon storage. There are also issues related to regulation, legal frameworks, international trade, liability, prices, large surfaces, large volumes of ...". [Switzerland]	Not applicable - the headline statement has been dropped in this form.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
56522	22	6	22	6	There should be a caveat on this like "likely require". Do all scenarios really require large scale carbon storage? Or better would be to move this sentence to be subpoint, instead of main highlighted point. [Eleanor Johnston, United States of America]	Not applicable - Because we agree that this was an unfortunately formulated paragraph, the whole text has been substantially changed and the volumes. New section C3.3 now says: "Transitions in global and regional land use are required to limit warming to 1.5°C. Such transitions require integrative policies to sustainably manage competing demands on land for human settlements, food, livestock feed, fibre, bioenergy, carbon storage, biodiversity and ecosystem services. This may include sustainable intensification of land use practices, enhanced agricultural productivity and diet changes. Such options are often limited by institutional, environmental and socio-cultural feasibility, though experiences show that these constraints can be overcome (high confidence)."
9170	22	7			Please change "and and" to "and" [Marco Turco, Spain]	Editorial - copyedit to be completed prior to publication
17796	22	7	22	8	Duplication. One of two 'regional climate's needs to be deleted. [Republic of Korea]	Editorial - copyedit to be completed prior to publication. Second regional climate to be removed
43980	22	7	22	8	regional climate is duplicated. [Seita Emori, Japan]	Editorial - copyedit to be completed prior to publication. Second regional climate to be removed
46230	22	7	22	9	the second part of 4.3 is too genaral to have any meaning; messages need to be separated out [Netherlands]	Noted. To be addressed in the SPM FGD
49554	22	7	22	9	dietary patterns are part of food systems, and I wonder why livestock systems are not mentioned. Livestock fulfills many services and functions, in particular in countries of the South, and these context/regional specificities are important. reformulate e.g. to "food systems, including dietary patterns, livestock systems and their manifold roles in society-nature interactions. [Karlheinz ERB, Austria]	Accepted - text revised. Livestock systems to be included in the SPM FGD
30170	22	9	22	9	As political objectives, the SDGs should not be put on the same level with environmental services [France]	Noted. The linkage that is sought to be made is between the options and the SDGs, with a range of other drivers Clearer drafting in the SPM FGD may address this
6920	22	12	22	34	It would be helpful for the reader if the changes in agriculture triggered by mitigation, adaptation and CO2 removal activities are described within the broader context of sustainable development, delivering food and fibre for a significant larger population and the changes in diets in major countries such as China. It might helpful to refer to other assessment reports, e.g. those from IPBES. [Klaus Radunsky, Austria]	Accepted. If relevant this would be best placed in the underlying chapters and probably not in the SPM that takes a global and systemic view
9054	22	12	22	39	This should be put into context: changes in agriculture triggered by mitigation, adaptation and CO2 removal activities should be described in context of sustainable development, in particular the possible effects on food production between 1,5°C and 2°C pathways. [Luxembourg]	Taken into account. This is the SPM Much of this underlying dynamic is dealt with in detail in Ch 3, 4 and 5
11414	22	12	22	34	How much of this would also apply to 2°C? [United Kingdom (of Great Britain and Northern Ireland)]	Noted. The dynamics would be similar, but the extent of the impacts may be much more as outlined in Ch 3 Quantification may be very difficult given the current literature base
30172	22	12	22	12	The land-use and ecosystem transitions refered to in this sentence should be better explained, with quantative figures of the involved areas. [France]	Noted. Difficult in the context of 15C Evidence limited See confidence statements
43842	22	12	22	12	This rules out biomass combustion due to adverse impacts and losses regarding agricultural land and ecosystems. [Peter Carter, Canada]	Noted. The SPM and the Chapters assess the question of multidimensional feasibility and trade-offs in some detail Pl refer to Ch4 for an evidence based response to this hypothesis
50056	22	12	22	34	The bullets under the (modified) 4.3 headline are not covering the key issues. I suggest to add a bullet on sustainable biomass, one on forests and one on soil carbon enhancement. The fourth bullet on agricultural practices should include the need for productivity increase of crops and the connection to diets should be spelled out in more detail, referring to the shift from meat and dairy to plant based protein and the freeing up of land. [Bert Metz, Netherlands]	Noted. To be considered in SPM FGD edit
11416	22	14	22	14	Change to: "significant and rapid changes…" [United Kingdom (of Great Britain and Northern Ireland)]	Accepted - text revised. Text to be altered in the SPM FGD
29232	22	14	22	17	What is exactly meant by "ecosystem health"? Please add "loss of biodiversity and habitat". Ecosystem health is not sufficient to describe the potential loss of biodiversity and habitat by changes of agric. and forest systems. [Germany]	Taken into account - text revised. This text has changed substantially, but care has been taken not to use the term "ecosystem health" and to use the term biodiversity directly. The new text reads as follows: "Such transitions require integrative policies to sustainably manage competing demands on land for human settlements, food, livestock feed, fibre, bioenergy, carbon storage, biodiversity and ecosystem services."
49556	22	15	22	16	These impacts on livelyhoods are not only mediated via ecosystem health implications, but also simply via land-use competition (and access to ecosystem services by population groups), which should be mentioned. [Karlheinz ERB, Austria]	Taken into account - text revised. This text has been changed considerably, but care has been taken to integrate the idea of land use competition affecting livelihoods etc. The new text reads as follow: "Transitions in global and regional land use are required to limit warming to 1.5°C. Such transitions require integrative policies to sustainably manage competing demands on land for human settlements, food, livestock feed, fibre, bioenergy, carbon storage, biodiversity and ecosystem services."
11418	22	19	22	2	this is a pretty generic statement. What exactly are you trying to convey here? [United Kingdom (of Great Britain and Northern Ireland)]	Not applicable - text no longer exists.
19030	22	19	22	2	what are the implications of this? Please elaborate. [Andrea TILCHE, Belgium]	Not applicable - text no longer exists.
19258	22	19	22	2	explain why Biophysical climate feedbacks of land use change are not considered [Spain]	Not applicable - text no longer exists.
21636	22	19	22	2	What is the point been made here? Should state the implications of the fact. [Sweden]	Not applicable - text no longer exists.
30174	22	19	22	2	Some explanations on the consequences of the non-consideration of biophysical climate feedback of land use change should be given: what is underestimated or overestimated? [France]	Not applicable - text no longer exists.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
31262	22	19	22	19	It would be very helpful for policy makers if examples of biophysical climate feedbacks - (e.g., changes in land evaporation or surface albedo) - could be included, as provided in the executive summary of Chapter 3 (3-9 line 2). [Japan]	Taken into account. Maybe more appropriate to leave them in Chapter summaries as relevant policy instruments may not be available to all countries
38988	22	19	22	19	I suggest adding "and global" after regional. [Jan Fuglestvedt, Norway]	Accepted - text revised. Text to be changed in the SPM FGD
49558	22	19	22	2	Biophyisical impacts of land use can be massive and encompass land cover changes as well as land modifications (the latter being of ignored; Luyssaert et al. 2014, doi 10.1038/nclimate2196, Erb et al., 2016, doi 10.1111/gcb.13443) - why are these impacts not taken into account. At least, the reason should be given and substantiated (e.g. are not important, are fuzzy, are currently not quantifiable), or, better, the impact evaluated. [Karlheinz ERB, Austria]	Not applicable - text no longer exists.
59338	22	19	22	22	This is a categorical statement which may not be true in all cases. Suggest qualifying the statement. [United States of America]	Not applicable - text no longer exists.
59340	22	19	22	19	This first sentence seems much more firmly asserted than seems reasonable. Fine to say that 'local to regional changes in land use can be an important contributor to the local to regional changes that will be experienced in the future' but the latitudinal, geographic, and orographic influences on the climate are what really allows for the type of land cover that occurs. Because these influences remain largely consistent, changes in land use (or really land cover) can have an influence, but it is not clear that "land use" (by humans) is a key determinant of regional climate (except maybe in the few percent of the area used for major urban areas). A more nuanced statement is needed. [United States of America]	Not applicable - text no longer exists.
59342	22	19	22	2	True, but it needs to be added that such feedbacks are generally a good bit smaller than the global influence being exerted by changes in GHG concentration. Basically, it needs to be indicated what the relative size of this omission is. [United States of America]	Not applicable - text no longer exists.
50428	22	2	22	2	The correct reference is 3.6.2.1. [Switzerland]	Not applicable - text no longer exists.
29616	22	22	22	22	Agriculture, forestry and other land use mitigation options >>>> Mitigation options in land use e.g. in agriculture and forestry that take into account… [Finland]	Revised draft reorganised texts and rephrased messages substantially and the sentence deleted.
30176	22	22	22	25	This sentence seems tautological: "if sustainable development concerns are taken into account... there are synergies with Sustainable Development Goals"... [France]	In revised draft sentence removed.
30178	22	22	22	25	For agriculture, agro-ecology is an example that could be mentioned. [France]	Sentence deleted.
49560	22	22	22	25	This sounds obvious if not tautological ("options that take sustainability goals into account provide large synergies with sustainable development goals.". A more pointed, message-bourne statement would be more adequate for the SPM. E.g. "considerable potentials exist with options that are in line with SDGs, in particular in rural areas of developing countries". And I wonder if not the same is true for industrialized countries, too. [Karlheinz ERB, Austria]	Sentence removed. Figure deleted and new simplified figure added SPM4.
59344	22	22	22	34	These statements have no specific relevance to 1.5°C pathways, vis a vis any other climate scenario. Suggest rewriting to clarify specific issues related to 1.5°C scenarios, or removing. [United States of America]	Taken into account. Derived from 15 C specific feasibility assessment PI see the underlying sections in Ch4
44668	22	23	22	23	Should this not be "… local people's rights and needs, biodiversity …"? Ample citations from the Mary Robinson Foundation and others to suport this. [Penny Urquhart, South Africa]	Accepted - text revised. Text to be altered in SPM FGD
9056	22	26	22	33	The feasibility and limits of using BECCS as negative emissions technology should be more clearly described in this paragraph. [Luxembourg]	Rejected - These statements are about adaptation and not BECCS. The relevant dimensions of concern with respect to the feasibility of CDR are included in C2.1.
16578	22	27	22	29	Bullet point reflects adaptation strategies. Suggest moving it under section 4.7 [Valentin Foltescu, France]	Rejected - Headline statement related to adaptation options
30180	22	27	22	29	This bulletpoint should be rephrased as it is not so clear whether irrigation is part of conservation agriculture or a specific option. [France]	Accepted. Irrigation is not specifically part of conservation agriculture. See Glossary definition - to be inserted
30182	22	27	22	29	« conservation agriculture, efficient irrigation, and mixed-crop-livestocfk systems » Agro-ecology, including agro-forestry, could be mentioned. [France]	Accepted - text revised. Agroforestry has been added to the FGD.
30184	22	27	22	27	It would be relevant to define the principles of conservation agriculture in the Glossary :for the FAO: (i) Continuous minimum mechanical soil disturbance.(ii) Permanent organic soil cover. (iii) Diversification of crop species grown in sequences and/or associations. ==> irrigation is not specifically part of conservation agriculture [France]	Accepted. To add to Glossary
30186	22	27	22	29	Please include climate services that are widely described in section 4.3.3 [France]	Accepted - added 'climate services'
46232	22	27	22	29	there is a need for a separte key message on the potential contribution of dietal change to mitigating GHG emissions, the space for enhancing CO2 removal and - more generally - reducing pressure on land [Netherlands]	Noted. Not strongly supported as a headline level message by the 1.5C specific literature
51180	22	27	22	29	Agroecology as an effective mitigation and adaptation strategy should receive great attention here. [Linda Schneider, Germany]	Accepted - text revised. Agroforestry has been added to the FGD.
55820	22	27	22	29	This section should include the assessment of the options listed (4.3.3) and the assessment figures, comparing them (4.5.2), together with their synergies and trade-offs. [Debora Ley, Guatemala]	Noted. Accept, included in the final plenary approval draft.
58644	22	27	22	27	conservation agriculture - is this a universally understood set of practices? Suggest referring to definition in glossary or chapter. [New Zealand]	Accepted. To add to Glossary

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59346	22	27	22	29	Section 4.3.3. does not provide support for this key conclusion. It simply restates the same premise. If this is going to be a conclusion, an analysis of the literature in the section itself is required, rather than just an additional assertion of the same conclusion, absent supporting information and discussion. [United States of America]	The reviewer is right about section 4.3.3 not providing support to what is the SPM text (pg 22, lines 27-29). This is because the supporting text is in section 4.2.2 and not 4.3.3. This mistake in the SPM is probably related to the changes made in the chapter for when sections changed numbers during the final modifications. Section 4.2.2 in Chapter 4 has the full text and references regarding issues associated with Land Change transitions, i.e., Agricultural Ecology, Behavioral Change, Irrigation, Food wastage, etc. Section 4.3.3 is about urban issues and mostly unrelated to the above issues.
30188	22	28	22	29	The topic of food waste could be added along "Behavioural change around diets" [France]	Noted. Is linked in the underlying chapter
30190	22	28	22	29	{4.4.5} does not specifically address agricultural practices, reference to remove ? [France]	Accepted - text revised. {4.4.5} reference to be removed
40764	22	28	22	28	Make limits to adaptation explicit. Suggest rewording to include 'up to a point' after ' … effective adaptation strategies." [Liese Coulter, Australia]	Rejected. See response to comment 51184
49304	22	28	22	29	Here the SPM correctly identifies behavioural change around diets as something that would reduce emissions and pressure on land, but in chapter 4 (4.3.3.1) this is not adequately covered, rather dietary shifts are dealt with as an adaptation option and mitigation options are limited to reducing food waste, bioenergy and biotechnology (and there is some confusion between what is considered to be adaptation vs. mitigation) [Bill Hare, Germany]	Noted. This reflects some of the contradictions in the underlying literature
49562	22	28	22	29	mixed crop-livestock systems alone are not, or not all mixed livestock systems are necessarily effective; see e.g. land competition issues, issues of animal welfare, desease risk, etc. Furthermore, local contexts are important here, sometimes ruminants in grazing only systems are a powerful mean to broaden the resource base of society and thus increase food security (e.g. Schader et al. 2015, doi 10.1098/rsif.2015.0891, Erb et al, 2016 doi 10.1038/ncomms11382.) A more nuanced, specific statement is needed. Furthermore, the changes in diets could be specified (reduction of animal products in Western diet patterns, reduction in the share of highly refined food, reduction in food waste) - and this could also yield health co-benefits(Tilman and Clark, 2014, doi 10.1038/nature13959) [Karlheinz ERB, Austria]	Noted. Detail that could be considered in the underlying chapter if appropriate
55404	22	28	22	29	This single line is almost the only statement in the SPM about mitigation options for non-CO2 emissions from the land-sector (apart from one other statement on page 26, which is largely devoid of substance). That is despite the SPM elsewhere making clear that reducing non-CO2 emissions is a critical element of 1.5 degree pathways, and despite agriculture contributing a large share of non-CO2 emissions. There is a gaping hole in this assessment with regard to mitigation from agriculture that ihn my view does not meet the IPCC criteria of a comprehensive and balanced assessment. See more detailed comments on chapter 4. [Andy Reisinger, New Zealand]	Accepted - text revised. To be picked up in the Special Report on Land Use Co-chairs to decide on cross-referencing
11420	22	29	22	29	could 'behavioural change around diets' be made more explicit so that it means something more direct and targeted, e.g. 'reduced meat consumption (particularly beef)' - the point may be lost on some policymakers. [United Kingdom (of Great Britain and Northern Ireland)]	Noted. Difficult because of the diversity of drivers in different regions of the world
11422	22	31	22	34	Generic statement. Any difference between 1.5 and 2 degrees on this point? [United Kingdom (of Great Britain and Northern Ireland)]	Taken into account. This is based on underlying literature highlighting the need of overarching adaptation options to build resilience with any temperature increase.
36328	22	31	22	34	Consider adding - However, cost of adaptation with mitigation-cobenifits need to be incetivized, particularly to the small and marginal farmers. [India]	There is not sufficient literature at the moment.
40878	22	31	22	34	Consider adding…however, cost of adaptation with mitigation-cobenifits need to be incetivized, particularly to the small and marginal farmers. [NARESH KUMAR SOORA, India]	There is not sufficient literature at the moment.
55822	22	31	22	34	Overarching adaptation options refer to adaptation options that apply to energy, land use, urban, and industrial transitions, therefore, this should not be listed here only under land-use. This bullet should include the adaptation options assessed in 4.3.3, including the assessment figures of 4.5.3, and indicating syenrgies and trade-offs [Debora Ley, Guatemala]	Accepted - text revised. To be considered in SPM FGD revision
59348	22	31	22	34	This statement seems out of place under 4.3 and might be better placed under one of the following sections that is focused more on adaptation. [United States of America]	Taken into account. See response to Comment 55822
51290	22	32	22	32	In the statement "investing in health, social safety nets", "health" may be replaced with "health care", "public health" or "human health". [Muhammad Latif, Pakistan]	Accepted - text revised. Human health can be considered in the SPM FGD revision
19032	22	33	22	33	Please insert "(…) ecosystem- and (…)" between "risk management" and "education-based". It is important to underline the connection between climate change and nature in adaptation measures. This is indeed consistent with SDGs. [Andrea TILCHE, Belgium]	The link between climate change and nature in adaptation measures is present in the adaptation options assessed in Ch. 4 and is further strengthened in Ch. 5. Overarching adaptation options are now discussed in Section B.
48630	22	35	22	4	Suggest clarifying what type of innovation you are referring to. Is it technological innovation? Or innovation in policies, financing, tehcnologies and governance? If it's the latter, than technologies should be mentioned earlier. [Yamina Saheb, France]	Noted. This is signalled in the Glossary term.
1532	22	36			Replace "Limiting global warming OF 1.5°C …" with "Limiting global warming TO 1.5°C …" [David Wratt, New Zealand]	Accept
34384	22	36			As written it sounds like limiting global warming to 1.5C implies the need for transformational adaptation, whereas not doing so does not require transformational adaptation. Limiting global warming to 1.5C would require less adaptation than any other plausible warming scenario. [Nathan Gillett, Canada]	Accepted. Text has been revised
6922	22	36	22	36	It is suggested to substitute "of" by "to". [Klaus Radunsky, Austria]	Editorial - copyedit to be completed prior to publication

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30192	22	36	22	37	Use of the term “strategy” would be appropriate here. Proposal : “Limiting global warming to 1.5°C implies setting up Climate strategies based on transformational adaptation and mitigation [….] [France]	Rejected as doesn’t clarify text
31264	22	36	22	37	Usually, holding global warming to below 1.5°C requires small adaptation needs compared to substantial global warming as pointed above. Define what is "transformational adaptation". [Japan]	Rejected as transformational adaptation is defined in the glossary
36330	22	36	22	36	Replace 'of' by "to' after global warming [India]	Editorial - copyedit to be completed prior to publication
36936	22	36	22	37	Usually, holding global warming to below 1.5°C requires small adaptation needs compared to substantial global warming as pointed above. [Keigo Akimoto, Japan]	Rejected. This comment is a duplication of the above
38990	22	36	22	38	While "transformational adaptation and mitigation" may have a clear meaning to some, I am afraid that this is not clear to many of the SPM's target audience. I hope you can look for alternative wording that can reach a lager audience. [Jan Fuglestvedt, Norway]	Rejected as transformational adaptation is define in the glossary
49026	22	36	23	48	This section should address adaptation more fully, and the need for transformational adaptation in particular should be more fully elaborated. [David Waskow, United States of America]	Taken into account - text revised. Transformational adaptation is discussed under D6.1
50058	22	36	22	39	This headline is supposed to reflect the key messages on governance, capacity and policy needed to deliver the 1.5 consistent pathways. It does not do that yet. When I look at chapter 4, governance is discussed in 4.4.1, capacity in 4.4.2 and there are three different areas for policy discussed in 4.4.3, 4.4.4 and 4.4.5: policy instruments in general (4.4.5), innovation policy (4.4.4) and policy to influence behaviour and lifestyles (4.4.3). It would be appropriate of the headline in the SPM would reflect the massages for all the five areas, using the subsequent bullets to elaborate on these five areas. A possible text could look like " Limiting global warming to 1.5 degrees implies rapid transitions that require effective international, national and local governance arrangements and stakeholder engagement, strengthened capabilities in policy design, regulation and enforcement, and implementation of rigorous policy packages that combine (financial) incentives with mandatory requirements through regulations; the latter component being much stronger than for 2 degree pathways. In addition, innovation policies and policies to influence behaviour have to feature prominently." [Bert Metz, Netherlands]	Accepted. This is now included in Box SPM 1, see definition of enabling conditions. This issues is also discussed under D2
53372	22	36	23	46	Insert a section on feasibility: Dynamic aspects of feasibility, such as the potential of short-term gains from switching from coal to gas which generate lock-in and reduce long-term feasibility must be taken into account. [Kjell Kühne, Mexico]	Taken into account - text revised. Text has been removed - enabling conditions that enhance the feasibility of limiting global warming to 1.5C are now defined in Box SPM 1
58254	22	36	22	36	Perhaps "Limiting glboal warming to 1.5 C". [Peter Marcotullio, United States of America]	Editorial - copyedit to be completed prior to publication
59350	22	36	22	36	It seems that it should be "Limiting global warming to" or "Limited global warming of" [United States of America]	Editorial - copyedit to be completed prior to publication
59352	22	36	22	39	This is a very important statement. However, the last sentence (lines 37-38) is not clear. How is this related to the first sentence? [United States of America]	Accepted. The text has been reorganised. D3.1 discusses the need for incremental and transformational adaptation, while conditions enabling change are now discussed in Box SPM 1 (definition enabling conditions), and under D2
59354	22	36	22	39	It would be helpful to distinguish between mitigation and adaptation here, which have distinct characteristics. [United States of America]	Accepted. The key message is now included in D3, focusing on adaptation.
7430	22	37	22	37	Insert behind "mitigation" "through significantly more far-reaching mitigation policies, especially carbon pricing" [Axel Michaelowa, Switzerland]	Taken into account. D3.1 now only refers to adaptation
40940	22	37	22	38	Insitutional and innovation capabilities are only two of the many limiting factors - there are constraints arising from vested interests, technological, infrastructure lock in, prevalent norms and practices, etc. as mentioned in lines 25-29 on p23 of SPM. [Neelam Singh, United States of America]	Accepted. Relevant enabling conditions are now referred to in Box SPM 1 (definition of enabling conditions) - relevant enabling conditions are also discussed under D2
44670	22	37	22	37	Suggest revising to read "… coherent multi-level governance …" for greater specificity. [Penny Urquhart, South Africa]	Noted. Text no longer included, but we do now refer to strengthened multiple governance in D2.6, and strengthened accountable multilevel governance in D7.2
59356	22	37	22	4	This section could be targeted for streamlining, as it is somewhat repetitive of information contained in SPM section 4.5 on page 24, and is not specific to 1.5 or 2°C scenarios. [United States of America]	Accepted - text revised. The text has been reorganised and revised, repetitive information has been removed
62936	22	38			Box 4.4 The lack of finance is a major obstacle to the implementation of measures [Michelle Mycoo, Trinidad and Tobago]	Accepted. We now list different types of enabling conditions - see box SPM 1, including finance
32636	22	38	22	38	far-reaching (hyphen) (also p23 lines 2-3) [Jonathan Lynn, Switzerland]	Editorial - copyedit to be completed prior to publication
6924	22	41	22	44	The following wording is suggested: In this report the feasibility of limiting warming to 1.5oC is addressed by considering the capacity to achieve a specific goal or target, to integrate considerations of natural systems into scenarios of human systems, and to put technical transformations into the appropriate political, social and institutional context. [Klaus Radunsky, Austria]	Taken into account - text revised. Text has been removed - enabling conditions are now defined in Box SPM 1
11424	22	41	22	44	This paragraph is overly complicated, not clear what it is saying [United Kingdom (of Great Britain and Northern Ireland)]	Accepted. Text has been removed - enabling conditions are now defined in Box SPM 1
29618	22	41	22	44	This paragrap seems introductory; not many paragraphs like this in SPM? [Finland]	Accepted. Text has been removed - enabling conditions are now defined in Box SPM 1
30194	22	41	22	41	We suggest : 'In this report, the feasibility of limiting warming to 1.5 °C is addressed...' [France]	Accepted. Text has been removed - enabling conditions are now defined in Box SPM 1
32156	22	41	22	44	The analysis of 'feasibility' in this report should have been based on Chapter 04. However, the scientific quality of the analysis on this issue in Chapter 04 is very poor and does not provide the basis of a thorough assessment of this question in any form. It is therefore required to limit the application of ‘feasibility’ to elements that can actually be substantiated based on content of the report (geophysical or technological dimensions) and delete the rest. This also applies to cross chapter box 1.3. [Jamaica]	Taken into account. Text has been removed - enabling conditions are now defined in Box SPM 1. Chapter 4 now reports feasibility assessment substantiated by the scientific literature

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32638	22	41	22	44	text could be clearer [Jonathan Lynn, Switzerland]	Accepted. Text has been removed - enabling conditions are now defined in Box SPM 1
36604	22	41	22	44	The analysis of 'feasibility' in this report should have been based on Chapter 04. However, the scientific quality of the analysis on this issue in Chapter 04 is very poor and does not provide the basis of a thorough assessment of this question in any form. It is therefore required to limit the application of 'feasibility' to elements that can actually be substantiated based on content of the report (geophysical or technological dimensions) and delete the rest. This also applies to cross chapter box 1.3. [Snaliah Mahal, Saint Lucia]	Taken into account - text revised. Text has been removed - enabling conditions are now defined in Box SPM 1. Chapter 4 now reports feasibility assessment substantiated by the scientific literature]Taken into account. Text has been removed - enabling conditions are now defined in Box SPM 1. Chapter 4 now reports feasibility assessment substantiated by the scientific literature
40590	22	41	22	44	This bullet point is one long sentence and should be split up. It also does not make grammatical sense and must be reworded for clarity. [Jonny Williams, New Zealand]	Accepted - text revised. Text has been removed - enabling conditions are now defined in Box SPM 1
40766	22	41	22	44	Readability/concise. Suggest rewording to "In this report, the feasibility of limiting warming to 1.5°C is addressed by considering the capacity to achieve a specific goal or target, which requires integrating natural system considerations into human system scenarios and placing technical transformations into their political, social, and institutional context." [Liese Coulter, Australia]	Accepted. Text has been removed - enabling conditions are now defined in Box SPM 1
50060	22	41	23	4	The bullets need to reflect in a systematic manner the various points about governance, institutional capabilities and policy (see my comment on the headline text above). The first bullet is vague and too academic; I strongly suggest to delete it. I would start the bullets section with messages on governance and institutional capabilities. Some text from the last bullet (line 42) could be useful here, particularly the point about power asymmetry, but the more important are the points made in section 4.4.1 of chapter 4 on the importance of having a good integration of international, national and local governance (emphasising that cities for instance can act more quickly than national governments) and strong engagement with stakeholders (essential for getting the support from them for implementing rapid transition). Ch 4.4.1 should be improved to make the key lessons stand out better. [Bert Metz, Netherlands]	Noted. Text no longer included in SPM
55826	22	41	22	41	Feasibility should be described following the feasibility dimensions of Ch. 1 and that were applied to all options of Ch. 4. and described in greater detail in 4.5.2 and 4.5.3. The description of feasibility here seems very limited compared to the work actually done. [Debora Ley, Guatemala]	Accepted. Text has been removed - enabling conditions are now defined in Box SPM 1
59358	22	41	22	44	This section could be targeted for streamlining. Contextual statements should be in the introduction and not on page 22. [United States of America]	Editorial - copyedit to be completed prior to publication. Text has been removed - enabling conditions are now defined in Box SPM 1
38992	22	42	22	42	Do you need both words "goal" and "target"? I think the former is enough. [Jan Fuglestvedt, Norway]	Accepted. Text has been removed - enabling conditions are now defined in Box SPM 1
30196	22	43	22	44	Better to formulate this like: "requiring technical, institutional, behavioural and financial transformations at the local and global levels." [France]	Taken into account - text revised. Text has been removed - enabling conditions are now defined in Box SPM 1
50430	22	43	22	43	Write: "… human systemsscenarios according to sustainable development, the placement …". [Switzerland]	Taken into account - text revised. Text has been removed - enabling conditions are now defined in Box SPM 1
30198	22	44	22	44	{4.5.4} deals with sustainable development. Maybe a reference should be added? [France]	Taken into account - text revised. Text has been removed - enabling conditions are now defined in Box SPM 1
9092	22	46	22	47	This sentence about institutions in "Least Developed Countries" is somehow misleading. Institutions in Europe and Northern America don't know how to curb their emission by 5 or 10. In this regards, they are not more able to solve the problems, and it should not be suggested. [Frédéric Durand, France]	Taken into account - text revised. Text has been removed
29234	22	46	23	4	Please also consider that enhanced institutional capabilities, "cross-institutional partnerships and multi-scale communication can also facilitate the development of policy pathway for transformation in complex decision making contexts" (as found in Ch5, p62, ll 50-52). [Germany]	Not Applicable - no longer included in the chapter
30200	22	46	22	46	« Strange way to put it. "are" make it sound like it is in their essence. Suggestion: "are currently", "could improve". » Strange way to put it. "are" make it sound like it is in their essence. Suggestion: "are currently", "could improve". [France]	Taken into account - text revised. Text has been removed - enabling conditions are now defined in Box SPM 1
53366	22	46	23	4	Reconsider this paragraph. It could be read as "LDCs" are an obstacle to a 1.5° pathway. However, on a global scale LDCs contribute next to nothing to emissions and thus while equity concerns may make it more difficult to implement certain measures there, they will not become a significant obstacle to a global 1.5° pathway. [Kjell Kühne, Mexico]	Not Applicable - no longer included in the chapter
59360	22	46	23	11	This information is not specific to 1.5 or 2°C scenarios and should be removed or based upon information specific to these scenarios. [United States of America]	Not Applicable - no longer included in the chapter
43982	22	47			and is duplicated. [Seita Emori, Japan]	Editorial - copyedit to be completed prior to publication
17798	22	47	22	47	Duplication. One of two 'and's needs to be deleted. [Republic of Korea]	Editorial - copyedit to be completed prior to publication
19034	22	47	22	47	Please add "(but not only)" after "particularly". Explanation: the SDGs are universal; the transition to sustainable development is needed both in developed and developing countries. While some developed countries are further advanced than others, the economic paradigm shift is happening in many bottom-up activities but is still largely missing in the mainstream politics, including in developed countries. This is a message that should reach policy-makers of developed countries. [Andrea TILCHE, Belgium]	Taken into account - text revised. Text has been removed
30202	22	47	22	47	Wording: « and and » Delete the repetition [France]	Editorial - copyedit to be completed prior to publication
36332	22	47	22	47	Delete "and". Used twice [India]	Editorial - copyedit to be completed prior to publication

