

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
284	1		54		This is an important chapter and as a CLA I wanted to see how it would help the whole document and my chapter. I think there is a lot of work to do to shape the material provided into enabling it to fulfil this need. <i>There is a lot of material that is largely presented as a series of isolated essays in a text book. It starts well and finishes well with the conclusions showing how to now edit the narrative of the chapter to be framed. The three frameworks of: Economics with SDG's; Ethics; and, Transitions, needs to be shaping the whole chapter. I was pleased that Transitions did get in there but it was like an afterthought and was not developed nearly as much as it could have. The Transitions framing is extremely useful for other chapters as it enables us to frame our issues in terms of the multi-levels that then have policy implications.</i> We have used that framing as it was in the earlier version of the chapter. Its not as clear now and the figure showing it is awful. The figure we have used is much simpler. Lets try and resolve that at least.	Agree on importance of transition, but not as 'the' overarching Analytic Framework, and it is complex in context of shifting development pathways. The formatting error in the Figure was very unfortunate and extensive work has gone into discussing and developing more useful, more easily understood - those not familiar pressed the "so what" aspect of MLP theories. For the SOD we have engaged one of the world's experts on transition theories as a CA and sought to illustrate relevance in terms of S-curve dynamics.	Newman Peter	Curtin University and CLA chapter 10	Australia
410					Generally well written but some serious spelling/grammar mistakes. Hopefully the latter will be addressed in the copyediting stage.	Hopefully improved now	Timothy Barker	Keele University	United Kingdom (of Great Britain and Northern Ireland)
412	4	30	4	31	political	The text has been revised. But with the use of "can" and "sometimes" the statement is not really political.	Timothy Barker	Keele University	United Kingdom (of Great Britain and Northern Ireland)
414	5	13	5	14	political	The text has been revised	Timothy Barker	Keele University	United Kingdom (of Great Britain and Northern Ireland)
416	5	12	5	12	citation	Exec Sum completely redrafted	Timothy Barker	Keele University	United Kingdom (of Great Britain and Northern Ireland)
418	7	28	7	28	AFOLU - acronym not yet declared	Corrected	Timothy Barker	Keele University	United Kingdom (of Great Britain and Northern Ireland)
420	8	13	8	13	"solar radiation management" requires explanation	The term has been restated as Solar Radiation Modification (SRM) as per SR1.5 report. The same report may be consulted for further details on SRM.	Timothy Barker	Keele University	United Kingdom (of Great Britain and Northern Ireland)
422	9	45	9	45	do we need to be saying who did NOT sign up to the Paris Agreement?	Rejected. Not the focus of the assessment	Timothy Barker	Keele University	United Kingdom (of Great Britain and Northern Ireland)
424	10	30	10	30	is there discussin of GDP+?	"GDP+" seems to be used in various ways - clarify, with reference? Values are discussed in section 4, and more extensively including metrics in Chapter 5	Timothy Barker	Keele University	United Kingdom (of Great Britain and Northern Ireland)
426	11	11	11	13	yes, see comment number 8	Not sure which one is comment 8	Timothy Barker	Keele University	United Kingdom (of Great Britain and Northern Ireland)
428	11	33	11	33	brilliant	Thanks.	Timothy Barker	Keele University	United Kingdom (of Great Britain and Northern Ireland)
430	12	10	12	10	:)	Noted	Timothy Barker	Keele University	United Kingdom (of Great Britain and Northern Ireland)
432	13	23	13	23	is it worth pointing out the UK experience?	Rejected - we do not go into details here.	Timothy Barker	Keele University	United Kingdom (of Great Britain and Northern Ireland)

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434	17	15	17	16	can the ppresence of all these goals, agreements, accords etc deter state & citizen involvement by being pereceived as over-prescriptive?	Yes. it can.	Timothy Barker	Keele University	United Kingdom (of Great Britain and Northern Ireland)
436	18	18	18	26	se previous comments on GDP+ etc	Noted.	Timothy Barker	Keele University	United Kingdom (of Great Britain and Northern Ireland)
438	19	23	19	23	is "transformating" a word?	This word has been removed from the revised version	Timothy Barker	Keele University	United Kingdom (of Great Britain and Northern Ireland)
440	19	32	19	32	brilliant	Thank you	Timothy Barker	Keele University	United Kingdom (of Great Britain and Northern Ireland)
442	22	5	22	16	double check for ky terms in the glossary	Noted	Timothy Barker	Keele University	United Kingdom (of Great Britain and Northern Ireland)
444	24	5	24	6	why is the UK so high here? Missing analysis?	Partly accepted -we use a different figure now.	Timothy Barker	Keele University	United Kingdom (of Great Britain and Northern Ireland)
446	25	30	25	35	cruciall, oignantly interesting	Rejeted -very unclear comment. Most of this paragraph has been removed.	Timothy Barker	Keele University	United Kingdom (of Great Britain and Northern Ireland)
448	25	26	25	29	truly? DIY, SMEs?	Rejected - unclear comment.	Timothy Barker	Keele University	United Kingdom (of Great Britain and Northern Ireland)
450	27	27	27	27	doesn't make sense	Accepted. Corrected.	Timothy Barker	Keele University	United Kingdom (of Great Britain and Northern Ireland)
452	28	24	28	35	star! Accurate, timely & well presented	Thank you very much.	Timothy Barker	Keele University	United Kingdom (of Great Britain and Northern Ireland)
454	29	8	29	9	Now, this is a SCIENTIFIC treatment of the politics (see previous comment!)	Thank you.	Timothy Barker	Keele University	United Kingdom (of Great Britain and Northern Ireland)
456	30	12	30	12	conflict resolution?	Noted - comment not very specific	Timothy Barker	Keele University	United Kingdom (of Great Britain and Northern Ireland)
458	30	33	30	33	can more literature be cited here please e.g. Maslow's Hierarchy of Needs? Social constructivism (Vygotsky?) My own and others e.g. our NECSI paper (Woehle, R., Jones, G.T., Barker, T & Piper, M. (2009) Theory and Modeling of Emergent Dynamics: The Effects of Intervention on Social and Cultural Capital. Social Development Issues) i.e. network theory?	Rejected - The literature you mention are general theories and not directly applied to vlimate or energy. We are sure that these theories can be applied to climate and energy, but as our chapter is just an overview chapter, and in this paragraph, we have chosen papers that are directly applied to our purpose.	Timothy Barker	Keele University	United Kingdom (of Great Britain and Northern Ireland)
460	35	1	36	44	EXCELLENT!	Thank you	Timothy Barker	Keele University	United Kingdom (of Great Britain and Northern Ireland)
462	38	20	38	29	interesting from an economic perspective alone!	Mainly econ section and carbon pricing has been a major focus	Timothy Barker	Keele University	United Kingdom (of Great Britain and Northern Ireland)
464	38	32	38	32	no mention of TIME!	Implicit in dynamics but now more explicit]	Timothy Barker	Keele University	United Kingdom (of Great Britain and Northern Ireland)

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466	39	47	39	47	It would be interesting to inspect these behavioural models from my own AI/social science background. At this time my feeling that by focussing on such deterministic "rule-based" and isolated "individual" behaviour processes is out of step with current thinking which favours more social and emergent phenomena.	Important point noted in redraft	Timothy Barker	Keele University	United Kingdom (of Great Britain and Northern Ireland)
468	41	1	41	22	see my own book "Sitrep Earth" (unpublished) - a lot of commonality! Plus maybe a table can be used here please e.g. critique, postulate (problem solving)? [cons & pros?]	Noted.	Timothy Barker	Keele University	United Kingdom (of Great Britain and Northern Ireland)
470	42	3	42	3	citation!	Noted - references to gender aspects are in section 1.5.6. This section is referred to in the beginning of this subsection.	Timothy Barker	Keele University	United Kingdom (of Great Britain and Northern Ireland)
472	42	9	42	11	may be true but due to resources, time constraints etc we need to be pragmatic and focus!	Noted	Timothy Barker	Keele University	United Kingdom (of Great Britain and Northern Ireland)
474	42	31	42	31	carbon taxes are not uncontentious! i.e. shouldn't be accepted prima facie	Noted	Timothy Barker	Keele University	United Kingdom (of Great Britain and Northern Ireland)
476	43	2	43	4	key!	There was an unfortunate technical error in conversion to PDF, however the Figure has been substnially reworked	Timothy Barker	Keele University	United Kingdom (of Great Britain and Northern Ireland)
478	44	20	44	20	a very reductionist approach to a particularly post-positivist phenomenon. Categorising physical systems is perhaps a preoccupation of meteorologists and physicists. Biologists, et but doesn't necessarily map onto the social sciences so clearly!	We disagree. We have accommodated different ways of framing the climate challenge bearing min mind that this is report is for climate mitigation and policy responses.	Timothy Barker	Keele University	United Kingdom (of Great Britain and Northern Ireland)
480	46	10	46	20	See previous comment on reductionism - over reliance upon the use of categories (see Aristotle!)	I think we have now addressed this sufficiently	Timothy Barker	Keele University	United Kingdom (of Great Britain and Northern Ireland)
482	46	29	46	29	makes sense but but overtly 'rational' versus 'emotional' bsed motivation for interventions?	Didn't actually understand the point / suggestion being made?	Timothy Barker	Keele University	United Kingdom (of Great Britain and Northern Ireland)
484	47	21	47	36	ar ewe over egging the pudding with regard to analysis? Too much thinking and not enough feeling?	Meaning of comment is not clear. The assessment report is about analysis not feeling.	Timothy Barker	Keele University	United Kingdom (of Great Britain and Northern Ireland)
486	48	13	48	14	obviously!	Language has been edited.	Timothy Barker	Keele University	United Kingdom (of Great Britain and Northern Ireland)
488	48	38	48	45	citatoin e.g. Nash? + see problems with game theory (rational!)	Acknowledged.	Timothy Barker	Keele University	United Kingdom (of Great Britain and Northern Ireland)
490	49	11	49	11	good!	Thank you.	Timothy Barker	Keele University	United Kingdom (of Great Britain and Northern Ireland)
492	50	2	50	2	yes!	Thank you.	Timothy Barker	Keele University	United Kingdom (of Great Britain and Northern Ireland)
494	50	12	50	12	my books: Sitrep Earth, Third Space ( <a href="http://www.doctimbarker.uk/pubs">www.doctimbarker.uk/pubs</a> )	Noted.	Timothy Barker	Keele University	United Kingdom (of Great Britain and Northern Ireland)
496	50	32	50	32	reboot - opportunity for humanity...	Text edited.	Timothy Barker	Keele University	United Kingdom (of Great Britain and Northern Ireland)

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498	51	13	51	13	knowledge gaps - I CAN HELP - see comments on post-positivism versus positivist & reductionist mechanisms!!!	Noted, thank you.	Timothy Barker	Keele University	United Kingdom (of Great Britain and Northern Ireland)
500	54	8	54	8	"nexus" GOOD!	Thank you.	Timothy Barker	Keele University	United Kingdom (of Great Britain and Northern Ireland)
620	5	1	5	18	I consider that authors could include at the end of the executive summary what is the goal/s of the chapter I.	Exec Sum completely redrafted	Cabrerizo Marco J.	Department of Ecology and Animal Biology, University of Vigo	Spain
622	1	20	1	20	Advancements? I think that it would be more appropriate.	accepted	Cabrerizo Marco J.	Department of Ecology and Animal Biology, University of Vigo	Spain
624	8	12	8	15	I think that the solar radiation management concept is not well-explained	The term has been restated as Solar Radiation Modification (SRM) as per SR1.5 report. The same report may be consulted for further details on SRM.	Cabrerizo Marco J.	Department of Ecology and Animal Biology, University of Vigo	Spain
626	11	17	10	17	At the same way than mentioned in a previous comments, I would change by "advancements" because you can not state that something is a "gap" of knowledge?, and similarly talk about development...Better, advancement.	Larger change to text	Cabrerizo Marco J.	Department of Ecology and Animal Biology, University of Vigo	Spain
628	11	17	19	17	Maybe include social pressures as well?. They are explained at the end of this section	Social pressures are mentioned on p. 12.	Cabrerizo Marco J.	Department of Ecology and Animal Biology, University of Vigo	Spain
630	12	3	12	7	I think that this paragraph could be moved to 1.2.1. because it does not represent an advancement/development as stated in the section.	Rejected.	Cabrerizo Marco J.	Department of Ecology and Animal Biology, University of Vigo	Spain
632	13	33	13	40	I consider that authors could expand such explanation including the planetary boundaries stated by Rockström et al. 2009 in Nature, and expanded by et Steffen al. 2015 Science in relation with the effects derived and the safe operating space for Earth, and ultimately, for human beings.	Suggestion noted and adapted	Cabrerizo Marco J.	Department of Ecology and Animal Biology, University of Vigo	Spain
634	14	29	14	29	..what?. goals, maybe). Some word is missing in this statement. Please complete it. I suggested this word according those explained by authors in lines 45-46, page 14.	Text edited.	Cabrerizo Marco J.	Department of Ecology and Animal Biology, University of Vigo	Spain
636	16	15	16	16	Figure quality should be increased	Done.	Cabrerizo Marco J.	Department of Ecology and Animal Biology, University of Vigo	Spain
638	18	23	18	24	A dot is missing	Edited.	Cabrerizo Marco J.	Department of Ecology and Animal Biology, University of Vigo	Spain
640	18	41	18	43	Greenhouse gases were already defined in previous pages (i.e. GHG). Please modify it accordingly.	accepted. Change made to GHG	Cabrerizo Marco J.	Department of Ecology and Animal Biology, University of Vigo	Spain
642	18	44	18	44	Figure 1.5 appears repeated.	Figure and reference have been removed.	Cabrerizo Marco J.	Department of Ecology and Animal Biology, University of Vigo	Spain
644	19	23	19	23	Change by entail	This mention has been removed from the revised version	Cabrerizo Marco J.	Department of Ecology and Animal Biology, University of Vigo	Spain
646	20	12	20	12	City transformations services should appear in italics for consistency.	In the revised text, we have removed the sub-headings and integrated the sub-sections together.	Cabrerizo Marco J.	Department of Ecology and Animal Biology, University of Vigo	Spain

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648	20	25	20	25	EJ should be defined the first time that it is used into the text.	Accepted - text revised	Cabrerizo Marco J.	Department of Ecology and Animal Biology, University of Vigo	Spain
650	20	41	20	42	Why?. I suggest that authors extend the affirmation made in this sense.	Thank you for the comment. This sentence has been replaced as a result of general editing undertaken in this section	Cabrerizo Marco J.	Department of Ecology and Animal Biology, University of Vigo	Spain
652	20	42	20	45	In reality, ecosystems will change because species from temperate ecosystems will migrate to higher latitudes in which they will find temperatures inside their optimum, but not ecosystems per se, as authors stated. Please re-write.	Thank you for the comment, and the reference. This sentence has been replaced as a result of general editing undertaken in this section	Cabrerizo Marco J.	Department of Ecology and Animal Biology, University of Vigo	Spain
654	23	15	23	15	Delete information technology?	Rejected - we find information technology to be important when we give an overview over rapid developments in technology that may give potentials for transformative changes.	Cabrerizo Marco J.	Department of Ecology and Animal Biology, University of Vigo	Spain
656	24	4	24	6	Numbers inside figure are difficult to be seen at the present form. Maybe increase font size?.	Partly accepted -we use a different figure now.	Cabrerizo Marco J.	Department of Ecology and Animal Biology, University of Vigo	Spain
658	27	34	27	43	I would move this paragraph at the beginning of the section because, I think that it would be more appropriate to present the limitations, and after that, changes, initiatives, and proposals that are being developed.	Accepted. This section has been substantially rewritten.	Cabrerizo Marco J.	Department of Ecology and Animal Biology, University of Vigo	Spain
660	28	1	28	5	I would move this paragraph at the beginning of the section because, I think that it would be more appropriate to present the limitations, and after that, changes, initiatives, and proposals that are being developed.	Accepted. This section has been substantially rewritten.	Cabrerizo Marco J.	Department of Ecology and Animal Biology, University of Vigo	Spain
662	28	13	28	22	This last paragraph should be moved to the following section as the 2nd paragraph. First, it should be defined, as authors did, the politics of interest. After that, it could be suggested that "policies would need not only to increase amounts.....etc".	Text has been revised.	Cabrerizo Marco J.	Department of Ecology and Animal Biology, University of Vigo	Spain
664	31	42	31	47	Could be merged with 1.4.5.- Political economy	Rejected. We don't see the justification.	Cabrerizo Marco J.	Department of Ecology and Animal Biology, University of Vigo	Spain
666	32	1	32	39	Could be merged with 1.4.5.- Political economy	Rejected.	Cabrerizo Marco J.	Department of Ecology and Animal Biology, University of Vigo	Spain
668	44	20	44	48	real and effective to a local/regional scale, in order to, they reach a global dimension with global-scale consequences. It can be linked with those discussed by authors in lines 23-27 from page 47.	Point not clear to me sorry	Cabrerizo Marco J.	Department of Ecology and Animal Biology, University of Vigo	Spain
670	45	1	45	30	real and effective to a local/regional scale, in order to, they reach a global dimension with global-scale consequences. It can be linked with those discussed by authors in lines 23-27 from page 47.	Repeated comment, addressed	Cabrerizo Marco J.	Department of Ecology and Animal Biology, University of Vigo	Spain
672	51	13	51	13	Knowledge gaps is empty? Is it possible?. Please clarify.	Thank you for your comment, it was a placeholder for the because the team found it easier to develop the chapter and identify knowledge gaps in the process. The section is being written for the SOD.	Cabrerizo Marco J.	Department of Ecology and Animal Biology, University of Vigo	Spain
674	51	14	51	14	I think that it could be presented in the introduction section. Maybe it would be more informative.	Accepted. Thank you, the figure has been relocated.	Cabrerizo Marco J.	Department of Ecology and Animal Biology, University of Vigo	Spain

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676	55	25	55	27	Check all references cited for consistency. I have only highlighted some common mistakes here. " Journal or book name?	Accepted, thank you.	Cabrerizo Marco J.	Department of Ecology and Animal Biology, University of Vigo	Spain
678	56	13	56	13	Spelling of the abbreviated Journal form.	Thank you, but this is the style chosen by the TSU, we cannot change it.	Cabrerizo Marco J.	Department of Ecology and Animal Biology, University of Vigo	Spain
680	56	46	56	46	Abbreviated Journal form	Thank you, but this is the style chosen by the TSU, we cannot change it.	Cabrerizo Marco J.	Department of Ecology and Animal Biology, University of Vigo	Spain
682	68	10	68	10	Modify "chang" by "change	This is an abbreviation which is part of the referencing style, which we cannot change because it has been determined for the whole of AR6 to use.	Cabrerizo Marco J.	Department of Ecology and Animal Biology, University of Vigo	Spain
684	68	30	68	30	Modify "chang" by "change	This is an abbreviation which is part of the referencing style, which we cannot change because it has been determined for the whole of AR6 to use.	Cabrerizo Marco J.	Department of Ecology and Animal Biology, University of Vigo	Spain
686	11	3	11	3	Figure quality should be increased	Addressed	Cabrerizo Marco J.	Department of Ecology and Animal Biology, University of Vigo	Spain
709	10	26	10	28	increased investment for 1.5C pathway is noted, but should be balanced by also mentioning estimated savings in avoided climate damages	We rather assumed that was implied - but see in particular section 1.6.2 and the cross-working group box in Chapter 3	Christa Clapp	CICERO	Norway
711	10	38	10	38	in Chapter 15 we are trying to use 'capital markets' instead of 'private' climate finance, as it is an embedded mix of public and private sources (e.g. publicly administered pension funds)	We refer to public and private, and blended; would be useful to review our final language.	Christa Clapp	CICERO	Norway
713	10	43	10	46	the most significant governance development' one could argue alongside the EU Sustainable Finance Action Plan which is being implemented	Maybe but wary of singling out particularly countries or regions in this Introductory section	Christa Clapp	CICERO	Norway
715	28	13	28	13	policies would increase amounts invested? Or would they simply support a shift in investment to cleaner activities given a 'fixed' amount of global capital? This statement should be made more precise.	Accepted. The emphasis was changed to the "switch" part of the sentence so it now reads as "Policies would need not only to facilitate a shift toward low-carbon solutions but may also have to increase investment levels (15.6.2)"	Christa Clapp	CICERO	Norway
717	52	33	52	35	Ch. 15 explores the role of investment and finance in mitigation AND adaptation	Accepted, thank you.	Christa Clapp	CICERO	Norway
1027	1	1	54	25	This chapter is clear, comprehensive and very well written.	Thank you!	Harry Saunders	Carnegie Institution for Science	United States of America
1029	16	15	16	22	The need to maximize the synergy element is correct in its intent. And Figure 1.3 is the right mental picture to be working with. The tradeoff element needs to figure into this in a way that suggests it is more complex and subtle than just maximizing synergy alone. (Example in next comment)	Figure has been revised	Harry Saunders	Carnegie Institution for Science	United States of America