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38476	22	47	22	47	Please delete repeated word "and".Thank you [Linah Ababneh, United States of America]	Editorial - copyedit to be completed prior to publication
40592	22	47	22	47	Repetition of the word 'and' needs to be changed. [Jonny Williams, New Zealand]	Editorial - copyedit to be completed prior to publication
44108	22	47	22	47	reads and and deleate one of them [Moshe Kinn, United Kingdom (of Great Britain and Northern Ireland)]	Editorial - copyedit to be completed prior to publication
56526	22	47	22	47	delete second "and" [Eleanor Johnston, United States of America]	Editorial - copyedit to be completed prior to publication
57918	22	47	22	47	There is a duplicate “and and” in the phrase “Least Developed Countries and and among." [Siir KILKIS, Turkey]	Editorial - copyedit to be completed prior to publication
59362	22	47	22	47	Remove redundant "and" [United States of America]	Editorial - copyedit to be completed prior to publication
59364	23	1	23	46	No mention of the need for innovations in science, engineering, and policy. New innovations are needed to reach goals and associated reductions in emissions. [United States of America]	Taken into account - text revised. Text in question no longer in SPM, and greater focus on innovation in new text
13306	23	6	23	8	Replace "affected by the reduced use of fossil fuels necessary to meet ambitious climate goals, despite multiple other sustainable development benefits" with "disproportionally affected by future needs to restrict the use of fossil fuels via stranded assets, unusable resources under the ground, lower capacity use, early phase out of large infrastructure already under construction under stringent cimate goals and higher carbon prices". [Eleni Kaditi, Austria]	Not Applicable - no longer included in the chapter
19036	23	6	23	11	Text sounds overly negative, whereas the OECD report “Investing in Climate, Investing in Growth” highlights that oil rich countries can also benefits from the transition with successful economic diversification. Besides, it is unclear whether this assertion is about response measures in general or additional measures for a 1.5°-consistent response. [Andrea TILCHE, Belgium]	Taken into account. Text in question no longer in SPM, with suggestion addressed in new text
30204	23	6	23	11	Woud it be possible to insert : "There are emergent opportunities for energy price reforms, energy efficiency, turning emissions in valuable products, and deployment of renewables and other clean technologies, if accompaniedwiith appropriate policies and in the context of economic diversification" Chapter 5, Box 5.2, p.53 lines 31-34. [France]	Taken into account. Text in question no longer in SPM, with suggestion addressed in new text
32640	23	6	23	11	could mention export diversification too? [Jonathan Lynn, Switzerland]	Taken into account. Text in question no longer in SPM, with suggestion addressed in new text
43844	23	6	22	11	• Economies dependent upon fossil fuel-based energy generation and/or export revenue will [not] be affected by the reduced use of fossil fuels necessary to meet ambitious climate goals, [except for large environmental pollution benefits and economic and employment growth in good jobs in the new clean energy industries], [Peter Carter, Canada]	Not Applicable - no longer included in the chapter
45908	23	6	23	7	This may not be fully the case since if these economies start developing activity to support a transition to low-carbon energy sector, they may offset the losses by the establishment of new industries. [Deger Saygin, Turkey]	Not Applicable - no longer included in the chapter
49306	23	6	23	11	Include a statement referring to benefits of renewable energy for energy security, access, independence of imports as well as other cobenefits for many countries who depend on energy imports for fossil fuel use [Bill Hare, Germany]	Noted. This is not the place, it's done in the final section of the chapter/report.
50070	23	6	23	29	The policy part of the bullets section should first provide messages on policy packages in general and then follow with specific messages about innovation policy and policy to influence behaviour. That means starting with the (modified) bullets 4 and 5 that address the policy packages. The main messages there are (drawing from 4.4.5) that all available policy instruments are needed, both providing (financial) incentives, such as carbon pricing and climate friendly infrastructure investments and policies that require mandatory action, such as standards, technology requirement like mandatory CCS on coal plants and controls on car ownership (as done in China, illustrated in box 4.8). These mandatory requirement are much more important in 1.5 degree pathways than in 2 degree pathways, because the time for deep reduction is much shorter. A second key message on policy packeges in general is the huge importance of policies to facilitate a "just transition" (now in the bullet on line 6 of page 23 only for fossil fuel dependent countries; this needs to be broadened to all countries and the termm "just transition" to be added), something that is crucial for 1.5 degree strategies. The section on policy packages can then be followed by some bullets on innovation policy. A problem is that chapter 4.4.4 is not very specific about our knowledge on effective innovation policy. The points made in 4.4.4.3 about "technology push" versus "demand pull" are useful for the SPM, but then need to be elaborated after chapter 4 extends the discussion on effective innovation policy. The point made in 4.4.4.3 about using industrial policy to promote climate friendly innovation, rather than using climate policy is also something for the SPM. [Bert Metz, Netherlands]	Taken into account. Text in question no longer in SPM, with suggestion addressed in new text
52984	23	6	23	8	This could be seen as referring to just national economies, while communities etc would also be impacted [Ireland]	Not Applicable - no longer included in the chapter
56528	23	6	23	11	Suggest pairing this point with a point about the benefits of 1.5 on economic growth (e.g., clean energy jobs). Or rewording to cast in a more positive light. E.g., Fossil fuel dependent economies will need to seek opportunities for reskilling the workforce as demand for fossil fuels declines in 1.5 scenarios. [Eleanor Johnston, United States of America]	Taken into account. Text in question no longer in SPM, with suggestion addressed in new text
11020	23	7	23	7	reduced use of unabated fossil fuels necessary to meet ambitious climate goals [Wilfried Maas, Netherlands]	Not Applicable - no longer included in the chapter
11426	23	7	23	8	What are these other benefits? How do they compare in scale to the negative impacts? [United Kingdom (of Great Britain and Northern Ireland)]	Not Applicable - no longer included in the chapter
6988	23	8	23	9	Replace the word supplementary with " transition towards green policies" [Flintull Annica Eriksson, Sweden]	Not Applicable - no longer included in the chapter

Comment No	From Page	From Line	To Page	To Line	Comment	Response
13308	23	8	23	11	Replace "There is a need for supplementary policies, including retraining, to ease job losses and the effects of higher energy prices, when they occur, particularly in developing countries where the workforce is largely semi- or unskilled (very high confidence)" with "Whether or not side-effects materialize, and to what extent side-effects materialize, will be case- and site-specific, as they will depend on local circumstances and the scale, scope, and pace of implementation." [Eleni Kaditi, Austria]	Taken into account. Text in question no longer in SPM, with suggestion addressed in new text
30206	23	9	23	9	We think this "retraining" applies only to job losses, not to "the effects of higher energy prices". But the commas in the sentence as not well placed, they should be after "job losses". [France]	Not Applicable - no longer included in the chapter
30208	23	9	23	9	“Job losses” The impact on employment is not always clear. Does “job losses” mean net losses and increase in unemployment, or job shifts (e.g. from thermal power plants to variable renewable). Socio-political implications can be very different. Is it possible to assess the job potential of the 1.5°C target? [France]	Not Applicable - no longer included in the chapter
45910	23	9	23	9	Is it `when` or `if`, please double check. [Deger Saygin, Turkey]	Not Applicable - no longer included in the chapter
19038	23	1	23	1	Supplementary policies are needed “particularly in developing countries where the workforce is largely semi- or unskilled”: the critical factor is “where the workforce is largely semi- or unskilled”, whether in a developed or developing country. Therefore “in developing countries” should be deleted. [Andrea TILCHE, Belgium]	Taken into account. Text in question no longer in SPM, with suggestion addressed in new text
11130	23	13	23	16	Some repetition with SPM-21 lines 19-24 [Denmark]	Not Applicable - no longer included in the chapter
11428	23	13	23	16	Is this specific to 1.5°C? [United Kingdom (of Great Britain and Northern Ireland)]	Not Applicable - no longer included in the chapter
13310	23	13	23	14	Delete the text ", including carbon pricing mechanisms and regulation,". [Eleni Kaditi, Austria]	Not Applicable - no longer included in the chapter
29236	23	13	23	16	This paragraph is partly redundant with the statement on page 21 line 19-24 [Germany]	Not Applicable - no longer included in the chapter
30210	23	13	23	16	Land-based mitigation options, especially afforestation, should be acknowledged in the portfolio of differnte mitigation policy options. [France]	Accepted. Included in C2.1 in FGD
31266	23	13	23	14	We understand that the key message of this section is the necessity of a broad portfolio of policies. Current text mentions carbon pricing only, but the key message would be more well understood if more variation of policy examples are mentioned. [Japan]	Not Applicable - no longer included in the chapter
31268	23	13	23	16	A broad portfolio of different mitigation policy options is necessary not only for 1.5°C scenario but also for 2°C scenario. Need more accurate diagnoses for 1.5°C pathways. [Japan]	Not Applicable - no longer included in the chapter
37072	23	13	23	24	These two bullet points are both emphasizing a broad range of policy intruments. They should be merged. With regard to line 22-23, like some form of carbon pricing can be necessary but insufficient alone, we could also argue that some form of non-carbon pricing can be ncessary but insufficient alone. Since it is misleading to single out carbon pricing here, these two lines should be removed. [Jun Arima, Japan]	Not Applicable - no longer included in the chapter
59366	23	13	23	16	This point was already made on SPM-21, line 19. [United States of America]	Not Applicable - no longer included in the chapter
63080	23	13	23	16	This is an important statement, but it is very similar to the statement on page 21 lines 19-22: this raises 1) a problem of duplication - only one statement is needed and 2) a potential problem of coherence: why are the statements slightly different? please include the most comprehensive and clear statement. [Belgium]	Not Applicable - no longer included in the chapter
50432	23	15	23	15	Write: "… emission reduction while fostering sustainable development". [Switzerland]	Not Applicable - no longer included in the chapter
29238	23	18	23	23	Please also consider findings from chapter 5 in this statement. Key aspects of policy instruments enabling and promoting change (e.g. on CRDP) also include participatory governance and distributive governance. (see 5.6.4.1) [Germany]	Accepted. Included in FGD - D2.2 reads 'Limiting global warming to 1.5°C requires enhanced action by countries and non-state actors in the next decade'.
31270	23	18	23	23	Options of policy instruments seem to be not providing sufficient information for limiting warming to below 1.5°C . This paragraph should include information on how stringent these policies are. [Japan]	Not Applicable - no longer included in the chapter
40768	23	18	23	2	Readability: Suggest rewording from “Packages of policy instruments targeting key factors enabling and promoting change, working across governance levels and promoting innovation,” to “Packages of policy instruments that target key factors enabling and promoting change, work across governance levels and promote innovation,”. [Liese Coulter, Australia]	Not Applicable - no longer included in the chapter
30212	23	19	23	19	« promoting innovation » Suggestion to add "promoting efficiency and innovation" [France]	Not Applicable - no longer included in the chapter
32642	23	19	23	19	drop comma after innovation [Jonathan Lynn, Switzerland]	Not Applicable - no longer included in the chapter
13312	23	2	23	21	Delete the text ", both price and non-price,". [Eleni Kaditi, Austria]	Not Applicable - no longer included in the chapter
49308	23	2	23	21	This states that "policy instruments...are needed to accerlate the deployment of carbon-neutral technologies" - carbon negative technologies should also be included here. [Bill Hare, Germany]	Not Applicable - no longer included in the chapter
6926	23	21	23	23	The following wording is suggested: Evidence and theory suggests that some form of carbon pricing can be necessary but would be insufficient if implemented in isolation. [Klaus Radunsky, Austria]	Not Applicable - no longer included in the chapter
7432	23	21	23	21	Insert behind "non-price" "including international market mechanisms" [Axel Michaelowa, Switzerland]	Not Applicable - no longer included in the chapter
11430	23	21	23	21	it's not just for carbon neutral technologies, but carbon negative ones too (where the risks of deployment are acceptable) [United Kingdom (of Great Britain and Northern Ireland)]	Not Applicable - no longer included in the chapter
13314	23	21	23	23	Delete the text "Evidence and theory suggests that some form of carbon pricing can be necessary but insufficient in isolation (medium agreement).". [Eleni Kaditi, Austria]	Not Applicable - no longer included in the chapter

Comment No	From Page	From Line	To Page	To Line	Comment	Response
29240	23	21	23	23	Please reformulate the sentence "Evidence and theory suggests that some form of carbon pricing can be necessary but insufficient in isolation" as this formulation is liable to misunderstanding. It implies that carbon pricing in isolation can never be sufficient, but is this also true for a perfectly functioning world-wide carbon market? As long as the carbon price does not reflect real prices, additional instruments can help to achieve the desired transformation, as shown in AR5. But will other instruments really be able to generate the desired transformation without carbon prices reflecting better the real carbon related costs? [Germany]	Not Applicable - no longer included in the chapter
29242	23	21	23	21	Please insert behind "price" "(including international market mechanisms)" [Germany]	Not Applicable - no longer included in the chapter
30214	23	21	23	23	« Evidence and theory suggests that some form of carbon pricing can be necessary but insufficient in isolation (medium agreement). » Maybe redundant with the paragraph above [France]	Not Applicable - no longer included in the chapter
31272	23	21	23	23	Carbon pricing is one of the policy options and it is said that " in practice, the feasibility of a global carbon pricing mechanism deserves careful consideration" as pointed out in 2.5.1. We understand that the key message of this section is the necessity of a broad portfolio of policies. Current text mentions carbon pricing only, but the key message would be more well understood if more variation of policy examples are mentioned. [Japan]	Not Applicable - no longer included in the chapter
32644	23	21	23	22	evidence and theory suggest (not suggests) [Jonathan Lynn, Switzerland]	Not Applicable - no longer included in the chapter
19040	23	22	23	22	Text should read “theory and evidence” rather than “evidence and theory” (epistemology). [Andrea TILCHE, Belgium]	Not Applicable - no longer included in the chapter
29620	23	22	23	23	in isolation' - this may need some clarification [Finland]	Not Applicable - no longer included in the chapter
30216	23	22	23	22	Typo : suggest (not suggest) [France]	Not Applicable - no longer included in the chapter
30218	23	22	23	22	Why only "some form"? Suggest to delete this [France]	Not Applicable - no longer included in the chapter
15586	23	23	25	29	Could be elevated to a High Level Statement in SPM1.2. Possibly added to the fourth headline statement. [Australia]	Noted, barriers and enabling factors are now headline statement D2
19042	23	25	23	29	Not clear how transitioning to adaptation implementation is a barrier to reaching the 1.5 temperature goal. Broadly speaking, and bearing in mind co-benefits, adaptation is a response to climate change impacts, mitigation is what drives the temperature scenarios. [Andrea TILCHE, Belgium]	Not Applicable - no longer included in the chapter
31042	23	25	23	29	Limited understanding on the risks posed by climate change and available adaptation options is also a barrier that is very important in many contexts. [James FORD, Canada]	Not Applicable - no longer included in the chapter
31274	23	25	23	35	We would appreciate if IPCC can clarify differences between 1.5°C and 2.0°C since this seems to be a general statement which is not limited to 1.5 warming world. [Japan]	Noted. Statement has been rephrased in FGD, and line of sight has been extended
40012	23	25	23	25	Is this a new finding? Can something more specific be said? [Kornelis Blok, Netherlands]	Not Applicable - no longer included in the chapter
59368	23	25	23	29	Barriers include ... finance, technology Barriers for finance and technology have specific implications in UNFCCC context such as technology transfer and IPR. A more appropriate framing could be around enabling environments and capacity building, or possibly challenges and/or opportunities. [United States of America]	Not Applicable - no longer included in the chapter
6928	23	26	23	29	The following wording is suggested: Barriers include finance, information, technology, public attitudes, special interests, political will, social values and practices and human resource constraints as well as lack of institutional capacity to strategically use available knowledge, resources and technologies. [Klaus Radunsky, Austria]	Not Applicable - no longer included in the chapter
33886	23	26	23	29	Please consider adding barriers such as knowledge gaps, lack of research funding and lack of political commitment to this section. [Norway]	Not Applicable - no longer included in the chapter
13316	23	27	23	27	Delete the text ", special interests". [Eleni Kaditi, Austria]	Not Applicable - no longer included in the chapter
30220	23	27	23	27	Proposal to add "and behaviours" after "public attitudes" [France]	Not Applicable - no longer included in the chapter
17800	23	28	23	28	It would be clear to delete the first 'and' (before practices). [Republic of Korea]	Not Applicable - no longer included in the chapter
6930	23	31	23	33	It is suggested to delete the first sentence of this paragraph. The reason being that it should be avoided to address specific stakeholders in an IPCC report that has to address issues from a global perspective. The second sentence addresses the legitimate aspect of the potential of changes in behaviour and life style - and this is an important statement, independent of the thinking of some actors in the policy and finance area. [Klaus Radunsky, Austria]	Not Applicable - no longer included in the chapter
33888	23	31	23	35	The second sentence in this bullet point currently reads as a contradiction. If the changes in life-style have only lead to limited emission reductions, how have they promoted effective adaptation behaviour around the world? Perhaps this sentence would need some more explanation or rephrasing? [Norway]	Not Applicable - no longer included in the chapter

Comment No	From Page	From Line	To Page	To Line	Comment	Response
50062	23	31	23	46	The bullet section can then be completed with some bullets on the imporatnce of policies to influence behaviour. The current bullets 7,8 and 9 are rather vague on this and should therefore be strengthened. Looking at section 4.4.3, the follwing messages seem to come through: (1) so far behaviour oriented policy has not been apllied widely and stringently and therefore effects have been limited; (2) behaviour can be influenced by disseminating knowledge on climate change and the relevant technologies and practices to limit it , but account must be taken of values, ideology and worldviews in designing optimal information campaigns; (3) emphasising individual and social benefits can make policies to influence behaviour more effective;(4) people are more likely to change behaviour if they are given the opportunity to make commitments, if they feel they are part of a community effort and if they feel the burden of taking action is fairly shared with business and government; (5) voluntary changes that involve rewards are more effective than imposed changes that restrict choice. I suggest to include these messages in the SPM bullets here. [Bert Metz, Netherlands]	Taken into account - text revised. Text in question no longer in SPM, with suggestion addressed in new text
59370	23	31	23	31	Replace "may" by the appropriate choice from the IPCC likelihood lexicon. [United States of America]	Not Applicable - no longer included in the chapter
46234	23	32	23	32	Please elaborate on which factors affecting behaviour are meant. Especially since the positive message of this sentence sounds unlogical next to the following rather negative sentence. [Netherlands]	Not Applicable - no longer included in the chapter
19044	23	33	23	35	(behaviour and lifestyle related measures have had limited impact): text should be clarified – should the reader infer that there is limited emission reduction potential in these activities (which then contradicts other parts, eg SPM P3L37)? Or that they haven't been effectively pursued to their full potential yet? [Andrea TILCHE, Belgium]	Not Applicable - no longer included in the chapter
19260	23	33	23	33	A review of term "limited" is necessary. A reference couldn't be found and final message could be misunderstood. [Spain]	Not Applicable - no longer included in the chapter
30222	23	33	23	34	Chapter 4 sound more positive about the potential for mitigation induced by behaviour-related measure. We would suggest adding at first the sentence "Changes in behaviour and lifestyles are essential for a transition to 1.5°C." (Chapter 4, p.6, l9-15). [France]	Not Applicable - no longer included in the chapter
46236	23	33	23	35	The sentence on behaviour and lifestyles related measures is unclear by mixing up findings for mitigation and adptations; better separate [Netherlands]	Not Applicable - no longer included in the chapter
13318	23	37	23	4	Delete the text "Mitigation actions in the energy demand sectors and behavioural response options with appropriate management of rebound effects can advance multiple Sustainable Development Goals simultaneously, more so than energy supply side mitigation actions (very high confidence). (Figure SPM5) {5.4.1, Table 5.1 a-c, Figure 5.4.1}". [Eleni Kaditi, Austria]	Not Applicable - no longer included in the chapter
49022	23	37	23	4	The statement here should also reflect the sustainable development benefits of measures involving energy supply, which are touched on in Chapter 5.4.1, including for energy access and health benefits. As currently stated, the incorrect implication here is that the sustainable development benefits of supply side energy actions are not salient. . [David Waskow, United States of America]	Taken into account - text revised. Text in question no longer in SPM, with suggestion addressed in new text
49024	23	37	23	4	This bulleted paragraph should likely be moved to the next section of the SPM, under 4.5 [David Waskow, United States of America]	Not Applicable - no longer included in the chapter
56534	23	37	23	4	This is a dangerous dichotomy to set up. For 1.5°C supply side interventions will be necessary and, as figure 5.4.1 highlights, non-biomass renewables offer many complimentary synergies. This should be acknowledged rather than dismissing, supply side interventions as not complimentary to the SDGs. [Eleanor Johnston, United States of America]	Not Applicable - no longer included in the chapter
58170	23	37	4		Supply side measures, however, will also decrease air-pollution, which is a crucial co-benefit. Moreover, supply side measures require the regulation of fewer actors and may be cheaper than the regulating in a comprehensive and balanced way many more actors on the demand side. [Nico Bauer, Germany]	Noted. Synergies and trade-offs of energy supply options with SDGs are in FGD Figure SPM3
40594	23	38	23	38	Please define 'rebound effects'. [Jonny Williams, New Zealand]	Not Applicable - no longer included in the chapter
6932	23	42	23	44	The following wording is suggested: In order to limit global warming to 1.5oC governance has to create an enabling environment for the implementation of the appropriate mitigation and adaptation activities at all levels. Those activities might include e.g. behavioural change, policy intsruments and innovation, and all need to be aligned with the sustainable development goals. [Klaus Radunsky, Austria]	Taken into account - text revised. Text in question no longer in SPM, with suggestion addressed in new text
30224	23	42	23	46	It could also be underlined that participatory mechanisms are key and should include communities, multi-stakeholders, at different levels (local, regional and state) (5.5, 5.6, 1.4) [France]	Taken into account - text revised. Text in question no longer in SPM, with suggestion addressed in new text
31276	23	42	23	46	We would appreciate if IPCC can clarify differences between 1.5°C and 2.0°C since this seems to be a general statement which is not limited to 1.5 warming world. [Japan]	Not Applicable - no longer included in the chapter
32858	23	42	23	46	The issue of governance is poorly developed and in particular with the question of a clear identification of agency / the different agents involved in moving the world towards a 1.5ºC future. A key question that in climate governance is 'who is the solution', and in particular how different responsibilities will have to be redistributed in a world aimed at 1.5ºC beyond that of national and regional governments –and specially in comparison to a 2ºC world'. Thus, individual and collective agency is hidden with economic and academic categories such as 'sectors' and 'cities', although day-to-day actions are not organised under such groupings but carried out by concrete multi-national corporations, organisations which operate as networks in multiple sectors, nations and cities at the same time and which may or may not fit with the old traditional nation-state demarcations and responsibilities. [J. David Tabara, Spain]	Rejected - outside the scope of the chapter

Comment No	From Page	From Line	To Page	To Line	Comment	Response
34386	23	42		45	Since this phrase contains 'can create an enabling environment' rather than 'creates an enabling environment' it is almost guaranteed to be true. To appreciate this, consider how difficult it would be to demonstrate that the opposite is true - 'Multi-level governance in a 1.5C warmer world cannot create an enabling envirоinment for mitigation and adaptation options....'. It is thus rather an empty statement. [Nathan Gillett, Canada]	Not Applicable - no longer included in the chapter
38994	23	42	23	42	I suggest you use other words for multi-level governance; I think this can be said simpler by being conret about what it means. [Jan Fuglestvedt, Norway]	Rejected - not supported by the peer-reviewed published literature
38996	23	42	23	46	As I udnerstand this, you are talking about what is needed to achieve 1.5 and how to remain there. As it is written now is seems that you talk about a world that has reached 1.5. Can this be clarified? And them you may consider changing 1.5 world to 1.5 consistent pathways or developments. [Jan Fuglestvedt, Norway]	Not Applicable - no longer included in the chapter
44672	23	42	23	42	Suggest revising to read "Coherent multi-level governance …" for greater specificity. [Penny Urquhart, South Africa]	Not Applicable - no longer included in the chapter
63092	23	44	23	46	what are power assymetries ? [Belgium]	Not Applicable - no longer included in the chapter
31278	23	45	23	45	Please clarify whether "power" in "power asymmetries" refers to political or economical power. [Japan]	Not Applicable - no longer included in the chapter
53228	23	47	23	47	Delete one "end" [Maria-Carmen Llasat, Spain]	Not Applicable - no longer included in the chapter
29244	23	48	23	48	Please add the following sentence from Ch. 5 (P5L14-18) (new bullet point) because it underlines that social processes (e. g. power structures, decision-making processes, stakeholder involvement, broad participation) are preconditions to achieve adaptation pathways in line with SDGs: "Adaptation pathways that use a mix of adaptation options and maximise synergies and minimise trade-offs with sustainable development are successful when they follow inclusive, deliberative, and place-specific processes and procedural justice mechanisms; yet, persistent uneven power structures that dominate decision making reinforce existing social inequalities (medium evidence, high agreement)." [Germany]	Not Applicable - no longer included in the chapter
29246	24		24		We strongly encourage the author team to integrate an improved version of Figure 5.5 from Ch. 5 (P47) in the SPM. Rationale: Figure shows that achieving a climate resilient world depends on mitigation and adaptation policies and measures as well as on achieving SDGs. Growing literature shows that societal transformation against the background of climate change and achieving SDGs is an enabling factor and precondition for decarbonisation and adaptation pathways (e. g.: Feola, G. 2015. Societal transformation in response to global environmental change: A review of emerging concepts. Ambio 44: 376-390, doi 10.1007/s13280-014-0582-z; Mapfumo, P. et al. 2015. Pathways to transformational change in the face of climate change: an analytical framework. Climate and Development, doi 10.1080/17565529.2015.1040365; Termeer C.J.A.M. et al. 2017. Transformational change: governance interventions for climate change adaptation from a continuous change perspective. Journal of Environmental Planning and Management 60 (4): 558-576, doi 10.1080/09640568.2016-1168288). Furthermore this figure builds on figure SPM.9 of IPCC AR5 WGII and shows the further development of the idea of climate resilient pathways in the context of sustainable development. [Germany]	SPM statements revised substantially but due to space limits more precise and shorter statements now convey major findings based on assessment
1534	24	1	24	2	I think "and" should be inserted after "1.5°C" so this sentence becomes: "… limiting global warming to 1.5°C AND target energy efficiency and demand …" [David Wratt, New Zealand]	Not Applicable - no longer included in the chapter. The sentence in the current format no longer appears in the revised SPM. The message has been redrafted and appears at D4 , D4.1, D4.2
6934	24	1	24	5	The following wording is suggested: Pathways that are consistent with limiting global warming to 1.5oC address energy efficiency and demand and provide strong synergies between sustainable development and mitigation actions. These actions can have high synergies with policies and actions in the areas of water and air quality, public health, and terrestrial and marine ecosystems. The risks resulting from those mitigation actions for poverty, hunger and energy access can be alleviated by redistributive measures. [Klaus Radunsky, Austria]	SPM statements revised substantially but due to space limits more precise and shorter statements now convey major findings based on assessment
11102	24	1	24	3	This sentence is gramatically incorrect - seems that a verb or another part of the sentence is missing. [Denmark]	Not Applicable - no longer included in the chapter. The sentence in the current format no longer appears in the revised SPM. The message has been redrafted and appears at D4 , D4.1, D4.2
19046	24	1	24	3	This sentence seems to be incorrect, and as a result is unclear. Please re-phrase/clarify. [Andrea TILCHE, Belgium]	Not Applicable - no longer included in the chapter. The sentence in the current format no longer appears in the revised SPM. The message has been redrafted and appears at D4 , D4.1, D4.2
30226	24	1	24	3	There seems to be a typo in the first sentence : Pathways that are consistent with limiting global warming to 1.5°C by targeting energy efficiency and demand provide strong synergies between sustainable development and mitigation actions. [France]	Not Applicable - no longer included in the chapter. The sentence in the current format no longer appears in the revised SPM. The message has been redrafted and appears at D4 , D4.1, D4.2
30228	24	1	24	6	The main synergies (water, public health, terrestrial and marine ecosystems) and trade-offs (poverty, hunger and energy access) are not the ones that stand-out in Figure 5.3. [France]	SPM statements revised substantially but due to space limits more precise and shorter statements now convey major findings based on assessment
30230	24	1	24	5	This sentence is not precised in the paragraphs underneath. What redistributive measures? [France]	SPM statements revised substantially but due to space limits more precise and shorter statements now convey major findings based on assessment
31280	24	1	24	3	Please edit the sentence so that we can be sure which word serves the verb. [Japan]	Not Applicable - no longer included in the chapter. The sentence in the current format no longer appears in the revised SPM. The message has been redrafted and appears at D4 , D4.1, D4.2

Comment No	From Page	From Line	To Page	To Line	Comment	Response
31282	24	1	24	6	SPM4.5 puts a focus only on synergies between sustainable development and mitigation actions. In the underlying report, however, trade-offs are also emphasized. (For example, see Chapter 4 page 5 line 20-21: "Mitigation options compatible with 1.5°C warming can help meet sustainable development and the SDGs (synergies) but some generate negative consequences (trade-offs).", and page 19 line 53-53: " There are synergies and trade-offs between the dual goal of keeping temperatures below 1.5°C global warming and achieving sustainable development, in the short and the long term") Need more well balanced summary. [Japan]	Both synergies and trade-offs are now shown through a new figure which replaces SPM7
32646	24	1	24	3	sentence does not read. Perhaps missing "and" between "demand" and "provide" in line 2 [Jonathan Lynn, Switzerland]	Not Applicable - no longer included in the chapter. The sentence in the current format no longer appears in the revised SPM. The message has been redrafted and appears at D4 , D4.1, D4.2
40770	24	1	24	5	In SPM Box 4.5, the first sentence is ambiguous. It could be edited to give different meanings by 1) deleting the word 'provide' or 2) by inserting 'to' to form … demand to provide ...". In the last sentence "The risks ... of mitigation ..." should be reworded to "The risks ... from mitigation ..." . [Liese Coulter, Australia]	Not Applicable - no longer included in the chapter. The sentence in the current format no longer appears in the revised SPM. The message has been redrafted and appears at D4 , D4.1, D4.2, D4.4
49310	24	1	24	6	This statement about synergies beween SD and mitigation actions is very important and needs to be more substantiated in particular in Chapter 4. [Bill Hare, Germany]	Both synergies and trade-offs are now shown through a new figure which replaces SPM7
50100	24	1	28	22	The structure odf this section of the SPM on the realtion with SD needs to be improved. There are now too many points on the relation of 1.5C strategies with SD that heavily overlap and make it hard for the reader to get the key messages. This is partly caused by the underlying chapters 4 and 5 that discuss the literature in different places and from different perspectives. For instance, there is literature on 1.5C pathways that looks at SD implications and there is also literature that looks at achieving SD goals , consistent with a 1.5C temperature limit. Drawing separate conclusions from these two discussions, as is done in SPM 4.5,/4.8 on the one hand and 4.9 on the other, is not helpful. Better to draw integrated conclusions from these different strands of literature, so that a clearer picture for policy makers emerges. That means restructuring sections 4.5, 4.8 and 4.9. A possible headline message for such a combined section could be: "It is possible to pursue development pathways that meet the SDGs, while limiting global warming to 1.5oC. This can be done by maximising the SD benefits from mitigation and adaptation measures and minimising and/or compensating the trade-offs. It also requires ensuring the socio-economic conditions are in place for realising the mitigation and adaptation measures of 1.5oC consistent pathways." This should then be followed by bullets that cover specific aspects (see separate comment). The point on equity that is covered in headline 4.9 should then be kep separate (see suggestions in a separate comment). [Bert Metz, Netherlands]	SPM statement revised substantially but due to space limits more precise and shorter statements now convey major findings based on assessment
52986	24	1	24	4	synergies with adaptation should be included [Ireland]	SPM statements revised substantially but due to space limits more precise and shorter statements now convey major findings based on assessment
55830	24	1			It would help to have some bullets on adaptation pathways, and the synergies and trade-offs with mitigation pathways and SDGs [Debora Ley, Guatemala]	SPM statements revised substantially but due to space limits more precise and shorter statements now convey major findings based on assessment
56530	24	1	24	3	sentence doesn't make sense. Missing a word? [Eleanor Johnston, United States of America]	Not Applicable - no longer included in the chapter. The sentence in the current format no longer appears in the revised SPM. The message has been redrafted and appears at D4 , D4.1, D4.2
58260	24	1	24	3	Perhaps "Pathways consistent with limiting global warming to 1.5 C that target eneryg..." [Peter Marcotullio, United States of America]	Not Applicable - no longer included in the chapter. The sentence in the current format no longer appears in the revised SPM. The message has been redrafted and appears at D4 , D4.1, D4.2
59372	24	1	24	3	Revise to improve syntax: "Many pathwsys that are ... 1.5°C and target energy efficiency ..." [United States of America]	Not Applicable - no longer included in the chapter. The sentence in the current format no longer appears in the revised SPM. The message has been redrafted and appears at D4 , D4.1, D4.2
62910	24	1	24	3	There is something wrong with this sentence, maybe a word or two missing? [Sabine FUSS, Germany]	Not Applicable - no longer included in the chapter. The sentence in the current format no longer appears in the revised SPM. The message has been redrafted and appears at D4 , D4.1.
63082	24	1	24	3	This sentence is difficult to read, there seems to be a wording problem [Belgium]	SPM statements revised substantially but due to space limits more precise and shorter statements now convey major findings based on assessment
52988	24	3	24	6	Assume refers to management of terrestial systems etc [Ireland]	Not Applicable - no longer included in the chapter. The sentence in the current format no longer appears in the revised SPM. The message has been redrafted and appears at D4 , D4.1, D4.2
8282	24	4	24	6	Redistributive policies can mitigate to a certain extent but not fully remove the adverse effects of mitigation measures on poverty, hunger and energy access (for example, the issue of food security due to the land taken up by BECCS), while the affected developing countries are subject to the limited capacity and resources in implementing a redistributive policy. It is suggested to reformulate the sentence as "The risks for poverty, hunger and energy access of mitigation measures can be partly reduced but not fully alleviated by redistributive measures. Additional policies and measures are still needed". [China]	SPM statements revised substantially but due to space limits more precise and shorter statements now convey major findings based on assessment
11432	24	4	24	5	This should add that these alleviating actions (to overcome risks to poverty, hunger and energy access) can be done relatively cheaply (as per chapter 5.4). [United Kingdom (of Great Britain and Northern Ireland)]	Both synergies and trade-offs are now shown through a new figure which replaces SPM7

Comment No	From Page	From Line	To Page	To Line	Comment	Response
33890	24	4	24	5	It is somewhat unclear what is supposed to be redistributed. Please consider to rephrase [Norway]	Not Applicable - no longer included in the chapter. The sentence in the current format no longer appears in the revised SPM. The message has been redrafted and appears at D4.2
43846	24	4	24	5	4.5 ... The risks for poverty, hunger and energy access of mitigation measures [can be avoided by ruling out biofuels and biomass combustion] [Peter Carter, Canada]	SPM statements revised substantially but due to space limits more precise and shorter statements now convey major findings based on assessment
51066	24	4	24	5	remove the words poverty and hunger from this sentence. See comment 28 above. There is a fundamental problem with the underlying report from which this statement is derived. [Doreen Stabinsky, United States of America]	SPM statements revised substantially but due to space limits more precise and shorter statements now convey major findings based on assessment
59374	24	4	24	5	Rephrase to: "However, pursuing such pathways could pose risks for poverty, hunger, and energy access of mitigation measures that would have to be considered." Current statement is overly policy-prescriptive and prejudicial to the response governments may choose to address and mitigate against such risks. [United States of America]	SPM statements revised substantially but due to space limits more precise and shorter statements now convey major findings based on assessment
38998	24	5	24	5	While "redistributive measures" may be totally clear to authors I think you could use more common words here; and be more contrete about what is redistributed. [Jan Fuglestvedt, Norway]	SPM statements revised substantially but due to space limits more precise and shorter statements now convey major findings based on assessment
59376	24	5	24	5	The reference to "redistributive measures" is out of place, as it seems to refer to points made under 4.8. Also suggest replacing with a broader reference to social protection or equivalent that covers a wider range of potential measures. [United States of America]	SPM statements revised substantially but due to space limits more precise and shorter statements now convey major findings based on assessment
8062	24	8	24	12	dematerialisation or digitalization? The servers in the cloud consumes significant of energy, so these two are very different. Dematerialisation is often a misleading word. [Quentin Perrier, France]	SPM statements revised substantially but due to space limits more precise and shorter statements now convey major findings based on assessment
13320	24	8	24	12	Delete the text "Mitigation options that emerge from cross-sectoral efforts at city scale show enhanced synergies with Sustainable Development Goal, as well as those emerging from new sectoral organisations based on the circular economy concept such as zero waste, decarbonisation and dematerialisation, and multi-policy interventions following systemic approaches (medium evidence, high agreement). {Boxes 4.1, 4.2 and 4.3, 5.4.1.4}.". [Eleni Kaditi, Austria]	SPM statements revised substantially but due to space limits more precise and shorter statements now convey major findings based on assessment
30232	24	8	24	8	As there are other sub national scales which are important, we would propose to add '"sub national and city [France]	SPM statements revised substantially but due to space limits more precise and shorter statements now convey major findings based on assessment
32648	24	8	24	11	organizations decarbonization dematerilaization (z not s) (is "dematerialization" understandable?) [Jonathan Lynn, Switzerland]	Not Applicable - no longer included in the chapter. The sentence was deleted and no longer appears in the revised SPM.
32930	24	8	24	9	Syntax needs revision - "synergies with the Sustainable Development Goals". [Thomas Damassa, United States of America]	Not Applicable - no longer included in the chapter. The sentence was deleted and no longer appears in the revised SPM.
34388	24	8		12	This bullet point is hard to understand. The first phrase notes that mitigation options that emerge from cross-sectoral efforts at the city scale show enhanced synergies with SDGs. Enhanced compared to what? Migitation options that emerge from individual sectors at the city level? Migitation options that emerge from cross-sectoral efforts at the national scale? Also, it is not clear how the second phrase relates to the first. Is the overall meaning 'Mitigation options that arise from 1) cross-sectoral efforts at the city scale, 2) new sectoral organisations based on circular economy concepts, and 3) multi-policy interventions following systemic approaches, show enhanced synergies with SDGs.' If this is the intended meaning then it still isn't clear against what the comparison is made - is this referenced against all other mitigation options? [Nathan Gillett, Canada]	SPM statements revised substantially but due to space limits more precise and shorter statements now convey major findings based on assessment
40598	24	8	24	12	This sentence is too long and should be reworded for clarity. [Jonny Williams, New Zealand]	Not Applicable - no longer included in the chapter. The sentence was deleted and no longer appears in the revised SPM.
45912	24	8	24	12	The sentence is rather long and confusing. Suggest it is rephrased. [Deger Saygin, Turkey]	Not Applicable - no longer included in the chapter. The sentence was deleted and no longer appears in the revised SPM.
49312	24	8	24	12	Synergies of mitigation options with SD goals are not only relevant for efforts at city scale, but at all scales, in particular through reducing fossil fuel use and increasing renewable energy use and energy efficiency. This should be also much better substantiated in Chapter 4. [Bill Hare, Germany]	SPM statements revised substantially but due to space limits more precise and shorter statements now convey major findings based on assessment
55828	24	8	24	12	This goes beyond the city-level, including rural areas or working with land-use issues [Debora Ley, Guatemala]	SPM statements revised substantially but due to space limits more precise and shorter statements now convey major findings based on assessment

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50102	24	8	28	22	As stated in the comment on 4.5-4.9, following a new headline statement, bullets need to follow that cover the various key issues on the linkage between 1.5C strategies and meeting SDGs. I suggest the following sequence: 1) bullets on maximising the SD benefits of 1.5 C pathway: start with highlighting the areas where most co-benefits will accrue: water availability and quality, clean energy and human health (illustrated with figure SPM 6 or figure 5.4 right hand panel) ; the first, second and third bullet on page 24 can be also be used. 2) bullets on minimising and/or compensating trade-offs: the fourth bulet on page 24 and the third bullet under 4.8 (on page 27) can be used, but need to be supplemented with material from chapter 5.4.3 (see page 5-36, lines 1-3; , lines 25-27; lines 45-47; page 5-37, lines 19-20.); 3) bullets on the SD conditions that are required for making 1.5C strategies feasible (a choice needs to be made if this point is covered here or in section3.6):in chapter 2.3.2.1 (page 39, lines 29-34) there is a statement that clarifies what these conditions are: avoiding high population growth, low educational achievements, low per capita income growth, high inequality and a focus on regional rather than global security; in line with this chapter 2.5.1 makes clear that no scenarios exist that meet the 1.5C limit under SSP3 assumptions (high population growth, low economic growth and technological progress, focus on regional energy and food security) and ichapter 5.6.1 (page 45, lines 49-52) does the same ; therefore bullets need to stress the need to focus policy efforts on creating the right conditions, in addition to making the right choices on mitigation and adaptation. many other bullets should be removed, as they do not provide clear messages. [Bert Metz, Netherlands]	SPM statement revised substantially but due to space limits more precise and shorter statements now convey major findings based on assessment
59378	24	8	24	18	This information is not specific to 1.5 or 2°C scenarios and should be removed or based upon information specific to these scenarios. [United States of America]	SPM statements revised substantially but due to space limits more precise and shorter statements now convey major findings based on assessment
11132	24	9	24	9	suggest to replace "those" with "options" for clarity. [Denmark]	Not Applicable - no longer included in the chapter. The sentence was deleted and no longer appears in the revised SPM.
30234	24	9	24	9	Typo : Sustainable Development Goals [France]	Not Applicable - no longer included in the chapter. The sentence was deleted and no longer appears in the revised SPM.
40596	24	9	24	9	Goal' should read 'Goals'. [Jonny Williams, New Zealand]	Not Applicable - no longer included in the chapter. The sentence was deleted and no longer appears in the revised SPM.
40772	24	9	24	9	Sustainable Development Goal' should be plural [Liese Coulter, Australia]	Not Applicable - no longer included in the chapter. The sentence was deleted and no longer appears in the revised SPM.
30236	24	1	24	1	Substitution of fossil energy intensive materials by bio-based materials, including harvested wood products, should me mentionned as an example of circular economy concept. [France]	SPM statements revised substantially but due to space limits more precise and shorter statements now convey major findings based on assessment
40774	24	1	24	1	There should be a comma after'concept'. [Liese Coulter, Australia]	Not Applicable - no longer included in the chapter. The sentence was deleted and no longer appears in the revised SPM.
6984	24	11	24	11	replace the word dematerialisation with "consumption of resources", as it is easier to understand. [Flintull Annica Eriksson, Sweden]	Not Applicable - no longer included in the chapter. The sentence was deleted and no longer appears in the revised SPM.
30238	24	11	24	11	dematerialisation or digitalization? The servers in the cloud consume significant energy, so these two are very different. Dematerialisation is often a misleading word. [France]	Not Applicable - no longer included in the chapter. The sentence was deleted and no longer appears in the revised SPM.
30240	24	11	24	11	Could "multi-policy interventions following systemic approaches" be explained? [France]	Not Applicable - no longer included in the chapter. The sentence was deleted and no longer appears in the revised SPM.
11134	24	14	24	14	Pathways ..with options to reduce. … Seems a strange fomulation. Measures in stead of options? [Denmark]	Not Applicable - no longer included in the chapter. The sentence was deleted and no longer appears in the revised SPM.
31284	24	14	24	25	We would appreciate if IPCC can clarify differences between 1.5°C and 2.0°C. [Japan]	SPM statements revised substantially but due to space limits more precise and shorter statements now convey major findings based on assessment
32926	24	14	24	18	The "co-benefits" of short-lived climate mitigation for sustainable development go well beyond health improvements from reduced air pollution. See, for example, Haines et al. 2017 Nature Climate Change. Additional benefits of short-lived climate forcer mitigation include enhanced food security, energy access, and opportunities for gender equality. Recommend a separate summary box focused on short-lived climate forcers with separate bullets on each potential "co-benefit" as linked to the SDGs. [Thomas Damassa, United States of America]	SPM statements revised substantially but due to space limits more precise and shorter statements now convey major findings based on assessment
33892	24	14	24	18	For clarification, please consider to remove "such as methane, black carbon and short-lived hydrofluorocarbons". Rationale; the current formulation excludes SLCF with cooling effect, where reduction also have health co-benefits, such as NOx, OC. Also, please consider to clarify the sentence in line 16-18. For example "Pathways limiting global warming to 1.5°C with options to reduce short-lived climate forcers, have co-benefits for sustainable development in terms of health through the prevention of air pollution. However, some short-lived climate forcers related to improving air quality have cooling effects, and thus, reductions come with trade-offs for reducing warming." [Norway]	SPM statements revised substantially but due to space limits more precise and shorter statements now convey major findings based on assessment
39000	24	14	24	15	hydrofluorocarbons does not have health impacts trough air pollution. I suggest deleting this group of gases here. [Jan Fuglestvedt, Norway]	SPM statements revised substantially but due to space limits more precise and shorter statements now convey major findings based on assessment

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42876	24	14	24	18	As cooling aerosols are reduced, including when they are reduced as co-emitted pollutants during the shift from fossil fuels to clean energy, it is critical to reduce the non-CO2 climate pollutants faster. [Kristin Campbell, United States of America]	SPM statements revised substantially but due to space limits more precise and shorter statements now convey major findings based on assessment
42928	24	14	24	18	As cooling aerosols are reduced, including when they are reduced as co-emitted pollutants during the shift from fossil fuels to clean energy, it is critical to reduce the non-CO2 climate pollutants faster. [Durwood Zaelke, United States of America]	SPM statements revised substantially but due to space limits more precise and shorter statements now convey major findings based on assessment
43848	24	14	24	18	• Pathways limiting global warming to 1.5°C with options to reduce short-lived climate forcers, … [will result in an increase of global warming from the unmasking of the aerosol effect must be accounted for in policymaking and projections of global surface warming. This effect further substantiates that global emissions must decline immediately and rapidly.] [Peter Carter, Canada]	SPM statements revised substantially but due to space limits more precise and shorter statements now convey major findings based on assessment
49314	24	14	24	18	Do not only refer to Short lived climate forecers for cobenefits for sustainable development in terms of health through prevention of air pollution. These cobenefits are very strong for mitigation through decarbonising electricity sector and electrifiying energy use in other sectors such as transport, buildings, industry, therefore drastically reducing co2 emissions from fossil fuels and replacing fossil fuels with renewable energy as well as increasing energy efficiency. [Bill Hare, Germany]	SPM statements revised substantially but due to space limits more precise and shorter statements now convey major findings based on assessment
52990	24	14	24	17	Is there a reason ground level ozone is not mentioned? [Ireland]	SPM statements revised substantially but due to space limits more precise and shorter statements now convey major findings based on assessment
6936	24	16	24	18	It is suggested to delete the last sentence of this paragraph because this aspect should have been addressed in all the scenarios published in the literature. This fact only would confuse the reader who is less familiar with the design of scenarios. [Klaus Radunsky, Austria]	SPM statements revised substantially but due to space limits more precise and shorter statements now convey major findings based on assessment
16580	24	16	24	18	Delete the last sentence. This is the rationale: Pathways limiting global warming with the options to reduce black carbon, methane and hydrofluorocarbons already include the cooling impact of the co-emitted sulphate. The trade-off is thus already accounted for in the scenarios. [Valentin Foltescu, France]	SPM statements revised substantially but due to space limits more precise and shorter statements now convey major findings based on assessment
40776	24	16	24	16	Readability/concise: Suggest rewording from “sustainable development in terms of health through the prevention of air pollution.” To “sustainable development health goals by preventing air pollution.” [Liese Coulter, Australia]	Not Applicable - no longer included in the chapter. The sentence was deleted and no longer appears in the revised SPM.
44794	24	16	24	18	This is apprent. Then, the passway to overcome this confliction should be required. [Hiroaki Kondo, Japan]	SPM statements revised substantially but due to space limits more precise and shorter statements now convey major findings based on assessment
51070	24	16	24	18	This is a bizarre sentence. The point of the paragraph is to highlight co-benefits of reducing emissions and preventing air pollution, which has substantial human health implications. The last sentence seems to say it might be alright to keep polluting and harming people's health because there are solar radiation management "benefits." Usually we don't talk about public health benefits in the negative sense of "trade-offs." That's rather morbid. If such a statement is to be made it should be moved to the section on solar radiation management, and removed from a paragraph that is about protecting health. [Doreen Stabinsky, United States of America]	SPM statements revised substantially but due to space limits more precise and shorter statements now convey major findings based on assessment
56960	24	16	24	18	comes with trade offs for reducing warming is unclear. Perhaps prefer: "will, other things being equal, increase warming." [Oliver Morton, United Kingdom (of Great Britain and Northern Ireland)]	Not Applicable - no longer included in the chapter. The sentence was deleted and no longer appears in the revised SPM.
19048	24	18	24	18	The point is the difference in timescales: i.e. faster warming initially when air pollutants or SCLP (except BC and CH4) are removed. [Andrea TILCHE, Belgium]	SPM statements revised substantially but due to space limits more precise and shorter statements now convey major findings based on assessment
19262	24	2	24	25	Eplease explain. It is not clear whether the challenges for social acceptability are the sustainable development trade-offs [Spain]	SPM statements revised substantially but due to space limits more precise and shorter statements now convey major findings based on assessment
19446	24	2	24	21	Please refer to the key features of the Diamond Scenario in more full and add the bolded words: "Pathways limiting global warming to 1.5°C that feature very low energy demand and apply neither CCS nor BECCS show..." (See the description of the Diamond scenario in the Figure SPM5.) [Jennifer Morgan, Netherlands]	SPM statements revised substantially but due to space limits more precise and shorter statements now convey major findings based on assessment
30242	24	2	24	23	The sentence is not clear enough. It seems to imply an implicit disctinction between SDG and sustainable development. Also it does not seem to reflect the many synergies compared to the very limited number of trade-offs identified in Figure SPM5. Suggestion to replace "multiple" by "many or most" SDGs and to be specific on the increased risk of trade-offs with SDG 2 and 8. [France]	Figure has been deleted. SPM statements revised substantially but due to space limits more precise and shorter statements now convey major findings based on assessment
34390	24	2		23	The first part of the sentence appears to contradict the second. If pathways limiting global warming to 1.5C that feature very low energy demand show pronounced positive effects across multiple SDGs with very high confidence, how is it that they also show increased risk of sustainable development trade-offs? It must be that the 'multiple SDGs' with positive effects don't capture the negative effects on poor and indigenous populations. This could be written much more clearly, by simply summarising the positive effects and negative effects on sustainable development. [Nathan Gillett, Canada]	SPM statements revised substantially but due to space limits more precise and shorter statements now convey major findings based on assessment
40600	24	2	24	23	This sentence does not make grammatical sense and should be reworded. [Jonny Williams, New Zealand]	Not Applicable - no longer included in the chapter. The sentence in the current format no longer appears in the revised SPM. The message has been redrafted and appears at D4.2
56532	24	2	24	25	The sentence could be clearer. I'm not really sure what it is trying to say. What is meant by "tradeoffs" and "challenges"? [Eleanor Johnston, United States of America]	Not Applicable - no longer included in the chapter. The sentence in the current format no longer appears in the revised SPM. The message has been redrafted and appears at D4.2

Comment No	From Page	From Line	To Page	To Line	Comment	Response
56962	24	2	24	23	I don't think this sentence makes sense: should "though increased" in fact read "though they increase"? [Oliver Morton, United Kingdom (of Great Britain and Northern Ireland)]	Not Applicable - no longer included in the chapter. The sentence in the current format no longer appears in the revised SPM. The message has been redrafted and appears at D4.2
41468	24	22	24	23	verb is missing in second part of the sentence - what with "though increased risk of sustainable development trade-offs…"? Though there exists risk of …??? [Maria Pia Carazo Ortiz, Germany]	Not Applicable - no longer included in the chapter. The sentence in the current format no longer appears in the revised SPM. The message has been redrafted and appears at D4.2
29554	24	23	24	24	The last sentence (and the whole para) could benefit from an example (terminology may be challenging for readers less familiar with social sciences) [Finland]	Not Applicable - no longer included in the chapter. The sentence was deleted and no longer appears in the revised SPM.
29248	24	25	24	25	Table 5.1 as reference? This reference does not exist in Ch. 5. [Germany]	Not Applicable - no longer included in the chapter. References changed in revised SPM after redrafting of the sentence which now appears with edited text in D4.2
30244	24	27	24	29	This pararaph is somewhat redundant and less precise than previous paragraphs. It should be specified. [France]	Not Applicable - no longer included in the chapter. The sentence in the current format no longer appears in the revised SPM. The message has been redrafted and appears at D4 and D4.1
31286	24	27	24	29	It would be helpful for policy makers to include more concrete examples of policy and measures. [Japan]	SPM statements revised substantially but due to space limits more precise and shorter statements now convey major findings based on assessment
43850	24	27	24	29	• Policy designs and measures [especially those that rule out biofuels and biomass combustion] can reduce trade-offs between mitigation options compatible with 1.5°C warming and achieving sustainable development and the Sustainable Development Goals. [Peter Carter, Canada]	SPM statements revised substantially but due to space limits more precise and shorter statements now convey major findings based on assessment
29250	24	29	24	29	Figure 5.41 as reference: This figure does not exist in Ch. 5 [Germany]	Not Applicable - no longer included in the chapter. References changed in revised SPM after redrafting of the sentence which now appears in changed version in D4 and D4.1
49	25		25	5	This graph is difficult to understand [Meinhard Doelle, Canada]	Figure deleted
436	25				FIGURE SPM 5: this is a very uncompelling, text-loaded and overall unattractive figure. Very technical and not presentable to a non-scientific audience. [Thomas Stocker, Switzerland]	Figure deleted
4264	25				Figure SPM5.I doubt how/if all the colour codes reflect the scientific consensus. I guess the figure requires scrutiny perhaps by a larger group of LA in this report, in order to reflect better consensus and nonconsensus areas. For example, in my area of expertise (CCS) it is odd that CCS gets a red mark (high confidence¡) on health and wellbeing (like Nuclear ??¡¡) while it gets nothing on the "planet" aspects. I would expect a red mark for CCS on the "responsible consumption and production" because CCS is recognised to be an "end pipe solution" that could delay the energy system transformation towards more sustainable sytems. In contrast, it does not deserve a red mark on the "prosperity" side, as CCS deployment is a industry-driven mitigation option, with large oportunities to generate economic activity. [Abanades Carlos, Spain]	Figure deleted
5488	25				Figure SPM5 is extremely complex and is only referenced in the SPM text once. Suggest simplifying or removing from the SPM. [Haroon KHESHGI, United States of America]	Figure deleted
6938	25				Figure SPM 5: The title "Alternative mitigation choices for 1.5oC have widely varying sustainable development implications" conveys the message that there is still the situation that we have more mitigation options than actually needed to still meet the 1.5oC goal. However, the first sentence in paragraph 3.5 says: "All mitigation pathways compatible with limiting global warming to 1.5oC by 2100 involve removal of CO2 from the atmosphere". Therefore the title is misleading and confusing and should be changed. A more appropriate wording might for figure SPM 5 might be: Mitigation actions and their sustainable development implications. [Klaus Radunsky, Austria]	Figure deleted
9058	25				Figure SPM5: This Figure contains an enormous amount of information and can only be fully understood after studying it carefully. We suggest to either deleting part of this figure (e.g. the different scenarios : diamond, circle etc. as this seems very technical for an SPM) and/or split the figure in several figures that are more easy to digest [Luxembourg]	Figure deleted
9114	25		25		Useful tool but initially difficult to understand so clear explanation below is helpful and key take home messages [Grenada]	Figure deleted
11106	25		25		Consider summing up the latter part of the figure in textual format as a note to the figure (e.g. what conclusions can be derived from the overview of the different relative scenario SDG risk and synergy profiles?) [Denmark]	Figure deleted
12944	25		25		Useful tool but initially difficult to understand so clear explanation below is helpful and key take home messages [Saint Kitts and Nevis]	Figure deleted
19052	25		25		The grouping of the SDGs (top row) lack rationale. What would be the rationale in separating "people" from "prosperity"? Whose prosperity is it, if not that of the "people"? And if it is the prosperity of the people, then why is it separate from the people? [Andrea TILCHE, Belgium]	Figure deleted
19054	25		25		Increased use of biomass: for what? If for food, then the + correlation with SDGs 1 and 2 is understandable, but then it is not a mitigation measure. If it is for bioenergy, then the table should say so, and the overwhelmingly negative impact on SDGs 2, 14 and 15 should be recognised. Erb et al. 2018. Unexpectedly large impact of forest management and grazing on global vegetation biomass. Nature volume 553, pages 73–76 (04 January 2018). [Andrea TILCHE, Belgium]	Figure deleted