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1031	30	9	30	11	<p>This statement appears to be in contradiction with the findings of AR1.5: "...high rebound can help in providing faster access to affordable energy (SDG 7.1) where the goal is to reduce energy poverty and unmet energy demand (see Chapter 2, Section 2.4.3)" and goes on to say "...and to address policy-related trade-offs and welfare enhancing benefits (robust evidence, high agreement) (Chakravarty et al., 2013; Chakravarty and Roy, 2016; Gillingham et al., 2016), (Chakravarty et al., 2013)."</p> <p>Rebound is economic welfare-creating, even though it reduces emissions savings from energy efficiency. This is a tradeoff, especially in the case of developing countries with under-served energy needs and in need of building out the infrastructure of modernity. The statement reading "...transfers of mitigation technology should be carefully designed to avoid so-called rebound effects on emissions..." I think is incorrect and appears to contradict SR1.5. It's difficult to argue a position that the tradeoff should always favor emissions reductions only, and not consider welfare tradeoffs at all. At minimum, the word "avoid" is much too strong. This points to deeper equity-related ethical questions that may lead developing countries to make this tradeoff differently from industrialized ones. It is not clear that the goal to maximize "synergy" between Climate goals and SDRs is the same as maximizing societal utility for a particular country's population.</p>	Accepted - we have changed the wording and removed the term "rebound".	Harry Saunders	Carnegie Institution for Science	United States of America
1033	39	28	39	29	The citation to Kahneman and Tversky is not correct. Amos Tversky sadly died long before 2018 or likely would have shared the Nobel Prize with Kahneman. Should be showing as 1979, published in <i>Econometrica</i> 47 (2): 263–291	Thanks. The reference I was to book I guess later edition, but the article now cited	Harry Saunders	Carnegie Institution for Science	United States of America
1035	54	24	54	25	An excellent, highly general recent development in this area comes from Lemoine, who incorporates highly flexible functional forms: Lemoine D. 2018. General Equilibrium Rebound from Energy Efficiency Innovation. Working Paper 25172. National Bureau of Economic Research. <a href="http://www.nber.org/papers/w25172">http://www.nber.org/papers/w25172</a>	Thank you, but the Technical Supporting Unit has suggested to delete FAQ 1.5 and the chapter has accepted the suggestion.	Harry Saunders	Carnegie Institution for Science	United States of America
1099	11	33	11	33	The percentage shares of population and CO2 emissions by income group are incorrect	We have replaced the figure.	Erik Haites	Margaree Consultants Inc.	Canada
1257	26	30	26	30	"from 127 in 2018" should be "from 127 bn USD in 2018"	Accepted. Numerical estimates were deleted.	Dirk Paessler	Paessler AG (a 300 people Software Company) and Carbon Drawdown Initiative GmbH (philanthropy/incubator/angel investment company focused on negative emissions)	Germany
1517	40	43	40	45	there are problems with the grammar in these lines. The word 'and' in line 43 is superfluous and on line 45 the phrase ending in 'respect for' requires a final word	Thanks, done	Thomas Heyd	University of Victoria	Canada
1519	41	19	41	19	delete the word 'of'	OK	Thomas Heyd	University of Victoria	Canada
1731	4		5		<i>Exec Summary reads well but is a short version of the longer problem outlined above. Its not as structured as it could be and leaves the three frames conclusion to a short and largely undeveloped few lines.</i>	The Exec summary has been completely revamped. We hope the revised version meets the expectation of the reviewer.	Newman Peter	Curtin University and CLA chapter 10	Australia
1733	6		13		The first two sections, 1.1 and 1.2 are strong and set up the chapter well.	Accepted!	Newman Peter	Curtin University and CLA chapter 10	Australia

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1735	13		15		Section 1.3 is also strong but does not include the 'Relevant Concept of 'Decoupling' which is well developed in UN and other literature.	Suggestion noted	Newman Peter	Curtin University and CLA chapter 10	Australia
1737	15		18		Section 1.3.2 on SDG's is trying to show how this must be part of the economic development narrative but when it uses the phrase 'narrow focus on climate mitigation' I think it is overbalanced and undermines the report. It is of course not narrow and if not done then it will undermine any attempt to achieve the SDG's. Its a matter of words and the next para goes on to explain the timeline issue but we should never suggest mitigation is narrow. Perhaps 'climate mitigation that is not integrated into the SDG's' or something.	Climate change is diffintely narrow but it is still narrower than development so the setence is correct in this conext.	Newman Peter	Curtin University and CLA chapter 10	Australia
1739	17		18		The sustainable development corridor idea is well explained but it does tend to suggest that developing places are going to just follow developed trajectories. What about leap-frogging?	Figure revised.	Newman Peter	Curtin University and CLA chapter 10	Australia
1741	18	11	27		ways of measuring development other than GDP is a big topic and I think could have more space as it's a big framing item. The idea that well-being is not yet measured could be expanded by examining Gross National Happiness in more detail as this is measured. There are five recent papers I can provide on how this is done and how it is integrated with GDP and GHG in Bhutan.	Agreed. GDP is used in this section only as a measure of the scale of human activity. We agree that GDP should not be assumed to be a measure of happiness or aggregate welfare.	Newman Peter	Curtin University and CLA chapter 10	Australia
1743	18		34		The whole of 1.4 needs a lot of work. It needs to be drawn into the broader narrative of the three frames and cut back from the more rambling style into an update since AR5 and 1.5, rather than a text book approach. It also needs a lot of checking with other chapters that could well be contradictory as it is with some of chapter 10 on aviation and shipping (p22) and supply of new resources (p24). It doesnt do justice to the work on nuclear in the 1.5 SR (p24) and a whole para on CCS has only one reference (to the Energy Transitions Commission which should not be used in an IPCC report at all), is very revealing. This is not good work though it can be repaired by simply involving people from other chapters.	This section has been shortened and made more compact. Cross-chapter coordination is on-going.	Newman Peter	Curtin University and CLA chapter 10	Australia
1745	28		29		The political economy section is also text book style rather than updates since AR5 to show new material.	We believe the style is consistent with the rest of the drivers assessed.	Newman Peter	Curtin University and CLA chapter 10	Australia
1747	29		34		This seems quite repetitive of early sections and doesn't seem to be part of Drivers anyway. The best new parts in International Co-operation as it is post AR5 and enables the final conclusion about the new era at the end of the chapter.	Noted	Newman Peter	Curtin University and CLA chapter 10	Australia
1749	35	0	36	0	Scenarios and Narratives is almost all scenarios and yet narratives gets further mentions later. It's a big part of other chapters and is a new element in AR6 that should be better explained here.	Generic, discuss	Newman Peter	Curtin University and CLA chapter 10	Australia
1751	37	0	45	0	This is the main thrust of the chapter that should have drawn from the previous sections but mostly is stand-alone and yet it could be more integrated. 1.52 (economics) is very strong with clear policy implications; 1.53 (ethics) is not great as it is mostly political economy with throw-away ethical statements that dont lead anywhere - surely it can have strong policy implications but that is not done; 1.54 (transitions) is OK but not well written and not as policy-related as it could be; too much is given to social transformation which is not helpful when you are getting towards the conclusions. It didnt fit I feel. Better diagrams and more of the transition literature should be where this chapter is moving at this point.	Section somewhat recast to also try and draw stronger linkages	Newman Peter	Curtin University and CLA chapter 10	Australia



Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
1753	45	0	50	0	1.5.5 just doesn't fit here. The Multi Level Governance section follows directly on from Transitions or should. This could be rewritten to be shorter and more related to transitions policy at different levels. It would then lead to the Conclusions which are strong and need to be more coherently part of the whole chapter.	Agreed. We have moved this subsection further up, to the end of a new section 1.3	Newman Peter	Curtin University and CLA chapter 10	Australia
1755	2	6	2	6	Add pt.1.2.2 as Compliance / targets achieved	Exec Sum changed	Alka Bharat	Department of Architecture & Planning, M.A.National Institute of Technology (An Institute of National Importance),Bhopal (M.P.)	India
1757	2	7	2	7	modify pt. 1.2.2 as 1.2.3 and other succeeding points accordingly	Exec Sum changed	Alka Bharat	Department of Architecture & Planning, M.A.National Institute of Technology (An Institute of National Importance),Bhopal (M.P.)	India
1759	2	7	2	7	remove 2015	Exec Sum changed	Alka Bharat	Department of Architecture & Planning, M.A.National Institute of Technology (An Institute of National Importance),Bhopal (M.P.)	India
1761	2	8	2	8	delete context and recent developments	Exec Sum changed	Alka Bharat	Department of Architecture & Planning, M.A.National Institute of Technology (An Institute of National Importance),Bhopal (M.P.)	India
1763	2	8	2	8	modify the sentence as "Economy,Emissions, Climate studies and Sustainability	Exec Sum changed	Alka Bharat	Department of Architecture & Planning, M.A.National Institute of Technology (An Institute of National Importance),Bhopal (M.P.)	India
1765	2	12	2	12	Add: theories and tools	Exec Sum changed	Alka Bharat	Department of Architecture & Planning, M.A.National Institute of Technology (An Institute of National Importance),Bhopal (M.P.)	India
1767	2	15	2	16	Swap pts. 1.4.2 with 1.4.3	Exec Sum changed	Alka Bharat	Department of Architecture & Planning, M.A.National Institute of Technology (An Institute of National Importance),Bhopal (M.P.)	India
1895	11	28	12	2	The figure is vague and the website page does not appear (e.g. it is not clear what the income categories mean, or if this data is by region or populations in regions). Suggest creating a clear figure with defined axes and labels based on clear data sources. For example, the AR4 SPM included such a figure. Suggest that any changes in that figure that are notable be mentioned here. The rapid development of Asia is, for example, a notable difference.	Taken into account. Figure 1.2 has been replaced with Figure 1.3 a and 1.3 b in line with AR5.	Haroon Khesghi	ExxonMobil Research and Engineering Company	United States of America
1897	43	1	43	3	The figure is neither visible nor understandable. Suggest replacing or deleting.	There was an unfortunate technical error in conversion to PDF, however the Figure has been substnially reworked	Haroon Khesghi	ExxonMobil Research and Engineering Company	United States of America

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
1899	42	33	0	0	For section 1.5.4, an explanation of the difference between transition and transformation would be useful here since there is confusion in its meaning and appropriate use in WG3. Since this section includes both words in the title suggest defining the difference if there is a clear difference, or simply use one term if there is no clear difference.	Accepted clarified in introducing section	Haroon Kheshgi	ExxonMobil Research and Engineering Company	United States of America
1901	37	46	37	47	The text wrongly describes EPA's clean energy plan as legislation when it was a plan by the EPA meant to be a plan for further implementation of pre-existing legislation. Suggest changing legislation to plan.	Thanks, corrected	Haroon Kheshgi	ExxonMobil Research and Engineering Company	United States of America
1903	50	32			It is not clear what the conclusion section is based on. Suggest this section be deleted, and key substantiated and traceable statements be put in the Executive Summary.	It was trying to bring together some broad themes of the chapter, which also echo through the report - broadly, around the range of things that have changed, climate in wider context, potentials for transition, and brief indication of governance. PArtly stylistic - it feels incomplete to have a big chapter with nothing to offer broad thematic conclusions as an end point.	Haroon Kheshgi	ExxonMobil Research and Engineering Company	United States of America
1905	54	11			Suggest deleting faq 1.3 as it is not frequently asked in the context of climate change.	Thank you, but it has been agreed with the Technical Supporting Unit to keep it.	Haroon Kheshgi	ExxonMobil Research and Engineering Company	United States of America
1907	54	11			Suggest deleting faq 1.2 as it is not frequently asked in the context of climate change. If the term is used frequently, then it should be defined in the glossary.	Thank you, but it has been agreed with the Technical Supporting Unit to keep it.	Haroon Kheshgi	ExxonMobil Research and Engineering Company	United States of America
1909	53	26			Suggest clarifying the ambiguity between land carbon sinks that might be natural or anthropogenic as this can be a significant differentiation (e.g. effects of CO2 fertilization on managed lands).	Accepted, thank you.	Haroon Kheshgi	ExxonMobil Research and Engineering Company	United States of America
2029	3	35			Greenhouse Gas should not be capitalized. Throughout the chapter, ensure that once the abbreviation "GHG" is defined, that this is used (except at the beginning of a sentence as it is here).	Exec Sum completely redrafted	Amy Townsend-Small	University of Cincinnati	United States of America
2031	4	27	4	29	The sentence starting with "Electric vehicles..." is unclear and needs to be rewritten. Do you mean to say that since AR5 was published, there have been many advances in the areas of electric vehicles, communications, and IT that have potential for low-carbon emissions? It is not clear what you mean by "general purpose technologies" and it is also unclear why the other industries are leaders in low-GHG emissions.	Exec Sum completely redrafted	Amy Townsend-Small	University of Cincinnati	United States of America
2033	6	8			should be persistent, not persisting	Accepted, thank you.	Amy Townsend-Small	University of Cincinnati	United States of America
2035	3		5		Overall, the executive summary is kind of hard to read and it has a lot of jargon, especially towards the end, where you start discussing frameworks (I think of this as a jargon term). Given that it may be the only part of your report that some people read, and that your report is crucially important for readers from multiple disciplines (social science, political science, greenhouse gas emissions modelers, etc), it would be worth giving it a careful rewrite for a more general audience.	The Executive Summary has been completely revamped. We hope the new ES meets the expectation of the reviewer. It should be noted though that many reviewers praise the current version for being readable.	Amy Townsend-Small	University of Cincinnati	United States of America
2037	7	5	7	8	Sentence beginning with "The science is clear..." I'm not sure what is meant here. Would it be more concise to say that the 1.5 degree target will be reached in only a few years to decades at current emissions levels of about 40 Gt CO2 per year?	Reworded. The range 1.5-2 is declared Aim of Paris agreement	Amy Townsend-Small	University of Cincinnati	United States of America
2039	7	28			AFOLU needs to be defined	Done	Amy Townsend-Small	University of Cincinnati	United States of America

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
2041	8	44	9	2	Excellent that this is included here. I would go one step further and add something like "increased reliance on imported goods is one reason United States carbon dioxide emissions have fallen over the last decade"	This paragraph is making a conceptual point about embodied emissions. New empirical estimates and their implications for specific countries are addressed in Chapter 2.	Amy Townsend-Small	University of Cincinnati	United States of America
2043	12	28			Is this the first mention of the United States withdrawal from the Paris agreement? Maybe worth bringing it up in the earlier section about the PA. Also, in this sentence, perhaps could mention that US withdrawal could cause other countries to neglect their commitment (i.e., a stronger statement than what is currently here)	Noted	Amy Townsend-Small	University of Cincinnati	United States of America
2045	11	17	13	31	I love this section. Very clearly written, and interesting. I love the organization with the bold subheadings.	Thanks.	Amy Townsend-Small	University of Cincinnati	United States of America
2047	13	23			May want to add "and the consequences for global and regional methane emissions of this are still under investigation" or something similar on the end of this sentence?	Location unclear in redraft?	Amy Townsend-Small	University of Cincinnati	United States of America
2049	15	26			should be "on" not "in"	Edited	Amy Townsend-Small	University of Cincinnati	United States of America
2051	15	39			Is the word "won" extraneous?	Edited.	Amy Townsend-Small	University of Cincinnati	United States of America
2053	16	5			Should be "Development"	Edited	Amy Townsend-Small	University of Cincinnati	United States of America
2055	16	24	16	27	This sentence requires revision. Suggestion: "... more sustainable, resilient, and prosperous for humanity (Hellin and Fisher 2019), the timelines of the integration of both agreements are limited in terms of policy tools."	Suggestion adapted.	Amy Townsend-Small	University of Cincinnati	United States of America
2057	16	31			should this be "with an aspirational target of 1.5 degrees Celcius"?	Edited.	Amy Townsend-Small	University of Cincinnati	United States of America
2059	17	16			Figure 1.4 - which color line represents the Least Developed Countries and which represents more developed countries? Not really clear what is shown here other than the two types of countries eventually settle on a sustainable path.	Figure edited.	Amy Townsend-Small	University of Cincinnati	United States of America
2061	18	21	18	22	references are repeated	Edited.	Amy Townsend-Small	University of Cincinnati	United States of America
2063	18	44			repeated reference to figure 1.5	Figure has been removed in the revised version	Amy Townsend-Small	University of Cincinnati	United States of America
2065	20	12			City transformation services needs to be italicized	Noted. In the revised text, we have removed the sub-headings and integrated the sub-sections together.	Amy Townsend-Small	University of Cincinnati	United States of America
2067	26	18			Missing the first set of quotation marks in this sentence	Accepted. Corrected.	Amy Townsend-Small	University of Cincinnati	United States of America
2069	29	6			Should be an "and" in here I think? "weekend policy design on emissions trading systems AND limited the development of alternative fuelled automobiles, for example".	Typo has been addressed.	Amy Townsend-Small	University of Cincinnati	United States of America

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
2071	29	8			I don't really know what "building coalitions of actors" means.	We think the meaning is discernible from the context within which it is used.	Amy Townsend-Small	University of Cincinnati	United States of America
2073	29	8	29	17	Overall I would love to see more examples in this paragraph than just the last one to help the non political scientists understand what you're getting at here! This is a pretty crucial paragraph.	We have effected minor revisions but we think the section is accessible.	Amy Townsend-Small	University of Cincinnati	United States of America
2075	29	47			should be favors, not favor	Accepted	Amy Townsend-Small	University of Cincinnati	United States of America
2077	32	37			should be importance, not important (second word on line)	Text revised	Amy Townsend-Small	University of Cincinnati	United States of America
2079	33	5			should be create, not creates	Edited.	Amy Townsend-Small	University of Cincinnati	United States of America
2081	33	28			Delete the phrase "which scientist say are" and add "to" between necessary and avoid. Not appropriate to have a sentence like this in an IPCC report	Edited.	Amy Townsend-Small	University of Cincinnati	United States of America
2083	33	35			agreement greeting incentives? Not sure what this phrase means.	Edited.	Amy Townsend-Small	University of Cincinnati	United States of America
2085	33	37	34	5	This paragraph has widespread grammatical errors that make it difficult to read	Noted.	Amy Townsend-Small	University of Cincinnati	United States of America
2087	34	38	0	0	Why is Climate Change capitalized?	Corrected	Amy Townsend-Small	University of Cincinnati	United States of America
2089	37	44	38	5	The Obama-era legislation in question here was called the Clean Power Plan, it was the United States' plan for complying with the Paris Agreement, and there was a term called the "social cost of carbon" that the Supreme Court agreed could be discounted when the legislation was repealed. It's good that this is mentioned here but should the overall chapter be revised to reflect the fact that the United States is withdrawing from the Paris Agreement? Isn't this going to have a spillover effect on other countries?	The text has been revised.	Amy Townsend-Small	University of Cincinnati	United States of America
2091	38	9	0	0	recognizes	American or English spelling	Amy Townsend-Small	University of Cincinnati	United States of America
2093	43	2	0	0	Figure 1.7 doesn't look right - black background? Is it not finished yet?	There was an unfortunate technical error in conversion to PDF, however the Figure has been substnially reworked	Amy Townsend-Small	University of Cincinnati	United States of America
2095	45	22	0	0	"scholarship on social transformation has to Humanities" - is something missing here?	Thanks; edited	Amy Townsend-Small	University of Cincinnati	United States of America
2097	49	36	50	2	These two paragraphs seem to really capture what is happening in the US since the Paris Agreement withdrawal.	Thank you.	Amy Townsend-Small	University of Cincinnati	United States of America
2099	52	14			Delete "Re-"	Accepted, thank you.	Amy Townsend-Small	University of Cincinnati	United States of America
2255	6	19			SROCCC should be SROCC	Accepted and amended, thank you.	Sara Vicca	University of Antwerp	Belgium