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19056	25				The actual figure includes symbols with crosses and hyphens in bold font as well as in normal font. These are not distinguished in the legend in the top. Is the distinction between bold font and normal font in symbols meaningful, or is it simply an editorial error? The bottom four rows with risk and synergy profiles have the symbols reordered, from risks on the left to synergies on the right. Is this reordering really necessary? Would it not be more transparent and more informative to keep the symobls in the original column, as in the main part of the figure above? [Andrea TILCHE, Belgium]	Figure deleted
29622	25				Figure SPM5. This figure is very detailed and it may take quite a while to study it in detail and to learn about interactions. The legends are rather small, so it is difficult just to see key details in the presentation. It is likely, that someone who is very familiar with SDG issues, could comprehend the figure more easily than somebody without such background. If the aim is to inform generally how the mapping exercise was carried out, checking the details is less important and the figure may be ok. [Finland]	Figure deleted
29674	25		25		Fig 2.31. With the 4 illustrative scenarios (square, circle, cross, diamond) what is missing is an indication of the economic costs of each. This is crutial for policy-makers to use this for guidance. [Tim Dixon, United Kingdom (of Great Britain and Northern Ireland)]	Figure deleted
32230	25		25		Useful tool but initially difficult to understand. A clear explanation provided below would be helpful and also highlight key take home messages [Jamaica]	Figure deleted
36632	25		25		Useful tool but initially difficult to understand. A clear explanation provided below would be helpful and also highlight key take home messages [Snaliah Mahal, Saint Lucia]	Figure deleted
49698	25		25	5	SPM Figure 5: This figure lacks context in that it gives no understanding that 1. humans and all their products are made from closed mass natural resources, 2. the 1987 UN SD Objective is for future generations remain uncompromised in meeting their needs for natural resources, 3. all 17 SD Goals depend upon 1 Goal (12): sustainable extraction, production and consumption of natural resources, 4. IRP, the global authority projects that by the 2040s extraction-production-consumption will be completely unsustainable. [Michael Wadleigh, United States of America]	Figure deleted
58174	25				Figure SPM5: this figure is extremely complicated and too qualitative. It is not instrumental for policy makers. The multi-dimensional figure with many different scenarios does not lead to a clear policy conclusion and does not provide valuable information. The space for a figure can be filled more usefully. [Nico Bauer, Germany]	Figure deleted
58622	25		25		Useful tool but initially difficult to understand so clear explanation below is helpful and key take home messages [Donovan CAMPBELL, Jamaica]	Figure deleted
5924	25	1			I looked at this figure for a good ten minutes and still don't fully understand the entirety or have a clear idea what the intended take away messages are. Significant efforts to streamline and simplify this figure to make it accessible even to experts let-alone non-experts would be advisable. The figure as it stands is trying to say way too much at a level of detail that may be appropriate in the main text from whence it came but is far too nuanced in my view for an SPM audience. Particularly when the SPM does not have the supporting interpretative text available to support this figure in the originating chapter. [Peter Thorne, Ireland]	Figure deleted
11022	25	1	25	1	Update picture and table on Fossil Fuel with CCS (SDG synergies&Trade offs) with Chapter 5 update using the information in the IPEICA "Mapping the oil and gas industry to the Sustainable Development Goals: An Atlas" report [Wilfried Maas, Netherlands]	Figure deleted
11046	25	1			In the table, CCS with fossil fuel use is not a negative for SDG/people. Quite the opposite, as it offers greater opportunity for industrial develpoment without CO2 emissions. [Wilfried Maas, Netherlands]	Final assessment in the chapter 5 now represented by a new figure
19050	25	1	25	5	Labels SDGs unreadible. Instead of 'cross', 'square' scenarios: can these be labelled with a more descripitive name-including the SSP context. What would be SSP context of the diamond scenario? Content wise the exact attribution of label and certainty seems to be quite disputable in some cases, and deserves fleshing out. There is a large risk that the report will be vulnerable to the specific choices made. Sometimes crosses are bold other times not- explain. Lower panel needs an 'SDG' labelling. [Andrea TILCHE, Belgium]	Figure deleted
21638	25	1	25	5	The figure SPM5 is very busy and does not provide a message that is easy to take in. Would some streamlining be possible to highlight the key information? Also, the last panel in the figure - how should one comprehend the "descending order"? What do the columns correspond to? [Sweden]	Figure deleted
29252	25	1	25	5	Figure SPM5: complex, but very informative figure, current form is not suitable for the SPM; some suggestions: (i) centre the "block" of rating with colourful squares to the top (ii) move legend-like explanations somewhere at the bottom (iii) icons for SDGs targets in line beneath '"people, planet, ..." are badly identifiable - maybe only use of SDG numbers (iv) SDG 13 is missing, brief info necessary (v) to increase size and readability: turn the figure around 90° (vi) use more comprehensive scenario names like "demand reduction scenario" instead of "circle scenario" (vii) it is not clear, why + / - are sometimes printed in bold, sometimes not, while same confidence is indicated by intensity of colour) (viii) split the figure in two parts [Germany]	Figure deleted

Comment No	From Page	From Line	To Page	To Line	Comment	Response
30246	25	1	25	5	Figure SPM5 : This figure is interesting but is really hard to read as it contains too much information. The description of the 4 illustrative scenarios should be framed in a box, in the main text, in order to facilitate the reading of this quite complex figure. [France]	Figure deleted
30248	25	1	25	5	Figure SPM5 : The classification "+" or "-" is based on an unknown scale. For example, in column 8 (decent work), I disagree with several choices. Why does nuclear provide more decent work than CCS? (both need to extract minerals, and nuclear employees might be subject to radiations). And what do the empty squares mean? neutral, or no opinion, or that it could be either plus or minus? [France]	Figure deleted
30250	25	1	25	5	Figure SPM5 : SDG should be indicated in their usual standard order, from 1 to 17 or their icons should be made more readable. [France]	Figure deleted
30252	25	1	25	5	Figure SPM5 : Is it possible to add CCU ? [France]	Chapter 5 figure and underlying table does include CCU
31288	25	1	25	5	Please align all confidence color boxes with each of the SDGs pictures. The bottom four rows of boxes are shifted (by one space) to the right side. [Japan]	Figure deleted
32660	25	1	25	1	Figure SPM 5 contains a lot of information in one place and thus might be hard to grasp. In addition, the size of some fonts and icons is rather small and hard to read. The grouping of the SDGs is not necessarily helpful, especially as other figures, like SPM 7, use the numerical order. It would be good to add information regarding the cost of each of the 4 scenarios (if possible). Some pairings of mitigation measure and SDG need reevaluation. For example, why has Fossil-CCS a - rating for health and wellbeing, BECCS +/- and increased biomass use +? Use of biomass for combustion usually leads to higher PM emissions than for fossil fuels, mainly due to supply chain emissions, such as pre-treatment. Thus, you would expect a negative impact on health. CCS technologies, however, are a double-edged sword in this regard, as they increase some air pollutants (through additional fuel needed to make up for the energy penalty of CO2 capture) but decrease others. [Jasmin Kemper, United Kingdom (of Great Britain and Northern Ireland)]	Figure deleted
33894	25	1	25	5	Figure SPM 5: Please consider using more intuitive names for the scenarios instead of square, circle etc. Consider splitting information into two or more panels/illustrations to make it easier for non-scientists to digest the information. Consider applying the following principles from the Guidance for data visuals (J. Harold. et.al., Tyndall Centre, 2017): Guideline 5: reduce complexity where it is possible. Guideline 9: use cognitive perceptual design principles. [Norway]	Figure deleted
36334	25	1	25	5	Consider the following 1) If the scenarios indicated are the SSP's; then it is better to just refer to the SSP's directly. It would not be advisable to introduce a new scenario framework in this way. 2) The potential positive or negative interactions with SDG's are likely to vary signficantly across countries & regions - showing this at the global scale may be misleading. 3) It is surprising to find that there are no negative implications of BECCS - that is certainly not the general sense of the literature. It may be more helpful to simply indicate some of the strongest positve and negative interlinkages between mitigation policies and SDG's - rather than try and capture all interactions in a complex, confusing - and actually debatable figure. [India]	Figure deleted
39002	25	1	25	5	This is a potentially good figure, but as it is presented now I am afraid it will not be well udnerstood. A good integration with the text and explanations there are needed. I also hope the authors will work further in the figure to help the reader understand how to navigate through this landscape of much information. [Jan Fuglestvedt, Norway]	Figure deleted. Some important information has been combined with revised SPM 7 figure.
40602	25	1	25	5	This figure is extraordinarily complicated. Could the information be split into more than one figure? Policy makers are unlikely to have the time to go through this figure in detail. [Jonny Williams, New Zealand]	Figure deleted
43852	25	1	25	5	Figure SPM 5: Remove biofuels biomass and remove CCS [Peter Carter, Canada]	Figure deleted
46238	25	1	25	5	clear how 4 scenarios presented here compare with widelt used SSP framework, which include so-calles Shared Policy Actions (SPA's). Usability of this interesting approach could be strongly enhanced if embedded in broader socio-economic pathways. [Netherlands]	Figure deleted
46240	25	1	25	5	Fig SPM-5 is extremely busy and packed with (interesting) information. It may be wise to reduce this in the SPM to support for main messages and keep detailed background in full report. [Netherlands]	Figure deleted
49564	25	1	25	1	Is the grouping of SDGs made by the authors of the SPM/chapters, and, is it really needed? I think there is not much information added, the aggregate level is not used for increasing comphrehensibility (there is, for instance, quite a heterogeneous picture per aggregate - so what it is used for. This question occurs to me because it is somehow intuitive, but at second sight not stringent. Why should inequalities relate to prosperity, and not to people? Why is good education not prosperity? Why is clean and affordable energy not people or prosperity? I would just drop the aggregates. [Karlheinz ERB, Austria]	Figure deleted
49566	25	1	25	1	Increased use of biomass: why is it strong positive for health - in a world where we have half a billion people with obesity challenges? This also depends on the type of biomass - more woodfuel demand will not really enhance health. And: why is it biomass increase neutral with live on land and no interrelation with life "below water". Increasing harvest will most likely impact these ecosystems, see Maxwell et al., 2016 10.1038/536143a. Why is fuel switch negative for "zero hunger", but BECCS not? Large scale beccs will require a lot of area, as discussed in the content-chapters. Just to mention a few. The figure is not really convincing, afterall. [Karlheinz ERB, Austria]	Figure deleted

Comment No	From Page	From Line	To Page	To Line	Comment	Response
50106	25	1	25	4	Figure SPM5 is unreadable and not suitable for the SPM. Figure SPM6 or figure 5-4 right hand panel do a much better job to illustrate the linakges between 1.5 C pathways and SD. [Bert Metz, Netherlands]	Figure deleted
50434	25	1	25	5	Figure SPM 5 is too complicated. The very interesting infomation that it contains should be made available in a more friendly way for the reader. [Switzerland]	Figure deleted
54860	25	1	25	1	Figure SPM5: include meaning of bold and un-bold symbols in the main legend, rather than in small text mid-way through the figure. [Jordan Harold, United Kingdom (of Great Britain and Northern Ireland)]	Figure deleted
54862	25	1	25	1	Figure SPM5: When printed, will all information be legible? font size is small and SDG icons are very difficult to read, even on a large computer screen. One option might be to split out as two figures - one that shows the SDG interactions per mitigation measure, and another to show scale of deployment of mitigation measures and scenario SDG risk profiles. [Jordan Harold, United Kingdom (of Great Britain and Northern Ireland)]	Figure deleted
54914	25	1	25	1	Figure SPM 5: Although this figure contains useful information, it contains too much information for presentation purposes. It may be better to put it a sperate box rather than a figure. [Bram Bregman, Netherlands]	Figure deleted
55592	25	1	25	5	Figure SPM 5: This figure is problematic in a few ways. First need to be very clear that figure is portraying gross impacts of mitigation measures (not net of reduced negative impacts of cliamte change itself.). [David Cooper, Canada]	Figure deleted
55594	25	1	25	5	Figure SPM 5: This figure is problematic in a few ways. (continued). Second a number of the assessments for implications of measures on particualr SDGs are highly questionable -- often probably as a result of the level of aggregation. Eg: impact of renewables on biodiversity is shown as nehative with high confidence. there would indeed be negative impacts of eg hydropwer on freshwater bodiversity (though many impacts coudl be mitigated). Yet the total impact on biodiversity overall is likley to be much more significant for biomass (and BECCS) -induced land change effects yet this is assesed as both negative/positive with only medium confidence! This cannot be correct. [David Cooper, Canada]	Figure deleted
51366	25	1	25	5	While I appreciate the effort to produce this synthesis figure, it perhaps confuses more than clarifies: 1) If the scenarios indicated are the SSP's; then it is better to just refer to the SSP's directly. It would not be advisable to introduce a new scenario framework in this way. 2) The potential positive or negative interactions with SDG's are likely to vary signficantly across countries & regions - showing this at the global scale may be misleading. 3) It is surpirsing to find that there are no negative implications of BECCS - that is certainly not the general sense of the literature. It may be more helpful to simply indicate some of the strongest positve and negative interlinkages between mitigation policies and SDG's - rather than try and capture all interactions in a complex, confusing - and actually debatable figure. [Anand Patwardhan, United States of America]	Figure deleted
55596	25	1	25	5	Figure SPM 5: This figure is problematic in a few ways. (continued). Third the scale on the right (being strecthed over the full range) suggests that renewables measnure in circle scenarios is "low". I think that this can be misleading (even with the heading "relative"). [David Cooper, Canada]	Figure deleted
55598	25	1	25	5	Figure SPM 5: Suggest that the measure behavioural response: diets and food waste be more logicaly listed under demand box. [David Cooper, Canada]	Figure deleted
56536	25	1	25	1	Non-biomass renewables should not have a harmful effect on SDG9. Renewables can make industry more resilient. [Eleanor Johnston, United States of America]	Figure deleted
56538	25	1	25	1	Biomass at the point of combustion is worse than coal and only if it is regrown or sustainably sourced can it be clean, so there should be much less confidence that biomass will enhance SDG 7 (see ch4 page35 lines16-18; and papers like Sterman, Siegel, Rooney-Varga 2018 http://iopscience.iop.org/article/10.1088/1748-9326/aaa512 and Booth 2018 http://iopscience.iop.org/article/10.1088/1748-9326/aaac88, both in Environmental Research Letters, and many others) [Eleanor Johnston, United States of America]	Figure deleted
56540	25	1	25	1	Does not make sense that biomass would help SDG8 and not non-biomass renewables [Eleanor Johnston, United States of America]	Figure deleted. Complete final assessment based new figure included in final version of SPM
56542	25	1	25	1	by calling wind and solar "non-biomass renewables" there is centrism being placed on biomass that is dangerous and irresponsible given the concerns about biomass as a "clean" energy source. Just call it "wind and solar." [Eleanor Johnston, United States of America]	Figure deleted
57652	25	1		5	Figure should also report CO2 recycling strategies. [WGII TSU, Germany]	Figure deleted
59380	25	1	25	5	There's a LOT going on this figure (SPM 5). Is this really meant as a simplified SPM synthesis graphic? At a minimum, there needs to be a more digestible takeaway that a person could understand with less than 30 minutes of intense study of the diagram. [United States of America]	Figure deleted

Comment No	From Page	From Line	To Page	To Line	Comment	Response
62278	25	1	25	5	Figure SPM5 is impossible to read. More importantly, the figure presents evaluations of positive and negative synergies with demand and supply side mitigation measures that are often not traceable or well-supported by the text in Chapter 5 on which this figure is based. For example, it is impossible to understand how “fossil fuels with CCS” would be ranked as having an overwhelming positive synergy with “affordable and clean energy.” Fossil fuel extraction cannot be categorized as “clean energy” given the wide array of documented harms not only to the climate but also human health harms, water/air pollution, earthquake risks, and biodiversity loss. CCS is not a proven technology to keep CO2 sequestered for millennia, with potentially catastrophic consequences in event of failure (leakage). [Shaye Wolf, United States of America]	The figure has been dropped in the new SPM version. A new figure has been constructed to replace SPM 7 and combined some of the relevant information from SPM 5 developed after testing for user feedback and help readability
6104	25	2	25	2	Fig SPM 5: This figure is complex, but I like the fact that different SSP pathways are being explored here. Why is something similar not being attempted for impacts and risks? Even with expert judgement alone, something could certainly be inferred about the magnification or damping of risk under different challenges to adaptation. This figure really needs to be matched and then combined with a risk figure using equivalent assumptions. [Timothy Carter, Finland]	Figure deleted. New simple figure added. SPM 4
15588	25	2	25	4	This figure is too complex for the SPM, better suited to a Technical Summary. [Australia]	The figure has been dropped in the new SPM version. A new figure has been constructed to replace SPM 7 and combined some of the relevant information from SPM 5 developed after testing for user feedback and help readability
32158	25	2			An important and very valuable concept in Chapter 02 relates to the separation of scenarios along key defining narratives. Such a transparent presentation of results is key to assess complex interlinkages such as SDGs and climate mitigation in a transparent way. In that regard, Fig SPM 5 is much more useful compared to Fig SPM 6 and 7 that do not transport the multi-faceted nature of the interlinkages and the need for integrated policies. Figure SPM 5, however, still is very difficult to read and efforts should be undertaken to synthesize the findings further. [Jamaica]	Noted
36606	25	2			An important and very valuable concept in Chapter 02 relates to the separation of scenarios along key defining narratives. Such a transparent presentation of results is key to assess complex interlinkages such as SDGs and climate mitigation in a transparent way. In that regard, Fig SPM 5 is much more useful compared to Fig SPM 6 and 7 that do not transport the multi-faceted nature of the interlinkages and the need for integrated policies. Figure SPM 5, however, still is very difficult to read and efforts should be undertaken to synthesize the findings further. [Snaliah Mahal, Saint Lucia]	Noted
40568	25	2	25	2	Add "global warming" after "1.5°C". [Sergio Henrique Faria, Spain]	Editorial
49316	25	2			Figure SPM 5,6 and 7 are all on SDGs and mitigation action. They are very different in complexity and comprehensiveness. Out of these, figure SPM5 best captures the strong dependence of the effects on the socio economic development pathway. Only figure is needed on the issue and the suggestion is to delete Fig. SPM 6 and 7 and keep SPM 5. However, the analysis of cobenefits and tradeoffs in all display items in the SPM ignores the benefits of avoiding climate change impacts when achieving 1.5 pathway, regarding these SDGs. This would obviously change the picture substantially. Full integration, however, might be difficult given the limited literature base. Any figure that is included on mitigation and SDGs needs to be balanced by an assessment of avoided SDG risks by limiting warming to 1.5. [Bill Hare, Germany]	Figure SPM 5 has been dropped in the new SPM version. A new figure has been constructed to replace SPM 7 and combines some of the relevant information from SPM 5 developed after testing for user feedback and help readability
53230	25	2	25	4	I want to congratulate you for figures SPM5 and SPM 6 that synthetizes the positive synergies, the risk of negative trade-offs and the SGDs. I also congratulate and acknowledge all the authors and coordinators involved in this report, that has an extraordinary importance for our world. [Maria-Carmen Llasat, Spain]	Thank you
63084	25	2	24	3	Broadly speaking, Figure SPM5 is nice and could be very relevant. However, it is quite complex, therefore we would like to ask for simplification efforts. The central part with +/- symbols appears very relevant. Is it possible to indicate (possibly in the text) to what extent those links with SDGs are specific to 1.5°C (and would thus differ for higher levels of warming) ? [Belgium]	Taken into account - text revised. Figure 5 of the FOD has been redesigned to more clearly focus on the central part. This is now of the new Figure 4.
63086	25	2	25	4	Please indicate the source of this figure, which is figure 2.31 (not just chapter 5) [Belgium]	No longer applicable - figure dropped
38478	25	3	25	3	Sustainable Development Goals is spelled out through SPM however, an acronym is used here. [Linah Ababneh, United States of America]	Editorial
29254	25	4	25	4	Citation is wrong. Figure SPM5 is based on Figure 2.31 (in section 2.5.3), not section 5.4. Information from sections 5.4 and 5.6 could however be considered complementary, and redundancies between the two chapters and approaches should be addressed. [Germany]	Noted
39928	26		27		It needs to add one paragraph about Climate Smart Forest Management between boxes 4.8 and 4.9 to sink CO2 capacity buliding in the forest areas and forest fire to reduce the CO2 emissions. [Hamidreza Solaymani Osbooei, Iran]	Taken into account - text revised. Sustainable forest management will be added, and is discussed in Ch. 4
48274	26		27		It needs to add one paragraph about Climate Smart Forest Management between boxes 4.8 and 4.9 to sink CO2 capacity buliding in the forest areas and forest fire to reduce the CO2 emissions. [Iran]	Taken into account - text revised. Sustainable forest management will be added, and is discussed in Ch. 4
15590	26	1	26	5	Could be elevated to a High Level Statement in SPM1.2 [Australia]	Taken into account. SPM has been restructured, adaptation is now mentioned initially in Section A

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19058	26	1	26	16	reducing vulnerability through adaptation is mostly synergistic with SD and SDGs': Compared to what? As it stands, this assertion could be understood as implying that adapting is preferable over preventing from an SDG standpoint. Maybe change 'mostly' with 'highly'? [Andrea TILCHE, Belgium]	Editorial - copyedit to be completed prior to publication. Highly conveys a better meaning than mostly
30254	26	1	26	2	Add 'goals' after sustainable development to be consistent with the remainder of the sentence : especially those ... [France]	Editorial - copyedit to be completed prior to publication
33896	26	1	26	5	In line 2: "especially those associated with agriculture". The subject of "those" is a bit unclear. Please consider to clarify. [Norway]	Editorial - copyedit to be completed prior to publication. ´Those' refer to goals.
40604	26	1	26	5	On line 2 does 'those' refer to particular SDGs? If so then this should be made clearer earlier in the sentence and if not then the whole sentence should be reworded as it currently is ambiguous in its meaning. [Jonny Williams, New Zealand]	Editorial - copyedit to be completed prior to publication. ´Those' refer to goals.
56544	26	1	26	4	What does "those" refer to? [Eleanor Johnston, United States of America]	Editorial - copyedit to be completed prior to publication. ´Those' refer to goals.
58262	26	1	28	1	What does "mostly" in this instance mean? Compared to what? [Peter Marcotullio, United States of America]	Accepted - text revised. Text will be revised for clarity
8618	26	2	26	2	especially those what? "measures" perhaps? [Pauline Midgley, Germany]	Editorial - copyedit to be completed prior to publication. ´Those' refer to goals.
11136	26	2	26	2	Not clear what the word "those"refers to. Please replace "those" with a noun [Denmark]	Editorial - copyedit to be completed prior to publication. ´Those' refer to goals.
39004	26	3	26	5	I suggest inserting "While before "adaptation needs…" and delete "but". [Jan Fuglestvedt, Norway]	Editorial - copyedit to be completed prior to publication
59382	26	4	26	4	What is meant by the term "adaptation limits"? What is the nature of the limit? Are these limits institutional, socio-economic, financial, behavioral, human, terrestrial? Unlike the term "mitigation," the term "adaptation" is multi-dimensional, multi-temporal, integrative, and dynamic and, as such, "adaptation limit" is an incomplete term. Adaptation involves a process of change. Is a limit, therefore, implied as the subjects limited ability to change? What is this limit based on? Either way, the term as presented cannot be understood by the reader and, therefore not applied usefully, without additional context. [United States of America]	Accepted. Please refer to the cross-chapter box on limits to adaptation and loss and damage, Cross-chapter box 12 in Ch. 5.
50	26	5	26	5	add "even" before 'in a 1.5…' [Meinhard Doelle, Canada]	Editorial - copyedit to be completed prior to publication
6940	26	5	26	5	The following wording is suggested: … in multiple systems and regions even in a 1.5oC warmer world. [Klaus Radunsky, Austria]	Editorial - copyedit to be completed prior to publication
31290	26	5	26	5	Please add "even" before "in a 1.5 warmer world" [Japan]	Editorial - copyedit to be completed prior to publication
11434	26	7	26	7	Can we say by how much? E.g. average adaptation costs of 1.5 pathways vs 2 degrees pathways? [United Kingdom (of Great Britain and Northern Ireland)]	Accepted. Adaptation needs will depend on the risks and impacts described in Ch. 3 as well as the enablings discussed in 4.4 and they will vary by country and region.
51184	26	7	26	14	This is the only place the SPM remotely broaches the topic of loss and damage, and even here shies away from calling it that. It is inacceptable that the SPM of SR1.5 avoids addressing loss and damage! [Linda Schneider, Germany]	Accepted, the text now mentions "Limits to adaptation and associated losses" in the headline statement of SPM FGD B6.
55832	26	7	26	14	Perhaps should also reference the cross-chapter box on limits to adaptation? [Debora Ley, Guatemala]	Accepted - text revised. Cross-chapter box will be referenced when discussing this topic.
6942	26	8	26	9	The current wording of the second sentence is confusing and lacks clarity. The following wording is suggested: Limits to adaptation and resulting losses to lives, livelihoods and infrastructure exist in a 2oC warmer world but also in a 1.5oC warmer world, although to a less extent. [Klaus Radunsky, Austria]	Accepted - text revised
63088	26	9	26	3	What is meant by "weakness in distribution and monitoring mechanisms"? Please clarify. [Belgium]	Accepted. This refers to how adaptation finance is being disbursed, implemented and monitored and how appropriate mechanisms enable adaptation finance goals being met.
30256	26	1	26	1	The reader could be puzzled by the "transformational" vs. the "transformative" term in the following paragraph. If it is possible, homogeneity should be there. [France]	Editorial - copyedit to be completed prior to publication. The term transformational is used throughout the entire report
46242	26	1	26	13	What are the limits to adaptation that are mentioned here? Is it possible to give an example? [Netherlands]	Accepted. Cross-chapter box will be referenced when discussing this topic. CAN WE GIVE SPECIFIC EXAMPLES?
40778	26	12	26	12	Inclusion. Current wording implys only the poorest will be at risk: Suggest rewording: " … putting large numbers of poor and vulnerable people, systems and regions at risk." to " … putting large numbers of people, systems and regions at risk, especially the poor and vulnerable." [Liese Coulter, Australia]	Accepted - text revised
30258	26	13	26	13	4.4.1 : The role of governance and institutions is not reflected in this paragraph ? Is this reference relevant ? 4.4.6. : Same comment, finance is not expressively addressed in this paragraph [France]	Taken into account - text revised. Governance, institutions and finance enable transformational adaptation. Sentence will be reworded.
30260	26	16	26	17	« Reducing climate vulnerability through adaptation is mostly synergistic with sustainable 17 development » It would be interesting and useful to precise what are those adaptative strategies (at least those with good evidence and good confidence). [France]	Accepted - text revised. Text will be revised
30264	26	16	26	21	Would it be possible to add a figure similar to the Figure SPM 5 for adaptation strategies? [France]	Noted. Unfortunately, the literature base is not there. We have included the feasibility assessment figure in a follow-up draft of the SPM.
43854	26	16	26	21	4.6 [This further confirms that the assumption of risk reduction by assumed effective benefit of adaptation is not valid, though work and progress on adaptation are urgent.] [Peter Carter, Canada]	Noted
46244	26	16	26	16	is mostly' or 'can be'? It depends on how adaptation interventions are designed. [Netherlands]	Accepted - text revised. Text will be revised
52992	26	16	26	17	What is mostly 55%? How can this this have high-confidence if is not clear? [Ireland]	Accepted - text revised. Text will be revised
59384	26	16	26	21	Which sustainable development goals? Which adaptation strategies? This sentence is vague. [United States of America]	Accepted - text revised. Text will be revised to detail specific SDGs and adaptation strategies together with their synergies and trade-offs.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
15592	26	18			Could you give example of which sustainable goals might be hardest to achieve? [Australia]	New Figure SPM 4 presents positive and negative interactions based on literature assessment.
30262	26	18	26	18	« Some adaptation strategies » It would be interesting and useful to precise what are those adaptation strategies (at least those with good evidence and good confidence). [France]	Accepted - text revised. Text will be revised to detail specific SDGs and adaptation strategies together with their synergies and trade-offs.
44674	26	19	26	21	This is a really fundamental finding that deserves to be elevated to the high-level statements. [Penny Urquhart, South Africa]	Noted. In the FGD of the SPM a statement is included that suggests something similar (B6 HS).
59386	26	21	26	21	After "causes of vulnerability" please add "and exposure" to make this sentence more accurate. There is sufficient literature and significant evidence, including SREX, pointing to not only vulnerability but also exposure as important determinants for the degree of risk associated with the impacts of climate change. [United States of America]	Accepted - text revised. Exposure will be added
6944	26	23	26	27	The current wording lacks clarity and is confusing. The following wording is suggested: There is the risk that adaptation even to address climate change impacts for a 1.5oC warmer world is not possible without increased finance and the active involvement of the financial sector because adaptation measures to a 1.5oC warmer world will require more investment than today, but still significantly less than for a global warming of 2oC. Financial and technological support is needed to build capacity for effective responses at all levels of governance, from state level to municipal level, in many countries. [Klaus Radunsky, Austria]	Editorial - copyedit to be completed prior to publication
8620	26	23	26	23	I think this is a "risk of adaptation ...being unattainable" rather than "risk from adaptation ...being unattainable" [Pauline Midgley, Germany]	Editorial - copyedit to be completed prior to publication
9158	26	23	26	45	These sections at the end of section 4 is where a much more extensive discussion of the challenges of finceancing the needed transformations using both public and private investment funds needs to be presented. This discussion should also make clear that because of the trillions of dollars that will need to be invested each year that "green growth" of the world economy will necessarily result, even if investment levels in other sectors of the economy are reduced. You need to point out that very high and rapid investments have been made in key public goods such as climate change mitigation technologies in the past, such as in the run up to World War II. This type of green growth will make it far easier to achieve the various SDG goals, especially income dependent goals like eliminating hunger. There will also be many co-benefits from green growth and SDG implementation which will further enhance economic development in less developed countries, as well as in righer countries. In fact, making very substantial investments in mitigating and adapting to climate change in the next decade may be the only reasonable way in which many of the SDGs will get close to full implementation. See again the Wulf, et.al., paper on financing issues and SDG synergies. [Richard Rosen, Germany]	Taken into account - text revised. Text will be revised to make a stronger case of the challenges of financing as well as financing for green growth and its co-benefits
29256	26	23	26	27	SPM 4.7 is the only message related to finance. Given the enormous importance of finance and financial systems to achieve a 1.5°C scenario, finance should have a more prominent place in the SPM. What is more, SPM 4.7 refers in an imbalanced way only to finance for adaptation, i.e. finance for mitigation is not considered at all. While it is important to highlight the challenges related to finance for adaptation, direct finance needs and institutional/regulatory requirements related to mitigation under a 1.5°C scenario are substantial and addressing them constitutes an important enabling factor for the fast transition needed. Please add at least one additional key message on mitigation finance, based on the key arguments of the section on "redirecting savings and de-risking climate investments" {4.4.6.2} [Germany]	Accepted - text revised. Additional detail on finance, for both mitigation and adaptation, will be added to better highlight its importance
29258	26	23	26	27	The message is not directly drawn from the report. For instance, on page 79, line 40 it says "These figures COULD be lower in a 1.5°C world.", whereas the formulation in SPM 4.7 contains less uncertainty. Also, the referenced sections {chapter 3, 4.4.6, and 4.5.1} do not discuss multi-level governance issues. Please consider to highlight here that (i) also in the 1.5°C world higher volumes of adaptation finance are needed {p. 79 l. 37-42} and that (ii) greater policy coordination and robust mechanisms for tracking, reporting and verifying have to be established {p. 79 l. 44-49}. [Germany]	Accepted - text revised. Additional detail on finance and multi-level governance will be added
32030	26	23	26	24	Proposed langage : Adaptation to global warming of 1.5°C could benefit from the active involvement of the financial sector and an increase in adaptation and mitigation related activities. [France]	Editorial - copyedit to be completed prior to publication
40780	26	23	26	23	Readability: Suggest rewording from “There is a risk from adaptation to global warming of 1.5°C being unattainable …” to “There is a risk that adaptation to global warming of 1.5°C is unattainable …” [Liese Coulter, Australia]	Editorial - copyedit to be completed prior to publication
44676	26	23	26	24	This needs to be stated far more strongly, as increased finance for 1.5 is an absolute necessity. Currently, there is insufficient finance for many parts of the world to address even the current adaptation deficit, never mind adapt to 1.5. There is ample evidence for this - e.g. the UNEP adaptation finnace gap reports. [Penny Urquhart, South Africa]	Accepted - text revised. Adaptation finance needs will be more clearly specified.
58266	26	23	26	24	It is hard to understand this sentence. What about "There is a risk that adpatioan to global warming of 1.5C is unatttainble without…"? [Peter Marcotullio, United States of America]	Editorial - copyedit to be completed prior to publication
59388	26	23	26	27	Rephrase to: "There is a risk from adaptation to global warming of 1.5°C being unattainable without increased finance; MORE EFFECTIVE, INNOVATIVE, AND TRANSFORMATIONAL APPROACHES TO ADAPTATATION; and the active involvement of the financial AND PRIVATE sector." [United States of America]	Accepted - text revised. Text will be revised to statement is more clear.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
59390	26	23	26	36	Why doesn't the SPM mention the various governance and evaluation challenges in implementing adaptation here? This section implies that finance is the limiting factor stopping adaptation in developing countries. What evidence is there that investments would necessarily be smaller in a 1.5°C scenario than a higher warming scenario? In both cases, communities will need to prepare for potential impacts of climate variability and change. Provide evidence of communities scaling up or down adaptation investments because they expect a particular level of warming. [United States of America]	Accepted - text revised. Text will be revised to address concerns.
32032	26	26	26	26	« Financial and technological support » Would it be possible to distinguisch public and private finance? [France]	Noted. Unfortunately, no peer-reviewed literature is available to support such a distinction.
40606	26	26	26	27	This sentence does not make grammatical sense and should be reworded. [Jonny Williams, New Zealand]	Accepted - text revised. Text will be revised for clarity
59392	26	26	26	27	This sentence needs to be reworded; it currently is hard to understand. Do you mean 'multi-level governance for climate'? [United States of America]	Accepted - text revised. Text will be revised for clarity
6946	26	29	26	3	The following wording is suggested: While adaptation finance has increased, weakness in distribution and monitoring mechanisms undermine its potential. [Klaus Radunsky, Austria]	Accepted - text revised. Text will be revised for clarity
19060	26	29	26	3	weakness in distribution mechanism of climate finance undermines its potential impact': Would be better to refer to 'allocation' than to 'distribution', and 'undermine their effectiveness' rather than 'undermines its potential impact' (more consistent with usual aid terminology). [Andrea TILCHE, Belgium]	Accepted - text revised. Text will be revised for clarity
29260	26	29	26	3	It is not clear, where this statement comes from. Reference given is {chapter 3, 4.4.6, and 4.5.1}. In chapter 3 the only part on finance relates to loss and damage, not to adaptation. Neither can the argument be found in the two other referenced sections. [Germany]	Accepted - text revised. Text will be revised for clarity
30266	26	29	26	3	« and monitoring mechanisms undermine their potential impact » This statement is not sufficiently argued in these chapters. [France]	Accepted - text revised. Text will be revised for clarity
36336	26	29	26	3	This conclusion on adaptation finance is weak, and not very accurate. It is not clear that the actual delivery of finance has increased substantially. There is greater screening of investments for climate risks; but little action thereafter. Resource transfers (new and additional resources) significantly lag both expressed demand as well as latent needs. It is not clear that distribution and lack of monitoring is the main barrier. [India]	Accept. The support for this statement in the literature is indeed weak. Statement removed in its current form and revised to noting that adaptation finance can alleviate climate change impacts.
50436	26	29	26	29	Write: "… monitoring mechanisms as well as the lack of capacity of nations to implement adaptation projects undermine their potential impact", cf. 4.4.6.3. [Switzerland]	Accepted - text revised. Text will be revised for clarity
51368	26	29	26	3	This conclusion on adaptation finance is weak, and actually not very accurate. It is not clear that the actual delivery of finance has increased substantially. There is greater screening of investments for climate risks; but little action thereafter. Resource transfers (new and additional resources) significantly lag both expressed demand as well as latent needs. It is not clear that distribution and lack of monitoring is the main barrier. [Anand Patwardhan, United States of America]	Accept. The support for this statement in the literature is indeed weak. Statement removed in its current form and revised to noting that adaptation finance can alleviate climate change impacts.
54162	26	29	26	3	It is highly problematic to simply state that adaptation finance has increased without referring to the immense gap that is yet to be filled [Ayman Bel Hassan Cherkaoui, Morocco]	Accepted - text revised. Text will be revised for clarity
59394	26	29	26	3	This statement could be expanded and amplified with some more of the underlying discussion on adaptation finance. [United States of America]	Accepted - text revised. Text will be revised for clarity
59396	26	29	28	29	Statements included in the specific points under Boxes 4.8 and 4.9 are general and not specific to 1.5°C pathways. These should be reframed within the context of 1.5°C scenarios, or removed. [United States of America]	Taken into account - text revised. Statements in revised SPM made more 1.5C-specific.
59398	26	29	26	3	Rephrase to: "While adaptation finance has increased, weaknesses in its distribution, GOVERNANCE, INNOVATION, EFFECTIVENESS, and monitoring mechanisms undermine its potential impact." [United States of America]	Accepted - text revised. Text will be revised for clarity
6948	26	32	26	36	The wording lacks clarity. The following one is suggested: Even adaptation to global warming of 1.5oC would not be possible without active involvement of the financial sector, including central and multilateral banks, as front-loading of investments compared to current actiuons is required. [Klaus Radunsky, Austria]	Accepted - text revised. Text will be revised for clarity
29262	26	32	26	36	We miss a distinction between public/governmental and private finance organisations, that follow different aims here. [Germany]	Noted. Unfortunately, no literature available.
29264	26	32	26	36	It is not clear, where this statement comes from. The argument can't be found in the reference provided {4.4.6}. In particular the formulation "as front-loading of investments compared to current actions is unavoidable" should be checked, as its meaning is not evident (what is the current action), and the language is very strong and therefore needs to be clearly substantiated in the literature. This is especially important as this statement is also part of the box line 22-28 on same page. [Germany]	Accept. "front-loading" is removed. The peer-reviewed literature was indeed insufficient to support such a specific statement. It has been strongly revised to indicate the capabilities and the roles of the financial sector.
31292	26	32	26	36	We would appreciate if IPCC can clarify differences between 1.5°C and 2.0°C since this seems to be a general statement which is not limited to 1.5 warming world. [Japan]	Taken into account. We have made every effort to obtain the data that could underpin such a statement but they cannot be found in the literature. Still, we feel that the qualitative statement has value so we are leaving it in.
32034	26	32	26	32	Please replace "requires" instead of "would be unattainable" [France]	Accepted - text revised. Text will be revised for clarity

Comment No	From Page	From Line	To Page	To Line	Comment	Response
36338	26	32	26	36	It is difficult to understand how this statement is derived from the actual text in 4.4.6. For example, there is no reference to "front-loading" in 4.4.6 - Where this term appears is actually in reference to changes needed for a 1.5 C target (mitigation, not adaptation). Institutional capacity-building is still not very convincing. [India]	See response to comment 29264
51370	26	32	26	36	It is difficult to understand how this statement is derived from the actual text in 4.4.6. For example, there is no reference to "front-loading" in 4.4.6 - where this term appears is actually in reference to changes needed for a 1.5 C target (mitigation, not adaptation). Institutional capacity-building is OK, but still not very convincing. [Anand Patwardhan, United States of America]	See response to comment 29264
5484	26	33	26	34	not clear what front-loading compared to current actions means? [Haroon KHESHGI, United States of America]	Noted. Term is removed as it was unclear and has too limited of a basis in the report.
30268	26	33	26	33	Development finance institution (DFI) and in particular regional and bilateral agencies, which, in volume, are biggest players than multilateral banks, should be mentionned. [France]	Accepted - text revised. DFI, regional and bilateral agencies will be mentioned
40608	26	33	26	33	Please define 'front-loading' or use a different term. [Jonny Williams, New Zealand]	Noted. Term is removed as it was unclear and has too limited of a basis in the report.
59400	26	33	26	33	Rephrase to: "... financial AND PRIVATE sector, including [DELETE: central and] multilateral banks ..." As the report (and relevant literature) presents no evidence that involvement of central banks is necessary (or, as claimed here, that success would be "unattainable" without their involvement). Best to highlight the need for private sector involvement beyond just private financial actors, considering how much of real assets globally are privately built, owned, or managed. [United States of America]	Accepted - text revised. Text will be revised for clarity
32036	26	35	26	35	« climate and transition risks » [This requires significant institutional capacity building at multiple levels to handle both] Add : climate (physical) and transition risks and to engage finance in adaptation and transition related activities in [the mainstream financial sector in all countries] [France]	Noted. Thank you for the suggested language. The text has been modified significantly, so this modification of the text cannot be implemented anymore.
59402	26	37	26	37	Suggest adding a paragraph on the investment conditions and enabling environment needed to secure active involvement of the financial sector in adaptation. This is well-documented by the World Bank/IFC/IADB and a range of other institutions. The literature certainly exists. It is useful to state that it needs to be done; it is even more useful to state how it can be achieved. [United States of America]	Accept. Language on this has been included in D6.2 of the FGD of the SPM.
29266	26	38	26	42	The concepts of "climate smart agriculture" and "climate smart forestry" should not be mixed with the concepts of sustainable agriculture and sustainable forestry. Since Ch 4 does not introduce "climate smart" concepts and Ch 5 takes a differentiated view on the pros and cons of "climate smart" concepts, the box should be limited to statements on sustainable agriculture and forestry. (same in second bullet) [Germany]	Noted. Glossary definition to be created or edited in SPM FGD
29882	26	38	28	22	SPM 4.8 to 4.9 include very general messages which are not specific to the question of the 1.5°C warming. Some of the messages should be more focused. [France]	Noted. SPM 4.8 is supported by a detailed multidimensional feasibility and synergies and trade-off analysis in Ch4 Further clarification by Ch 5
31294	26	38	27	15	We would appreciate if IPCC can clarify differences between 1.5°C and 2.0°C since this seems to be a general statement which is not limited to 1.5 warming world. [Japan]	The difference in impacts between 1.5°C and 2.0°C is explained in Ch. 3. This section discusses mitigation and adaptation options currently implemented, and which will still be required at higher temperature increases.
33898	26	38	26	4	Please consider to delete the extra adjective "climate smart" in addition to "sustainable", since "sustainable" is a well established term that also, in our view, already includes "climate smart" aspects. This would simplify the sentences. [Norway]	Noted. To be considered in SPM FGD edit
40610	26	38	26	4	This sentence is unclear, please reword. What is meant here by 'climate smart'? This may be defined elsewhere but I do not recall having seen this definition. [Jonny Williams, New Zealand]	Noted. To be considered in SPM FGD edit
51186	26	38	26	42	There are some very valid critiques of the climate smart agriculture (CSA) concept and discourse that relate to equity (Karlsson et al. 2018 'Triple wins' or 'triple faults'? Analysing the equity implications of policy discourses on climate-smart agriculture (CSA), The Journal of Peasant Studies, Vol. 45, No.1, pp.150-174, https://doi.org/10.1080/03066150.2017.1351433), the political economy and power structures within the discourse and field (Newell/Taylor 2018 Contested landscapes: the global political economy of climate-smart agriculture, The Journal of Peasant Studies, Vol. 45, No. pp. 108-129, https://doi.org/10.1080/03066150.2017.1324426) and conceptual ambiguities (Taylor 2018 Climate-smart agriculture: what is it good for?, The Journal of Peasant Studies, Vol. 45, No. 1, pp. 89-107, https://doi.org/10.1080/03066150.2017.1312355). These critiques should be included, and the concept of climate-smart agriculture not uncritically be embraced. [Linda Schneider, Germany]	Noted. Glossary definition to be created or edited in SPM FGD
55406	26	38	26	4	The term "climate smart agriculture" renders this statement largely a tautology, given that climate smart agriculture is defined as practices that address adaptation, mitigation and sustainable development goals. This statement needs to be more explicit to provide value and go beyond a tautological catch-phrase (agriculture that is designed to adapt, mitigate and address food security helps address both adaptation and mitigation). Also the statement "are cost-effective" needs clarification, relative to what? Carbon prices applied to all agricultural activities? Or benefits outweighing their costs even in the absence of carbon prices? if carbon prices, what prices, by when? Everywhere? [Andy Reisinger, New Zealand]	Noted. Glossary definition to be created or edited in SPM FGD

Comment No	From Page	From Line	To Page	To Line	Comment	Response
56546	26	38	26	42	cost effective relative to what? Cost effectiveness hasn't been mentioned so far in the SPM [Eleanor Johnston, United States of America]	Noted. To be considered in SPM FGD edit
59404	26	38	28	15	This information is not specific to 1.5 or 2°C scenarios and should be removed or based upon information specific to these scenarios. Lines 13-15 contain normative terms. [United States of America]	Accepted - text revised. Very wide comment that covers a range of statement Unclear which specific statements are normative
62274	26	38	26	42	The key message should clarify what is meant by “sustainable and climate smart forest management.” [Shaye Wolf, United States of America]	Noted. Glossary definition to be created or edited in SPM FGD
30270	26	39	26	39	The concept of "climate smart agriculture" should be defined in the Glossary or not used here. [France]	Noted. Glossary definition to be created or edited in SPM FGD
40782	26	39	26	39	The term 'climate smart agriculture' is not widely used ouside of agriculture and forestrysectors and requires context for other audiences of the SPM. Suggest adding the acronym (CSA) in this first mention to indicate that the term has a particular meaning, elswehere defined (Chapter 5, page 20, line 21). [Liese Coulter, Australia]	Noted. Glossary definition to be created or edited in SPM FGD
44678	26	39	26	39	Definition urgently required for the contested term of "climate-smart agriculture"; plus what is meant by sustainable climate-smart agriculture. [Penny Urquhart, South Africa]	Glossary definition to be created or edited in SPM FGD
29538	26	4			Did not find a definition of climate smart forest management in the glossary. How it is (as well as climate smart agriculture) understood in this report? [Finland]	Not applicable - term no longer appears
31296	26	4	26	4	Delete “climate smart” to ensure consistency. It is documented as “sustainable forest management can provide cost-effective measures” in chapter 3 page 178 line 47. [Japan]	Noted. Glossary definition to be created or edited in SPM FGD
33900	26	44	27	1	To be slightly more solution-oriented rather than problem-oriented, we suggest moving part of the sentence to read: "Combining adaptation and mitigation options can increase cost effectiveness, for example for agroforestry, ecosystem-based adaptation, efficient food production, afforestation and reforestation , but the potential to scale up remains a challenge (medium agreement) [Norway]	Accepted - text revised. Rephrase in SPM FGD
59406	26	44	27	2	Section 4.3.3 does not provide support for this key conclusion. It simply restates the same premise. Analysis of the literature in the section itself is required, rather than just an assertion of the same conclusion elsewhere, absent supporting information and discussion. [United States of America]	Accepted - text revised. Remove reference to {4.3.3} though some underlying literature on urban land-use change may be relevant
19062	27	1	27	1	efficient food production' in relation to CC mitigation doesn't say much. 'resource-efficient food production' (including water, energy, fertilizers and other GHG-related inputs) would make the point clearer. [Andrea TILCHE, Belgium]	Accepted - text revised
30272	27	1	27	1	{Box SPM2} There is a mismatch here. Box SPM 2 is referring to cities and global warming, not to AFOLU-based mitigation and adaptation. [France]	Accepted - text revised. Remove reference to Box SPM2
30274	27	4	27	6	Is it possible to mention agroecology as well ? [France]	Noted. To be reviewed in SPM FGD
30276	27	4	27	11	This paragraph reads as a defense of "climate-smart" agriculture and forest management, despite the last sentence of the paragraph and what is assessed in Chapters. It would be better to separate different elements : put first references to sustainable and healthy diets, food waste and their synergies with sustainable development ; then put references to climate smart agriculture and its risks at the end. [France]	Same response as above (ref comment 31298
31298	27	4	27	5	As for the phrase "sustainable and healthy diets", although it is already concise, it may be more helpful for policy makers if it is accompanied by more concrete message. Based on the text of this section, we understand that introducing new mitigation and adaptation technologies are insufficient to achieve a 1.5°C world, and the way of eating habits and food supply style also must be changed dramatically. If this understanding is correct, it would be very helpful if you could supplement so. [Japan]	Instead of expansion more crisper message developed in C2.4 and C 3.3.
33902	27	4	27	6	This is a very important statement which deserves emphasis. However, the phrase "sustainable and healthy diets" can by some readers be misinterpreted as e.g. "grass fed organic lean meat" which does not have low GHG emissions at all. Please be clear about the difference between animal-based and plant-based diets in terms of emissions, health and resources (such as land use, water, antibiotics etc.). And please consider to use a term which undoubtedly excludes high emission foods. A good example is found in chapter 2, page 94 under column food systems, where the term used are "healthy, low-meat diets". [Norway]	Noted. To be reviewed in SPM FGD
33904	27	4	27	11	Please consider to delete the extra adjective "climate smart" in addition to "sustainable", since "sustainable" is a well established term that also, in our view, already includes "climate smart" aspects. Further, consider to simplify and rephrase the first sentence to "Sustainable land/agricultural/forest management, the shift toward sustainable and healthy diets and reduction of food waste provide cost-effective measures and in many cases, CO2 removal." [Norway]	Noted. To be reviewed in SPM FGD
59408	27	4	27	11	Suggest editing this statement which is too detailed for the SPM. [United States of America]	Noted. Many commentators found this statement very useful, but suggested rephrasing to further clarify
30278	27	5	27	5	The concept of "climate-smat sustainable forest management" should be defined in the Glossary or not used here. [France]	Noted. Glossary to be reviewed and changed as appropriate
9106	27	9	27	1	Should add a qualifier, however if not managed carefully can be biased to towards technologies solutions..... [Grenada]	Please see response to comment 19064
12936	27	9	27	1	Should add a qualifier, however if not managed carefully can be biased to towards technologies solutions..... [Saint Kitts and Nevis]	Please see response to comment 19064

Comment No	From Page	From Line	To Page	To Line	Comment	Response
19064	27	9	27	9	Text makes a point on rural areas of developing countries. However, the critical factor is that these are poor rural areas, which isn't necessarily equivalent (especially with an understanding of 'developing country' as countries not listed in Annex I of the UNFCCC). Replace 'rural areas of developing countries' with 'poor rural areas'. [Andrea TILCHE, Belgium]	Sentence deleted and revised message is in C2.4 and C 3.3 also see D2.2
30280	27	9	27	1	This sentence is important to be kept. Although we agree with the message, it is not really reflected in {5.4.1.2 or 5.4.1.5}. Either add references or develop these aspects in the mentioned sections. You could also add inequalities between small-holders and agribusinesses {5.5.2}. [France]	Please see response to comment 19064
32224	27	9	27	1	Should add a qualifier, however if not managed carefully can be biased to towards technologies solutions..... [Jamaica]	Please see response to comment 19064
34394	27	9		11	Why should accounting for climate effects in agriculture lead to ignoring gender inequalitities? Is this a general conclusion, or just a comment on a particular approach or implementation of climate-smart agriculture? [Nathan Gillett, Canada]	The revised draft changed substantially. In new draft based on available literature assessment is made and shown in Fig SPM 4 dedicated specifically to all the SDGs of which one is SDG 5 (Gender equality) and their links to various mitigation options compatible with 1.5C pathways . The lack of sufficient literature/lack of interlinkage studied gets reflected in white boxes. D3.3 also mentions of gender equality in revised draft.
36626	27	9	27	1	Should add a qualifier, however if not managed carefully can be biased to towards technologies solutions..... [Snaliah Mahal, Saint Lucia]	Please see response to comment 19064
54160	27	9	27	1	There should also be a reference to indigengous and local people knowledge [Ayman Bel Hassan Cherkaoui, Morocco]	Please see response to comment 19064
58618	27	9	27	1	Should add a qualifier, however if not managed carefully can be biased to towards technologies solutions..... [Donovan CAMPBELL, Jamaica]	Please see response to comment 19064
59410	27	9	27	11	These points don't seem to be unique to climate-smart agriculture. [United States of America]	Please see response to comment 19064
30282	27	1	27	1	(gender) It seems that parenthesis are not used consistently for concepts such as the one here, and ther authors might want to include gender in the phrase, not using parenthesis. [France]	Please see response to comment 19064
62912	27	11	27	11	Add 4.3.8 as backing this statement. [Sabine FUSS, Germany]	Accepted - text revised. To add reference to 4.3.8
5486	27	13	27	15	Improvements in yields are not policies, they are dependent on technology and practices. This should be corrected. [Haroon KHESHGI, United States of America]	Please see response to comment 19064 also in revised draft D.2 and D2.2 present modified massages
6950	27	13	27	13	Lack of clarity. The following wording is suggested: There are policies available that can support the poor and/or redistribute the burden of mitigation trade-offs related to …. [Klaus Radunsky, Austria]	Please see response to comment 19064 also in revised draft D.2 and D2.2 present modified massages
51064	27	13	27	15	remove this bullet point. See comment 28 above. [Doreen Stabinsky, United States of America]	Please see response to comment 19064 also in revised draft D.2 and D2.2 present modified massages
55408	27	13	27	15	I feel this statement is worth expanding, given the concern about food security within stringent mitigation pathways including the strong use of BECCS and other land-based mitigation approaches. [Andy Reisinger, New Zealand]	Please see response to comment 19064 also in revised draft D.2 and D2.2 present modified massages
59412	27	13	27	15	There is little evidence to believe that such an approach would be politically viable in many countries. The authors should include a discussion of dissenting views on such an approach to maintain balance. [United States of America]	Please see response to comment 19064 also in revised draft D.2 and D2.2 present modified massages
9100	27	17	27	23	Recommendations for the statement "and hence differs substancially between richer and poorer nation" be removed [Grenada]	Accepted. The text has been changed to "between and within regions and nations", in a sub-statement (D5.5).
9110	27	17	27	23	Reference to richer and poorer nations, this should be removed or clearly defined [Grenada]	Accepted. The text has been changed to "between and within regions and nations", in a sub-statement (D5.5).
12930	27	17	27	23	Recommendations for the statement "and hence differs substancially between richer and poorer nation" be removed [Saint Kitts and Nevis]	Accepted. The text has been changed to "between and within regions and nations", in a sub-statement (D5.5).
12940	27	17	27	23	Reference to richer and poorer nations, this should be removed or clearly defined [Saint Kitts and Nevis]	Accepted. The text has been changed to "between and within regions and nations", in a sub-statement (D5.5).
29268	27	17	27	23	The head-line statement lacks recognition of the governance and policy dimension that is covered both in the underlying SPM paras and chapter content. The current version could be read as if planning processes (such as NAPs) and whole-of-government approaches for adaptation policy design would not be a decisive driver for climate resilient outcomes. Particularly resilience is an area where learning is possible across richer and poorer nations as exemplified by the G20 commitment to develop a Work Program on Climate Resilience and Adaptation. [Germany]	Rejected. Given space constraints, this sentence had to be shortened and now avoids all listing of specific elements. Hence, governance is not included.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
30284	27	17	27	23	Here is missing the connection between gender and climate change. Women commonly face higher risks and greater burdens from the impacts of climate change in situations of poverty, and the majority of the world's poor are women. Both women and men are vulnerable to climate change, particularly if it reduces their capacity to adapt to its nega-tive impacts and also adversely affects their ability to con-tribute to mitigation. However, women are frequently ex-posed to additional gender–specific factors and barriers that consistently render them more vulnerable than men to the impacts of climate change and disasters. We suggest this article about it : Neumayer, E. and Plumper, T.,'The gendered nature of natural disasters: The impact of catastrophic events on the gender gap in life expectancy, 1981- 2002', Annals of the Association of American Geographers, Vol. 97, No 3, pp. 551- 566, 2007, doi: 10.1111/j.1467-8306.2007.00563.x, available at http://eprints. lse.ac.uk/3040/1/Gendered_nature_of_natural_disasters_(LSERO).pdf. [France]	Rejected. Gender is not sufficiently covered in the literature of anticipated climatic changes and impacts. No strong peer-reviewed literature was found to address gender in a 1.5C warmer world. Literature on gendered impacts up to 2014 was covered in the AR5.
31300	27	17	27	48	We would appreciate if IPCC can clarify differences between 1.5°C and 2°C since this seems to be a general statement which is not limited to 1.5 warming world. [Japan]	Taken into account. The difference between 1.5C and 2C is explained in the introduction and section A of the FGD. Reference to 1.5 specifically in section D (FGD) is made were 1.5C specific literature is available.
32220	27	17	27	23	Recommendations for the statement "and hence differs substancially between richer and poorer nation" be removed [Jamaica]	Accepted. The text has been changed to "between and within regions and nations", in a sub-statement (D5.5).
32228	27	17	27	23	Reference to richer and poorer nations, this should be removed or clearly defined [Jamaica]	Accepted. The text has been changed to "between and within regions and nations", in a sub-statement (D5.5).
33906	27	17	27	22	Please consider adding political will and industry as well? [Norway]	Rejected. Given space constraints, this sentence had to be shortened and now avoids all listing of specific elements.
36622	27	17	27	23	Recommendations for the statement "and hence differs substancially between richer and poorer nation" be removed [Snaliah Mahal, Saint Lucia]	Accepted. The text has been changed to "between and within regions and nations", in a sub-statement (D5.5).
34396	27	17		22	The meaning of this paragraph is not clear. The final sentence says that the potential for pursuing climate resilient development pathways to meet the Sustainable Development Goals, achieve low carbon societies, and limit global warming to 1.5C differs substantially between richer and poorer nations. The implication is that richer nations have the potential to pursue these pathways, but poorer nations do not. This seems to me to be conflating two different things. While it makes sense that richer nations can more easily meet the SDGs, many poorer nations are already low carbon societies, and therefore, in terms of future cumulative per capita emissions, I would expect have more potential to pursue climate resilient pathways going forwards than rich countries with present day high emissions and lots of fossil-fuel-dependent infrastructure. [Nathan Gillett, Canada]	Accepted. The text has been changed to "between and within regions and nations", in a sub-statement (D5.5).
36630	27	17	27	23	Reference to richer and poorer nations, this should be removed or clearly defined [Snaliah Mahal, Saint Lucia]	Accepted. The text has been changed to "between and within regions and nations", in a sub-statement (D5.5).
50110	27	17	28	22	The message on (international) equity is too vague: in the headline it is only mentioned as a "framework"; in the bullets (#3,4,5 and 6) messages on equity are not very policy relevant. What should have been said is that ensuring equitable 1.5C strategies will require a different implementation of the CBDR principle. Current implementation is that developing countries consider it fair to reduce emissions less and later than developed countries (see for instance page 5-49, lines 6-12). However, in 1.5C pathways the room for such differentiation is much smaller than in 2C pathways ("everything needs to be done everywhere"; this is illustrated by the fact that under SSP-3 conditions, with "late accession" of developing countries, 1.5C limits cannot be reached, see chapter 2.5.1); and that means equity should be sought much more in rich countries paying for part of the mitigation eforts of developing countries and assisting them in creating the right institutional and governance arrangements to enable them to strenthen their miigation efforts and to assist them in strenthening their resilience against climate change. That message should come through in the headline and the subsequent bullets. To underpin these SPM conclusions, chapter 2 and 5 should discuss these issues much better than in the current draft. [Bert Metz, Netherlands]	Rejected. Thank your for your comment. We agree but given competing requests, we were asked to not engage with CBDR. We have changed the text in Ch5 but the details were not elevated to the SPM.
58620	27	17	27	23	Reference to richer and poorer nations, this should be removed or clearly defined [Donovan CAMPBELL, Jamaica]	Accepted. The text has been changed to "between and within regions and nations", in a sub-statement (D5.5).
59414	27	17	27	19	Climate-resilient development pathways are not uniform and therefore do not have the same objectives, goals, timelines, etc. More accurately, "Climate-resilient pathways are development trajectories that combine adaptation and mitigation to realize the goal of sustainable development. They can be seen as iterative, continually evolving processes for managing change within complex systems." As written, lines 17-19 mischaracterize the wide range of objectives for climate-resilient development pathways. For example, sustainable development is widely recognized as the ultimate goal, not meeting the Sustainable Development Goals. These are not the same thing. Similarly, a specific goal to limit global warming to 1.5°C is not part of the broader effort underway as part of climate-resilient development pathways. The term simply refers to the integration of adaptation and mitigation strategies and actions. It would also not be accurate to say that equity and fairness are a framing for climate-resilient development pathways. Suggest deleting current text in lines 17-19 and replace with existing language from the executive summary of WGII AR5 Chapter 20. [United States of America]	Please see substantially revised text in and under D5