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
2579	13	22	13	24	Exploitation of Shale Gas is at the expense of increased seismic activity, which is unacceptable in urban environments.	Noted	Michael Czerniak	Atlas Copco - Edwards	United Kingdom (of Great Britain and Northern Ireland)
2581	30	35	30	35	"comprises" should be singular, i.e. "comprise"	Noted, text revised.	Michael Czerniak	Atlas Copco - Edwards	United Kingdom (of Great Britain and Northern Ireland)
2583	31	3	31	3	Need an "a" adding....Some suggest that societal transformation towards a low carbon future	Edited.	Michael Czerniak	Atlas Copco - Edwards	United Kingdom (of Great Britain and Northern Ireland)
2585	53	20	53	20	...fluorinated gases (F-gases) contribute only a few per cent, however they have extremely long atmospheric lifetimes, some extending to tens of thousands of years. They have also grown at the fastest rate for any GHG (440% according to Chapter 2 of this report).	Accepted.	Michael Czerniak	Atlas Copco - Edwards	United Kingdom (of Great Britain and Northern Ireland)
2675	8	24	8	25	While many will personally agree with this statement, I think it is not up to this IPCC report to make it. Seen from IPCC, climate mitigation and adaptations are indeed ends in themselves. Then, it is expected that the report will assess the compatibility of consequences of mitigation actions with the SDG, possibly at various time scales, and compare various options and trade-offs.	Sentence has been rephrased.	Philippe Waldteufel	CNRS/IPSL/LATMOS	France
2759	3	13	3	14	Please verify the statement that the global economy continued to expand in 2014-2016. During this period, oil price collapsed and the drivers for oil demand must have also collapsed, which leads me to doubt this statement. There might have been slow down in growth, or even recession (as defined by two quarters of contraction, during this period.	This part of the Executive Summary (ES) has been edited following the compalte revamping of the ES	Arthur Lee	Chevron Services Company	United States of America
2761	4	34	4	35	Is this cost assessment not completed yet? Why not write a draft statement now?	Text has been revised.	Arthur Lee	Chevron Services Company	United States of America
2763	5	13	5	14	The tone of this statement about 'super-wicked' problem and that new forms of governance are needed is policy-prescriptive. A better way to write this is: "New forms of governance may help to address the complexities of this 'super-wicked' problem and to lower the barriers to what countries can achieve on their own."	Thank you for the suggestion.Text has been revamped.	Arthur Lee	Chevron Services Company	United States of America
2765	7	11	7	12	Need to be clear to reference specific section(s) or chapters of WG1 report, once you know which sections or chapters to reference	We have included specific reference to SPM Paras (pending WG1 finalisation / adoption obviously)	Arthur Lee	Chevron Services Company	United States of America
2767	9	44	9	44	Missing a word or words. I suggest "... hailed as a landmark agreement entered into force in November 2016 ..."	Accepted, text revised	Arthur Lee	Chevron Services Company	United States of America
2769	10	7	10	11	These lines, 7-11, should be moved to the section labeled 'Finance' below in the lines starting at line 22. The statements describe the Green Climate Fund, which is a key aspect of intergovernmental climate finance.	Taken into account	Arthur Lee	Chevron Services Company	United States of America
2771	10	11	10	11	A description about the state of the climate finance is missing here. I suggest this: "The Green Climate Fund (GCF) was given an important role in serving the Agreement and delivering the UNFCCC objective, and supporting the goal of keeping climate change well below 2 degrees Celsius. GCF rapidly gathered pledges worth USD 10.3, from developed and developing countries, regions, and one city (Paris) ... but this is still well short of the goal to mobilize \$100 billion by 2020."	accepted, text revised	Arthur Lee	Chevron Services Company	United States of America

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
2773	11	22	11	22	Please verify the statement that the global economy continued to expand in 2014-2016. During this period, oil price collapsed and the drivers for oil demand must have also collapsed, which leads me to doubt this statement. There might have been slow down in growth, or even recession (as defined by two quarters of contraction, during this period.	Accepted - This is based on global GDP growth which was positive these years. A reference to the World Bank is added.	Arthur Lee	Chevron Services Company	United States of America
2775	14	18	14	18	typographical error -- pursued	Corrected	Arthur Lee	Chevron Services Company	United States of America
2777	15	39	15	39	... for their own part ...	Edited.	Arthur Lee	Chevron Services Company	United States of America
2779	16				Figure 1.3 is an attempt at conceptualizing trade-offs and synergies, and relationships with the SDGs. However, the graphic is confusing as well as prejudicial in that 'traditional' actions are labeled as causing high temperature rise. Is that a finding by the authors or in the assessment of the underlying literature? Does this apply to all traditional paths? The references in lines 26 and 29 do not seem to suggest this almost nearly 4 degree C temperature rise.	Figures has been revised.	Arthur Lee	Chevron Services Company	United States of America
2781	17	16			What is the source of this graphic? Is it from the references in lines 9-10	Figure edited.	Arthur Lee	Chevron Services Company	United States of America
2783	18	44	18	44	Figure 1.5, the words are repeated.	Figure and reference have been removed.	Arthur Lee	Chevron Services Company	United States of America
2785	19	23	19	23	Bad English. Not "transformating" but "transforming"	This word has been removed from the revised version	Arthur Lee	Chevron Services Company	United States of America
2787	20	12	20	12	City transformation services. The font here should be italicized or otherwise made consistent with lines 22 and 37.	In the revised text, we have removed the sub-headings and integrated the sub-sections together.	Arthur Lee	Chevron Services Company	United States of America
2789	20	12	20	12	This label does not describe the paragraph clearly. Cities are not transformed overnight which the word transform would imply. It is the infrastructure that gets renewed over time, part by part, aspect by aspect. I recommend a different label: "City infrastructure renewals."	Agree. Have changed the title to Urbanization	Arthur Lee	Chevron Services Company	United States of America
2791	24	17	24	18	Need to update the data here to the new GCCSI report released in 2020. There are nineteen full scale commercial facilities now.	Accepted	Arthur Lee	Chevron Services Company	United States of America
2793	27	27	27	27	Developing country shortfall is more acutely driven ...	Accepted. Corrected.	Arthur Lee	Chevron Services Company	United States of America
2795	29	4	29	5	Not sure these are good references. Researchers cited have shown significant bias about the roles of industries.	We believe the references are relevant. The section reviews literature that highlights the role of fossil fuel companies in blocking climate action but also notes the role of other political economic factors including opposition (but also support) for climate action by citizens and other industry actors. It is not accurate to say that the chapter attributes slow progress to resistance from incumbent industries. The chapter covers several other drivers of and constraints against climate action.	Arthur Lee	Chevron Services Company	United States of America
2797	29	19	29	21	climate action is Goal 13 not Goal 10.	Accepted	Arthur Lee	Chevron Services Company	United States of America
2799	29	42	29	44	This is a very important statement and needs a clear reference. "The cheap mitigation options are often found in poor countries. But opportunity costs may be higher..." Without clear references, such statements are incendiary and often cause nations to disagree on action.	Accepted - we have deleted this sentence	Arthur Lee	Chevron Services Company	United States of America
2801	30	7	30	7	public and private	Accepted	Arthur Lee	Chevron Services Company	United States of America

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
2803	32	36	32	37	... these unprecedented reductions ... . The importance of policy ...	Typo has been addressed.	Arthur Lee	Chevron Services Company	United States of America
2805	32	42	32	42	... often mentioned as one of the important ...	Text edited.	Arthur Lee	Chevron Services Company	United States of America
2807	36	17	36	18	Indeed, other researchers have begun to explore the trade-offs. I recommend that this reference be added. MIT Joint Program on the Science and Policy of Global Change, Report 339. <a href="https://globalchange.mit.edu/publication/17392">https://globalchange.mit.edu/publication/17392</a>	Noted, thank you	Arthur Lee	Chevron Services Company	United States of America
2809	38	9	38	9	... recognises...	Thanks, done	Arthur Lee	Chevron Services Company	United States of America
2811	40	43	40	45	The sentence is incomplete. It needs to complete its reference to Hannis (2015). The sentence could be completed like this: "Acknowledging dependence on some larger reality does not require a total denial of self-regard or relinquishment of personal agency, but indicates a degree of humility, transcendence of the self, and respect for nature."	Thanks, done	Arthur Lee	Chevron Services Company	United States of America
2813	41	12	41	18	The sentence beginning with "Hackman (2016) ..." is repeated. A copy and paste error.	Duplicated text deleted	Arthur Lee	Chevron Services Company	United States of America
2815	43	0	0	0	Figure 1.7 needs better keys and legends. Otherwise the figure is unclear and useless. I recommend simply deleting the figure. The body text does a good enough job already explaining the micro, meso, and macro scales. The different dots of different colors, squiggly lines are no help.	There was an unfortunate technical error in conversion to PDF, however the Figure has been substantially reworked	Arthur Lee	Chevron Services Company	United States of America
2817	44	44	44	46	Is this Social Quantum Theory even valid? Just because this 'borrows' from quantum physics' does not make this valid at all. What is the evidence for any of this?	Deleted	Arthur Lee	Chevron Services Company	United States of America
2819	45	17	45	19	Incomplete sentence. 'Values and visions are especially important ...'	Addressed	Arthur Lee	Chevron Services Company	United States of America
2821	45	21	45	23	Sentences needs a lot of editing. It makes no sense. I suggest the following: "Thus, to achieve transformation, scholarship on social transformation offers additional perspectives beyond natural processes to include economic, social and cultural processes (Leggewis and Welzer 2010)."	Largely deleted. We have tried to focus our references principally on material published since the AR5	Arthur Lee	Chevron Services Company	United States of America
2823	47	13	47	13	... could be a useful technology ...	Thanks; also inserted "reversible" before heat pumps as these can act to cool	Arthur Lee	Chevron Services Company	United States of America
2825	47	38	47	38	achieve	Thank you. Corrected.	Arthur Lee	Chevron Services Company	United States of America
2827	48	11	48	12	I believe you are trying to say "... pursuit of well being." But this kind of statement has no business in a scientific assessment. How are you defining 'pursuit of well being'? What is defined as well being? And whose well being?	Language has been edited.	Arthur Lee	Chevron Services Company	United States of America
2829	48	19	48	19	driven mainly by ...	Language has been edited.	Arthur Lee	Chevron Services Company	United States of America
2831	49	17	49	17	unprecedented	Text has been revised	Arthur Lee	Chevron Services Company	United States of America
2833	49	18	49	18	conscious transformation ... context of ideas and experimentation across...	Text has been revised.	Arthur Lee	Chevron Services Company	United States of America
2835	49	28	49	29	This literature is very theoretical. Are there any references to practical solutions?	Text has been revised.	Arthur Lee	Chevron Services Company	United States of America
2837	50	25	50	26	I recommend a clearer sentence: "Ultimately, these approaches may engage wider public and international networks in imagining low carbon societies ..	Thank you. Suggestion adapted.	Arthur Lee	Chevron Services Company	United States of America

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
2839	50	33	50	33	No one should use the word 'hugely.' It is not even a proper adverb.	Accepted	Arthur Lee	Chevron Services Company	United States of America
2841	50	37	50	37	... slowed but not stopped and nationally determined contributions are inconsistent ...	Reworded	Arthur Lee	Chevron Services Company	United States of America
2843	52	14	52	14	Delete the 'Re.'	Accepted, has been removed, thank you.	Arthur Lee	Chevron Services Company	United States of America
2845	52	27	52	27	...examined...	Accepted, thank you.	Arthur Lee	Chevron Services Company	United States of America
2847	53	37	52	39	The sentence beginning with "The UNFCCC (2019) ..." refers to a definition and synonym of climate neutrality, carbon neutrality, and net-zero emissions. This reference is from the UNFCCC resources and questions (and answers) pages of the web site. You need to point out that these are not legally defined definitions and have no legal force. By referencing these definitions like this, the reader will believe that these meanings have legal force, which they do not.	Accepted, thank you.	Arthur Lee	Chevron Services Company	United States of America
3039	9	44	9	44	..hailed as a....' needs insertion (e.g. 'landmark climate change agreement')	Accepted, text revised	Dave Reay	University of Edinburgh	United Kingdom (of Great Britain and Northern Ireland)
3041	14	44	14	44	typo: 'sustainable'	Corrected.	Dave Reay	University of Edinburgh	United Kingdom (of Great Britain and Northern Ireland)
3043	22	40	22	42	repeated sentence	Duplicated text deleted	Dave Reay	University of Edinburgh	United Kingdom (of Great Britain and Northern Ireland)
3045	1				Really impressive FOD	Thankyou!	Dave Reay	University of Edinburgh	United Kingdom (of Great Britain and Northern Ireland)
3053	4	17		19	The technical meaning of the words "trade-offs" and "synergies" should be clearly explained, if possible, in foot notes. Both words should also be inserted in the glossary where there is the word "trade-off" (placeholder for SOD) but there isn't "synergy".	These terms are explained in the bibliography.	Manuela Milli	Government official	Italy
3055	6	41		42	Lines 41 and 42 on page 6 and lines 22 and 23 on page 3 are exactly the same. Lines 41 and 42 might be removed.	Thank you, it made more sense to delete on page 3.	Manuela Milli	Government official	Italy
3059	16	26		27	The second part of the sentence seems a little bit unclear. I suggest: "... the timelines for integration between both agreements in terms of policy tools and deadlines are limited."	Text has been revised	Manuela Milli	Government official	Italy
3061	17				The word "emphasis" and the verb "emphasise" have been too much used. A synonym might be inserted.	Text revised.	Manuela Milli	Government official	Italy
3063	19				Fig. 1.5 - Types of outputs (orange colour) are shown by an image usually used to represent a Data Base. I think it would be better to use just a rectangle with the outputs inside (there are relations and linkages also among emissions, goods & services, SD).	This figure has been removed from the revised version.	Manuela Milli	Government official	Italy
3067	49			2	I would suggest to introduce a sentence aimed at highlighting the need of a new workforce development. A sentence such as the following might be inserted on page 49 after line 2: "Partnerships among (State/local) governments, universities, research centres, private sector partners should provide specialized trainings and other workforce development programs aimed at increasing awareness, skills and knowledge in a wide-range of growing fields".	Text has been revised.	Manuela Milli	Government official	Italy



Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
3199	3	1	5	18	Congratulations to the team that prepared this executive summary. It has a very good structure, uses a language that is easy to understand and provides very relevant und important insights. These messages should also inform the synthesis report of AR6.	Thank you. ES has however been revamped. We hope the reviewer continues to like the new ES.	Klaus Radunsky	retired from Umweltbundesamt	Austria
3895	4	2			The comment "when this is not priced" means that the solution to avoid damages because of trade would be to give a monetary value to these damages. This is controversial, as giving a price entails that money can compensate damages (weak sustainability).	Don't think this invalidates the (important) qualifier - the point is about the potential limits to environmental pricing in general, raher than specificaly around trade	Catherine MACOMBE	INRAE Institut national de la recherche agronomique et de l'environnement	France
3897	4	11			e.g.	Exec Sum completely redrafted	Catherine MACOMBE	INRAE Institut national de la recherche agronomique et de l'environnement	France
3899	4	34		35	a comment to replace	Exec Sum completely redrafted (and space very limited)	Catherine MACOMBE	INRAE Institut national de la recherche agronomique et de l'environnement	France
3901	6	36			chapter 2 is in italic	Accepted and amended, thank you.	Catherine MACOMBE	INRAE Institut national de la recherche agronomique et de l'environnement	France
3903	6	40			Chs for chapters	Accepted and amended, thank you.	Catherine MACOMBE	INRAE Institut national de la recherche agronomique et de l'environnement	France
3905	7	31		32	a comment to replace	Comment is unclear. The text in parentheses - (SOD to report any changes in WGI) - has been deleted.	Catherine MACOMBE	INRAE Institut national de la recherche agronomique et de l'environnement	France
3907	12	3		4	This sentence is not clear	Accepted. Text substantially changed for SOD.	Catherine MACOMBE	INRAE Institut national de la recherche agronomique et de l'environnement	France
3909	12	7			a comment to replace	Accepted. Done.	Catherine MACOMBE	INRAE Institut national de la recherche agronomique et de l'environnement	France
3911	12	38		39	to complemente	Noted	Catherine MACOMBE	INRAE Institut national de la recherche agronomique et de l'environnement	France
3913	14	44			sustainable	Corrected.	Catherine MACOMBE	INRAE Institut national de la recherche agronomique et de l'environnement	France
3915	15	11			one bracket ( to remove	Edited.	Catherine MACOMBE	INRAE Institut national de la recherche agronomique et de l'environnement	France
3917	15	20			one ; is missing in the references	Edited	Catherine MACOMBE	INRAE Institut national de la recherche agronomique et de l'environnement	France
3919	15	39			own instead of won ?	Edited.	Catherine MACOMBE	INRAE Institut national de la recherche agronomique et de l'environnement	France
3921	16	18			name of the authors of the Figure 1.3	Adapted.	Catherine MACOMBE	INRAE Institut national de la recherche agronomique et de l'environnement	France
3923	16	26			erase "the timelines"	Edited	Catherine MACOMBE	INRAE Institut national de la recherche agronomique et de l'environnement	France

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3925	17	16			in the Figure 1.4, the authors of the figure are not indicated	Figure edited.	Catherine MACOMBE	INRAE Institut national de la recherche agronomique et de l'environnement	France
3927	18	21		22	repetition of the two references	We will remove repetitive references.	Catherine MACOMBE	INRAE Institut national de la recherche agronomique et de l'environnement	France
3929	18	44			Twice Figure 1.5	Figure has been removed in the revised version	Catherine MACOMBE	INRAE Institut national de la recherche agronomique et de l'environnement	France
3931	19	22			in the Figure 1.5, the authors of the figure are not indicated	This figure has been removed from the revised version.	Catherine MACOMBE	INRAE Institut national de la recherche agronomique et de l'environnement	France
3933	20	14			one ; at the wrong position	Accepted - text revised	Catherine MACOMBE	INRAE Institut national de la recherche agronomique et de l'environnement	France
3935	20	33		34	this sentence is not clear	We have revised the sentence, as follows: "A range of perspectives can be considered – there is evidently going to be an increased demand for"	Catherine MACOMBE	INRAE Institut national de la recherche agronomique et de l'environnement	France
3937	21	11			human survival instead of "sustainable development"	Thank you, this section has undergone general editing	Catherine MACOMBE	INRAE Institut national de la recherche agronomique et de l'environnement	France
3939	21	38			odd y	This sentence has now been deleted	Catherine MACOMBE	INRAE Institut national de la recherche agronomique et de l'environnement	France
3941	21	45			estimate that	Accepted	Catherine MACOMBE	INRAE Institut national de la recherche agronomique et de l'environnement	France
3943	22	6			a dot is missing	Fixed	Catherine MACOMBE	INRAE Institut national de la recherche agronomique et de l'environnement	France
3945	22	40			e.g.	Fixed in the revised version	Catherine MACOMBE	INRAE Institut national de la recherche agronomique et de l'environnement	France
3947	22	41			amongst	Fixed in the revised version	Catherine MACOMBE	INRAE Institut national de la recherche agronomique et de l'environnement	France
3949	22	42			the same references quoted as in line 40	Fixed in the revised version	Catherine MACOMBE	INRAE Institut national de la recherche agronomique et de l'environnement	France
3951	22	47			a bracket ) in excess	Fixed in the revised version	Catherine MACOMBE	INRAE Institut national de la recherche agronomique et de l'environnement	France
3953	23	10			section 1.2 above?	Accepted	Catherine MACOMBE	INRAE Institut national de la recherche agronomique et de l'environnement	France
3955	23	28			reference to add	Noted - the subsection is totally rewritten.	Catherine MACOMBE	INRAE Institut national de la recherche agronomique et de l'environnement	France
3957	23	33			cryptocurrencies	Accepted	Catherine MACOMBE	INRAE Institut national de la recherche agronomique et de l'environnement	France

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3959	23	38			e.g.	Accepted	Catherine MACOMBE	INRAE Institut national de la recherche agronomique et de l'environnement	France
3961	23	39			bracket ( in excess	Accepted	Catherine MACOMBE	INRAE Institut national de la recherche agronomique et de l'environnement	France
3963	23	44		45	one bracket is missing	Accepted	Catherine MACOMBE	INRAE Institut national de la recherche agronomique et de l'environnement	France
3965	24	7			to be reconfirmed for SOD	Comment unclear. No change made.	Catherine MACOMBE	INRAE Institut national de la recherche agronomique et de l'environnement	France
3967	24	18		20	There is no principal verb in the sentence	Accepted - The sentence has been improved.	Catherine MACOMBE	INRAE Institut national de la recherche agronomique et de l'environnement	France
3969	25	6			e.g.	Noted - this sentence is deleted.	Catherine MACOMBE	INRAE Institut national de la recherche agronomique et de l'environnement	France
3971	25	7			one bracket ) is missing	Noted - this sentence is deleted.	Catherine MACOMBE	INRAE Institut national de la recherche agronomique et de l'environnement	France
3973	25	20			e.g.	Noted - this is deleted.	Catherine MACOMBE	INRAE Institut national de la recherche agronomique et de l'environnement	France
3975	29	36			I suggest "the highest impacts will be likely felt" because no one knows what will happen in fact.	Accepted	Catherine MACOMBE	INRAE Institut national de la recherche agronomique et de l'environnement	France
3977	29	42			the date is missing in the reference Edmonds et al.	Accepted	Catherine MACOMBE	INRAE Institut national de la recherche agronomique et de l'environnement	France
3979	29	44			hampers	Noted - the sentence is deleted	Catherine MACOMBE	INRAE Institut national de la recherche agronomique et de l'environnement	France
3981	30	6			It seems that the section 1.4.5 Political Economy does not deal with the issue of transfers from rich countries to poor countries.	This is a valid point but is covered in the equity and justice section.	Catherine MACOMBE	INRAE Institut national de la recherche agronomique et de l'environnement	France
3983	31	21			meaning of CDM	Text has been edited	Catherine MACOMBE	INRAE Institut national de la recherche agronomique et de l'environnement	France
3985	31	24			what is section 4.11, in the chapter 4?	Text has been edited.	Catherine MACOMBE	INRAE Institut national de la recherche agronomique et de l'environnement	France
3987	32	13			section 5.2 is in chapter 5 ?	1.5.2 (now 1.6.2)	Catherine MACOMBE	INRAE Institut national de la recherche agronomique et de l'environnement	France
3989	32	18			e.g.	done.	Catherine MACOMBE	INRAE Institut national de la recherche agronomique et de l'environnement	France
3991	32	22			section 5.4. is in the chapter 5?	1.5.4 (now 1.6.4)	Catherine MACOMBE	INRAE Institut national de la recherche agronomique et de l'environnement	France

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3993	32	37			the importance of...	text revised	Catherine MACOMBE	INRAE Institut national de la recherche agronomique et de l'environnement	France
3995	33	12			and before reduce to be removed	Edited	Catherine MACOMBE	INRAE Institut national de la recherche agronomique et de l'environnement	France
3997	33	28			to avoid	Edited.	Catherine MACOMBE	INRAE Institut national de la recherche agronomique et de l'environnement	France
3999	34	5	0	0	et al. 2013	Ref formatting should be automatic	Catherine MACOMBE	INRAE Institut national de la recherche agronomique et de l'environnement	France
4001	34	42	0	0	a bracket ( in excess	Corrected	Catherine MACOMBE	INRAE Institut national de la recherche agronomique et de l'environnement	France
4003	34	42	0	0	e.g.	Corrected	Catherine MACOMBE	INRAE Institut national de la recherche agronomique et de l'environnement	France
4005	35	24	0	0	Moss et al.	Noted, thank you	Catherine MACOMBE	INRAE Institut national de la recherche agronomique et de l'environnement	France
4007	36	9	0	0	space after )	Noted, thank you	Catherine MACOMBE	INRAE Institut national de la recherche agronomique et de l'environnement	France
4009	36	10	0	0	remove the last "the"	Noted, thank you	Catherine MACOMBE	INRAE Institut national de la recherche agronomique et de l'environnement	France
4011	36	17	0	0	2050, 2018	Noted, thank you	Catherine MACOMBE	INRAE Institut national de la recherche agronomique et de l'environnement	France
4013	38	9	0	0	recognises	Following editorial guidelines ..	Catherine MACOMBE	INRAE Institut national de la recherche agronomique et de l'environnement	France
4015	38	13	0	0	of in	Thanks, done	Catherine MACOMBE	INRAE Institut national de la recherche agronomique et de l'environnement	France
4017	38	38	0	0	e.g.	OK	Catherine MACOMBE	INRAE Institut national de la recherche agronomique et de l'environnement	France
4019	38	40	0	0	e.g.	OK	Catherine MACOMBE	INRAE Institut national de la recherche agronomique et de l'environnement	France
4021	38	43	0	0	e.g.	OK	Catherine MACOMBE	INRAE Institut national de la recherche agronomique et de l'environnement	France
4023	38	43	0	0	the fourth bracket is not at the right place	OK	Catherine MACOMBE	INRAE Institut national de la recherche agronomique et de l'environnement	France
4025	39	1	0	0	e.g.	OK	Catherine MACOMBE	INRAE Institut national de la recherche agronomique et de l'environnement	France

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4027	39	25	0	0	e.g.	OK	Catherine MACOMBE	INRAE Institut national de la recherche agronomique et de l'environnement	France
4029	39	26	0	0	a bracket ( in excess	OK	Catherine MACOMBE	INRAE Institut national de la recherche agronomique et de l'environnement	France
4031	39	28	0	29	the number of bracket is not correct	OK	Catherine MACOMBE	INRAE Institut national de la recherche agronomique et de l'environnement	France
4033	40	7	0	0	Davenport 2009,	Thanks, done	Catherine MACOMBE	INRAE Institut national de la recherche agronomique et de l'environnement	France
4035	40	24	0	0	date for Tietenberg and Lewis	Thanks, done	Catherine MACOMBE	INRAE Institut national de la recherche agronomique et de l'environnement	France
4037	40	31	0	0	alternative	Thanks, done	Catherine MACOMBE	INRAE Institut national de la recherche agronomique et de l'environnement	France
4039	40	38	0	0	et.al and repetition of Patterson	Thanks, done	Catherine MACOMBE	INRAE Institut national de la recherche agronomique et de l'environnement	France
4041	40	43	0	0	remove , and	Thanks, done	Catherine MACOMBE	INRAE Institut national de la recherche agronomique et de l'environnement	France
4043	41	15	0	18	repetition of the sentence	Duplicated text deleted	Catherine MACOMBE	INRAE Institut national de la recherche agronomique et de l'environnement	France
4045	41	23	0	0	tends	OK	Catherine MACOMBE	INRAE Institut national de la recherche agronomique et de l'environnement	France
4047	42	11	0	0	tacking or tackling?	Noted thanks	Catherine MACOMBE	INRAE Institut national de la recherche agronomique et de l'environnement	France
4049	42	20	0	0	one bracket is missing	Accepted, Clarified	Catherine MACOMBE	INRAE Institut national de la recherche agronomique et de l'environnement	France
4051	42	22	0	0	one bracket is not at the fair place	Ch.1 CLAs made significant effort to engage rest of report around transition concepts	Catherine MACOMBE	INRAE Institut national de la recherche agronomique et de l'environnement	France
4053	42	40	0	0	highlights	OK	Catherine MACOMBE	INRAE Institut national de la recherche agronomique et de l'environnement	France
4055	43	6	0	7	et al.	OK	Catherine MACOMBE	INRAE Institut national de la recherche agronomique et de l'environnement	France
4057	43	2	0	0	In Figure 1.7 is abscissa the time? The figure is difficult to understand	There was an unfortunate technical error in conversion to PDF, however the Figure has been substnially reworked	Catherine MACOMBE	INRAE Institut national de la recherche agronomique et de l'environnement	France
4059	43	27	0	0	issue with "both", because the previous paragraph is about three approaches	Thanks, clarified	Catherine MACOMBE	INRAE Institut national de la recherche agronomique et de l'environnement	France

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
4061	43	29	0	0	levels	Relevant point but surely some strategic planning to take account of climate change likely to be better than none	Catherine MACOMBE	INRAE Institut national de la recherche agronomique et de l'environnement	France
4063	45	19	0	20	Patterson et al. 2018)), no coma in the reference	Thanks; edited	Catherine MACOMBE	INRAE Institut national de la recherche agronomique et de l'environnement	France
4065	45	21	0	23	The sentence is not complete	Thanks; edited	Catherine MACOMBE	INRAE Institut national de la recherche agronomique et de l'environnement	France
4067	45	30	0	0	a bracket ) in excess	Thanks; edited	Catherine MACOMBE	INRAE Institut national de la recherche agronomique et de l'environnement	France
4069	45	35	0	0	section 1.3 section 1.4	Corrected	Catherine MACOMBE	INRAE Institut national de la recherche agronomique et de l'environnement	France
4071	45	37	0	0	section 1.5	Corrected	Catherine MACOMBE	INRAE Institut national de la recherche agronomique et de l'environnement	France
4073	45	47	0	0	reference to policy chapter to be given	Added	Catherine MACOMBE	INRAE Institut national de la recherche agronomique et de l'environnement	France
4075	47	10	0	0	e.g.	Noted.	Catherine MACOMBE	INRAE Institut national de la recherche agronomique et de l'environnement	France
4077	47	11	0	0	e.g.	Noted.	Catherine MACOMBE	INRAE Institut national de la recherche agronomique et de l'environnement	France
4079	47	28			scales	Corrected	Catherine MACOMBE	INRAE Institut national de la recherche agronomique et de l'environnement	France
4081	47	38			achieve	Typo corrected.	Catherine MACOMBE	INRAE Institut national de la recherche agronomique et de l'environnement	France
4083	47	43			section 1.4	Edited. Thank you.	Catherine MACOMBE	INRAE Institut national de la recherche agronomique et de l'environnement	France
4085	48	5			e.g.	Edited.	Catherine MACOMBE	INRAE Institut national de la recherche agronomique et de l'environnement	France
4087	48	14			repetition of "a more"	Text has been edited.	Catherine MACOMBE	INRAE Institut national de la recherche agronomique et de l'environnement	France
4089	48	16			section 1.5	Text has been edited.	Catherine MACOMBE	INRAE Institut national de la recherche agronomique et de l'environnement	France
4091	48	19			by power...	Text has been edited.	Catherine MACOMBE	INRAE Institut national de la recherche agronomique et de l'environnement	France
4093	48	28			e.g.	Text has been edited.	Catherine MACOMBE	INRAE Institut national de la recherche agronomique et de l'environnement	France

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4095	48	29			e.g.	Text has been edited.	Catherine MACOMBE	INRAE Institut national de la recherche agronomique et de l'environnement	France
4097	48	31			check ref	Sorry. Now edited.	Catherine MACOMBE	INRAE Institut national de la recherche agronomique et de l'environnement	France
4099	48	41			collective benefit	Editted.	Catherine MACOMBE	INRAE Institut national de la recherche agronomique et de l'environnement	France
4101	49	18			transformation	Edited.	Catherine MACOMBE	INRAE Institut national de la recherche agronomique et de l'environnement	France
4103	49	22			one dot in excess	Edited.	Catherine MACOMBE	INRAE Institut national de la recherche agronomique et de l'environnement	France
4105	50	25			it may engage	Sorted	Catherine MACOMBE	INRAE Institut national de la recherche agronomique et de l'environnement	France
4107	50	38		39	from some countries	corrected	Catherine MACOMBE	INRAE Institut national de la recherche agronomique et de l'environnement	France
4109	52	14			Re- to remove	Accepted, thank you.	Catherine MACOMBE	INRAE Institut national de la recherche agronomique et de l'environnement	France
4111	52	27			examined	Accepted, thank you.	Catherine MACOMBE	INRAE Institut national de la recherche agronomique et de l'environnement	France
4113	52	36			e.g.	Accepted, thank you.	Catherine MACOMBE	INRAE Institut national de la recherche agronomique et de l'environnement	France
4115	28	31			In order to reflect the carbon leakage considerations and outsource of the emissions to less committed countries, I suggest to add a phrase of "trade status" or something more representative in the text, right after the word "production,": specifically the central role of structures of power, production, trade status, and a commitment to economic growth	Thank you. Valid point about carbon leakage. However, this statement is about the relationship between economic growth and GHG emissions. The role of trade is covered elsewhere in the chapter.	Hossein Khajehpour	Energy Engineering Department, Sharif University of Technology	Iran
4117	29	5			This sentence is recommended to be added before "in other contexts" : "Another example has been the emphasis of major OPEC countries with oil-reliant economies on the response measures needed to support their economies against the adverse effects of global climate actions."	We do not think that this suggested addition will work in the context of the paragraph.	Hossein Khajehpour	Energy Engineering Department, Sharif University of Technology	Iran

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
4119	30	11			Before ending the section 1.4.6, it is recommended to add a paragraph on the necessity of shared responsibility allocation approaches among the producers and consumers of the embodied emissions: "Ignorance of the producer and consumer equity considerations resulted in the adverse effects of carbon leakage on the global emissions during the enforcement of the Kyoto protocol. Therefore, there is an essential need for the development and application of shared responsibility allocation approaches among the producers and consumers of upstream and downstream emissions. Several approaches are recommended to reflect this equity consideration in the global allocation of the expected responsibilities of emitters and consumers in the design of integrated global climate action. (Feng, 2003, Rodrigues, Domingos, et al. 2006, Lenzen, Murray et al. 2007, Rodrigues and Domingos 2008, Zhou 2009, Hoeltl and Brandtweiner 2011, Marques, Rodrigues, et al. 2012, Berzosa, Barandica, et al. 2014, Csutora and Vetóné mőzner 2014, Kander, Jiborn et al. 2015, Liu and Fan 2017, Khajehpour et al. 2019) An effective approach which motivates both the producers toward greener production and the consumers toward less and greener consumption, simulataniously." Complete addresses of the references are provided in cell I-18.	The section highlights the role of equity and fairness anchored in the principle of shared responsibility.	Hossein Khajehpour	Energy Engineering Department, Sharif University of Technology	Iran
4121	30	11			<a href="http://dx.doi.org/10.1016/j.econ.2006.05.018">http://dx.doi.org/10.1016/j.econ.2006.05.018</a> , <a href="https://doi.org/10.1016/j.econ.2007.12.010">https://doi.org/10.1016/j.econ.2007.12.010</a> , <a href="http://dx.doi.org/10.1038/nclimate2555">http://dx.doi.org/10.1038/nclimate2555</a> , <a href="http://dx.doi.org/10.1016/j.econ.2006.05.018">http://dx.doi.org/10.1016/j.econ.2006.05.018</a> , <a href="https://doi.org/10.1016/S0921-8009(03)00104-6">https://doi.org/10.1016/S0921-8009(03)00104-6</a> , <a href="https://doi.org/10.3390/su9122220">https://doi.org/10.3390/su9122220</a> , <a href="https://doi.org/10.1016/j.jclepro.2017.08.013">https://doi.org/10.1016/j.jclepro.2017.08.013</a> , <a href="https://doi.org/10.1002/ieam.1489">https://doi.org/10.1002/ieam.1489</a> , <a href="https://doi.org/10.1007/978-3-319-89590-1_17">https://doi.org/10.1007/978-3-319-89590-1_17</a>	Thank you for these references.	Hossein Khajehpour	Energy Engineering Department, Sharif University of Technology	Iran
4123	32	8			This sentence is recommended to be added before "international" : "For instance, the considerations of the response measures since COP 11 and especially in the Paris Agreement has been an important factor for participation of oil-reliant economies which demand this support to offset the adverse effects of global climate actions on their national economies."	Rejected. The value of this addition is not clear.	Hossein Khajehpour	Energy Engineering Department, Sharif University of Technology	Iran
4125	22	35			To be added before the "A comparison": "Also, some researchers propose that there is an essential need for the development and application of shared responsibility allocation approaches among the producers and consumers of upstream and downstream emissions. Several approaches are recommended to reflect this equity consideration in the global allocation of the expected responsibilities of emitters and consumers in the design of integrated global climate action. (Feng, 2003, Rodrigues, Domingos, et al. 2006, Lenzen, Murray et al. 2007, Rodrigues and Domingos 2008, Zhou 2009, Hoeltl and Brandtweiner 2011, Marques, Rodrigues, et al. 2012, Berzosa, Barandica, et al. 2014, Csutora and Vetóné mőzner 2014, Kander, Jiborn et al. 2015, Liu and Fan 2017, Khajehpour et al. 2019) An effective approach which motivates both the producers toward greener production and the consumers toward less and greener consumption, simulataniously." Complete addresses of the references are provided in cell I-18.	Accepted - [This comment has been addressed as follows: In recent years, other methods have been suggested as a way of accounting for emissions, such as shared responsibility (Lenzen et al. 2007), technology adjusted consumption based accounting (Kander et al. 2015), value added-based responsibility (Piñero et al. 2019) and exergy-based responsibility (Khajehpour et al. 2019).	Hossein Khajehpour	Energy Engineering Department, Sharif University of Technology	Iran



Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
4865	3	16	3	19	It would be useful to mention the upper safe limit in GtCO <sub>2</sub> eq which are necessary to stay below the 2 degree target, as a comparison to the 52-58 Gt currently suggested by policy-makers.	This part of the Executive Summary (ES) has been edited following the compalte revamping of the ES	Frauke Urban	KTH Royal Institute of Technology	Sweden
4867	14	24	15	20	It would be useful to mention that low carbon development, climate resilient development, climate compatible development and other concepts need to go hand in hand with poverty reduction measures in poorer countries, especially if they focus mainly on mitigation rather than adaptation. See for example Urban, F. and Nordensvärd, J., 2013. Low Carbon Development: Key Issues. Earthscan, Routledge, Abingdon. Chapter 15.	Suggestion adapted.	Frauke Urban	KTH Royal Institute of Technology	Sweden
4869	23	15	23	34	There is an increasing number of research publications that link digitalisation, energy use and emissions. The research comes to the conclusion that the contribution of the ICT sector to energy use and emissions is in fact quite considerable (e.g. Belkhir, L and Elmerligi, A. 2018. Assessing ICT global emissions footprint: Trends to 2040 & recommendation. Journal of Cleaner Production. Vol 177: 448-463. International Energy Agency (IEA) 2017. Digitalisation and Energy 2017. Available at: <a href="https://www.iea.org/reports/digitalisation-and-energy">https://www.iea.org/reports/digitalisation-and-energy.</a> )	Accepted: Citation has been added to support this point	Frauke Urban	KTH Royal Institute of Technology	Sweden
4871	43	5	43	18	In recent years we have seen that the dynamics of climate-relevant niche innovation are partly changing, with incumbents occasionally playing a larger role than before. For example in Sweden where incumbent firms such as steel manufacturers SSAB and mining firm LKAB are investing in joint ventures (with utility Vattenfall) to produce fossil free steel. We can see this in other cases too and the reasons are mainly related to the regulatory environment with the Paris Agreement, EU countries' decarbonisation goals etc (landscape pressure influencing the dominant regime, from which new niche innovations emerge). Maybe this is a new dynamic that could be mentioned here too?	Very interesting remark. Have sought to capture the point, implicitly also in the new form of diagram.	Frauke Urban	KTH Royal Institute of Technology	Sweden
4873					Great chapter, well done!	Thankyou !	Frauke Urban	KTH Royal Institute of Technology	Sweden
5059	6	45	6	45	Urging USA for Paris Agreement???	Rejected - policy prescriptive	Sayed Masoud Mostafavi Darani	Iran Meteorological Organization	Iran
5061	10	33	10	33	filling the ...	Think this addressed?	Sayed Masoud Mostafavi Darani	Iran Meteorological Organization	Iran
5223	1	14			Non market services are missing. Also role of forests needs to be highlighted.	Noted and to be considered further in reviewing our Oct 8 submission	Mostafa Jafari	Head of TPS for LFCCs/ and IPCC LA	Iran
5225	21	1	21	10	Non market services are missing. Also role of forests needs to be highlighted.	We have now mentioned the following reference (Chazdon, R. L. J. s. (2008), "Beyond deforestation: restoring forests and ecosystem services on degraded lands", Vol. 320 No. 5882, pp. 1458-1460.). Due to word limits, we were unable to add a detailed mention of the role of forests.	Mostafa Jafari	Head of TPS for LFCCs/ and IPCC LA	Iran

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
5627	17	25	17	25	The phrase "over consumption" is highly problematic, as it reflects a normative value judgment which is not factual, scientific, objective, or universally held. Who is to say that people in developed countries are engaging in "over consumption"? By what metric or objective standard can that claim be supported? This term reflects an advocacy position rather than a summary of research or the views of the scientific community, and thus has no place in the AR6 report. Furthermore, final consumption itself is not necessarily the problem, but rather the negative environmental externalities that are often associated with consumption. There are certainly alternative ways to consume that are sustainable, and therefore should not be criticized so harshly. "Over consumption" is also the kind of phrase that engenders warranted criticism and backlash to the IPCC reports, hindering their ability to influence policy implementation in practice. I suggest getting rid of it and replacing it with a factual, objective statement, such as the fact that consumption is typically higher in developed countries.	Edited.	Benjamin Leibowicz	The University of Texas at Austin	United States of America
5629	23	29	23	34	This passage is a bit misleading in that it suggests that the energy use and emissions implications of the IT sector are tied to specific, niche technologies such as cryptocurrencies. The issue is actually a lot broader - and in terms of future energy and environmental impacts, much more significant - than that. The passage should make it clear that these concerns are associated with the explosive growth of data and computing in general.	rejected: This section focuses on the larger role of technology in shaping future emissions, largely through energy pathways.	Benjamin Leibowicz	The University of Texas at Austin	United States of America
5631	25	36	25	39	From my perspective, this passage presents too positive an assessment of recent innovation on technologies for decarbonization. The assessment is accurate for the electricity sector, but should also acknowledge and clarify that very little progress has been made in other substantial GHG-emitting sectors. For example, there remain sectors like heavy industries and aviation for which technological substitution possibilities for decarbonization are lacking and essentially have not been adopted at all.	Accepted - this paragraph has been removed.	Benjamin Leibowicz	The University of Texas at Austin	United States of America
5633	42	31	42	31	I oppose "differentiated carbon taxes" as a potential remedy for the distributional impacts of climate policy that the IPCC AR6 should be supporting, even tacitly. As soon as carbon taxes are differentiated, that can dramatically increase the cost of climate policy and lead to serious policy side effects such as carbon leakage. Distributional impacts would be much more effectively dealt with via financial transfers and the tax system, as alluded to earlier in this passage. An excellent, convincing argument against "differentiated carbon taxes" as an idea worth considering is provided by 2014 Nobel laureate Jean Tirole in Chapter 8 (The Climate Challenge) of his book "Economics for the Common Good."	Noted - IPCC does not favor any of these measures. We are just referring to the literature.	Benjamin Leibowicz	The University of Texas at Austin	United States of America
5691	23	15	23	34	A growing literature exists on the potential of digital solutions to support decarbonization through more efficient processes. One scenario estimates the adoption of digital solutions across several industries would realize \$81 billion in annual cost savings and avoid up to 823 million metric tonnes of carbon dioxide per year. GE/Intel, Digital Efficiency: Driving Decarbonization and Unlocking Business Value across Industries, 2017, <a href="https://www.ge.com/sites/default/files/GE_Intel_Digital_Efficiency.pdf">https://www.ge.com/sites/default/files/GE_Intel_Digital_Efficiency.pdf</a> .	accepted: This comment seems to support the current section.	Seth Dunn	General Electric	United States of America