Comment No	From Page	From Line	To Page	To Line	Comment	Response
62276	27	17	27	23	Key Message 4.9 should incorporate discussion of IPCC equity principles for apportioning the global carbon budget among countries. [Shaye Wolf, United States of America]	Rejected. Given space constraints, this sentence had to be shortened and now avoids all listing of specific elements. Hence, equity is not included. However, reference to equity is now made in A4 in the FGD.
59416	27	17	27	28	This statement reflects a selective and unbalanced presentation of literature, mainly relying only on results from economic models that assume near-zero discount rates. Should highlight that there is no consensus amongst economic literature/models on this point, with some models showing such pathways could lead to short- and long-term reduction in economic growth globally. As to whether such economic impacts would be justified, the SPM should explain that the actual impacts on at least the economic dimension of sustainable development will depend on discount rate assumed, actual avoided losses (where significant uncertainty currently exists), and other macroeconomic assumptions (e.g., growth, long-term return on capital). Depending on the actual impacts, as well as success in avoiding them, these may or may not lead to socially efficient allocation of capital over the long run (e.g., jeopardizing SDGs, worsening equity across space and time.) Given the inherent uncertainties in evaluating these questions, this spectrum of possibilities must be laid out in any serious analysis and should be included here. [United States of America]	Accepted. This first bullet under the headline statement (now shorter) has been removed.
9094	27	19	27	22	This wording about "Least Developed Countries" is misleading. Industrialized countries are those which will face the major problems to curb their CO2 emissions (see incoherence with page 20 lines 33-34). [Frédéric Durand, France]	Accepted. This paragraph did not mention LDCs. The text has been changed to "between and within regions and nations", in a sub-statement (D5.5).
39006	27	19	27	23	I find this 2nd part of the headline statement a bit obvious and general. That ability to take action depends on capacity and depends on a country being rich or poor, is well known. I hope the authors can try to develop this statement into something that adds more to the issues; being more concrete, new findings etc. [Jan Fuglestvedt, Norway]	Taken into account - text revised. The text has been changed to "between and within regions and nations", in a sub-statement (D5.5).
6952	27	25	27	27	The following wording is suggested: Scenarios show that with policies that focus on sustainable development with shifts to more sustainable energy, material and food consumption patterns, as well as lower energy demand, also strong growth in economic output could be achieved until the end of the century. [Klaus Radunsky, Austria]	Rejected. The entire bullet point has been deleted.
9102	27	25	27	28	It should be clear that this scenarios is for 1.5 degrees. [Grenada]	Taken into account - text revised. The entire bullet point has been deleted.
12932	27	25	27	28	It should be clear that this scenarios is for 1.5 degrees. [Saint Kitts and Nevis]	Taken into account - text revised. The entire bullet point has been deleted.
13322	27	25	27	28	Delete the text "Scenarios show that with policies that focus on sustainable development with shifts to more sustainable energy, material and food consumption patterns, and lower energy demand could be achieved together with strong growth in economic output until the end of the century (medium to high confidence). (Figure SPM7) {2.4.3, 2.5.2, 2.5.3}". [Eleni Kaditi, Austria]	Accepted. Done. Sentence deleted.
17802	27	25	27	25	The word 'with' before 'policies' needs to be deleted. [Republic of Korea]	Accepted - text revised. Done. Sentence deleted.
30286	27	25	27	28	This is a good paragraph that should be kept. [France]	Rejected. Paragraph has been deleted.
31302	27	25	27	36	We would appreciate if IPCC can clarify differences between 1.5°C and 2°C since this seems to be a general statement which is not limited to 1.5 warming world. [Japan]	Taken into account. The difference between 1.5C and 2C is explained in the introduction and section A of the FGD. Reference to 1.5 specifically in section D (FGD) is made were 1.5C specific literature is available.
32222	27	25	27	28	It should be clear that this scenarios is for 1.5 degrees. [Jamaica]	Taken into account - text revised. The entire bullet point has been deleted.
32650	27	25	27	27	read several time but unclear. Something and lower energy demand can be achieved but what [Jonathan Lynn, Switzerland]	Accepted. The entire bullet point has been deleted.
36624	27	25	27	28	It should be clear that this scenarios is for 1.5 degrees. [Snaliah Mahal, Saint Lucia]	Taken into account - text revised. The entire bullet point has been deleted.
40784	27	25	27	28	Unclear: It is not clear in this sentence exactly what 'could be achieved'. Possible rewording could be "Scenarios show that implementing policies focused on sustainable development can provide strong growth in economic output together with shifts to more sustainable energy, material and food consumption patterns, and lower energy demand, until the end of the century." [Liese Coulter, Australia]	Rejected. The entire bullet point has been deleted.
54158	27	25	27	28	That sentence is, syntaxically, unintelligible [Ayman Bel Hassan Cherkaoui, Morocco]	Taken into account - text revised. The entire bullet point has been deleted.
58614	27	25	27	28	It should be clear that this scenarios is for 1.5 degrees. [Donovan CAMPBELL, Jamaica]	Taken into account - text revised. The entire bullet point has been deleted.
8064	27	3	27	31	This sentence does not give much information... and sounds like diplomatic jargon. [Quentin Perrier, France]	Accepted. The entire bullet point has been deleted.
11436	27	3	27	32	This sentence states "The efficiency of integrated approaches between mitigation, adaptation and sustainable 31 development approaches to deliver triple-wins depends on several enabling conditions". No reference is made to the enabling conditions, what are these or where can they be found? [United Kingdom (of Great Britain and Northern Ireland)]	Accepted. The entire bullet point has been deleted.
19066	27	3	27	31	The importance of synergy between adaptation, mitigation and overall SDG is recognised in the text, but their efficiency depends on 'enabling conditions'. Some examples based on the paragraphs referred therein would be very helpful in illustrating this key aspect. Otherwise the sentence looks banal. [Andrea TILCHE, Belgium]	Accepted. The entire bullet point has been deleted.
30288	27	3	27	32	This sentence does not give much information. It could be precised by explainaing enabling conditions for triple-wins between mitigation, adaptation and sustainable development. [France]	Accepted. The entire bullet point has been deleted.
32652	27	3	27	32	the efficiency of approaches between approaches? [Jonathan Lynn, Switzerland]	Taken into account - text revised. The entire bullet point has been deleted.
33908	27	3	27	32	When the "several enabling conditions" are not mentioned the whole bullet point may seem somewhat redundant. Please consider to remove or rephrase this bullet point. [Norway]	Accepted. The entire bullet point has been deleted.

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36340	27	3	27	32	It is not just a matter of efficiency. The actual existence of solutions that deliver these "triple wins" requires radical change in policy design, and overcoming institutional, organizational and other barriers - which should not be under-estimated. [India]	Rejected. The entire bullet point has been deleted.
40786	27	3	27	31	Readability/concise: Reword from "The efficiency of integrated approaches between mitigation, adaptation and sustainable development approaches to deliver triple-wins depends on several enabling conditions" to "Several enabling conditions are needed to efficiently integrate approaches between mitigation, adaptation and sustainable development to deliver triple-wins." [Liese Coulter, Australia]	Rejected. The entire bullet point has been deleted.
51372	27	3	27	32	It is not just a matter of efficiency. The actual existence of solutions that deliver these "triple wins" requires radical change in policy design, and overcoming institutional, organizational and other barriers - which should not be under-estimated. [Anand Patwardhan, United States of America]	Rejected. The entire bullet point has been deleted.
56548	27	3	27	32	this statement isn't very useful. Name the "enabling conditions" rather than refer to them abstractly? [Eleanor Johnston, United States of America]	Rejected. The entire bullet point has been deleted.
59418	27	3	27	32	Spell out the enabling conditions or provide pertinent examples for effective integrated approaches. [United States of America]	Rejected. The entire bullet point has been deleted.
19264	27	34	27	34	The quote "especially if framed without considerations of the complex local-national to regional linkages and" should be removed. This statement is made in the reference chapters, although not explained. The local-national to regional linkages must be consider in mitigation and adaptation policies. [Spain]	Accepted. The entire bullet point has been deleted.
34398	27	34		36	This paragraph does not state whether the implications described are positive or negative. Also it doesn't say between what or whom the equity refers to. Read literally it says that if framed with consideration for the complex local-national to regional linkages and feedbacks in socio-ecological systems, migitation and adaptation policies are less likely to effect equity. Isn't there potential for positive implications for equity if mitigation actions are framed with regard to these linkages and feedbacks? I'm not sure that there is a clear take-home message here for policymakers. [Nathan Gillett, Canada]	Not Applicable - no longer included in the chapter. This entire bullet point has been deleted.
56550	27	34	27	36	It sounds like the phrase "profound implications" has a negative connotation here, but the phrase can also be a positive thing too. Word choice should be much more precise and specific. [Eleanor Johnston, United States of America]	Taken into account - text revised. The entire bullet point has been deleted.
19068	27	35	27	35	The term 'local-national to regional' is not clear. [Andrea TILCHE, Belgium]	Taken into account - text revised. The entire bullet point has been deleted.
31304	27	38	27	39	We would appreciate if IPCC can clarify differences between 1.5°C and 2°C since this seems to be a general statement which is not limited to 1.5 warming world. [Japan]	Taken into account. The difference between 1.5C and 2C is explained in the introduction and section A of the FGD. Reference to 1.5 specifically in section D (FGD) is made were 1.5C specific literature is available.
31306	27	38	27	43	As for the definition of three key inequalities related to equity, it seems to be a definition based on just one article (Klinsky and Winker, 2014). As there are various aspects regarding equity, this definition needs more careful consideration before indicating in SPM / Glossary so that the message of this report, 1.5 degree target cannot be achieved without all countries' efforts, please be clear as pointed out in subsection 5.6.2.1(from page 47 line 16 to page 47 line 20). [Japan]	Not Applicable - no longer included in the chapter. The entire bullet point has been deleted.
33910	27	38	27	4	This sentence may seem somewhat abstract and difficult to immediately understand. Please consider to rephrase and simplify. [Norway]	Accepted. The entire bullet point has been deleted.
35468	27	38	27	43	I feel this is a very important point and should get more prominence. It could perhaps be moved higher up, closer to the top. [Ashok Sreenivas, India]	Rejected. The entire bullet point has been deleted.
39008	27	38	27	43	This para contains some essentail elements related to the 1.5 challenge. Would it be possible to add something more and new here? And something that is less general, but more specific to the 1.5 challenge? [Jan Fuglestvedt, Norway]	Rejected. The entire bullet point has been deleted.
43856	27	38	27	43	The impacts on equity of climate change depend upon the conditions under which limiting global warming to 1.5°C and adapting to 1.5°C can be achieved. .... [This further reinforces the imperative for immediate decline in global emissions followed by rapid decline, the most basic human rights particularly of the generation of today's children and all future generations.] [Peter Carter, Canada]	Noted. The entire bullet point has been deleted.
46080	27	38	27	43	It is frequently noted that the worst impacts fall on 'the poor, most vulnerable, least responsible'. However, the opposite, 'the rich, least vulnerable, most responsible with the power to implement solutions and response strategies' are not identified. In disease analogy, this is like scientists reporting that "flies are not responsible for transmitting malaria" - without adding that "mosquitoes are", the problem will never be solved. Greenhouse gas emissions and resource consumption are directly linked to the UN human development level which is measured by per capita indicators, not national totals. The International Resource Panel and many other science organizations feature per capita responsibility facts, and there is good cause for the IPCC to do the same. • Authors of the IPCC 1.5°C Report: 71% are from UN Very High Developed nations (US, EU), 5% from Low Developed (Nigeria and other African nations), 12% from Medium Developed (India), 12% from High Developed (China). IPCC does not publish the greenhouse gas emissions and resource extractions per capita for development level as above. Can it be that the 71% of IPCC science authors who are Very High Developed are hesitant to publish per capita facts because Very High Developed have the very highest emissions and extractions? [Michael Wadleigh, United States of America]	Noted. The entire bullet point has been deleted.

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51374	27	38	27	43	As written, this statement is incomprehensible - and likely incorrect. First, there is a concern about the implications of both climate change, and responses to climate change for equity - across countries and within countries. There is the question of equity with regard to responsibility; equity with regard to the sharing of the resource (carbon budget), equity with regard to the sharing of the (mitigation) burden and equity with regard to the distirbution of impacts. A much clearer and accurate statement pertaining to equity is needed. [Anand Patwardhan, United States of America]	Accepted. The entire bullet point has been deleted.
56552	27	38	27	43	Significance of statement not clear. Use of punctuation needs to be corrected to make second sentence readable. [Eleanor Johnston, United States of America]	Accepted. The entire bullet point has been deleted.
19266	27	42	27	42	Replace "implement" with "decide" (as in reference chapter). The meaning of those words is significantly different. [Spain]	Rejected. The entire bullet point has been deleted.
31308	27	42	27	42	Please clarify whether "power" in "power asymmetries" refers to political or economical power. [Japan]	Not Applicable - no longer included in the chapter. The entire bullet point has been deleted.
8284	27	45	27	47	The expression of poor and rich countries is not clear in classification, which is suggested to be rephrased as “The potential for climate-resilient development pathways differs between developed and developing countries (very high confidence), given different levels of development as well as differential responsibilities and capacities to cut emissions, eradicate poverty, and reduce inequalities and vulnerabilities. {5.6.2, 5.6.3}”. [China]	Taken into account - text revised. The text has been changed to "between and within regions and nations", in a sub-statement (D5.5).
9096	27	45	27	48	This wording about better resilience in "richer countries" is misleading. On the medium and long term, urbanized and technology-dependant countries can be more affected by events linked to global warming than rural countries (Cf. Katrina, Sandy, Irma... or cities near sea level like NYC or Tokyo...) [Frédéric Durand, France]	Taken into account - text revised. The text has been changed to "between and within regions and nations", in a sub-statement (D5.5).
30290	27	45	27	48	Although we agree with the message, this is a very general bullet point that may not have its place in the SPM. [France]	Taken into account - text revised. The text has been changed to "between and within regions and nations", also referring now to "different development contexts and starting points" in a sub-statement (D5.5).
31310	27	45	28	5	We would appreciate if IPCC can clarify differences between 1.5°C and 2°C since this seems to be a general statement which is not limited to 1.5 warming world. [Japan]	Taken into account. The difference between 1.5C and 2C is explained in the introduction and section A of the FGD. Reference to 1.5 specifically in section D (FGD) is made were 1.5C specific literature is available.
33912	27	45	27	48	Although important, the message in this statement is perceived as a repetition of previous statements and thus does not add much new. Please consider to rephrase and be more specific or remove the bullet point. [Norway]	Taken into account - text revised. The text has been changed to "between and within regions and nations", in a sub-statement (D5.5).
58646	27	45	27	48	would be useful to separate out the different variables in the second bullet - development levels, different responsibilities, different capacities, to remove the inference there's a homogenous set of developed countries equally responsible and equally capable of low emissions development. [New Zealand]	Taken into account - text revised. The text has been changed to "between and within regions and nations", also referring now to "different development contexts and starting points" in a sub-statement (D5.5).
59420	27	47	27	47	The reference to "responsibilities" is not policy-neutral and should be deleted. There is no consensus as to whether and to what extent countries have differing responsibilities with regard to the various items included in this list. [United States of America]	Accepted - text revised. Deleted.
19070	28	2	28	3	Community-led and bottom-up approaches offer potentials for climate-resilient development pathways at scale. There are many good practices of bottom-up social innovation for climate action, but far lesser cases of genuine upscaling. Revision of the text would be desirable. [Andrea TILCHE, Belgium]	Noted. Thank you. Agreed. Unfortunately, this sentence was not included in the FGD.
31312	28	7	28	1	Please clarify and explicitly include in the text what indicators have been used to as evidence of "undermine[ing] the rights," as we could not be sure even after referring to subsection 5.6.4 in the underlying chapter. [Japan]	Accepted - text revised. This sentence has been modified and reference to rights dropped.
31314	28	7	28	1	We would appreciate if IPCC can clarify differences between 1.5°C and 2°C since this seems to be a general statement which is not limited to 1.5 warming world. [Japan]	Taken into account. The difference between 1.5C and 2C is explained in the introduction and section A of the FGD. Reference to 1.5 specifically in section D (FGD) is made were 1.5C specific literature is available.
33914	28	7	28	1	Please consider communicate this message using a simpler language. [Norway]	Taken into account - text revised. This sentence has been modified and simplified.
40788	28	7	28	8	Readability/concise: Reword from " … constitute key aspects to enable ..." to " …are key enablers of …" [Liese Coulter, Australia]	Not Applicable - no longer included in the chapter. The entire bullet point has been deleted.
11438	28	9	28	9	What does 'dominant pathways' mean? [United Kingdom (of Great Britain and Northern Ireland)]	Taken into account - text revised. This sentence has been modified and reference to dominant pathways (explained in Ch5) removed.
11138	28	13	28	13	Limited indicators? Should it read "few indicators" or "a limited number of indicators"? [Denmark]	Noted. The entire bullet point has been deleted.
31044	28	13	28	15	This is exactly the same and even more pronounced for adaptation, as noted in chapter 4. consider adding "and adaptation" [James FORD, Canada]	Noted. The entire bullet point has been deleted.
31316	28	13	28	14	We would appreciate if IPCC can clarify differences between 1.5°C and 2°C since this seems to be a general statement which is not limited to 1.5 warming world. [Japan]	Taken into account. The difference between 1.5C and 2C is explained in the introduction and section A of the FGD. Reference to 1.5 specifically in section D (FGD) is made were 1.5C specific literature is available.
39010	28	13	28	15	Possible to add more to this point about lack of indicators and monitoring/evaluation? Some implications? [Jan Fuglestvedt, Norway]	Rejected. The entire bullet point has been deleted.

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52720	28	13	28	15	The MRV under the UNFCCC and the new Transparency Framework under the Paris Agreement have been designed and the existing MRV sytem operates exactly with the objective to track progress at a country level towards low carbon and climate resilient future. These systems are not perfect, but they are there and hopefully will improve over time. Then, at the global level, the global stocktake under the Paris agreement informed by the scientific information and the information reported by Parties through the transparency framework will serve as such monitoring and evaluation system at a global level. [Iulain Florin VLADU, Germany]	Noted. The entire bullet point has been deleted.
59422	28	13	28	15	This statement serves as key context and framing for section 4.9 and should be moved to a more primary bullet position. [United States of America]	Rejected. Yes, we agree. Unfortunately, this entire bullet point has been dropped in the FGD.
19268	28	17	28	19	Please give examples [Spain]	Rejected. Examples are included in Ch5 but due to space limitations not included in the SPM.
30292	28	17	28	18	Would it be possible to give some of these examples ? [France]	Noted. Examples are included in Ch5 but due to space limitations not included in the SPM.
31318	28	17	28	17	This sentence may paraphrase as follows: Some studies illustrate that 1.5°C-compatible, inclusive, prosperous an healthy societies are possible. [Japan]	Rejected. Thank you. Unfortunately, this entire bullet point has been dropped in the FGD.
33916	28	17	28	22	This statement consists of numerous listings of adjectives (first sentence), groups (sentence two) and somewhat complicated elements (sentence three). Please consider to reduce the listings to synthesise and clarify the message. [Norway]	Not Applicable - no longer included in the chapter. Thank you. Unfortunately, this entire bullet point has been dropped in the FGD.
36342	28	17	28	21	There is a fundamental problem with this approach. A 1.5 degree C target is a global target. Talking about 1.5 degree C "compatibility" at other scales requires distributional or allocation assumptions - either with regard to mitigation effort or mitigation burden or carbon space. Consequently, one could talk about low-carbon efforts being done at various scales, but hard to call them 1.5 compatible. [India]	Taken into account. We agree. 1.5-consistent pathways are now explained in Box SPM1.
39012	28	17	28	18	I think there are different views on this. depending on sets of values and background. Can this be made more value neutral, or presented in a way that does not implicty build on a specific set of values? (and does "healthy society" refer to human health or is about the characterisics of teh society; e.g. wellfare etc). [Jan Fuglestvedt, Norway]	Not Applicable - no longer included in the chapter. Thank you. Unfortunately, this entire bullet point has been dropped in the FGD.
44066	28	17		19	Very fundamental sentences. Deserves uplifting to the beginning - and not "hidden" in bullet close to end [Stephan Singer, Belgium]	Noted. Thank you. Agreed. Unfortunately, this sentence was not included in the FGD.
51376	28	17	28	21	There is a fundamental problem with this approach. A 1.5 C target is a global target. Talking about 1.5 C "compatibility" at other scales requires distirbutional or allocation assumptions - either with regard to mitigation effort or mitigation burden or carbon space. Consequently, one could talk about low-carbon efforts being done at various scales, but hard to call them 1.5 compatible. [Anand Patwardhan, United States of America]	Taken into account. We agree. 1.5-consistent pathways are now explained in Box SPM1.
59424	28	18	28	19	What does this sentence mean? Do the authors mean that current policies of these entities are not in line with reaching 1.5°C? The same statement is made later in Chapter 4. [United States of America]	Not Applicable - no longer included in the chapter. The entire bullet point has been deleted.
29270	28	24	28	24	Please add the following sentence from Ch. 5 (P4L18-22), because it underlines the framing of climate policy resp. the parallel goals of mitigation and achieving the SDGs. It could be the context for SPM Figures 5, 6, and 7. "Without consideration for equity and fairness, and concerted efforts from all countries as well as individuals, communities, and organizations, the dual goal of limiting global warming by the end of the 21st Century to 1.5°C compared to pre-industrial times, including temperature overshoots along the way, and achieving the SDGs by 2030 and beyond, inclusive of poverty eradication, will be exceedingly difficult to reach (high confidence)." [Germany]	Rejected. Thank you. We would have liked to see this sentence included as well, but unfortunately, the drafting team of the FGD SPM didn't agree.
51	29		29	13	the red area under 'animal species loss' seems counter-inuitive. Is that an error? If not, would warrant some explanation? [Meinhard Doelle, Canada]	Taken into account - text revised. There is a comprehensive new figure focusing on the mitigation effects of different options making it transparent where the trade-offs are coming from.
85	29		3		We strongly disagree that advancing towards 1.5 will create unemployment. Our evidence suggests that there is no trade-off from the employment side in achieving the 2 degrees and we don't see why 1.5 would create unemployment. Our evidence, which we are happy to share, supports the idea that climate change action supports SDG8 both in terms of growth and employment. See ILO (2018). World Employment and Social Outlook: Greening with Jobs (Geneva). [Guillermo Montt, Switzerland]	Rejected - not supported by the peer-reviewed published literature. Please note that employment effects may be positive or negative across different sectors. The overall net effect in the 1.5C pathways that were assessed in the report is small but negative by 2050.
6954	29				Figure SPM 6: This figure is appreciated. However it might require some further explanation and/or a broader approach. The issues are the following: a) what is "middle-of-the-road future development"? The IPCC used in the past different story-lines to describe the possible futures. It would be more consistent with assessments of the past to also use different socio economic scenarios. Using only one scenario would be very policy prescriptive b) what is the "middle of the road baseline pathway"? Again, this is a new concept and term and it would be very much preferred to use similar approaches as in the past. c) Why are the co-benefits and trade-offs measured for the year 2050 only? This choice is very arbitray - and such time horizone could not reflect the benefits of mitigation action but also not the significant larger climate change impacts and losses that have to be expected in a 2oC warming world by 2100 compared to a 1.5oC world. Given those fundamental problems it is suggested to include that figure and the associated assessment only in the report if the above issues can be adequately addressed. The alternative might be to limit this part to a qualitative assessment only and to defer a quantitative assessment to AR6. [Klaus Radunsky, Austria]	Accepted. The figure has been completely changed now focusing on the more comprehensive synthesis of the trade-offs for individual mitigation options (rather than systemic impacts from pathways).

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9116	29		29		Easier to understand but could be misleading because doesn't represent full spectrum of 1.5 scenarios. Also no graphics for climate change impacts of 1.5 degrees [Grenada]	Accepted. The figure has been completely changed now focusing on the more comprehensive synthesis of the trade-offs for individual mitigation options (rather than systemic impacts from pathways). Information on the net effects including climate impacts are unfortunately not available
12946	29		29		Easier to understand but could be misleading because doesn't represent full spectrum of 1.5 scenarios. Also no graphics for climate change impacts of 1.5 degrees [Saint Kitts and Nevis]	Accepted. The figure has been completely changed now focusing on the more comprehensive synthesis of the trade-offs for individual mitigation options (rather than systemic impacts from pathways). Information on the net effects including climate impacts are unfortunately not available
32232	29		29		Easier to understand but could be misleading because doesn't represent full spectrum of 1.5 scenarios. Also no graphics for climate change impacts of 1.5 degrees [Jamaica]	Accepted. The figure has been completely changed now focusing on the more comprehensive synthesis of the trade-offs for individual mitigation options (rather than systemic impacts from pathways). Information on the net effects including climate impacts are unfortunately not available
34400	29				In the figure mitigation of PM2.5 emissions is shown as having co-benefits for climate change and sustainable development. But overall reduction of aerosol aerosol-precursor emissions will warm the climate. Isn't this a trade-off situation? [Nathan Gillett, Canada]	Accepted. The figure has been completely changed now focusing on the more comprehensive synthesis of the trade-offs for individual mitigation options (rather than systemic impacts from pathways).
36344	29				Figure SPM 6 is an interesting effort to synthesize co-benefits and co-costs; however, it presents a limited picture with too many implicit assumptions. The magnitude of synergies and trade-offs is dependent on underlying socio-economic scenarios and policy implementation and will vary significantly across countries. [India]	Accepted. The figure has been completely changed now focusing on the more comprehensive synthesis of the trade-offs for individual mitigation options (rather than systemic impacts from pathways). In addition, the caption of the new figure emphasises now also the importance of local context and implementation practice.
36634	29		29		Easier to understand but could be misleading because doesn't represent full spectrum of 1.5 scenarios. Also no graphics for climate change impacts of 1.5 degrees [Snaliah Mahal, Saint Lucia]	Accepted. The figure has been completely changed now focusing on the more comprehensive synthesis of the trade-offs for individual mitigation options (rather than systemic impacts from pathways). Information on the net effects including climate impacts are unfortunately not available
49700	29		29	16	SPM figure 6: This figure lacks context and gives no understanding that 1. that IRP projects unsustainable extraction, production, consumption by the 20-40s, NOT "middle of the road socio-economic development", 2. IRP quantification of natural resource extraction with subsequent production and consumption is all important, all other goals depend on ir, not "21 sustainable development dimensions across 7 SD Goals, 3. all "hunger, health, energy access, toxicity and mineral resource implications" are dependent upon natural resource extraction from which humans and all their products are made, 4. the "local circumstances" of per capita responsibility for climate change and unsustainable development are not given. [Michael Wadleigh, United States of America]	Accepted. The figure has been completely changed now focusing on the more comprehensive synthesis of the trade-offs for individual mitigation options (rather than systemic impacts from pathways).
51378	29				Figure SPM 6 is an interesting effort to synthesize co-benefits and co-costs; however, it presents a limited picture with too many assumptions implicit. The magnitude of synergies and trade-offs is dependent on underlying socio-economic scenarios and policy implementation and will vary significantly across countries. [Anand Patwardhan, United States of America]	Accepted. The figure has been completely changed now focusing on the more comprehensive synthesis of the trade-offs for individual mitigation options (rather than systemic impacts from pathways). In addition, the caption of the new figure emphasises now also the importance of local context and implementation practice.
55834	29		3		Would be good to have this same analysis for adaptation options, showing their co-benefits and trade-offs with SDGs [Debora Ley, Guatemala]	Rejected - no scientific evidence/publication provided to support changes suggested by the reviewer. Unfortunately similar information for adaptation pathways are not available
58624	29		29		Easier to understand but could be misleading because doesn't represent full spectrum of 1.5 scenarios. Also no graphics for climate change impacts of 1.5 degrees [Donovan CAMPBELL, Jamaica]	Accepted. The figure has been completely changed now focusing on the more comprehensive synthesis of the trade-offs for individual mitigation options (rather than systemic impacts from pathways). Information on the net effects including climate impacts are unfortunately not available
5636	29	1	3	1	These graphs are very complex and hard to make sense of. Esp. Figure SPM 7 seems to have a lot of details that are hard to see even with a big screen and larger than 100%. In the explanatory text of Fig SPM 7 there are some sentence style mistakes on line 10 and 12 and 14. These sentences should begin with "The..." [Marion Grau, Norway]	Accepted - text revised. Figure design was improved for clarity
5926	29	1			I'm not convinced by the circular presentation. I had to rotate my laptop through 180 degrees to read it and it would be just as painful with a book. In general in terms of accessability writing text upside down is probably not going to help with concerns around readability and accessability. [Peter Thorne, Ireland]	Accepted - text revised
11140	29	1	29	1	Figure SPM 6 would benefit from a paragraph with examples of how to read information from the figure. [Denmark]	Taken into account - text revised. The figure has been completely changed now focusing on the more comprehensive synthesis of the trade-offs for individual mitigation options (rather than systemic impacts from pathways).
19074	29	1	29	16	Not clear what is the meaning of the 'factor change'? [Andrea TILCHE, Belgium]	Accepted - text revised
29272	29	1	29	13	The meaning of the different numbers of SDGs should be explained somewhere. [Germany]	Accepted - text revised
30294	29	1	29	13	Figure SPM6 : Interesting figure, but it is complicated. The standard name of the SDG should at least be given. [France]	Accepted. Figure was converted into a bar chart

Comment No	From Page	From Line	To Page	To Line	Comment	Response
30296	29	1	29	13	Figure SPM6 : Some of the key messages are discutable : 1) Mitigation actions may not increase population at risk of hunger 2) Why animal species loss due to mitigation actions ? 3) Mitigation actions could have a positive effect on unemployment. 4) The low level of co-benefit with forest area is surprising and should be verified. [France]	Taken into account - text revised. The new figure is more comprehensive, and the design clarifies that the reason for the trade-off is due to the deployment of specific mitigation options
19072	29	1	29	13	In the chart, the lack of negative impact (trade-off) on SDG15 is unacceptable, given the very substantial bioenergy (and even BECCS) assumptions in most scenarios. Land take for bioenergy has already caused considerable perturbations in food and land markets as well as habitat losses both directly and indirecty, although the policy-driven expansion of the sector has been very small compared to the ambitions implied by the scenarios. The positive impacts on freshwaters is also very surprising, Surely, impacts associated with fossil fuel production are going to be reduced, but the impacts of bioenergy are likely to be massive (agriculture s by far the biggest polluter fo waters globally, and that scenario implies a significant expansion of agricultural production), and CCS is likely to significantly aggravate the water qulity/availability. [Andrea TILCHE, Belgium]	Accepted. The new figure is more comprehensive, and the design clarifies that the reason for the trade-off is due to the deployment of specific mitigation options
29274	29	1	29	16	We suppose this figure SPM 6 bases on the Figure 5.4b) of chapter 5. We suggest to delete Figure SPM6 in the SPM due to the fact that the figure does not include the benefits of avoided impacts (This information is mentioned in the caption of Figure 5.4b but not in the caption of Figure SPM6). Baseline scenarios by 2050 might reach temperatures well above 1.5°C. Having in mind the results from Ch 3, in particular 3.5, there are severe impacts and risks in a baseline world by 2050 in particular concerning food security (also mentioned in 5.4.3.2) and biodiversity. Leaving out findings about avoided impacts makes it difficult if not impossible to gain a holistic understanding of how mitigation and sustainable development goals are linked. Hence, Figure SPM6 does not allow for a reasonable discussion about benefits and trade-offs of pathways, which is especially relevant, when this figure is used in the SPM. If this Figure is kept (in a modified way), some rather editorial suggestions: 1) Please the clarify in the caption what temperature stabilization range might be met with the "baseline" case - at the moment, it is unclear what the comparison is against, in particular with the reference year 2050. 2) Please also clarify where the analysis underlying this figure can be found in the full report. 3) The meaning of the different numbers of SDGs should be explained somewhere. 4) It is not clear what is meant by "mineral resource depletion". Which minerals? 5) The scale "factor change compared to the baseline" needs to be more specified. Please see also our comment on chapter 5.4.3., where we located the underlying chapter of this Figure. [Germany]	Accepted - text revised. The new figure is not showing pathways information anymore, but the effect of individual options
32654	29	1	29	13	good clear figure, would benefit from reminder of that the cited SDGs are rather than just numbers (provided in fig 7) [Jonathan Lynn, Switzerland]	Accepted - text revised
33918	29	1	3	2	Figure SPM 6 and Figure SPM 7: These figures are very complex and time consuming to make sense of. In the caption for Fig SPM 7 there are some sentence style mistakes on line 10 and 12 and 14. These sentences should begin with "The..." [Norway]	Accepted - text revised. Figure design was improved for clarity
33920	29	1	29	13	Figure SPM 6: Please consider to reshape this figure into horizontal bar diagram with the SDG's on the y-axis and the factor change on the x-axis. Also please consider applying the following principles from the Guidance for data visuals (J. Harold. et.al., Tyndall Centre, 2017): Guideline 4: choose visual formats familiar to your audience. Guideline 9: use cognitive perceptual design principles. [Norway]	Accepted - text revised. In the new figure we use a matrix rather than circular format
39316	29	1	29	1	Good visual, but the food security concerns are likely linked to BECCS inclusion rather than, for example, reerting to agroecology and significant reduction in livestock. What assumptions are made in these calculations that are less enlighted than those in the actual chapters? [Lindsey Cook, Germany]	Taken into account - text revised. The figure has been completely changed now focusing on the more comprehensive synthesis of the trade-offs for individual mitigation options (rather than systemic impacts from pathways).
40612	29	1	29	13	In this figure, the writing at the bottom of the 'wheel' should be rotated so that the reader does not have to turn the paper over to read it, e.g. the text relating to SDG7 (energy intensity, etc). Line 6 also mentions 7 SDGs but there are actually 8 labelled around the outside of the of the 'wheel'. [Jonny Williams, New Zealand]	Accepted - text revised. New design has no wheels any more
44068	29	1			why are there strong negative SDG implications for "animal species loss" and "population at risk from hunger" in the graph under a 1.5 C trajectory? Does not make any sense [Stephan Singer, Belgium]	Rejected - not supported by the peer-reviewed published literature. The reasons for possible trade-offs are explained in detail in the underlying studies assessed in chapter 5.
46246	29	1	29	1	This figure is difficult to understand and probably needs more explanation [Netherlands]	Taken into account - text revised. The figure has been completely changed now focusing on the more comprehensive synthesis of the trade-offs for individual mitigation options (rather than systemic impacts from pathways).

Comment No	From Page	From Line	To Page	To Line	Comment	Response
49568	29	1	29	1	Figure: I just can wonder that no trade-offs with SDG15 is identified. Largescale biomass demand for fuel or BECCS, with an increase world population, will create trade-offs with water (agriculture expansion) and forest (agricultural expansion into pristine ecosystems, increase of harvest intensity in forests, with e.g. homogenization effects) and trade-offs with biodiversity (given the sheer scale of BECSS in many scenarios. Furthermore, forest area is not a good and robust indicator, as it completely ignores quality-quantity aspects of forests, such as carbon stocks (see, again, Erb et al., 2018, nature 553, 73-76, doi: 10.1038/nature25138). [Karlheinz ERB, Austria]	Taken into account - text revised. The figure has been completely changed now focusing on the more comprehensive synthesis of the trade-offs for individual mitigation options (rather than systemic impacts from pathways).
54572	29	1	29	16	While the figure is interesting, there is high chance that readers will confuse this with the planetary boundaries visualisation [Reinhard Mechler, Austria]	Accepted. The new figure is not showing any circles
54864	29	1	29	1	Figure SPM6: will readers know/remember the names of the SDGs from their numbers? Recommend including the names of the SDGs in the labels. [Jordan Harold, United Kingdom (of Great Britain and Northern Ireland)]	Taken into account - text revised. The figure has been completely changed now focusing on the more comprehensive synthesis of the trade-offs for individual mitigation options (rather than systemic impacts from pathways).
54866	29	1	29	1	Figure SPM6: Will readers be familiar with the circle format of displaying the data? If not, a bar chart might be more intuitively understood and easier to read. [Jordan Harold, United Kingdom (of Great Britain and Northern Ireland)]	Accepted. Figure was converted into a bar chart
54868	29	1	29	1	Figure SPM6: Information may be more easily understood if grouped by co-benefits and trade-offs, rather than by SDGs - this might be possible if using a bar chart (i.e. ordering bars by descending factor change). [Jordan Harold, United Kingdom (of Great Britain and Northern Ireland)]	Accepted - text revised. The new figure groups the information both in terms of SDGS and by effect
54870	29	1	29	1	Figure SPM6: note that the circle format emphasizes co-benefits compared to trade-offs by virtue of visually larger coloured areas for co-benefits due to increasing width of bar with larger factor values (i.e. as the segment of the circle expands outwards). This could lead to biased judgements of the data as coloured areas are not directly comparable for co-benefits and trade-offs. A bar chart could remove this risk. [Jordan Harold, United Kingdom (of Great Britain and Northern Ireland)]	Accepted. Figure was converted into a bar chart
55608	29	1	29	13	Figure SPM 6: This figure is hugely problematic as a visual, especially in the SPM. (continued) the inidicator for animal speies loss under SDG15 is very negative, but the text in chapters 2, 4 and 5 woudl suggest that this woudl be highly dependednt int he particualr pathway to 1.5 taken. Sicne it would appear to reflect only one paper (Krey et al) that is submitted but not yet oublished it is difficult to evaluate however. [David Cooper, Canada]	Taken into account. Note that the figure shows bars with a big range of outcomes for biodiversity. Hence it is fully consistent with the conclusions in the underlying chapter. The new figure makes this clearer.
56554	29	1	29	1	The meaning of the word "tradeoffs" seems imprecise. "trade-off" is often defined as a compromise which can mean that a balance has been achieved, but here "tradeoff" is being used in a way that indicates the potential for something to be harmed or it not to work out. [Eleanor Johnston, United States of America]	Accepted. Trade-off is the right term here since it means that mitigation might imply the needs to compromise on other targets. We have added in the new figure however also a sub-heading explaining that we mean here "negative side-effects".
57656	29	1		16	Animal species loss needs to be specified [WGII TSU, Germany]	Accepted. Figure was converted into a bar chart
55600	29	1	29	13	Figure SPM 6: This figure is hugely problematic as a visual, especially in the SPM. First need to be very clear that figure is portraying gross impacts of mitigation measures (not net of reduced negative impacts of cliamte change itself.). Even if this is indicated mor celarly in the legend, the effect of the visual suggests that going for 1.5 will cause hunger. Yet we know that (1) it will mitigate increased risk of hunger from climate change itlsef; and (2) the actual increased risk from hunger depends of the [pathway taken to 1.5. The LED pathway would not do so, for example; while the SSP5 pathway would, with the others being intermediate. I would suggest it may be better to comapre among pathways instead. [David Cooper, Canada]	Taken into account - text revised. We will emphasize that the figure shows gross effects without considering impacts. Note that led is part of the figure, and as shown by the bars the effect on hunger is uncertain and can be very small (almost zero) to quite significant. The new figure makes this clearer.
59426	29	1	29	1	Figure SPM 6 has some surprising results and seems at odds with some of the previous statements in the SPM. Specifically, why is there more hunger and animal species loss in the 1.5°C scenario than there is in the non-mitigation cases (i.e., why are these such large trade-offs?)? [United States of America]	Rejected. The reasons for possible trade-offs are explained in detail in the underlying studies assessed in chapter 5. It is mainly large-scale bioenergy use and GHG prices that affect food prices and land with high biodiversity.
59428	29	1	29	1	Some statement of confidence should be included here for the various SDG calculations. [United States of America]	Taken into account - text revised. Confidence statements are shown in the underlying chapter
59430	29	1	29	2	Figure SPM 6 is very confusing. "benefits" is a positive entity. "tradeoffs" is neither positive or negative, but as the words say, are both. The figure shows major tradeoffs for population at risk of hunger in red. Is this saying 1.5°C would cause huge increase in the population at risk of hunger (a red, negative outcome) or a huge decrease in the population at risk of hunger (a co-benefit, should be black)? Similarly, with mineral resource depletion. Assumed black bars for all the toxicity indicates reduced exposures. Very strange that there is no benefit noted for premature deaths. [United States of America]	Accepted. Trade-off is the right term here since it means that mitigation might imply the needs to compromise on other targets. We have added in the new figure however also a sub-heading explaining that we mean here "negative side-effects".
59432	29	1	29	1	Question whether it is accurate to state that mitigation options consistent with 1.5°C are consistent with a high degree of animal species loss. Does the analysis factor in the risks to animal species from even more extreme warming scenarios? This seems to be a relevant comparison. Similarly, hunger and food prices would seem to be at greater risk from more extreme warming than from mitigation measures associated with 1.5°C scenarios. [United States of America]	Accepted - text revised. The design of the new figure clarifies that the reason for the trade-off is due to the deployment of specific mitigation options
6106	29	2	29	2	Fig SPM 6: This is a nice figure for mitigation. So where's the equivalent for adaptation? It surely could be done based on interpretation of the regional risks shown in SPM 3, assuming that these could be shown with respect to SDGs (for some representative indicators, perhaps). Then the mitigation and adaptation figures would logical be merged to look at adaptation mitigation co-benefits and trade offs. [Timothy Carter, Finland]	Rejected - not supported by the peer-reviewed published literature. Unfortunately there is no equivalent information from adaptation pathways available
40570	29	3	29	3	Replace "temperature" by "global warming". [Sergio Henrique Faria, Spain]	Noted. Text does not exist any more
56556	29	3	29	3	What is meant by "middle of the road socio-economic development"? [Eleanor Johnston, United States of America]	Noted. This refers to intermediate assumptions compared to the ranges in the literature.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
13324	29	6	29	6	Correct "seven Sustainable Development Goals" with "eight SDGs". [Eleni Kaditi, Austria]	Noted. Figure was removed
62706	29	2	2	23	This bullet point reads as policy prescriptive and so wording should probably be revised somewhat. [Greg FLATO, Canada]	Accepted - text revised
15594	29	29	2	13	This figure is very complex as presented. Consider converting to a simple bar chart, or moving to the body of the report. [Australia]	Accepted. Figure was converted into a bar chart
438	3				FIGURE SPM 7: I like the visual connection to the SDGs, but the authors pack too much stuff into this figure. Symbols are extremely small. e.g. around the perimeter of the disk. This is an incomprehensible figure for the purpose of an SPM. Regarding SDG 13: it should not appear in the top row, but leave a gap there and instead put the SDG 13 square into the centre of each disk. Something is there but not in recognizable form. [Thomas Stocker, Switzerland]	A new figure has been constructed which has been developed after testing for user feedback and help readability and it represents more complete assessment
5490	3				Figure SPM7 is extremely complex and is only referenced in the SPM text once. Suggest simplifying or removing from the SPM. [Haroon KHESHGI, United States of America]	A new figure has been constructed which has been developed after testing for user feedback and help readability and it represents more complete assessment
6956	3				Figure SPM 7: the figure is much too small. It should be enlarged significantly, e.g. by using a full page - or even two pages. [Klaus Radunsky, Austria]	Accepted - text revised. A new figure has been constructed which has been developed after testing for user feedback and help readability and it represents more complete assessment
6958	3				Figure SPM 7: There seems to be some redundancy between figures SPM 5 and SPM 7. Although the synergies and trade-offs of climate action and activities driven by SDGs are very relevant it seems more appropriate to address those only once in the SPM. The final question might be: which investments deliver the highest value for money and over which time period? [Klaus Radunsky, Austria]	A new figure has been constructed which has been developed after testing for user feedback and help readability and it represents more complete assessment
9060	3				Figure SPM7: This Figure contains an enormous amount of information and can only be fully understood after studying it carefully. We suggest to either deleted part of this figure (e.g. clustering the effects of segments and not showing the level of confidence, as this is rather technical) and/or split the figure in several figures that are more easy to digest. [Luxembourg]	A new figure has been constructed which has been developed after testing for user feedback and help readability and it represents more complete assessment
9118	3		3		Graphics for climate change impacts of 1.5 degrees not included, a bit difficult to understand [Grenada]	Accepted - text revised. A graphic on avoided impacts is included in the updated SPM (Fig SPM2)
11108	3		3		Very hard to read figure SPM7 - virtually impossible in printed format [Denmark]	Accepted - text revised. Figure design was improved for clarity
12948	3		3		Graphics for climate change impacts of 1.5 degrees not included, a bit difficult to understand [Saint Kitts and Nevis]	Accepted - text revised. A graphic on avoided impacts is included in the updated SPM (Fig SPM2)
15596	3		3		This figure is not readable as presented, better suited to a Technical Summary. [Australia]	A new figure has been constructed which has been developed after testing for user feedback and help readability and it represents more complete assessment
17792	3				It is hard to understand because Figure7 have too much information and small icons. It is needed to be revised more simply. [Republic of Korea]	Accepted - text revised. Figure design was improved for clarity
19078	3				Figure SPM 7: The figure is illegible at current size. Please expand to the whole page, moving the caption to a separate page. The caption is written in somewhat poor English. [Andrea TILCHE, Belgium]	Accepted - text revised. Figure design was improved for clarity
21640	3		3		Figure SPM7 needs to be given more space in order to be readable in a printed version. Consider also streamlining the figure to facilitate the key message to come better across. [Sweden]	Accepted - text revised. Figure design was improved for clarity
29624	3				Figure SPM 7 (see also the comment on SPM5) Would it be possible simply to tell in the beginning of the legend that the figure presents an analytical tool for presenting synergies and trade-offs. The rest of the caption woud guide interested readers. One detail: Red and green colours seem to symbolise two different things (level of confidence as well as negative and positive impacts); somewhat confusing. [Finland]	Accepted - text revised. Figure design was improved for clarity
32234	3		3		Graphics for climate change impacts of 1.5 degrees not included, a bit difficult to understand [Jamaica]	Accepted - text revised. A graphic on avoided impacts is included in the updated SPM (Fig SPM2)
36636	3		3		Graphics for climate change impacts of 1.5 degrees not included, a bit difficult to understand [Snaliah Mahal, Saint Lucia]	Accepted - text revised. A graphic on avoided impacts is included in the updated SPM (Fig SPM2)
49702	3		3	22	SPM figure 7: This gives no understanding that all 17 SDGs including climate action depend upon 1 goal, sustainable extraction (eg fossil fuel materials etc.) production (greenhouse gases) and consumption. In SD of which climate stabilization is a part, climate action is NOT in the center, extraction>production>consumption of natural resources is; all Energy (including solar-wind-hydro devices) all Industry, Residential Transport, Agriculture, Forestry, Oceans are sub-units of sustainable natural resource extraction>production> consumption. [Michael Wadleigh, United States of America]	A new figure has been constructed which has been developed after testing for user feedback and help readability and it represents more complete assessment
58626	3		3		Graphics for climate change impacts of 1.5 degrees not included, a bit difficult to understand [Donovan CAMPBELL, Jamaica]	Accepted - text revised. A graphic on avoided impacts is included in the updated SPM (Fig SPM2)
5928	3	1			Again, a figure so dense, and in such small typeface that I could probably spend half a day on it and still get the wrong end of the stick. This figure should be wholesale replaced with a very much simpler version. As noted elsewhere if all the detail is of interest then making a high level abstraction for print and supporting with an interactive discoverable online version may be a solution here. [Peter Thorne, Ireland]	A new figure has been constructed which has been developed after testing for user feedback and help readability and it represents more complete assessment
9010	3	1	3	3	This figure is once again difficult to read and understand. [Urs Neu, Switzerland]	Accepted. A new figure has been constructed which has been developed after testing for user feedback

Comment No	From Page	From Line	To Page	To Line	Comment	Response
19076	3	1	3	22	This Figure is extremely difficult to understand especially for a SPM. Are the outside ring colors corresponding to SDGs? Where does it start. [Andrea TILCHE, Belgium]	Accepted - text revised. Figure design was improved for clarity
29276	3	1	3	2	Figure SPM7:Helpful figure for considering the context of sustainability; but very complex ; difficult to understand and hard to read; please change design so that it is readable or split in 2 figures. Especially used in the SPM, this figure needs do be simplified. Suggestions to improve readability: 1) add "synergies" to upper "row of wheels", and trade-offs to lower "row of wheels" 2) add SDG numbers to coloured "wheel sections" to make the connection of strong 3) larger dimensions in order to better capture/comprehend the details. For instance, the size of the icons used for describing the segments of the wheels have to be increased. 4) No reference to the underlying chapter? We suppose {5.4.1}? [Germany]	Accepted - text revised. Figure design was improved for clarity
30298	3	1	3	2	Figure SPM 7 : Interesting but way too complicated figure, plus the icons are barely lisible. You may want to either simplify it to 2 or 3 weels or display it on 2 pages. Is it also possible to add the number of the SDGs to the circle? It's very hard to recognize them only with their colour. Also figuratives based on green, red and grey should be avoided as a large part of the human population does not distinguish them perfectly. A red-blue-yellow system like in figure SPM-5 page SPM-25 should be preferred. The 3 purple elements at the bottom of the figure should be better explained in the caption. [France]	Accepted - text revised. Figure design was improved for clarity
30300	3	1	3	2	Figure SPM 7 : Some of the key messages are discutable : Robust evidence and high agreement that CCS will reinforce SDG7 (more than others) [France]	A new figure has been constructed which has been developed after testing for user feedback and help readability and it represents more complete assessment
30302	3	1	3	2	Figure SPM 7 : Some of the key messages are discutable : Very robust evidence and very high agreement that non biomass renewable are counteracting on SDG6 (more than others) [France]	A new figure has been constructed which has been developed after testing for user feedback and help readability and it represents more complete assessment
30304	3	1	3	2	Figure SPM 7 : It is problematic to represent the same way two very different cases: -the one where we have information that indicate there are no positive or negative interaction -the one where we have no information. Having no information does not mean the goals are "consistent". [France]	Accepted - text revised. In the new figure empty cells refer to no interactions (rather than no information).
30306	3	1	3	2	Figure SPM 7 : When comparing the wheels of synergies and trade-offs, for a given goal and a given segment, there seem to be cases that are both "reinforcing" and "counteracting" (eg non-biomass renewable for SDG 6). this may appear as not making sense, and probably indicates that a different representation (disagregation of hydropower?) is needed. [France]	Noted. The SDGs comprise of sub-targets. Sometimes mitigation options might be associated with trade-offs for one sub-target, but synergies with other sub-targets. So, there is no inconsistency, but rather the possibility of dual effects. This is made clear in the underlying chapter and the appendix table providing further details of the effects.
30308	3	1	3	2	Figure SPM 7 : The difference between low evidence and agreement and medium or even high evidence and agreement seems thin: in table 5.1 the difference between those can be just two or three references (for medium or high) instead of just one (for low). [France]	Taken into account. The assessment does not only take into account the number of references, but also whether a reference is based on a single observation or e.g. multiple models have been used. In addition, the agreement across the studies is considered in the overall confidence statement.
31320	3	1	3	22	Figure SPM 7 is too complex to see in an A4 format paper. Please reconsider the contents to be included in this figure, by simplifying the figure or by combining the essence of the six circles to one. [Japan]	Accepted - text revised. Figure design was improved for clarity
32662	3	1	3	1	Figure SPM 7 is quite hard to read due to the small font and icon size. I understand the desire to present modern and appealing visuals in a report. However, this figure contains too much information at once. [Jasmin Kemper, United Kingdom (of Great Britain and Northern Ireland)]	Accepted - text revised. Figure design was improved for clarity
33922	3	1	3	2	Figure SPM 7: This is an elegant figure full of details and information. After a few minutes of reading, it appears intuitive and easy to read. However, one draw back is the size. Please consider to redraw the figure to make it readable in A4 paper size. Perhaps moving some elements and tilting the figure 90 degrees to be on a landscape format could improve readability. Althoug a circle starts in the "west" mathematically, perhaps it would be more intuitive if the SDG colours started on the top (north) on these circles, as moth readers probably are non-scientists. An interactive web-version of this figure would be great. [Norway]	Thanks. A new figure has been constructed which has been developed after testing for user feedback
37074	3	1	3	22	In Figure SPM7, characters are too small to read. Please ensure that all the Figures could be read in A4 format. [Jun Arima, Japan]	Accepted - text revised. Figure design was improved for clarity
38480	3	1	3	1	Scale of impact assessment graph (can't find the number): the black portion is illegible. [Linah Ababneh, United States of America]	Accepted - text revised. Figure design was improved for clarity

Comment No	From Page	From Line	To Page	To Line	Comment	Response
39014	3	1	3	1	In my view, this figure is far too complex and rich for the SPM. I absolutely support trying out new types of figures and formats, but as this is now I don't think it will work. I actually do not understand what the figure is telling, and I am afraid that it will not communicate well with the readers. It may work very well in an oral presentation were it is built up stepwise with explanations. It may also work better in the chapter than in the SPM if you introduce and explain it carefully. [Jan Fuglestvedt, Norway]	A new figure has been constructed which has been developed after testing for user feedback and help readability and it represents more complete assessment
39318	3	1	3	1	Again, real concern that these visuals do not fully take into account the explorations of the chapters on mitigation and adaptation, and thus include assumptions that can misguide policy makers. Do these visuals take into account all the explorations in the chapters? [Lindsey Cook, Germany]	A new figure has been constructed which has been developed after testing for user feedback and help readability and it represents more complete assessment
40014	3	1	3	1	This diagram looks fancy, but I think a simple bar diagram would convey the messages a lot better! [Kornelis Blok, Netherlands]	Accepted - text revised. Figure design was improved for clarity
40614	3	1	3	22	As for other figures in this report, this figure contains a huge amount of information and is thus extremely difficult to interpret. This is a summary for policy makers and should thus be straightforward to digest. [Jonny Williams, New Zealand]	Accepted - text revised. Figure design was improved for clarity
44796	3	1	3	1	Because Figure SPM7 is too complicated, It may be difficult to understand for policy makers. [Hiroaki Kondo, Japan]	A new figure has been constructed which has been developed after testing for user feedback and help readability and it represents more complete assessment
46248	3	1	3	2	Fig SPM-7: Overly busy presentation, hard to read and/or understand implications. Not fit for purposes of supporting messages at SPM level.Drop here and keep for analytical discussion in full report. Think of concise and more helpful presentation of issues in the SPM [Netherlands]	Accepted. A new figure has been constructed which has been developed after testing for user feedback. Full report chapter includes the old figure style with more clarificatory notes to guide readers.
46250	3	1	3	2	Unclear why figure SPM 6 and SPM 7 differ so much. Notably the high trade-offs in figure 6 on SDG 2 and 12 are not found in figure 7 (compared to clear trade-offs for SDG 6 in figure 7 consistent with relatively small trade-off on SDG 6 in figure 6). [Netherlands]	Accepted. SPM 6 deleted and SPM 7 in new design presents more complete assessment of literature
49570	3	1	3	1	I am not convinced by the strong-message persuasive power of this panel - it is just too complex and almost impossible to read in detail. [Karlheinz ERB, Austria]	A new figure has been constructed which has been developed after testing for user feedback and help readability and it represents more complete assessment
52994	3	1	3	2	Diagram is over ambitious in terms of detail [Ireland]	Accepted - text revised. Figure design was improved for clarity
54872	3	1	3	1	Figure SPM7; this figure contains a lot of information; while it might be visually appealing, there is a risk that the visual complexity makes it difficult for readers to extract information / key messages. Are readers expected to read off values within the circles? If, so this is a difficult task due to small font size, and small icons, which may be illegible when printed, and even on a reasonably sized computer screen. [Jordan Harold, United Kingdom (of Great Britain and Northern Ireland)]	Accepted - text revised. Figure design was improved for clarity
54874	3	1	3	1	Figure SPM7: A synthesis of the content of this figure, rather than the depth of detail currently presented might enable readers to better extract the message of what this figure is trying to convey. Readers could be directed to extra depth of detail provided in the chapter. [Jordan Harold, United Kingdom (of Great Britain and Northern Ireland)]	Accepted - text revised. Figure design was improved for clarity
54876	3	1	3	1	Figure SPM7: It is highly recommended that this figure is tested with the audience to check the level of ease of comprehension of the current figure format. [Jordan Harold, United Kingdom (of Great Britain and Northern Ireland)]	Accepted - text revised. Figure design was improved for clarity
54878	3	1	3	1	Figure SPM7: label within the figure that the top row of circles represents synergies and the bottom row of circles represents trade-offs (rather than including this as part of the caption), as this will be more easily comprehended. [Jordan Harold, United Kingdom (of Great Britain and Northern Ireland)]	Accepted - text revised. Figure design was improved for clarity
54880	3	1	3	1	Figure SPM7: this figure and figure SPM6 represent similar types of information, i.e. synergies/co-benefits and trade-offs with SDGs, yet the two figures use different visual representations (inner and outer circle segments, versus outer circle segments). Readers' comprehension is likely to be aided by using consistent visual representations across figures where it makes sense to do so. [Jordan Harold, United Kingdom (of Great Britain and Northern Ireland)]	Accepted - text revised. Figure design was improved for clarity
55602	3	1	3	2	Figure SPM 7: This figure is confusing in a few ways. First need to be very clear that figure is portraying gross impacts of mitigation measures (not net of reduced negative impacts of cliamte change itself.) The Nilsonn scale is perhaps not the best: there could, for example, be an interaction that is overall positive but still "constraining" in the sense of the particualr approach taken. The daisy wheels are so subdivided it is difficult to follow. Perhaps this level of subdivision is unecessary (eg the sub-sib division of the "Energy demand" set may not be needed. On the other hand, sustainable diests and reduced food waste could be moved into the demand category.) [David Cooper, Canada]	Accepted. A new figure has been constructed which has been developed after testing for user feedback. Yes it does include gross impacts which is clearly now mentioned in the chapter. Nilsson score has been replaced by SDG -interaction score and glossary includes definition/explanation of the term.
55604	3	1	3	2	Figure SPM 7: This figure is confusing in a few ways. (continued). The sub-categories in the "Lan and Oceans" wheel are problematic. Firstly the set is not very coherent, some are demand reduction, soem of means rather than ends (responsible sourceing). As noted, the behiovral change related ones would be better grouped toether udner demand reduction. It is misleading to include unproven (and in some cases illegal) approaches here like enhanced weathearing nd ocean fertiliztion. A betetr set might be" Soils; Livestock; Reduced loss of ecosystems (REDD etc); Afforeststion and restoration of land; protection of blue carbon). Taking, this and previous comment togther could simplify the wheels to one level of subdivision withoin each goal, each with 4 or 5 bars. [David Cooper, Canada]	Accepted. A new figure has been constructed which has been developed after testing for user feedback. Also, now in the final chapter version assessment is complete.
56560	3	1	3	1	This figure is very challenging to interpret. Too information dense, esp. for reading on a screen which is how most will view it. [Eleanor Johnston, United States of America]	Accepted - text revised. Figure design was improved for clarity