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
5693	23	15	23	34	Another study considers digital technology a "wild card" that can either support zero-carbon transformation or increase emissions (Falk et al., Exponential Roadmap, 2019, <a href="https://exponentialroadmap.org/wp-content/uploads/2019/09/ExponentialRoadmap_1.5_20190919_Single-Pages.pdf">https://exponentialroadmap.org/wp-content/uploads/2019/09/ExponentialRoadmap_1.5_20190919_Single-Pages.pdf</a> ).	accepted: This comment seems to support the current section.	Seth Seth Dunn	General Electric	United States of America
5695	23	15	23	34	Most recently, a report estimates that ICT (Information and Communication Technology) companies can reduce GHG emissions by 1.34 Gt versus a business as usual scenario by 2030 (GeSI, Digital With Purpose: Delivering a Smarter 2030, 2019, <a href="https://www.climate-kic.org/insights/digital-with-purpose-delivering-a-smarter-2030/">https://www.climate-kic.org/insights/digital-with-purpose-delivering-a-smarter-2030/</a> ).	accepted: This comment seems to support the current section.	Seth Seth Dunn	General Electric	United States of America
5703	24	20	24	22	Hydrogen may assist in steel production as a reductant (and I have published 3 papers on using hydrogen to do this, in the last two years) but the truth is that blast furnaces have a very long turnover time, and they will either be stranded assets or have CCS fitted. Hydrogen is many years away, and the amount of hydrogen you need to run a basic steelworks is biblical - we asked our final year design group to look into this last year and they ended up needing the entire output from a nuclear reactor to produce hydrogen to feed it. This statement is too bullish.	Partly accepted - We changed the sentence to be "...may offer future alternatives for some industrial processes like steel production".	paul fennell	Imperial College	United Kingdom (of Great Britain and Northern Ireland)
5959	30				Definition of institutions with reference to Douglas North (1990) is very superficial and very univocal. There is a number of definitions of institutions (see analysis by G. Peters 2012 and 2019). Why does it matter? Because some institutions are not identifiable at the first glance, and can stem - for example - from religious backgrounds, social beliefs, symbols. Therefore, climate action might be limited by some deep social institutions. to illustrate: in some societies there is a belief that forces of nature shouldn't be countered. Other societies see green economy in terms of non-industrialisation (eg Bhutan). As observed in Africa, some societies prefer to stay non-electrified to avoid electricity costs - hence deforestation increases. Hence, blue print policies will not work. Example Kyrgyzstan: any electricity tariff increase provokes non-payment for electricity. Hence, electricity tariff increase is more harmful for investments and innovation... In short, the definition of institutions given in the report opens a way for one-fit-all path for the climate change mitigation. Instead, one-fit-all has rarely worked because of deep social institutions	The examples mentioned (social beliefs) are recognised as part of informal institutions. The section has not suggested any blueprint policies but makes the point that institutions - formal and informal - can either hinder or facilitate climate action. In section supports the point that there is no one size that fits all.	Belyi Andrei	University of Eastern Finland, Centre for Climate Change, Energy and Environmental Law	.
5961	33				The chapter refers to international cooperation, but it entirely ignores multilateral investment protection especially for clean energy. Here, the role of the Energy Charter Treaty should be outlined. Energy Charter is the only multilateral mechanism providing investment protection for energy materials and products - including carbon-free energy. Now, there are vivid discussions about reforming the Energy Charter in a way to emphasize the priority of low carbon investments. This part of the debate is very relevant for the UNFCCC, because none of the agreements within the UNFCCC (including the Paris Agreement) provide this level of protection.	Noted, finance and investment is in 1.4.4.	Belyi Andrei	University of Eastern Finland, Centre for Climate Change, Energy and Environmental Law	Estonia
6431	3	4	3	4	Suggestion to use the original wording of PA Art.2.1 (a): "Holding the increase in the global average temperature to well below 2 °C above pre-industrial levels and pursuing efforts to limit the temperature increase to 1.5 °C" Reason: Holding an increase differs considerably from "keeping a temperature rise".	Accepted, text revised	Harald Diaz-Bone	First Climate AG	Switzerland

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6433	3	5	3	5	Suggestion to use the original wording of PA Art.2.1 (b): "Increasing the ability to adapt to the adverse impacts of climate change and foster climate resilience and low-GHG development" Reason: All three aspects (adaptation, climate resilience, and low-carbon development) are equally important here, so the latter two should not be dropped.	Accepted, text revised	Harald Diaz-Bone	First Climate AG	Switzerland
6435	3	6	3	6	Suggestion to delete "global". Reason: The original wording of Art. 2.1(c) is not limited to global financial flows. It reads: "Making finance flows consistent with a pathway towards low GHG emissions and climate-resilient development." This target can be read and implemented at all levels, including regional, national, sub-national and even corporate levels. In fact, several banks (e.g. members of GABV) have already started to address Art. 2.1c at the corporate level.	Accepted, text revised	Harald Diaz-Bone	First Climate AG	Switzerland
6437	3	7	3	7	Suggestion to revise the text in line with the original wording of PA Art. 2.1 and replace "It committed its Parties to strengthen the global response towards these goals" by "The agreement aims to strengthen the global response to the threat of climate change". Reason: Neither the objective of the Convention (UNFCCC Art.2) nor the three aims of the Paris Agreement (PA Art. 2) can be interpreted as commitment by (individual) Parties.	Accepted, text revised	Harald Diaz-Bone	First Climate AG	Switzerland
6439	3	11	3	11	Suggestion to replace "including on climate change" by "including on climate action". Reason: This is the name of SDG 13. Please note that we had a long debate on the name of SDG 13 and deliberately decided to not use climate change, as climate action is much more progressive!	Due to major revisions of the executive summary, editorial comments have been taken as noted and care was taken not to replicate the issues in the new version.	Harald Diaz-Bone	First Climate AG	Switzerland
8853	6	20	6	20	Beginning of line should read : These reports aim to assess... In above paragraph, the 3 special reports are mentioned	"This report" actually refers to AR6, so changed to "AR6 aims to assess..."	Michel SIMON	Vice Président SFENRAL	France
8855	12	41	6	41	Present wording says : "... aimed at reducing CO2 emissions from vehicles," This statement is inappropriate. The additional taxes were dealing only with gazole, and not with regular fuel. Gazole is more energetic than regular fuel, and thus gazole emits less CO2 than Regular (about 20% less emissions. It would be more correct to state : "..... aimed at reducing the gap between gazole and regular fuel prices". the official justification was more targeted to improve the air quality in the cities, by reducing emissions of microparticles.	Taken into account. This proposed tax hike comes from CO2 tax elevation.	Michel SIMON	Vice Président SFENRAL	France
9089	7	28	7	28	Abbreviation is introduced later in the chapter. Maybe worthwhile to define AFOLU here as well.?	Done	Jan Wohland	ETH Zürich	Switzerland
9091	24	9	24	13	What exactly does 'superior thermal efficiency' mean? There are hard physical limits to thermal efficiencies and I am sceptical whether 'superior' is a good fit here. If we talk about an effect of a few percents, I find that 'marginally increased efficiency' does a better job at communicating the scale of improvement.	Accepted - we have removed the sentence.	Jan Wohland	ETH Zürich	Switzerland

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
9093	24	9	24	15	<p>The importance of baseload generation declines to basically zero in highly renewable power systems. Schlachtberger et al. (2016) find that the “slowly flexible backup system is dominant at low renewable shares, but its optimized capacity decreases and drops close to zero once the average renewable power generation exceeds 50% of the mean load.” This is a consequence of the combined variability of electricity consumption and renewable feed-in.</p> <p>References Schlachtberger, D. P., Becker, S., Schramm, S. &amp; Greiner, M. Backup flexibility classes in emerging large-scale renewable electricity systems. <i>Energy Conversion and Management</i> 125, 336–346 (2016).</p>	rejected: while the outcome noted in the comment is possible, it is not certain.	Jan Wohland	ETH Zürich	Switzerland
9095	53	6	53	11	<p>I am very surprised by the last sentence (“The IPCC, in contrast, defines climate change as “a change in the state of the climate that can be identified (e. g., by using statistical tests) by changes in the mean and / or the variability of its properties, and that persists for an extended period, typically decades or longer”, making no such distinction.”).</p> <p>Is your point that the UNFCCC uses climate change and anthropogenic climate change synonymously while the IPCC uses climate change as an umbrella term for anthropogenic climate change and low-frequency/natural climate variability? So the concept that the UNFCCC refers to as “climate change”, is referred to as “anthropogenic climate change” by the IPCC? If yes, I don’t think that this is easy to understand in the text’s current form.</p>	This text was actually pasted verbatim from AR6 and is being revised. So, noted, thank you.	Jan Wohland	ETH Zürich	Switzerland
9097	53	28	53	30	<p>This sounds as if net neutrality could only be reached using negative emissions. However, conceptually it can also be achieved by complete elimination of positive emissions in the near future. I think it is important to highlight that even the 1.5 degree target can still be reached without negative emissions, as discussed in Grubler (2018).</p> <p>References: Grubler, A. et al. A low energy demand scenario for meeting the 1.5 °C target and sustainable development goals without negative emission technologies. <i>Nat Energy</i> 3, 515–527 (2018).</p>	Accepted, thank you.	Jan Wohland	ETH Zürich	Switzerland
9203	18	11	18	27	<p>Nunes et al. (2016) provide a guide on how the SDGs can be achieved using a health and well-being lens. REFERENCE: Nunes, A.R., Lee, K. and O’Riordan, T. (2016). Rethinking the Sustainable Development Goals under a health and well-being framework. <i>BMJ Global Health</i>, 1 (3): e000068.</p>	Noted.	Ana Raquel Nunes	University of Warwick, UK	United Kingdom (of Great Britain and Northern Ireland)
9215	3		85		<p>It was prepared in a high quality, and describes all items in this impressive report. The figures 1.4, 1.5, 1.6 &amp; 1.8 are impressive and involves the needed clarifications. Figure 1.7 in page 43 needs more clarifications.</p>	Exec Sum completely redrafted	Mounir Wahba Labib Risk	National Academy of Science, Egypt	Egypt
9363	4		5		<p>the 3 frameworks should be better defined and also supported by references and possibly by a dedicated graphic scheme.</p>	I hope we have better defined them - along with a fourth. Couldn’t think of a sensible graphics scheme	ANNA LAURA PISELLO	DEPARTMENT OF ENGINEERING - UNIVERSITY OF PERUGIA, ITALY	Italy
9365	8	24			<p>this sentence “Climate mitigation and adaptation should not be an end in themselves but a means to achieve” should be better reframed</p>	The sentence has been rephrased.	ANNA LAURA PISELLO	DEPARTMENT OF ENGINEERING - UNIVERSITY OF PERUGIA, ITALY	Italy

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
9367	22	15			this sentence is too much confidential "the central thought that underpins most literature on how to operationalise the link between sustainable"	Page no. is incorrect. This comment relates to line 21 on page 1-15 of the document Lilia emailed us on 19 May (Chapter 1_Compatible with Comments sheet)>	ANNA LAURA PISELLO	DEPARTMENT OF ENGINEERING - UNIVERSITY OF PERUGIA, ITALY	Italy
9369	14				the title of this section is too general... 1.3.1 Relevant Concepts and their limitations	The title should be understood in the context of the preceeding sections.	ANNA LAURA PISELLO	DEPARTMENT OF ENGINEERING - UNIVERSITY OF PERUGIA, ITALY	Italy
9483	3	16	3	19	The sentence is not strictly logical: "as ...unprecedented" does not in itself explain why efforts fall short to reach Paris tartgets.	This part of the Executive Summary (ES) has been edited following the complete revamping of the ES	Tom Kram	PBL (Fellow)	Netherlands
9485	3	22	3	22	SR1.5C is not mentioned here, suggest to add: "... as illustrated by SR1.C." after "... AR5,"	This part of the Executive Summary (ES) has been edited out following a complete revamping of the ES.	Tom Kram	PBL (Fellow)	Netherlands
9487	4	9	4	9	Hard to prove in comparison with Cold War years? Why not simply observe recent break from globalizing trend in past decades.	Text has been revised.	Tom Kram	PBL (Fellow)	Netherlands
9489	4	14	4	14	SR 1.5C was not introduced before, but accepting the comment on p.3/l.22 would remedy this	Exec Sum completely redrafted	Tom Kram	PBL (Fellow)	Netherlands
9491	6	32	6	32	explain "more slowly": compared with what period?	Clarified	Tom Kram	PBL (Fellow)	Netherlands
9493	7	7	7	7	Make explicit: 40GtCO2 or 40 GtCO2-eq? Next sentences refer to GHG, suggesting CO2-equivalent?	Its c. 40GtCO2 closer to 50GtCO2eq rephrased for long vs short term GHGs, refer to X-cutting box	Tom Kram	PBL (Fellow)	Netherlands
9495	9	14	9	14	"..much more briefly.." is hard to imagine ;-)	The text has been rephrased.	Tom Kram	PBL (Fellow)	Netherlands
9497	12	1	12	1	"helped" is not very a neutral term, replace by "implied" or "served"	Accepted	Tom Kram	PBL (Fellow)	Netherlands
9499	12	18	12	18	Elaborate, statement on "growing inequality" is unclear about causes and drivers of trend	Rejected - more details are found in the literature referred to. We have also added a reference to section 1.5.6 where we discuss mechanisms.	Tom Kram	PBL (Fellow)	Netherlands
9501	13	22	13	22	"Along this" sounds odd, as the Shale expansion has mixed impact on climate: replaces coal, but lowers prices and associated with methane leaks (recent satellite observations)	Rejected - we do not see anything wrong with the sentence.	Tom Kram	PBL (Fellow)	Netherlands
9503	20	32	20	32	Remove first "They interact." (repeated in next sentence)	Accepted - text revised	Tom Kram	PBL (Fellow)	Netherlands
9505	21	32	21	34	Rephrase, current sentence is incorrect.	Accepted	Tom Kram	PBL (Fellow)	Netherlands
9507	22	45	22	46	Aviation and shipping were not under Kyoto either, I think	The international portion of shipping and aviation falls under Article 2.2 of the Kyoto Protocol ("...pursue limitation or reduction of emissions of GHGs not controlled by the Montreal Protocol from aviation and marine bunker fuels, working through the International Civil Aviation Organization and the International Maritime Organization, respectively." - Chapter 10 Section 'Accountability and governance options')	Tom Kram	PBL (Fellow)	Netherlands
9509	26	17	26	37	(also editorial) These paragraphs on investments are not clearly written, confusing and raise more questions than they answer. The wide ranges for "policy baselines" warrant explanation, the many ranges of numbers confuse the message and no numbers seem to refer to "targets of the Paris Agreement", which is what is what the first sentence announces. Annual averages over 2016-50 of up to 3.8 trillion look inconsistent with single year levels starting from 1.6 in 2016 and reaching 1.7-2.7 by 2050.	Accepted. These numerical estimates have been removed. Chapter 15 addresses this in much more detail and the reader will be referred to the proper section in SOD Ch 15.	Tom Kram	PBL (Fellow)	Netherlands
9511	29	42	29	44	incomplete and not very clear treatment of these complex issues. "Cheap options" for who, does this take into account limited access to capital and high depreciation to cover risks? Role for foreign investment, e.g. CDM-like arrangements? Why and how would mitigation hamper development, and why can it not be the opposite - say for fossil fuel importing economies?	Accepted - we have deleted this sentence	Tom Kram	PBL (Fellow)	Netherlands

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
9633	32	42	34	36	Analytical models (Finus and Pintassilgo 2013; Weikard 2009) as well as more complex, regionalised simulations (Meya et al. 2017) show that whether uncertainty about the level and regional distribution of future climate change damages and abatement cost, hinders or fosters cooperation depends on the availability of financial transfer schemes between countries. While real-world uncertainty (changing the distribution between countries) may present an obstacle to cooperation, as creates losers and, there is a rich set of transfer and compensation schemes that can potentially turn uncertainty from an obstacle into an opportunity, e.g. by burden sharing schemes or emission trading. To put it simpler: In face of uncertainty in the distribution of damages and abatement cost across world regions, transfers between world regions support international climate cooperation (Meya et al. 2017). References: Finus, M., & Pintassilgo, P. (2013). The role of uncertainty and learning for the success of international climate agreements. <i>Journal of Public Economics</i> , 103, 29–43. Meya, J. N., Kornek, U., & Lessmann, K. (2018). How empirical uncertainties influence the stability of climate coalitions. <i>International Environmental Agreements: Politics, Law and Economics</i> , 18(2), 175-198. Weikard, H. P. (2009). Cartel stability under optimal sharing rule. <i>The Manchester School</i> , 77, 575–593.	This is a rich and valid comment. We understand the key point as being consistent with the message conveyed in the section that international co-operation can act as a barrier or driver for climate action depending on the structure, politics and interests as well as how issues of fairness are addressed.	Jasper Meya	German Centre for Integrative Biodiversity Research	Germany
9649	40	10	42	33	Section 3.6.2 in Chapter 3 of IPCC WG3 AR5 (i.e., the last IPCC AR) summarized the state of knowledge on discounting and the applicability of the simple Ramsey rule and extensions. Table 3.2 also consider long-term social discount rates between from the literature between 1.4 and 16 percent. Two new contributions to the literature I) find larger consensus on the value of the long-term social discount, and II) questions the applicability of the simple Ramsey rule. I think it is important to highlight these more recent contributions. The key normative/ prescriptive (relating directly to Table 3.2. in the previous IPCC AR) is: Drupp, Moritz A., Freeman, Mark C., Groom, Ben, and Frikk Nesje (2018), Discounting Disentangled. <i>American Economic Journal: Economic Policy</i> 10(4), 109-34. Webpage: <a href="http://www.aeaweb.org/articles?id=10.1257/pol.20160240">http://www.aeaweb.org/articles?id=10.1257/pol.20160240</a> Abstract: The economic values of investing in long-term public projects are highly sensitive to the social discount rate (SDR). We surveyed over 200 experts to disentangle disagreement on the risk-free SDR into its component parts, including pure time preference, the wealth effect and return to capital. We show that the majority of experts do not follow the simple Ramsey Rule, a widely-used theoretical discounting framework, when recommending SDRs. Despite disagreement on discounting procedures and point values, we obtain a surprising degree of consensus among experts, with more than three-quarters finding the median risk-free SDR of 2 percent acceptable. The key positive/ descriptive contribution is: Giglio, Stefano, Maggiori, Matteo, and Johannes Stroebel (2015), Very Long-Run Discount Rates. <i>Quarterly Journal of Economics</i> 130(1), 1–53. Webpage: <a href="https://doi.org/10.1093/qje/qju036">https://doi.org/10.1093/qje/qju036</a>	Thank you. Despite this literature, there remains strong controversy regarding the computation and application of discount rate in climate policy.	Frikk Nesje	Heidelberg University	Germany