Comment No	From Page	From Line	To Page	To Line	Comment	Response
57654	3	1			Figure needs to be simplified to provide better access [WGII TSU, Germany]	A new figure has been constructed which has been developed after testing for user feedback and help readability and it represents more complete assessment
59434	3	1	3	22	Figure SPM 7 is so complicated that one questions utility for policymakers. [United States of America]	Accepted. A new figure has been constructed which has been developed after testing for user feedback
59436	3	1	3	2	Figure SPM 7 is far too confusing and complicated. Suggest rethinking how to visually convey this important information. [United States of America]	A new figure has been constructed which has been developed after testing for user feedback ad help readability
59438	3	1	3	1	SPM Figure 7 is very hard to read, thus ineffective other than the caption that explains the wheel graphs. [United States of America]	A new figure has been constructed which has been developed after testing for user feedback ad help readability
46252	3	3	3	2	Missing is the assumed development, compare the explanation on page 29 line 3 [Netherlands]	Not Applicable - no longer included in the chapter. Figure changed in revised SPM version. The sentences deleted .
9172	3	5			Please change "Sustainble" to "Sustainable" [Marco Turco, Spain]	Not Applicable - no longer included in the chapter. Figure changed in revised SPM version. The sentences deleted .
39334	3	5	3	5	Sustainble must be Sustainable [Olga Alcaraz, Spain]	Not Applicable - no longer included in the chapter. Figure changed in revised SPM version. The sentences deleted .
40616	3	6	3	8	The sentence starting with 'Here SDG 13' and ending with 'with the 16 SDGs' does not make grammatical sense. [Jonny Williams, New Zealand]	Not Applicable - no longer included in the chapter. Figure changed in revised SPM version. The sentences deleted .
57920	3	6	3	8	The sentence may be improved with the elimination of the phrase "what do they interact" preferably to read, "Here SDG 13 climate action is at the centre, showing how mitigation actions (climate action) in various sectors can interact with the other 16 SDGs." [Siir KILKIS, Turkey]	Not Applicable - no longer included in the chapter. Figure changed in revised SPM version. The sentences deleted .
9174	3	14			Please change "Agriculure" to "Agriculture" [Marco Turco, Spain]	Not Applicable - no longer included in the chapter. Figure changed in revised SPM version. The sentences deleted .
9176	3	15			Please change "color" to "colour" [Marco Turco, Spain]	Not Applicable - no longer included in the chapter. Figure changed in revised SPM version. The sentences deleted .
40618	3	16	3	2	These sentences are grammatically dubious. [Jonny Williams, New Zealand]	Not Applicable - no longer included in the chapter. Figure changed in revised SPM version. The sentences deleted .
57922	3	17	3	17	The phrase "lighter the shade confidence level is lower" may read "lighter the shade lower the confidence level" for consistency within the sentence. [Siir KILKIS, Turkey]	Not Applicable - no longer included in the chapter. Figure changed in revised SPM version. The sentences deleted .
19270	3	18	3	18	Replace "action sand" with "actions and" [Spain]	Not Applicable - no longer included in the chapter. Figure changed in revised SPM version. The sentences deleted .
40620	3	18	3	18	action sand' should read 'actions and'. [Jonny Williams, New Zealand]	Not Applicable - no longer included in the chapter. Figure changed in revised SPM version. The sentences deleted .
5638	31		31		The box seems a bit random at the end of this document. If one were to discuss specific mitigation efforts that are proposed for policy makers should there not be more than the ones in Box SPM 2? Why choose these and why are they at the very end? Is this a good way to end the SPM? It seems a better way to end the SPM would be a summary paragraph rather than a very complex, difficult Figure SPM 7 and the Box SOM 2. That means the SPM trails off without a real conclusion [Marion Grau, Norway]	The city box was deleted and does not appear in FGD SPM. SPM relevant elements were integrated into other sections of the SPM while other pieces were re-integrated into main chapters of the report. The decision was made to delete the box in order to maintain the overall storyline and balance of the SPM.
15598	31	1	31	1	It would be useful to highlight current and projected future proportions of the global population that live in urban areas, which will make it clearer why this box focuses on cities [Australia]	The city box was deleted and does not appear in FGD SPM. SPM relevant elements were integrated into other sections of the SPM while other pieces were re-integrated into main chapters of the report. The decision was made to delete the box in order to maintain the overall storyline and balance of the SPM.
15600	31	1	31	48	This box is more topical than necessary for the SPM, and should be in another chapter [Australia]	The city box was deleted and does not appear in FGD SPM. SPM relevant elements were integrated into other sections of the SPM while other pieces were re-integrated into main chapters of the report. The decision was made to delete the box in order to maintain the overall storyline and balance of the SPM.
30310	31	1			There is a mismatch between the content of the Box, about cities and global warmings of 1,5°C, and the mentions made before in the text: - the mention line 12 page SPM-20 is about climate mitigation and adaptation actions, integrated with sustainabkle developement initiatives (perhaps Box SPM 2.3 ?) - the mention line 1 page SPM-27 is about land-based mitigation and adaptation actions [France]	The city box was deleted and does not appear in FGD SPM. SPM relevant elements were integrated into other sections of the SPM while other pieces were re-integrated into main chapters of the report. The decision was made to delete the box in order to maintain the overall storyline and balance of the SPM.
33924	31	1	31	48	Box SPM 2: The box seems a bit random at the end of this document. If one were to discuss specific mitigation efforts that are proposed for policy makers should there not be more than the ones in Box SPM 2? Why choose these and why are they at the very end? Is this a good way to end the SPM? It seems a better way to end the SPM would be a summary paragraph rather than a very complex, difficult Figure SPM 7 and the Box SOM 2. That means the SPM trails off without a real conclusion. [Norway]	The city box was deleted and does not appear in FGD SPM. SPM relevant elements were integrated into other sections of the SPM while other pieces were re-integrated into main chapters of the report. The decision was made to delete the box in order to maintain the overall storyline and balance of the SPM.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
36346	31	1	31	5	The Summary for Policy Makers highlights the need to target non-CO2 climate forcers. It should also identify the distinction between the aerosols and HFCs as well as the role of policy matters and other stakeholders to tackle these different emissions coming from different sources. Reference - (Chaturvedi & Sharma 2015, Modelling long-term HFC emissions from India's residential air-conditioning sector: exploring implications of alternative refrigerants, best practices, and a sustainable lifestyle within an integrated assessment modelling framework, Climate Policy). [India]	The city box was deleted and does not appear in FGD SPM. SPM relevant elements were integrated into other sections of the SPM while other pieces were re-integrated into main chapters of the report. The decision was made to delete the box in order to maintain the overall storyline and balance of the SPM.
39016	31	1	31	48	I find it strange that a separate box is given to cities and global warming of 1.5. While the role is cities clearly is a very important element, there are also other important elements that could be lifted to a box; e.g., technological development, international collaboration, the strenthening of NDCs etc. Land use and negative emission is also a very strong cadidate due to to the critical role. It may be argued that there will be a SR for this, but still it would make sense to have it here due to the role for achieving 1.5. Also wrt to format it seems strange to have one small box in the start on defintion of GMST and then a large box on cities. If it is decided to keep the cities box, then I suggest to use this format also for other critcial concepts and issues. I also think the content does not justify a box on this and I think it would be much better to integrate the cities text together with the rest of the text and don't have a box on this. [Jan Fuglestvedt, Norway]	The city box was deleted and does not appear in FGD SPM. SPM relevant elements were integrated into other sections of the SPM while other pieces were re-integrated into main chapters of the report. The decision was made to delete the box in order to maintain the overall storyline and balance of the SPM.
40942	31	1	31	2	Consider adding a box on the role/contribution of non-state actors too - businesses and transnational initiatives (differentiating from subnational actors such as cities). [Neelam Singh, United States of America]	The city box was deleted and does not appear in FGD SPM. SPM relevant elements were integrated into other sections of the SPM while other pieces were re-integrated into main chapters of the report. The decision was made to delete the box in order to maintain the overall storyline and balance of the SPM.
44680	31	1	31	48	Box could be strengthened by mentioning the implications fr surrounding rural areas that supply the cities and also provide some of their mitigation space - as is mentioned in Cross Chapter Box 5-1. [Penny Urquhart, South Africa]	The city box was deleted and does not appear in FGD SPM. SPM relevant elements were integrated into other sections of the SPM while other pieces were re-integrated into main chapters of the report. The decision was made to delete the box in order to maintain the overall storyline and balance of the SPM.
59440	31	1	31	47	Given how many major cities are located in coastal regions and in many cases right at sea level, it is surprising that the issue of sea level rise is not mentioned here, esepcially how important it is for warming to be limited as much as possible, not just at the peak value but to return to a very low level as soon as possible in order to slow the rate of rise of sea level. It would just seem that this has to be discussed in this box for coastal cities to have prospects of survival in centuries ahead. [United States of America]	The city box was deleted and does not appear in FGD SPM. SPM relevant elements were integrated into other sections of the SPM while other pieces were re-integrated into main chapters of the report. The decision was made to delete the box in order to maintain the overall storyline and balance of the SPM.
50108	31	1	31	48	Having a full page box on urban systems seems a bit overdone. Key conclusions on the role of urban systems in 1.5C strategies can be included in section 3.4 (where urban systems are mentioned in the headline)) and in the restructured section 4.5/4.8/4.9 (where there currently is one rather vague bullet on page 24, lines 8-12). [Bert Metz, Netherlands]	The city box was deleted and does not appear in FGD SPM. SPM relevant elements were integrated into other sections of the SPM while other pieces were re-integrated into main chapters of the report. The decision was made to delete the box in order to maintain the overall storyline and balance of the SPM.
59442	31	1	31	48	Is a box the best way to present this information? Perhaps it should simply have an SPM section. [United States of America]	The city box was deleted and does not appear in FGD SPM. SPM relevant elements were integrated into other sections of the SPM while other pieces were re-integrated into main chapters of the report. The decision was made to delete the box in order to maintain the overall storyline and balance of the SPM.
24788	31	2	31	7	I would emphasize the importance of not delaying actions with a sentence about the economic benefit that the application of adaptation strategies could produce. I suggest to add at line 6 the next sentence: Nowdays, the costs of damages due to climate change is estimated to be up to six time larger than the cost of implementation of efficient adaptation measures (H2020WATER-2014/2015) Reference: H2020-WATER-2014-two-stage Research & innovation actions. Topic: Water Innovation: Boosting its value for Europe. See the link (http://www.2020-horizon.com/Water-cycle-under-future-climate-i2053.html) [David Pulido-Velazquez, Spain]	The city box was deleted and does not appear in FGD SPM. SPM relevant elements were integrated into other sections of the SPM while other pieces were re-integrated into main chapters of the report. The decision was made to delete the box in order to maintain the overall storyline and balance of the SPM.
6960	31	6	31	6	Lack of clarity. The following wording is suggested: Such deep, structural changes as required under a 1.5oC pathway can be enabled by a …. [Klaus Radunsky, Austria]	The city box was deleted and does not appear in FGD SPM. SPM relevant elements were integrated into other sections of the SPM while other pieces were re-integrated into main chapters of the report. The decision was made to delete the box in order to maintain the overall storyline and balance of the SPM.
8048	31	6	31	6	66% likelihood of staying below 1.5: The uncertainty that enter in this percentage should be clarified. After 30 years of IPCC, policy makers still use "reaching 2°C" equivalently to "having 66% chance of staying below 2°C" - because, I think, it is not clear what is in this uncertainty. Uncertainty on growth, technical progress are not accounted for here, for example. [Quentin Perrier, France]	The city box was deleted and does not appear in FGD SPM. SPM relevant elements were integrated into other sections of the SPM while other pieces were re-integrated into main chapters of the report. The decision was made to delete the box in order to maintain the overall storyline and balance of the SPM.
39046	31	6	31	6	Confusing start for the first bullet; "such deep…". I uderstand that it refers tio te title, but still i dont think it works. [Jan Fuglestvedt, Norway]	The city box was deleted and does not appear in FGD SPM. SPM relevant elements were integrated into other sections of the SPM while other pieces were re-integrated into main chapters of the report. The decision was made to delete the box in order to maintain the overall storyline and balance of the SPM.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
58272	31	6	31	11	Should we state that the "deep strucutral changes" include socio-economic, infrastructrual, built environment, etc..? What do "rapidly, systemic transtiion in urban areas" mean? [Peter Marcotullio, United States of America]	The city box was deleted and does not appear in FGD SPM. SPM relevant elements were integrated into other sections of the SPM while other pieces were re-integrated into main chapters of the report. The decision was made to delete the box in order to maintain the overall storyline and balance of the SPM.
59444	31	6	31	11	What about smart distributed energy supplies? Consider more community and local scale energy systems instead of relying on grid technologies alone? Of course, smart grids are very important, but not everywhere. Innovations are needed for both smart grids and distributed power systems. [United States of America]	The city box was deleted and does not appear in FGD SPM. SPM relevant elements were integrated into other sections of the SPM while other pieces were re-integrated into main chapters of the report. The decision was made to delete the box in order to maintain the overall storyline and balance of the SPM.
15602	31	7	31	7	Facilitated by government and the private sector. [Australia]	The city box was deleted and does not appear in FGD SPM. SPM relevant elements were integrated into other sections of the SPM while other pieces were re-integrated into main chapters of the report. The decision was made to delete the box in order to maintain the overall storyline and balance of the SPM.
54540	31	11	31	11	box 4.1 shall be added inside the bracket [Paolo BERTOLDI, Italy]	The city box was deleted and does not appear in FGD SPM. SPM relevant elements were integrated into other sections of the SPM while other pieces were re-integrated into main chapters of the report. The decision was made to delete the box in order to maintain the overall storyline and balance of the SPM.
59446	31	12	31	13	Statement 2.1 in the box is currently phrased awkwardly, to imply discrete increases in risk in steps of 0.5°C, whereas risk increases are continuous. Perhaps rephrase to indicate the ability to detect risk increases is limited to these discrete differences. [United States of America]	The city box was deleted and does not appear in FGD SPM. SPM relevant elements were integrated into other sections of the SPM while other pieces were re-integrated into main chapters of the report. The decision was made to delete the box in order to maintain the overall storyline and balance of the SPM.
59448	31	13	31	14	The authors should recognize that the "opportunity" for global governance is a reason that some could misunderstand and dismiss this report as being politically-driven and not science-driven. Wording is areas like this needs to be more precise. Clarify what is meant by global governance here rather than waiting for Chapter 4. [United States of America]	The city box was deleted and does not appear in FGD SPM. SPM relevant elements were integrated into other sections of the SPM while other pieces were re-integrated into main chapters of the report. The decision was made to delete the box in order to maintain the overall storyline and balance of the SPM.
54538	31	16	31	16	section 4.4.4 shall be added inside the bracket [Paolo BERTOLDI, Italy]	The city box was deleted and does not appear in FGD SPM. SPM relevant elements were integrated into other sections of the SPM while other pieces were re-integrated into main chapters of the report. The decision was made to delete the box in order to maintain the overall storyline and balance of the SPM.
6986	31	18	31	18	replace the word dematerialisation with "consumption of resources", as it is easier to understand. [Flintull Annica Eriksson, Sweden]	The city box was deleted and does not appear in FGD SPM. SPM relevant elements were integrated into other sections of the SPM while other pieces were re-integrated into main chapters of the report. The decision was made to delete the box in order to maintain the overall storyline and balance of the SPM.
13326	31	18	31	19	Delete the text "The circular economy concept such as zero waste, decarbonisation and dematerialisation shows high synergies with sustainable development goals {Box 5.1, 5.4.1.4, 4.3}". [Eleni Kaditi, Austria]	The city box was deleted and does not appear in FGD SPM. SPM relevant elements were integrated into other sections of the SPM while other pieces were re-integrated into main chapters of the report. The decision was made to delete the box in order to maintain the overall storyline and balance of the SPM.
40622	31	18	31	19	This sentence does not make grammatical sense and should be reworded. [Jonny Williams, New Zealand]	The city box was deleted and does not appear in FGD SPM. SPM relevant elements were integrated into other sections of the SPM while other pieces were re-integrated into main chapters of the report. The decision was made to delete the box in order to maintain the overall storyline and balance of the SPM.
59450	31	18	31	19	What does "dematerialisation" mean? [United States of America]	The city box was deleted and does not appear in FGD SPM. SPM relevant elements were integrated into other sections of the SPM while other pieces were re-integrated into main chapters of the report. The decision was made to delete the box in order to maintain the overall storyline and balance of the SPM.
15604	31	21	31	22	Why are threshold peak budgets higher than threshold return budgets for 2 degrees warming? (seems counter-intuitive and different to the 1.5 budgets). Suggest displaying this data in a more visual format to avoid this confusion. [Australia]	The city box was deleted and does not appear in FGD SPM. SPM relevant elements were integrated into other sections of the SPM while other pieces were re-integrated into main chapters of the report. The decision was made to delete the box in order to maintain the overall storyline and balance of the SPM.
19080	31	21	31	28	While carbon pricing is mentioned, there is no mention of the need to reduce subsidies to fossil fuels globally . Is this part of the mitigation pathways considered? [Andrea TILCHE, Belgium]	The city box was deleted and does not appear in FGD SPM. SPM relevant elements were integrated into other sections of the SPM while other pieces were re-integrated into main chapters of the report. The decision was made to delete the box in order to maintain the overall storyline and balance of the SPM.
19082	31	21	31	28	In these paragraph and the next a comparison should be made between people affected by 1.5 (stated as 350 million) and by 2° (absent) [Andrea TILCHE, Belgium]	The city box was deleted and does not appear in FGD SPM. SPM relevant elements were integrated into other sections of the SPM while other pieces were re-integrated into main chapters of the report. The decision was made to delete the box in order to maintain the overall storyline and balance of the SPM.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
38926	31	21	31	23	This sounds too obvious for a stetment in bold like this. Would be good if you add more about the implications of this. [Jan Fuglestvedt, Norway]	The city box was deleted and does not appear in FGD SPM. SPM relevant elements were integrated into other sections of the SPM while other pieces were re-integrated into main chapters of the report. The decision was made to delete the box in order to maintain the overall storyline and balance of the SPM.
59452	31	21	31	23	Add "exposure" to "vulnerabilities and adaptation capacities" [United States of America]	The city box was deleted and does not appear in FGD SPM. SPM relevant elements were integrated into other sections of the SPM while other pieces were re-integrated into main chapters of the report. The decision was made to delete the box in order to maintain the overall storyline and balance of the SPM.
15606	31	25			Increase urban impacts from global warming comes from each 0.1C or less increase, not just from 0.5C. One would conclude that increase of 0.4C is okay and has no additional impact. Please amend. [Australia]	The city box was deleted and does not appear in FGD SPM. SPM relevant elements were integrated into other sections of the SPM while other pieces were re-integrated into main chapters of the report. The decision was made to delete the box in order to maintain the overall storyline and balance of the SPM.
11142	31	25	31	27	350 million more people … as compared to what? As compared to the situation of today with a of 1C level of warming, is that what is meant? [Denmark]	The city box was deleted and does not appear in FGD SPM. SPM relevant elements were integrated into other sections of the SPM while other pieces were re-integrated into main chapters of the report. The decision was made to delete the box in order to maintain the overall storyline and balance of the SPM.
19180	31	25	31	26	Additional to what? Present day? [Andrea TILCHE, Belgium]	The city box was deleted and does not appear in FGD SPM. SPM relevant elements were integrated into other sections of the SPM while other pieces were re-integrated into main chapters of the report. The decision was made to delete the box in order to maintain the overall storyline and balance of the SPM.
56558	31	25	31	27	0.5°C seems arbitrary. Risks increase with any increase in temp (e.g. 0.4°C) [Eleanor Johnston, United States of America]	The city box was deleted and does not appear in FGD SPM. SPM relevant elements were integrated into other sections of the SPM while other pieces were re-integrated into main chapters of the report. The decision was made to delete the box in order to maintain the overall storyline and balance of the SPM.
59454	31	25	31	25	Wouldn't it be more accurate to say "Any additional warming increases risks to urban areas'? There is nothing special about 0.5°C. [United States of America]	The city box was deleted and does not appear in FGD SPM. SPM relevant elements were integrated into other sections of the SPM while other pieces were re-integrated into main chapters of the report. The decision was made to delete the box in order to maintain the overall storyline and balance of the SPM.
31322	31	26	31	27	Financial and technological support has very political implications and it seems it is not discussed comprehensively in the text in the underling current chapter. It needs to be clearly indicated which articles are referred, and what is the level of agreement as well as evidence. In case of low agreement and limited numbers of supporting articles and/or evidence, please specify so with appropriate scale of confidence since IPCC rule reads the IPCC works by assessing published literature. [Japan]	The city box was deleted and does not appear in FGD SPM. SPM relevant elements were integrated into other sections of the SPM while other pieces were re-integrated into main chapters of the report. The decision was made to delete the box in order to maintain the overall storyline and balance of the SPM.
7004	31	29	31	31	This bullet says "Warming of 2°C poses greater risks to urban areas than warming of 1.5°C in most cases…". It's true, but to say this here, may lead the perception that heating up to 1.5°C is less risky in urban areas. [Serhat Sensoy, Turkey]	The city box was deleted and does not appear in FGD SPM. SPM relevant elements were integrated into other sections of the SPM while other pieces were re-integrated into main chapters of the report. The decision was made to delete the box in order to maintain the overall storyline and balance of the SPM.
9108	31	29	31	31	How is urban defined [Grenada]	The city box was deleted and does not appear in FGD SPM. SPM relevant elements were integrated into other sections of the SPM while other pieces were re-integrated into main chapters of the report. The decision was made to delete the box in order to maintain the overall storyline and balance of the SPM.
12938	31	29	31	31	How is urban defined [Saint Kitts and Nevis]	The city box was deleted and does not appear in FGD SPM. SPM relevant elements were integrated into other sections of the SPM while other pieces were re-integrated into main chapters of the report. The decision was made to delete the box in order to maintain the overall storyline and balance of the SPM.
19084	31	29	31	31	Can this bullet be connected to the previous one, and be more quantitive? [Andrea TILCHE, Belgium]	The city box was deleted and does not appear in FGD SPM. SPM relevant elements were integrated into other sections of the SPM while other pieces were re-integrated into main chapters of the report. The decision was made to delete the box in order to maintain the overall storyline and balance of the SPM.
32226	31	29	31	31	Please elaborate on how 'urban' is defined [Jamaica]	The city box was deleted and does not appear in FGD SPM. SPM relevant elements were integrated into other sections of the SPM while other pieces were re-integrated into main chapters of the report. The decision was made to delete the box in order to maintain the overall storyline and balance of the SPM.
36628	31	29	31	31	Please elaborate on how 'urban' is defined [Snaliah Mahal, Saint Lucia]	The city box was deleted and does not appear in FGD SPM. SPM relevant elements were integrated into other sections of the SPM while other pieces were re-integrated into main chapters of the report. The decision was made to delete the box in order to maintain the overall storyline and balance of the SPM.

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59456	31	29	31	31	In this sentence, the "level of poverty" is only one dimension of vulnerability. The sentence should be expanded to more broadly discuss factors that determine "adaptive capacity" such as governance, policy response to previous extreme events, access to resources, social cohension, etc. [United States of America]	The city box was deleted and does not appear in FGD SPM. SPM relevant elements were integrated into other sections of the SPM while other pieces were re-integrated into main chapters of the report. The decision was made to delete the box in order to maintain the overall storyline and balance of the SPM.
13328	31	3	31	31	Delete the text "(energy, water, transport)". [Eleni Kaditi, Austria]	The city box was deleted and does not appear in FGD SPM. SPM relevant elements were integrated into other sections of the SPM while other pieces were re-integrated into main chapters of the report. The decision was made to delete the box in order to maintain the overall storyline and balance of the SPM.
10230	31	33	31	35	Focus should be on emissions reduction, not energy demand. 2030 needs to see more GHG emissions reduction. [Saudi Arabia]	The city box was deleted and does not appear in FGD SPM. SPM relevant elements were integrated into other sections of the SPM while other pieces were re-integrated into main chapters of the report. The decision was made to delete the box in order to maintain the overall storyline and balance of the SPM.
10958	31	33	31	35	Focus should be on emissions reduction, not energy demand. 2030 needs to see more GHG emissions reduction. [Nedal KATBEHBADER, Switzerland]	The city box was deleted and does not appear in FGD SPM. SPM relevant elements were integrated into other sections of the SPM while other pieces were re-integrated into main chapters of the report. The decision was made to delete the box in order to maintain the overall storyline and balance of the SPM.
10960	31	33	31	33	to delete: "such as methane". such as the food (livestock),Since this is a misleading message, since food production is essential to ensure food security especially in developing countries. [Nedal KATBEHBADER, Switzerland]	The city box was deleted and does not appear in FGD SPM. SPM relevant elements were integrated into other sections of the SPM while other pieces were re-integrated into main chapters of the report. The decision was made to delete the box in order to maintain the overall storyline and balance of the SPM.
29278	31	33	31	35	The text states that “all end-use sectors require significant demand reductions by 2030”. It is not entirely clear whether that relates to lower demand of e.g. energy or other inputs by those sectors’ production, induced by e.g. more efficient production processes, or whether a reduction of the demand of the goods produced by those sectors is referred to. In the latter case, the focus of the statement should be more on sustainable consumption than on demand reductions per se (see Chapter 5, page 26, line 4-5 and Fischedick et al. 2014). And why is this statement contained in the box on cities? [Germany]	The city box was deleted and does not appear in FGD SPM. SPM relevant elements were integrated into other sections of the SPM while other pieces were re-integrated into main chapters of the report. The decision was made to delete the box in order to maintain the overall storyline and balance of the SPM.
30312	31	33	31	35	This has to be emphasized. [France]	The city box was deleted and does not appear in FGD SPM. SPM relevant elements were integrated into other sections of the SPM while other pieces were re-integrated into main chapters of the report. The decision was made to delete the box in order to maintain the overall storyline and balance of the SPM.
31324	31	33	31	35	“Food (livestock)” clarification should be provided on what aspect of the livestock sector is meant by this term. As it stands it appears extremely unbalanced by describing the livestock sector as “end-use sector”, which is relevant both to production side and consumption side, in line with building and transport. [Japan]	The city box was deleted and does not appear in FGD SPM. SPM relevant elements were integrated into other sections of the SPM while other pieces were re-integrated into main chapters of the report. The decision was made to delete the box in order to maintain the overall storyline and balance of the SPM.
46254	31	33	31	35	This message should get more stress in the text. I think it is incorrect to put it (solely) under the headline of box SPM 2.2 (line 21-23) that deals primarily on urban areas and impacts. [Netherlands]	The city box was deleted and does not appear in FGD SPM. SPM relevant elements were integrated into other sections of the SPM while other pieces were re-integrated into main chapters of the report. The decision was made to delete the box in order to maintain the overall storyline and balance of the SPM.
46428	31	33	31	35	This message should get more emphasis in the text. I think it is incorrect to put it (solely) under the headline of box SPM 2.2 (line 21-23) that deals primarily on urban areas and impacts. [Netherlands]	The city box was deleted and does not appear in FGD SPM. SPM relevant elements were integrated into other sections of the SPM while other pieces were re-integrated into main chapters of the report. The decision was made to delete the box in order to maintain the overall storyline and balance of the SPM.
54156	31	38	31	38	the potential to scale up remains a challenge. "Potential" should be deleted. Scaling up is the challenge, not the potential to scale up. [Ayman Bel Hassan Cherkaoui, Morocco]	The city box was deleted and does not appear in FGD SPM. SPM relevant elements were integrated into other sections of the SPM while other pieces were re-integrated into main chapters of the report. The decision was made to delete the box in order to maintain the overall storyline and balance of the SPM.
13330	31	43	31	43	Replace "green" with "low-emission". [Eleni Kaditi, Austria]	The city box was deleted and does not appear in FGD SPM. SPM relevant elements were integrated into other sections of the SPM while other pieces were re-integrated into main chapters of the report. The decision was made to delete the box in order to maintain the overall storyline and balance of the SPM.
46452	31	43	31	44	the paragraph indicates that emission cuts from NDCs submitted will lead to higher warming than 1.5C; however it would be consequent here to add to which level of expected warming temperatures might increase based on the NDCs, and ranges are available from literature, and are also provided in Chapter 4, page 97, line 10 [Sven Harmeling, Germany]	The city box was deleted and does not appear in FGD SPM. SPM relevant elements were integrated into other sections of the SPM while other pieces were re-integrated into main chapters of the report. The decision was made to delete the box in order to maintain the overall storyline and balance of the SPM.

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62142	118	6	118	6	maybe add "and hydrocarbons in transport", an evolution both needed in 1.5° path and also a trend now started. [Antoine Bonduelle, France]	The city box was deleted and does not appear in FGD SPM. SPM relevant elements were integrated into other sections of the SPM while other pieces were re-integrated into main chapters of the report. The decision was made to delete the box in order to maintain the overall storyline and balance of the SPM.