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
9657	17	14	17	16	Figure 1.4 is unclear and very hard to read. It also needs more thinking and explanation. Why there is only one SDG partly located in the developed countries area? Developed countries would also benefit in other SDGs, such as SDG 11 Sustainable Cities and Communities, and SDG 9 Industry, Innovation and Infrastructure.	Figure has been revised.	Xinfang Wang	University of Birmingham	United Kingdom (of Great Britain and Northern Ireland)
9659	17	24	17	25	Developed countries not only need to focus on climate mitigation and reducing over consumption. They also need to focus on climate adaptation, for example, how to deal with the more frequent flooding events happening in the UK.	Edited.	Xinfang Wang	University of Birmingham	United Kingdom (of Great Britain and Northern Ireland)
9945	9	12	9	14	all of which have pros and cons (Doukas and Nikas, 2020).  - Doukas, H., & Nikas, A. (2020). Decision support models in climate policy. <i>European Journal of Operational Research</i> , 280(1), 1-24.	Thanks for the useful reference. It has been cited.	Haris Doukas	School of Electrical and Computer Engineering, National Technical University of Athens	Greece
9947	31	8	31	9	Another noteworthy reference on deliberative democracy and climate governance: - Stevenson, H., & Dryzek, J. S. (2014). <i>Democratizing global climate governance</i> . Cambridge University Press.	CDM means Clean Development Mechanism	Haris Doukas	School of Electrical and Computer Engineering, National Technical University of Athens	Greece
9949	39	18	39	18	"different or complementary evaluation frameworks". See: - Doukas, H., & Nikas, A. (2020). Decision support models in climate policy. <i>European Journal of Operational Research</i> , 280(1), 1-24.	Relevant thanks - utilised in more general brief remarks on methods & tools	Haris Doukas	School of Electrical and Computer Engineering, National Technical University of Athens	Greece
9951	42	21	42	25	Distribution of emissions targets across countries, within economic and IA modelling analyses, also depend on the first discussed asymmetry, regarding equity principles. There still exist studies citing the grandfathering principle in their choice of burden sharing, despite it being heavily criticised. See for example: - Du Pont, Y. R., Jeffery, M. L., Gütschow, J., Rogelj, J., Christoff, P., & Meinshausen, M. (2017). Equitable mitigation to achieve the Paris Agreement goals. <i>Nature Climate Change</i> , 7(1), 38. - Kartha, S., Athanasiou, T., Caney, S., Cripps, E., Dooley, K., & Dubash, N. K. (2017). Response to Robiou du Pont et al on climate equity. <i>Nature Climate Change</i> . - Du Pont, Y. R., & Meinshausen, M. (2018). Warming assessment of the bottom-up Paris Agreement emissions pledges. <i>Nature communications</i> , 9(1), 4810. - Rogelj, J., & Schleussner, C. F. (2019). Unintentional unfairness when applying new greenhouse gas emissions metrics at country level. <i>Environmental Research Letters</i> , 14(11), 114039.	Noted - we do not go into the specific burden rules here.	Haris Doukas	School of Electrical and Computer Engineering, National Technical University of Athens	Greece



Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
9953	42	37	42	38	<p>There are many more recent paradigms and references to be added to Turnheim et al., Geels et al., Hof et al., including:</p> <ul style="list-style-type: none"> <li>- Trutnevyte, E., Hirt, L. F., Bauer, N., Cherp, A., Hawkes, A., Edelenbosch, O. Y., ... &amp; van Vuuren, D. P. (2019). Societal transformations in models for energy and climate policy: The ambitious next step. <i>One Earth</i>, 1(4), 423-433.</li> <li>- Doukas, H., Nikas, A., González-Eguino, M., Arto, I., &amp; Anger-Kraavi, A. (2018). From integrated to integrative: Delivering on the Paris Agreement. <i>Sustainability</i>, 10(7), 2299.</li> <li>- Sovacool, B. K. (2014). Diversity: energy studies need social science. <i>Nature News</i>, 511(7511), 529.</li> <li>- Tàbara, J. D., Clair, A. L. S., &amp; Hermansen, E. A. (2017). Transforming communication and knowledge production processes to address high-end climate change. <i>Environmental Science &amp; Policy</i>, 70, 31-37.</li> <li>- Steg, L. (2018). Limiting climate change requires research on climate action. <i>Nature climate change</i>, 8(9), 759-761.</li> </ul>	Very helpful thanks, citing several of these in next draft	Haris Doukas	School of Electrical and Computer Engineering, National Technical University of Athens	Greece
9955	47	23	47	29	<p>Multi-level governance is perceived critical even in futures featuring rapid technological development, as single governance structures could give rise to weak, unstable institutions and regulatory/monitoring frameworks and monopoly business interventions.</p> <ul style="list-style-type: none"> <li>- Song, L., Lieu, J., Nikas, A., Arsenopoulos, A., Vasileiou, G., &amp; Doukas, H. (2020). Contested energy futures, conflicted rewards? Examining low-carbon transition risks and governance dynamics in China's built environment. <i>Energy Research &amp; Social Science</i>, 59, 101306.</li> <li>- Di Gregorio, M., Fatorelli, L., Paavola, J., Locatelli, B., Pramova, E., Nurrochmat, D. R., ... &amp; Kusumadewi, S. D. (2019). Multi-level governance and power in climate change policy networks. <i>Global Environmental Change</i>, 54, 64-77.</li> </ul>	We agree. This point is made in the section.	Haris Doukas	School of Electrical and Computer Engineering, National Technical University of Athens	Greece
10025	9	3	9	4	<p>This paragraph seems incomplete; point should be further enhanced to discuss multi-level governance and policy actions and how this can work across scale to addressing the global common. An interdisciplinary social science review that can support discussion here: Jorgenson, A. K., Fiske, S., Hubacek, K., Li, J., McGovern, T., Rick, T., ... &amp; Zycherman, A. (2019). Social science perspectives on drivers of and responses to global climate change. <i>Wiley Interdisciplinary Reviews: Climate Change</i>, 10(1), e554. <a href="https://doi.org/10.1002/wcc.554">https://doi.org/10.1002/wcc.554</a></p>	Thanks for the comment and the references. We will incorporate in the next revision.	Jia Li	U.S. Environmental Protection Agency	United States of America
10027	11	17	13	31	<p>Discussion in Section 1.2.3 reads to be fragmented that jumps from topic to topic without clear themes; more work is needed to streamline the messages and improve clarity and flow.</p>	Noted - The section is covering a lot of subjects as it is an overview of recent developments.	Jia Li	U.S. Environmental Protection Agency	United States of America
10029	11	28	11	32	<p>This paragraph should be enhanced by highlighting key messages. The key point is disproportional contributions to GHG emissions of high income population. It would be good to add a sentence or two, such as "The population of high income (16% of global population) contributes disproportionately to global CO2 emissions (38% of global total emissions)." Another study that can be cited: "Globally, households with income in the top 10% are responsible for 36% of GHG emissions, while those in the bottom 50% are responsible for only 15% of emissions (Hubacek, Baiocchi, Feng, &amp; Patwardhan 2017)."</p>	Thanks for the comment. We will highlight the main message clearer in the text.	Jia Li	U.S. Environmental Protection Agency	United States of America
10031	14	27	14	29	<p>The sentence can also note that "Fundamentally, sustainable development recognizes interlinked and interdependent human and natural systems and implies...."</p>	Suggestion adapted. Thank you	Jia Li	U.S. Environmental Protection Agency	United States of America

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
10033	15	14	15	17	In recent years, social and climate justice is increasingly emphasized in climate assessment, public discourse and policy development. A few references: (1) Schlosberg, D., & Collins, L. B. (2014). From environmental to climate justice: climate change and the discourse of environmental justice. <i>Wiley Interdisciplinary Reviews: Climate Change</i> , 5(3), 359-374. (2) Adger, W. N., Paavola, J., Huq, S., & Mace, M. J. (2006). Toward justice in adaptation to climate change. <i>Fairness in adaptation to climate change</i> , 1-19. (3) Bulkeley, H., Edwards, G. A., & Fuller, S. (2014). Contesting climate justice in the city: Examining politics and practice in urban climate change experiments. <i>Global Environmental Change</i> , 25, 31-40.	Noted and adapted.	Jia Li	U.S. Environmental Protection Agency	United States of America
10035	18	2	18	4	provide citations to support the statement.	Edited.	Jia Li	U.S. Environmental Protection Agency	United States of America
10037	18	22	18	25	It may not be desirable to have a single measure to represent wellbeing. Wellbeing is multifaceted and indicators need to be supported by different categories of measures. In addition to data challenge, there are methodological challenges and underdevelopment to use a single measure for human well-being.	Edited.	Jia Li	U.S. Environmental Protection Agency	United States of America
10039	18	41	18	43	This sentence is problematic, suggest revision or removal. We have known GHG emissions are byproducts of economic and production activities and the damages they can cause for decades. It seems to be an easy excuse to describe this as "unintended".	accepted. The word "unintended" has been removed.	Jia Li	U.S. Environmental Protection Agency	United States of America
10041	18	40	21	20	Discussion in this section can be enhanced to incorporate social science perspectives, e.g., see: Jorgenson, A. K., Fiske, S., Hubacek, K., Li, J., McGovern, T., Rick, T., ... & Zycherman, A. (2019). Social science perspectives on drivers of and responses to global climate change. <i>Wiley Interdisciplinary Reviews: Climate Change</i> , 10(1), e554. <a href="https://doi.org/10.1002/wcc.554">https://doi.org/10.1002/wcc.554</a>	Accept.	Jia Li	U.S. Environmental Protection Agency	United States of America
10043	22	13	22	16	This sentence can be broadened to incorporate economic and social science perspectives on drivers of emissions and trade. For instance, sociology studies "unequal ecological exchange", e.g., Jorgenson, A. (2012). <i>The sociology of ecologically unequal exchange and carbon dioxide emissions, 1960–2005</i> . <a href="https://www.sciencedirect.com/science/article/abs/pii/S0049089X1100222">https://www.sciencedirect.com/science/article/abs/pii/S0049089X1100222</a> 5. Yu, Y, K. Feng and K. Hubacek (2014). China's unequal ecological exchange. <a href="https://www.sciencedirect.com/science/article/pii/S1470160X14000570">https://www.sciencedirect.com/science/article/pii/S1470160X14000570</a>	Accepted - text revised [Due to strict word limits, we are unable to provide a comprehensive discussion in Chapter 1. We have now added these references in the revised section.]	Jia Li	U.S. Environmental Protection Agency	United States of America
10045	25	8	25	14	The discussion of human dimensions pertaining to technologies should be substantially expanded. Here it should be noted human behaviors, choices, preferences are important components in technology choices and adoption, driving technology pathways and feasibility. These behaviors are also influenced by social norms, values, beliefs and peer effects.	Accepted- a sentence is added. We also have more discussion on this in 1.5.7.	Jia Li	U.S. Environmental Protection Agency	United States of America
10047	28	29	28	35	social scientists also refer to political power, social stratification, and unequal exchange that drive emissions (see interdisciplinary social science review Jorgenson et al. 2019, citation above).	The role of political power and unequal exchange are covered in the section.	Jia Li	U.S. Environmental Protection Agency	United States of America
10049	32	20	32	25	Here or somewhere in this section, it is also important to underscore the value of multi-tiered, multi-centric approaches and governance structures that encourage trust, agency, and cultural and historical relevance. (see social science review by Jorgenson et al. 2019, citation above)	The role of multi-level governance is covered elsewhere in the chapter (new section 1.7).	Jia Li	U.S. Environmental Protection Agency	United States of America

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
10051	43	1	43	3	Figure is hard to understand	There was an unfortunate technical error in conversion to PDF, however the Figure has been substnially reworked	Jia Li	U.S. Environmental Protection Agency	United States of America
10053	47	26	47	29	Interdisciplinary social science perspectives underscore the value of multi-tiered, multi-centric approaches and governance structures that encourage trust, agency, and cultural and historical relevance. (see review by Jorgenson et al. 2019, citation above)	We agree. This point is made in the section.	Jia Li	U.S. Environmental Protection Agency	United States of America
10069	17	14	17	15	Figure 1.4 is important but needs to be improved for better understanding. First of all, the space between the red and brown curves should be filled in with colour, to emphasise that this is an area of variation. Secondly, I recommend removing the boxes of the 14 sustainable development objectives (SDGs), to simplify the figure (considering that they are explained in the text).	Figure has been revised.	Claudio Valdovinos	University of Concepcion	Chile
10597	3	12	#REF!	19	You mention here what the Paris Agreement would require if GHG emissions in 2030 were 50-60GtCO <sub>2</sub> eq/yr, but you don't mention what current emissions are. The reader might be able to infer this, but best to be more explicit?	The statement has been revised and the ES has been revamped completely.	David Schoeman	University of the Sunshine Coast	Australia
10599	3	1	5	18	It is clear that this is intended as a broad narrative of the Chapter, but it would have been very usefus to have had pointers to Sections where further detail could be found. At present this reads more like an Internal Draft Exeec Summary?	Good point. The new ES povides such pointers. The revised chapter also has a map that should help with reading the entire report.	David Schoeman	University of the Sunshine Coast	Australia
10601	10	18	0	0	SDG14 does not involve land, but oceans, seas and marine life (not life in "water", either). SDG15 refers to terrestrial environments.	apologies we missed this, aim to correct in final	David Schoeman	University of the Sunshine Coast	Australia
10603	11	32	0	0	Neither % population nor % emissions total 100%; the numbers in the bar chart's bars don't match the numbers above, either?	Noted- the percentages sum up to 100 apart from where there is rounding of the number	David Schoeman	University of the Sunshine Coast	Australia
10605	16	15	0	0	Having the scale of SDG achievement run opposite to global mean surface temperature is disconcerting, and probably needs to be rethought	Noted	David Schoeman	University of the Sunshine Coast	Australia
10607	21	1	0	20	Will WGIII use the term "ecosystem services" or "nature's contributions to people"? The latter seems to be the IPBES framing?	Thank you. This mention has been removed due to word constraints, and general editing of the section. In the revised text, we have removed the sub-headings and integrated the sub-sections together.	David Schoeman	University of the Sunshine Coast	Australia
10697	13	13	13	14	The competitiveness of solar and wind energy with fossil fuels is markedly different across countries. For example, in India and ASEAN countries, coal is still competitive than solar and wind energy. It should be added.	Accepted - a sentence is added	Deguchi Tetsuya	Research Institute of Innovative Technology for the Earth	Japan
10699	16	16	16	16	It is misleading to include "SDG7 and SDG13" in the circle of "Climate Policy" in this figure. SDG7 has mutple objectives, namely, "ensure access to affordable, reliable, sustainable, and modern energy for all", which cannot always be achieved simutaneously. Ambitious climate policy could substantially raise energy cost, which could impede affordable energy acecss for low income people. Therefore, it is not correct to treat SDG7 in the circle of "Climate Policy". SDG7 should be deleted.	Figure has been revised	Deguchi Tetsuya	Research Institute of Innovative Technology for the Earth	Japan
10701	22	38	22	42	"whilst others explore clubs based on the potential benefits of free trade, risk reduction and technology cooperation amongs members (eg. Obergassel et al (2019); Hermwille (2019))." is duplicated.	Duplicated text deleted	Deguchi Tetsuya	Research Institute of Innovative Technology for the Earth	Japan
10703	25	10	25	10	"sometimes wind" should be "sometimes solar and wind" . The public objections to mega solar projects are also increasing in Japan.	Accepted	Deguchi Tetsuya	Research Institute of Innovative Technology for the Earth	Japan

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
10705	43	1	43	1	Figure 1.7 should be deleted, or replaced by the other, because it is hard to understand at all.	There was an unfortunate technical error in conversion to PDF, however the Figure has been substantially reworked	Deguchi Tetsuya	Research Institute of Innovative Technology for the Earth	Japan
10737	0	0	0	0	Chapter 1 itself is written in good way to understand the whole WG3 report. I congratulate authors' effort for this.	Thank you for the reference. It has been noted that countries have different priorities.	Mitsutsune Yamaguchi	Research Institute of Innovative Technology for the Earth	Japan
10739	0	0	0	0	<i>In the past IPCC reports, cost calculations were always underestimated. The reason is that cost was calculated by the least cost models. In other way, modelers assume global uniform carbon tax is introduced. Additional costs were shown in Table SPM 2 of AR5, for example, in the way where some technologies were unavailable, (such as no CCS, no nuclear etc.). If no CCS is available, cost will be 138% more (AR5). The most important point, however, is that single global carbon tax is far from realistic. One study shows, in relation to NDCs, that the global cost will be 6.5 times in comparison to that calculated by the least cost model if each country implement their NDC by their own carbon tax to achieve the same total reductions. I hope LAs of this chapter look for such literature and add description that current cost calculations based on least cost basis are always underestimated as long as costs are calculated based on the assumption of global single carbon tax. Reference: Akimoto, K., Homma, T. Sano, F. and Shoai-Tehrani, B. (2018), "Evaluations on emission reduction efforts of NDCs and their economic impacts by sector", A paper presented at The 6th World Congress of Environmental and Resource Economists (WCERE 2018)</i>	We have cited the reference as it makes an important point, but reject the overall assertion in this comment because it is at least counterbalanced by tendency in many models and past projections to underestimate innovation - as demonstrated in several chapters of the report, in fact it appears now that deep reductions may be significantly cheaper than previously assessed	Mitsutsune Yamaguchi	Research Institute of Innovative Technology for the Earth	Japan
10741	0	0	0	0	On the policy relevance of the IPCC reports; Ottmar Edenhofer once wrote after the publication of AR5/WG3 where he co-chaired that "even in the rare case that there is no initial disagreement over a specific set of objectives regarding a policy problem, the actual practical consequences of the best means to realize these objectives can surprisingly lead to a world that is, in fact, not desirable and necessitates a completion and revision of the initial objectives". The paper continues "---- possibly leading to a revision of the 2 degree C goal as such in this hypothetical case" (Ottamar Edenhofer and Martin Kowarsch, Environmental Science & Policy 51, 2015 56-64). This kind of view is seldom reflected in this chapter.	Considered. Eg. the possibility of higher costs from bad implementation is noted and referenced in section SOD 6.2 on Economic Frameworks. Broadly the CLAs consider that such factors are at least offset by other and more positive developments (eg. in technology) as well as the accelerating impact and risks, and improved understanding eg. of discounting, as developed in Econ Frameworks section	Mitsutsune Yamaguchi	Research Institute of Innovative Technology for the Earth	Japan
10743	0	0	0	0	<i>There exists several literatures that argue temperature targets are not appropriate and will not work due to various reasons, including huge uncertainty of ECS, carbon budget, impossibility of allocating of carbon budgets, especially for negative emissions. Furthermore, possibility of achieving the target is at best 66% (never 100%). These literature argue for net zero emissions without specifying particular time limit. Chapter 1 is the most appropriate chapter to touch upon this issue with literatures. Some examples of literatures are: Geden, O. (2013), "Modifying the 2°C Target", SWP Research Paper, German Institute for International and Security Affairs, June 2013, Kaya, Y., Yamaguchi, M. and Geden, O. (2019), "Towards net zero CO2 emissions without relying on massive carbon dioxide removal", Sustainable Science, Geden, O. and Beck, S. (2014), "Renegotiating the global climate stabilisation target", Nature Climate Change 4.</i>	Noted. Our response related to this reviewer's previous comment. There is no one right framing. Acknowledge lit. reality of negotiations. Note net zero element	Mitsutsune Yamaguchi	Research Institute of Innovative Technology for the Earth	Japan

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
10745	4	1	4	4	It is relevant to add sentences on border carbon adjustmen (BCA) based on literatures in view of EU's recent move toward introducing it.	The complete revamping of the ES has made this otherwise valid comment somewhat redundant.	Mitsutsune Yamaguchi	Research Institute of Innovative Technology for the Earth	Japan
10747	4	43	4	45	Please add the followings after "change" in line 45; "For discussions of comparison between mitigation cost and avoided benefit, see Chapter 3 of this report". (Now shown 3.6.2.2 of Chapter 3 of FOD)	The comment is valid but no longer applicable as the text has been edited following a total revamp of the Executive Summary.	Mitsutsune Yamaguchi	Research Institute of Innovative Technology for the Earth	Japan
10749	4	19	4	19	After "unavoidable", add in bracket "(some examples are trade-off with biodiversity and food production in relation to BECCS)". (For reference, IPCC Land use special report 2019, p.25, 28, 553 and IEA WEO 2019 p.123)	Text has been revised.	Mitsutsune Yamaguchi	Research Institute of Innovative Technology for the Earth	Japan
10751	4	32	4	32	The following sentence should be inserted at the top of this line. "Also there exists important uncertainties on climate change, including equilibrium climate sensitivity, carbon budget. In addition,".	Text has been revised.	Mitsutsune Yamaguchi	Research Institute of Innovative Technology for the Earth	Japan
10753	5	19	5	19	Please add the followings; "Lastly, Paris Agreement set temperature targets of 2 degree (and hopefully 1.5 degree). There exist several literatures that argue for a paradigm shift from temperature targets to long-term net zero emissions as temperature targets are not actionable for actors such as countries, entities, individual etc."	Noted	Mitsutsune Yamaguchi	Research Institute of Innovative Technology for the Earth	Japan
10755	47	19	47	19	Please add the followings; "Lastly, Paris Agreement set temperature targets of 2 degree (and hopefully 1.5 degree). There exist several literatures that argue for a paradigm shift from temperature targets to long-term net zero emissions as temperature targets are not actionable for actors such as countries, entities, individual etc.(Geden, O. (2013), "Modifying the 2°C Target", SWP Research Paper, German Institute for International and Security Affairs, June 2013, Kaya, Y., Yamaguchi, M. and Geden, O. (2019), "Towards net zero CO2 emissions without relying on massive carbon dioxide removal", Sustainable Science, Geden, O. and Beck, S. (2014), "Renegotiating the global climate stabilisation target", Nature Climate Change 4)".	Rejected. See response to comment above. This really is beyond scope of this section	Mitsutsune Yamaguchi	Research Institute of Innovative Technology for the Earth	Japan
10757	11	32	11	32	In addition to Figure 1.2, please add the same type of chart as shown in AR5 Fig. SPM.1 and add "for detailed discussions, please see Chapter 2". This chart in AR5 is quite useful and impressive to show how rapidly global GHG emissions has increased and its breakdown by gas and to understand the current status at a glance.	Accepted. We have now presented the same type of chart in AR5 Figure SPM.1	Mitsutsune Yamaguchi	Research Institute of Innovative Technology for the Earth	Japan
10759	14	33	14	33	please rewords "de-growth". I could not find this in my dictionary.	Sorry. The spelling has been changed.	Mitsutsune Yamaguchi	Research Institute of Innovative Technology for the Earth	Japan
10761	19	27	19	27	Diringer et al. 2019 is not a peer-reviewed literature. Delete	Accepted, this reference has been removed.	Mitsutsune Yamaguchi	Research Institute of Innovative Technology for the Earth	Japan
10763	24	20	24	22	Add innovation with hydrogen as heat in building, maritime and surface transport. Refer to UK's Net Zero Technical report, Committee of Climate Change May 2019, p. 62	Rejected - This paragraph is about CCS	Mitsutsune Yamaguchi	Research Institute of Innovative Technology for the Earth	Japan
10765	37	40	37	40	After "2017", add "and though cost-benefit analysis will be useful for optimal resource allocation if successfully implemented,".	A major part of this section is indeed about CBA, made more explicit	Mitsutsune Yamaguchi	Research Institute of Innovative Technology for the Earth	Japan
10767	38	9	38	9	After dialogue", add "it should be noted that this approach fails to show the optimal level of temperature target or emissions reductions".	Interesting, but more complex. Section text now touches upon this question	Mitsutsune Yamaguchi	Research Institute of Innovative Technology for the Earth	Japan

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
10769	37	23	37	43	It may be informative to touch upon the new literature by Michel Grubb and Claudia Wieners on their view on their new findings of cost-benefit analysis. See "Modeling Myths: On the Need for Dynamic Realism in DICE and other Equilibrium Models of Global Climate Mitigation" Working paper No.112 Jan. 2020, Institute for New Economic Thinking	Already referenced	Mitsutsune Yamaguchi	Research Institute of Innovative Technology for the Earth	Japan
10771	34	37	47	18	Discussions in chapter 1.5 completely ignore Pragmatic Enlightened Model of assessment making (PEM) proposed by Dr. Ottmar Edenhofer, Co-Chair of AR5/WG3. At least introduction of PEM with some comments on this proposal should be added. Refer to "Cartography of pathways: A new model for environmental policy assessments" by Ottmar Edenhofer and Martin Kowarsch, Environmental Science & Policy 51, 2015 56-64).	The reviewer is right in suggesting we refer to the PEM: "According to the PEM's policy assessment methodology, policy objectives and their means can only be evaluated in light of the practical consequences of the means. Learning about the secondary effects, side effects and synergies of the best means may require a reevaluation of the policy objectives, for instance, regarding the use of bioenergy for climate mitigation." This is indeed at the heart of what chapter 3 of this report is doing. We will refer to the model in the text	Mitsutsune Yamaguchi	Research Institute of Innovative Technology for the Earth	Japan
10773	38	6	38	9	This means IPCC give up its role of assessment. More concretely, this means that, if there are literatures to argue against politically agreed goal such as 2 degree target from various scientific viewpoints (and there exists several ones), IPCC would not take up these standpoint in its assessment, but focus only on cost effective analysis of agreed goals. IPCC's role should not be narrowed in that way. The assessment report at least introduce those views. For your reference, such literatures are; Geden, O. (2013), "Modifying the 2°C Target", SWP Research Paper, German Institute for International and Security Affairs, June 2013, Kaya, Y., Yamaguchi, M. and Geden, O. (2019), "Towards net zero CO2 emissions without relying on massive carbon dioxide removal", Sustainable Science, Geden, O. and Beck, S. (2014), "Renegotiating the global climate stabilisation target", Nature Climate Change 4. Also I would like to point out cost-benefit outcome is actually introduced in Chapter 3 (page 73 lines 41-45) of this report.	Interesting, but more complex. Section text now touches upon this question	Mitsutsune Yamaguchi	Research Institute of Innovative Technology for the Earth	Japan
10775	38	6	38	7	Add after "analysis", "cost inevitably tends to be underestimated because most of cost calculations of this approach assume global uniform carbon tax (or carbon price) which is quite unrealistic at least for a decade or decades. One example shows total cost to achieve NDC towards 2030 (US 2025) by applying different carbon tax by each country will be 6.5 times bigger than the total cost calculated by uniform global carbon tax (Akimoto et al. 2018)". Also it is far from actual cases where mitigation measures are a combination of carbon pricing, direct regulations or other means. In this case cost will further increase. Please see Akimoto, K., Homma, T. Sano, F. and Shoai-Tehrani, B. (2018), "Evaluations on emission reduction efforts of NDCs and their economic impacts by sector", A paper presented at The 6th World Congress of Environmental and Resource Economists (WCERE 2018),	Significant point, now noted later in the section	Mitsutsune Yamaguchi	Research Institute of Innovative Technology for the Earth	Japan
10777	39	5	39	11	Add after "--- constraints)" ", though global emissions continue to grow and critical technologies such as CCS that are heavily needed to achieve the Paris targets are yet to be deployed fully both economically and institutionally (such as lack of legal systems)." It is IPCC's role to inform the readers the difference between "should" and "is". In this sense, I quite agree with the citations from Farmers et al. (2015).	Have added a bit on CCS/negative/CDR	Mitsutsune Yamaguchi	Research Institute of Innovative Technology for the Earth	Japan

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
10779	39	17	39	20	This argument is a little bit rough and not persuasive enough. The key issue is that what prevents us for more urgent action and what we should do to concur the barriers.	The statement is one about economic and conclusions from modeling - what prevents action may be more political	Mitsutsune Yamaguchi	Research Institute of Innovative Technology for the Earth	Japan
10781	39	32	39	35	This is true. We can assume certain assumptions and add sensitivity analysis. This information is still useful for decision makings. Please add one sentence on this point.	Noted	Mitsutsune Yamaguchi	Research Institute of Innovative Technology for the Earth	Japan
10783	46	34	46	37	Add after (chapter 3.8.3), "In some cases, feasibility of these conditions may lead for policymakers to revisit the Paris goals, especially 1.5 degree goal in view of the description in page 4 of Chapter 2 that carbon budget will be exhausted in about 9 years if we continue recent global emission trend and page 5 of Chapter 3 that describes that if NDCs are followed until 2030, --- it is no longer possible to stay below 1.5 degree warming with no or low overshoot". (Please refer Ottamar Edenhofer and Martin Kowarsch, Environmental Science & Policy 51, 2015 56-64, on this comment).	This is a viewpoint, but really not appropriate to expand here in a section which is a very short overview of the various dimensions to be considered	Mitsutsune Yamaguchi	Research Institute of Innovative Technology for the Earth	Japan
10959	11	21	11	23	GHG sink of cements is mentioned. However, this effect is highly overestimated. Concrete industry is technically and chemically fighting carbonisation (corrosion of reinforcing steel). Estimation of the degree of carbonisation of concrete in typical residential buildings showed rates between 0.001 (best estimate) and 0.01 (max) during a 60 years life time of the building, see Werner F., Frischknecht R. (2018) Technische Grundlagen zur Prüfung eines Wechsels auf die europäischen EPD Normen für die ökologische Bewertung von Baustoffen und Gebäuden, im Auftrag von cemsuisse, Lignum, Stahlbau Zentrum Schweiz, KBOB, Bundesamt für Umwelt, Amt für Hochbau der Stadt Zürich, Umwelt & Entwicklung & treeze, Zürich & Uster, <a href="https://treeze.ch/fileadmin/user_upload/downloads/Publications/Case_Studies/Building_and_Construction/181214_Projektbericht_Vergleich_KBOB_EP_D_v1.0.pdf">https://treeze.ch/fileadmin/user_upload/downloads/Publications/Case_Studies/Building_and_Construction/181214_Projektbericht_Vergleich_KBOB_EP_D_v1.0.pdf</a> ).	Rejected - GHG sink of cement is not mentioned in subsection 1.2.3	Rolf Frischknecht	treeze Ltd.	Switzerland
11221	3	3	3	4	I would delete "against many odds" as it is not explained why and does not contribute to the main essence of the sentence. Alternative: New sentence with description of the "odds"...	Accepted, changed	Pia Paola Huber	MSc from the University of Vienna	Austria
11223	4	27	3	29	The sentence "Electric vehicles ..." creates the impression that these technical innovations lead in any case to a low-carbon transformation. As there are obstacles to really reach this target (eg adverse effect in case of non-renewable energy used for electric cars or rebound effects) I recommend to reflect this.	This comment is valid but not longer applicable as the text has been edited out following a complete revamping of the ES.	Pia Paola Huber	MSc from the University of Vienna	Austria
11225	8	12	8	15	I would recommend to soften this sentence: "The less ambitious near-term emission trends could imply ..."	It is widely accepted NDCs in their present form will not meet the goals of Paris Agreement. Thus meeting these goals would require negative emissions and/or SRM.	Pia Paola Huber	MSc from the University of Vienna	Austria
11227	12	3	12	4	In order to not create the impression that rising global temperatures are "helpful", I would delete the words "have helped" and use instead some neutral words.	Accepted	Pia Paola Huber	MSc from the University of Vienna	Austria
11229	17	14	17	16	To my view this table is not self-explaining and I disagree with the idea, that some SDGs are reserved for different income situations. The outstanding idea of the SDGs is that they are universal - and maybe e.g. the challenge of less inequality (financial, gender, etc.) is an even bigger challenge to some developed countries than to some other countries with less income (also within their borders).	Figure has been revised.	Pia Paola Huber	MSc from the University of Vienna	Austria

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
11231	18	4	18	6	I disagree with the idea, that some SDGs are reserved for different income situations. The outstanding idea of the SDGs is that they are universal - and maybe e.g. the social cluster is even more important to some developed countries than some other countries with less income. The reasoning: They may be an important driver for the "increasing populism, nationalism, authoritarianism and growing protectionism" (page 4, line 7).	Figure edited.	Pia Paola Huber	MSc from the University of Vienna	Austria
11233	23	44	24	4	There are lots of other concerns that could have good reasoning concerning new technologies (e.g. rebound effects, social effects, etc). Not all of them are listed here and it appears like a very foreshortened list of potential concerns.	Noted - we refer to the subsection of "Social dimensions".	Pia Paola Huber	MSc from the University of Vienna	Austria
11235	24	9	24	15	This passage should at least have a short comment on reasoned concerns beside financial ones like nuclear waste (lack of repositories), safety, sustainability, etc.	accepted: we added the following phrase "but may fail if potential financial, safety, fuel cycle and regulatory risks are not properly managed (Manan et al. 2015)"	Pia Paola Huber	MSc from the University of Vienna	Austria
11237	24	16	24	22	This passage should at least have a short comment on reasoned concerns (CCS as well as hydrogen) like energy demand (must be renewable), end-of-pipe technology, costs, safety, sustainability, etc.	Accepted - we added a sentence (see also comment 1228 below)	Pia Paola Huber	MSc from the University of Vienna	Austria
11239	25	9	25	10	"Public attitudes" sounds a bit patronising, I would prefer "Public opinion"	Partly accepted - we deleted the word "Public".	Pia Paola Huber	MSc from the University of Vienna	Austria
11241	25	10	25	14	Is there evidence that they accelerate trends to fewer working hours? I would insert a reference for this theory...	Accepted - we added a reference.	Pia Paola Huber	MSc from the University of Vienna	Austria
11243	35	1	36	44	I would abbreviate the chapter (e.g. page 35 line 12-15 could be shortened to one sentence) and perhaps bullet points could help to visualise the different scenarios	Generic, discuss	Pia Paola Huber	MSc from the University of Vienna	Austria
11397	3	16	3	19	Add something like: "... which is at the same level of 58 (±5.8) GtCO <sub>2</sub> eq of global GHG emissions in 2018 (Chapter 2)".	This part of the Executive Summary (ES) has been edited following the complete revamping of the ES	Thomas Wiedmann	UNSW	Australia
11399	5	13	5	13	Not sure whether the word "super-wicked" is helpful here (or even defined)?	Exec Sum completely redrafted	Thomas Wiedmann	UNSW	Australia
11401	6	33	6	33	Replace "consumption footprint" with "consumption-based emissions".	Accepted, thank you.	Thomas Wiedmann	UNSW	Australia
11403	8	7	8	8	Add something like: "... which is at the same level of 58 (±5.8) GtCO <sub>2</sub> eq of global GHG emissions in 2018 (Chapter 2)".	Done	Thomas Wiedmann	UNSW	Australia
11405	8	10	8	10	"ambition would have to rapidly ramp up after 2030" - would it be possible to put a %-reduction figure per year to this statement? "rapidly" is quite vague	Good suggestion. Will seek inputs from Chapter 2 in this regard.	Thomas Wiedmann	UNSW	Australia
11407	17	15	17	16	Fig.1.4: This figure suggests that a relatively high level of per-capita GHG emissions is sustainable, which is incompatible with climate targets (e.g. net-zero emissions in 2050). The 'sustainability corridor' should be closer or at the bottom as ultimately all GHG should reach (net) zero. As countries develop, the goal should be to reduce their per-capita emissions, not increase them as the figure implies (most rapid reduction for developed countries). The y-axis does not work for 'concentrations' as there is only one atmospheric concentration.	Figures has been revised.	Thomas Wiedmann	UNSW	Australia
11409	15	45	18	37	Section 1.3.2: Should it be mentioned that there is an internal conflict within the SDGs in that Goal 8 (global economic growth equivalent to 3% per year) is incompatible with environmental Goals as long as there is no absolute decoupling of impacts from growth? Ref: Hickel, J. (2019) The contradiction of the sustainable development goals: Growth versus ecology on a finite planet. Sustainable Development, 0(0). <a href="https://doi.org/10.1002/sd.1947">https://doi.org/10.1002/sd.1947</a>	True but the point here is about SDGs and climate goal	Thomas Wiedmann	UNSW	Australia



Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
11411	21	27	21	31	The effect of trade openness / tariff cuts on GHG emissions is differentiated with no overwhelming evidence for either increase or decrease; there are many publications which seem to come to different conclusions, see section 2.4.5 Trade as a driver of GHG emissions. I suggest to simply refer to this section here.	Accepted. The text has been substantially shortened leaving more detailed discussion to Chapter 2.4.5	Thomas Wiedmann	UNSW	Australia
11413	54	11	54	25	FAQ1.5 on IO looks a bit out of place here as it deals with one specific method that is not essential to Chapter 1. This might be better placed in a chapter where IOA is more prominent, e.g. in Chapter 2 sections on CBE and trade. Another option might be to add 'input-output analysis' to the Glossary and explain it there.	Thank you, the Technical Supporting Unit has suggested to delete FAQ 1.5 and the chapter has accepted the suggestion.	Thomas Wiedmann	UNSW	Australia
11431	17	14	17	16	To my view this figure is not self-explaining and I disagree with the idea, that some SDGs are reserved for different income situations. The outstanding idea of the SDGs is that they are universal - and maybe e.g. the challenge of less inequality (financial, gender, etc.) is an even bigger challenge to some developed countries than to some other countries with less income (also within their borders).	Figure has been revised.	Pia Paola Huber	MSc from the University of Vienna	Austria
11433	43	1	43	3	To my view this figure is not self-explaining, there is no explanation of the scaling and it is too dark when printed in black/white-mode.	There was an unfortunate technical error in conversion to PDF, however the Figure has been substantially reworked	Pia Paola Huber	MSc from the University of Vienna	Austria
11435	50	45	50	46	There is little text which leads to the conclusion that "Many countries are witnessing rising populism..."	Accepted, deleted	Pia Paola Huber	MSc from the University of Vienna	Austria
11437	52	14	52	14	"Re-": Is there something missing?	Accepted, has been removed, thank you.	Pia Paola Huber	MSc from the University of Vienna	Austria
11439	53	20	53	20	I would delete the word "only".	Accepted.	Pia Paola Huber	MSc from the University of Vienna	Austria
11441	53	27	53	28	Sentence "The net..." is not easy to read with the commas. Perhaps easier to read: The net quantity of carbon released to the atmosphere (carbon footprint) is therefore zero.	Accepted.	Pia Paola Huber	MSc from the University of Vienna	Austria
11443					The chapter could be shorter...	We tried - but new material also had to come in. Will continue to review length	Pia Paola Huber	MSc from the University of Vienna	Austria
11501	3	31	3	31	Need more clarification on 'unprecedented scale of transition' in the chapter text. What do you mean 'the disastrous consequences of climate change'?	Valid point. However comment no longer applies as this part of the Executive Summary has been completely revamped.	Rawshan Ara Begum	Universiti kebangsaan Malaysia (UKM)	Malaysia
11503	13	39	13	39	What do you mean "safe climate limit"? For instance level of emission concentration (ppm) or temperature rise 1.5degree or below?	Language has been edited	Rawshan Ara Begum	Universiti kebangsaan Malaysia (UKM)	Malaysia
11511	42	33	30	45	As a layman, my understanding is that 'Transition' and 'Transformation' are somehow inter linkages or overlapping each other. After reading subsection 1.5.4, I am still not clear about the relationship of these concepts and their linkages/boundaries for climate actions (mitigation, adaptation or policy measures). Need clarification for better understanding.	Clarified w.r.t. Glossary definitions	Rawshan Ara Begum	Universiti kebangsaan Malaysia (UKM)	Malaysia
11575	29	19	29	21	perhaps provide reference to SDGs here	Rejected - They are referred earlier in the report, see for instance section 1.2.2.	John Devaey	Trinity College Dublin	Ireland
11577	29	19	30	11	the language in section 1.4.6 is too verbose and would benefit from some editing to sharpen the message and improve clarity. For example line 37-39 "The reason is mainly that these countries are more dependent on primary industries (agriculture, fisheries etc.) than rich countries, and that their infrastructure is also 39 in a poorer condition." could be altered to "For example, low income countries tend to be more dependent on primary industries (agriculture, fisheries, etc.) than high and middle income countries.	Accepted	John Devaey	Trinity College Dublin	Ireland

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
12119	3	1			The summary includes key perspectives from the Paris agreement, including the global goals on mitigation, adaptation and finance, and considerations of environmental conservation and just transition, with mitigation as a prime concern, which is reasonable. A perspective from the Paris agreement that is lacking, however, is food security, which should be mentioned. Currently, the summary makes reference of the SR1.5, including broad dimensions of feasibility (p 4 line 14-18). The SRCLL deserves similar mention, including reference to the five land challenges that must be addressed jointly. This will point out that the land sector is so much more than a mitigation option, while also being a key sector for mitigation. Following up, the SRCLL notes that while the land sector holds potential for mitigation, the potentials (and needs) for land based mitigation is very much dependent on the efforts taken in other sectors. If emissions reductions in other sectors are insufficient, higher burdens will be allocated to the land sector while potentials for instance for soil carbon sequestration may be reduced with increasing temperatures (SRCLL SPM D3). Thus, the challenge with mitigation should be divided in two, where mitigation in the land sector must be differentiated from overall mitigation, whilst mitigation in the land sector will always be most likely succeed if it is also helpful for food security.	The ES has been completely revamped. The new ES highlights the centrality of sustainable development and attaining the SDGs of which food security is a key part.	Maria Malene Kvalevåg	Norwegian Environment Agency	Norway
12121	4	1	4	4	Important to keep the language on trade in the executive summary, including stating that "there is little progress on incorporating environmental norms in the trade system".	The complete revamping of the ES has made this otherwise valid comment somewhat redundant.	Maria Malene Kvalevåg	Norwegian Environment Agency	Norway
12123	21	22	22	16	very good to include concrete examples, please keep!	Thank you	Maria Malene Kvalevåg	Norwegian Environment Agency	Norway
12125	22	13	22	16	Would it be possible to include some language also on the relationship between land-based emissions, commodities and consumptionbased emissions?	Taken into account - [covered in Section 1.5.1 - the issue of land-use is mentioned here]	Maria Malene Kvalevåg	Norwegian Environment Agency	Norway
12127	28	24	28	35	would it be possible to include some language on the relationship between landbased emissions such as deforestation and political economy?	It is not clear to us why this specific example is needed and what difference it makes to the section.	Maria Malene Kvalevåg	Norwegian Environment Agency	Norway
12649	53	24		25	CH4 and N2O), deforestation and land degradation (mainly CO2), fossil fuel production (mainly CH4) industrial processes 25 (mainly CO2, N2O and F-gases) and municipal waste and wastewater (mainly CH4)	Noted, thank you. FAQ has been rewritten.	Eray Özdemir	General directorate of Forestry	Turkey
12721					<i>there is very little discussion of what the difference is between BAU, incremental change, transitions and transformation but these are highly important in the subsequent chapters. Many of the following chapters, for example, consider transitions to be similar to transformation. Moreover, this means that some of the key challenges for change (incremental, transitional or transformational) are not discussed, e.g. the trade-offs between depth, scope and pace of change, see Termeer et al (2017) Transformational change: governance interventions for climate change adaptation from a continuous change perspective, Journal of Environmental Planning and Management 60(4), 558-567</i>	Think this better addressed in our new Section 3?	Robbert Biesbroek	Wageningen University	Netherlands
12725	47	20	50	30	It is not clear why 1.6. should be a stand-alone section, particularly because it is not clear what this section is aiming to achieve other than listing a range of topics which are related to MLG. How is this helping to frame the rest of the chapters?	We thought long and hard about this. We decided that MLG is not at the same analytical category as the "analytical frames" covered in the the previous section. MLG is an all encompassing frame under which the rest fits.	Robbert Biesbroek	Wageningen University	Netherlands

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
12727					There is a bit of discussion on other than western-democratic systems, but this could be much more nuanced (ostrom would agree that many parts of the world are not polycentric, and therefore have different governance responses available/that seem to work).	Unclear whether this referred to specific section - hopefully better addressed in our multi-level governance section?	Robbert Biesbroek	Wageningen University	Netherlands
12773	34	42	34	42	a link to considering ecosystems as wicked problems may be coherent here to deepen the content of the notion of super wicked problems (e.g. citing Ecosystem management as a wicked problem R DeFries, H Nagendra - Science, 2017 - science.sciencemag.org)	Useful, noted	antoine leblois	INRA	France
12775	38	9	38	9	Typo: "Social choice theory (Arrow et al. 2011) recognises" recognises with a missing "R"	Thanks, done	antoine leblois	INRA	France
12791	3	46	3	46	Reference to 'people's willingness' should be changed to state's willingness as there seems to be no research that measures the people's ambition.	The ES has been revamped. However it should be noted that willingness is different from ambition. The literature has a lot to say about people's willingness to pay or act in climate friendly ways.	Dina Townsend	University of Witwatersrand	Austria
12793	4	7	4	13	This paragraph appears to conflate multi-level cooperation at the state level with social media networking. Social media does not necessarily reflect cooperation by states and it is important to recognise that social media is not representative of many people who have no access or whose voices are not heard.	Text has been revised.	Dina Townsend	University of Witwatersrand	Austria
12795	9	44	9	45	Reference to the atmosphere as a global public good (an economic classification) is in conflict with later discussion of the need for recognition of non-economic worth of nature.	Noted, comment has a wrong line, should be in page 9, line 3. It is a common term in economic framing, but we have amended.	Dina Townsend	University of Witwatersrand	Austria
12797	19	3	19	3	The focus on the desires of individuals shifts the blame onto individuals without considering the context in which consumption happens. Need for discussion of corporate behaviour driving what is sold and promoted and the influence of corporate decision-making rather than individual desire	this statement has been generalized. It is also followed by statements about the importance of context.	Dina Townsend	University of Witwatersrand	Austria
12799	19	13	19	13	Consider replacing discussion of desires with discussion of needs	The reference to this term in the revised version has been removed from the old sentence	Dina Townsend	University of Witwatersrand	Austria
12801	19	23	19	24	Discussion of "preferences and lifestyles" appears to assume that people make decisions in a state of freedom and removed from their social and commercial contexts or from their needs. Also assumes that people are making choices with full information. Again seems to blame individual consumption rather than corporate production methods or state regulation of products. Also does not talk to the realities of the majority of people who because of poverty or other constraints have very limited consumption choices.	As part of edits made to the overall section, the line that this comment refers to has been removed.	Dina Townsend	University of Witwatersrand	Austria
12803	19	26	19	27	Reference to "underlying desire of humans to make a change" implies it is up to individuals to want something more or differently as opposed to up to regulators and businesses to change production methods and commercial practices	As part of edits made to the overall section, the line that this comment refers to has been removed.	Dina Townsend	University of Witwatersrand	Austria
12805	20	12	20	21	Cities are also sites of intense inequality and transformation needs to be inclusive and address existing vulnerabilities	Accepted - text revised and reference added (Shi et al. 2016)	Dina Townsend	University of Witwatersrand	Austria
12807	20	44	20	45	Consider also mentioning: Storing carbon in forests can also threaten forest-dependent communities and indigenous peoples.	This sentence has been replaced as a result of general editing undertaken in this section	Dina Townsend	University of Witwatersrand	Austria
12809	21	1	21	10	The discussion of eco-system services does not include literature that critiques the notion of ecosystem services and the idea that ecosystems are not usefully reduced to their services.	Thank you. This mention has been removed due to word constraints, and general editing of the section. In the revised text, we have removed the sub-headings and integrated the sub-sections together.	Dina Townsend	University of Witwatersrand	Austria

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
12811	29	18	29	34	This section is entitled Equity and Justice but there is no discussion of justice. Consider including discussion of justice, including historical injustices.	Accepted - We decided to delete "justice" from the title of the section	Dina Townsend	University of Witwatersrand	Austria
12813	29	18	29	34	The discussion of equity appears to occasionally conflate issues of equity between states and issues of equality between people. Worth clarifying what is being discussed and referring consistently throughout.	Accepted - This is now specified in the first sentence.	Dina Townsend	University of Witwatersrand	Austria
12815	30	20	30	23	This section against appears to place excessive blame on the conduct of consumers rather than producers or regulators. Questions of supply-chains or of what foods are available to people or of meat production methods are not discussed. The extent to which people are free to choose is not assessed. If cultural behaviour needs to be addressed, consider focussing on corporate culture and excessive business air travel.	Rejected - This section is about behavioral change on the demand side and do not focus on the supply side.	Dina Townsend	University of Witwatersrand	Austria
12817	39	36	39	43	The discussion of behavioural biases does not consider the kind of drivers that may affect behaviour of vast numbers of people including inequality, poverty, hunger, lack of access to energy sources and other resources. This may result in various behaviours (vegetation clearing, agricultural burning etc). Considering what drives the behaviour of those who live in houses and are free to make choices about their energy consumption only relates to a small percentage of the population and fails to consider the systematic drivers of certain behaviours.	The section considered micro and systematic drivers of behavior change	Dina Townsend	University of Witwatersrand	Austria
12819	40	16	40	16	Unclear who 'he' in this sentence refers to.	edited	Dina Townsend	University of Witwatersrand	Austria
12821	42	3	42	3	Extremely brief mention of gender aspects. This should be expanded and include appropriate references.	Noted - references to gender aspects are in section 1.5.6. This section is referred to in the beginning of this subsection.	Dina Townsend	University of Witwatersrand	Austria
12823	45	21	45	23	This sentence does not make sense - consider the grammar.	Addressed	Dina Townsend	University of Witwatersrand	Austria
12825	49	3	49	4	Extremely brief mention of participation without context or explanation. Consider expanding.	Text has been revised	Dina Townsend	University of Witwatersrand	Austria
12859	29	19	29	33	The discussion of equity appears to occasionally conflate issues of equity between states and issues of equality between people. Worth clarifying what is being discussed and referring consistently throughout.	We tried to sharpen this	Dina Townsend	University of Witwatersrand	Austria
12915	3	15	3	16	...., the national goals declared under .... are not sufficient to meet its agreed aims. Confusing!	Exec Sum completely redrafted	Prashant Goswami	Institute of Frontier Science and Application	India
12917	6	37	6	37	Replace "cheap" by "affordable"	Accepted, reworded	Prashant Goswami	Institute of Frontier Science and Application	India
13093	11	28	11	32	I would suggest to add a map with the worldwide distribution of the 4 categories reported on the table. Is there any way to add a range of uncertainty on the reported numbers?	Taken into account. Instead of adding a map. we replaced Figure 1.2 with Figure 1.3 a and 1.3 b with UN regional breakdown/	Nathalie Fagel	AGEs, Departement of Geology, University of Liege	Belgium
13095	12	17	12	21	Is it possible to give an order of magnitude of the impacts on the between-country inequality changes in the text?	Rejected - this is just a short review. The literature we refer to give the details.	Nathalie Fagel	AGEs, Departement of Geology, University of Liege	Belgium
13097	21	6	21	7	Any more recent reference with updated numbers?	Explicit link to pollinators has been removed in the revised version owing to constraints in word limits, and we now provide a broad perspective.	Nathalie Fagel	AGEs, Departement of Geology, University of Liege	Belgium
13099	43	2	43	3	The figure is not easy to read by itself, is there any way to improve it?	There was an unfortunate technical error in conversion to PDF, however the Figure has been substnially reworked	Nathalie Fagel	AGEs, Departement of Geology, University of Liege	Belgium
13101	46	10	46	11	I am not shure the word geophysics is the most appropraite but it seems that is was already retained in a previous assesment.	Correct - has become standard part of 'feasibility' terminology	Nathalie Fagel	AGEs, Departement of Geology, University of Liege	Belgium

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
13119	3	18	3	19	Since there were concrete numbers given for GHG emission in 2030, would it be possible to add the amount of GHG emissions for the 2 Degree Celsius Scenario - it currently only say 'would require wholly unprecedented global emission reductions post-2013.'	This part of the Executive Summary (ES) has been edited out following a complete revamping of the ES.	Petra Minnerop	University of Dundee	United Kingdom (of Great Britain and Northern Ireland)
13121	3	26	3	27	replace has with have	Exec Sum completely redrafted	Petra Minnerop	University of Dundee	United Kingdom (of Great Britain and Northern Ireland)
13123	3	33	3	34	other word for era, such as century?	Exec Sum completely redrafted	Petra Minnerop	University of Dundee	United Kingdom (of Great Britain and Northern Ireland)
13125	3	43	3	43	constrain instead of constraint?	Exec Sum completely redrafted	Petra Minnerop	University of Dundee	United Kingdom (of Great Britain and Northern Ireland)
13127	5	13	5	14	after governance : and additional international cooperation (the international level should be strengthened where ever possible	The role of international co-opertaon is highlighted in the revised ES	Petra Minnerop	University of Dundee	United Kingdom (of Great Britain and Northern Ireland)
13129	8	10	8	10	It would be good to have a number of concrete amounts included here as well.	Good suggestion. Will seek inputs from Chapter 2 in this regard.	Petra Minnerop	University of Dundee	United Kingdom (of Great Britain and Northern Ireland)
13131		3	12	3	replace have helped with 'promoted'	Accepted	Petra Minnerop	University of Dundee	United Kingdom (of Great Britain and Northern Ireland)
13133	31	25	31	26	The sentence states: The PA does not require parties to implement their NDCs but requires them to pursue domestic mitigation measures. Please note that this is disputed in the literature and might also be a view that has been overcome through various rulings of domestic courts where it was held that States have to comply with their own Policies under the Paris Agreement, for example in planning permission cases and EIA cases. Moreover, the Paris Agreement will have to be implemented with the Paris Rulebook and it is difficult to see that there is still a valid argument that national measures are not required to pursue domestice mitigation measures. See P. Minnerop, Petra Minnerop, 2020, The legal effect of the 'Paris Rulebook' under the doctrine of treaty interpretation, in Peter Cameron, Volker Roeben and Mu Xi (eds), Global Energy in Transition (Hart Publishing, forthcoming 2020	Accepted, text revised.	Petra Minnerop	University of Dundee	United Kingdom (of Great Britain and Northern Ireland)
13147	3	28	3	29	According to the Emission Gap Report 2019, GHG emissions have been rising steadily the last decade. Therefore, I suggest to reframe "...the gap between commitment and the action remains wide." to "... the total gap between commitment and the actions continues rising.", because the gap widens and not stabilizes or shrinks.	Exec Sum completely redrafted	Johan de Jong	Wageningen University & Research	Netherlands
13149	3	46	3	46	In my view, the sentence in this line suggests that there will be no costs (or no additional costs) when nations do not implement climate policy. In general, societal costs of lacking climate policy will be much higher on the long term. Therefore, I suggest to change the sentence or add a sentence that clarifies if no climate policy is implemented, societal costs will be most likely higher.	Exec Sum completely redrafted	Johan de Jong	Wageningen University & Research	Netherlands
13357	6	12	6	12	I would add "by mid-century" or "in the second half of the century" at the end of the sentence.	Accepted, added, thank you.	Adam Pawloff	Greenpeace	Austria

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
13359	12	44	13	3	The cited "mismatch between concerns (...) and willingness to pay" is only backed up by one study from the US - this is rather weak evidence in my opinion.	Rejected. There are other examples showing a mismatch between concerns and willingness to pay such as yellow vest, rejection of carbon tax in Washington state, Australia and so forth.	Adam Pawloff	Greenpeace	Austria
13361	13	10	13	18	I would consider adding LCOE analysis by Lazard, see e.g. <a href="https://www.lazard.com/perspective/lcoe2019">https://www.lazard.com/perspective/lcoe2019</a>	Rejected - this is not published literature	Adam Pawloff	Greenpeace	Austria
13363	33	40	33	44	To the best of my knowledge, the "common timeframes" issue is not yet resolved. As such it is the case that Art. 4 of the PA stipulates the communication, but not however the preparation of an NDC every 5 years. The EU e.g. would rather prepare an NDC every 10 years.	Accepted, text revised.	Adam Pawloff	Greenpeace	Austria
13365	34	6	34	24	I would argue that market mechanisms on the whole have failed to prove their worth in reducing emissions to date and have in fact often undermined such efforts (e.g. perverse incentives in the context of CDM). As such it seems to me that this paragraph is unduly biased toward market mechanisms whilst only touching upon the potential threat to environmental integrity very sparsely.	We do not think that the section is biased in favour of market mechanism. The section is not about any one policy but about the role of international co-operation in driving or hindering climate action.	Adam Pawloff	Greenpeace	Austria
13367	48	12	48	12	I assume "purist" is meant to read "pursuit" - in general this section is awash with typos, missing words and double spaces and need proof reading.	Typo corrected.	Adam Pawloff	Greenpeace	Austria
13429	47	38			"Achieve" should be "achieve"	Typo corrected.	Sophie Szopa	Commissariat à l'Energie Atomique et aux Energies Alternatives	France
13431	8	31			"AR5 Fig SPM6", please specify WG3	Done	Sophie Szopa	Commissariat à l'Energie Atomique et aux Energies Alternatives	France
13433	9	3	9	4	Here a link could be made toward international cooperations which have already taken place to solve environmental problems involving atmosphere as a global public good (ozone hole, acidic rain, intercontinental transport of air pollution....) (and link toward WG3 chapter 14)	Text has been modified and mention is made of Chapters 13 and 14.	Sophie Szopa	Commissariat à l'Energie Atomique et aux Energies Alternatives	France
13435	9	21	11	16	Why aren't the transnational alliances discussed in 1.2.3 (e.g. C40 Cities initiative) part of the multilateral context?	The list is not intended to be exhaustive.	Sophie Szopa	Commissariat à l'Energie Atomique et aux Energies Alternatives	France
13437	12	40	12	42	As explained in Lianos 2019, the yellow jacket protest was first and foremost a social protest against taxes and political views not because these taxes were done to reduce CO2. The example is given without enough subtlety.	Taken into account. The text has been modified that the yellow vest has broader aspects	Sophie Szopa	Commissariat à l'Energie Atomique et aux Energies Alternatives	France
13439	19	6	19	6	Reference to IPCC 2019c, the page 43 in this SPM doesn't exist	Agreed. We have replaced the earlier reference with the following: Stehfest, et al., 2009; Van Vuuren, et al., 2018; van den Berg, et al. 2019	Sophie Szopa	Commissariat à l'Energie Atomique et aux Energies Alternatives	France
13441	19	6	19	6	The SRCCL SPM never mentions the term "vegetarian", the citation should stick to the SPM wording.	Agreed. We have replaced the earlier reference with the following: Stehfest, et al., 2009; Van Vuuren, et al., 2018; van den Berg, et al. 2019	Sophie Szopa	Commissariat à l'Energie Atomique et aux Energies Alternatives	France
13443	19	32	19	32	repetition of "they interact"	Accepted - text revised	Sophie Szopa	Commissariat à l'Energie Atomique et aux Energies Alternatives	France
13445	30	21	30	22	Eshel et al.2019 discuss that for the US, it should be made clear as the benefits strongly depend on the baseline regime and location for food production.	Accepted - We mention that this is a study on the US.	Sophie Szopa	Commissariat à l'Energie Atomique et aux Energies Alternatives	France

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
13447	30	35	31	41	Short Lived climate forcers are also regulated by air pollution legislation, could it be introduced there?	Rejected. Specific regulation will be discussed in ch.13	Sophie Szopa	Commissariat à l'Energie Atomique et aux Energies Alternatives	France
13449	33	12	33	12	the number of emitters in this case was without comparison with the one in the climate issue	Accepted, text revised.	Sophie Szopa	Commissariat à l'Energie Atomique et aux Energies Alternatives	France
13451	35	24	35	26	Scenarios are used by climate modellers to provide information about THE EFFECTS ON CLIMATE OF emissions of greenhouse gases, aerosols and short-lived species that could be imagined.	Done	Sophie Szopa	Commissariat à l'Energie Atomique et aux Energies Alternatives	France
13595	3	32	3	32	Suggest adding the following sentence at end of paragraph: Commensurate political will is required to realise those goals.	Exec Sum completely redrafted	Stuart Bruce	Wilmer Cutler Pickering Hale and Dorr LLP	United Kingdom (of Great Britain and Northern Ireland)
13597	4	15	4	15	Add comma after institutional: "; and institutional, which"	Exec Sum completely redrafted	Stuart Bruce	Wilmer Cutler Pickering Hale and Dorr LLP	United Kingdom (of Great Britain and Northern Ireland)
13599	8	24	8	25	Add text in bold: Climate mitigation and adaptation should not be an end in themselves but a means to stabilise the global climate system so as to avoid catastrophic impacts of climate change and also to achieve Sustainable Development, including poverty eradication.	This is a normative comment. The current rephrasing of the text is in line with the principles governing IPCC work, namely, "to assess on a comprehensive, objective, open and transparent basis the scientific, technical and socio-economic information relevant to understanding the scientific basis of risk of human-induced climate change, its potential impacts and options for adaptation and mitigation." <a href="https://www.ipcc.ch/site/assets/uploads/2018/09/ipcc-principles.pdf">https://www.ipcc.ch/site/assets/uploads/2018/09/ipcc-principles.pdf</a>	Stuart Bruce	Wilmer Cutler Pickering Hale and Dorr LLP	United Kingdom (of Great Britain and Northern Ireland)
13601	9	13	9	13	Add comma after "theory"	Done	Stuart Bruce	Wilmer Cutler Pickering Hale and Dorr LLP	United Kingdom (of Great Britain and Northern Ireland)
13603	18	44	18	44	Delete duplicate term "Figure 1.5"	Figure and reference have been removed.	Stuart Bruce	Wilmer Cutler Pickering Hale and Dorr LLP	United Kingdom (of Great Britain and Northern Ireland)
13605	34	27	34	27	Add reference: (Bruce 2020). Full citation: Bruce, S., 2020: Global Energy Governance and International Institutions. In W. Filho et al (eds), Encyclopedia of the UN Sustainable Development Goals. Affordable and Clean Energy (Springer). DOI: <a href="https://doi.org/10.1007/978-3-319-71057-0_71-1">https://doi.org/10.1007/978-3-319-71057-0_71-1</a> . (Bruce assesses the role and function of selected international organisations on global energy and climate governance.)	This text has been revised in ways that overtake this comment.	Stuart Bruce	Wilmer Cutler Pickering Hale and Dorr LLP	United Kingdom (of Great Britain and Northern Ireland)
13607	34	28	34	28	Add reference: (Bruce 2020). Full citation: Bruce, S., 2020: Global Energy Governance and International Institutions. In W. Filho et al (eds), Encyclopedia of the UN Sustainable Development Goals. Affordable and Clean Energy (Springer). DOI: <a href="https://doi.org/10.1007/978-3-319-71057-0_71-1">https://doi.org/10.1007/978-3-319-71057-0_71-1</a> . Bruce assesses the role and function of selected international organisations on global energy and climate governance.)	This text has been revised in ways that overtake this comment.	Stuart Bruce	Wilmer Cutler Pickering Hale and Dorr LLP	United Kingdom (of Great Britain and Northern Ireland)
13609	48	19	48	19	Add word "by" between "is driven mainly power relations"	text has been edited.	Stuart Bruce	Wilmer Cutler Pickering Hale and Dorr LLP	United Kingdom (of Great Britain and Northern Ireland)

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
13611	48	37	48	37	Suggest adding the following sentence in bold at end of paragraph: Yet with a longer term view, the co-benefits from climate change mitigation and energy decarbonisation could be in the national self-interest in terms of economic efficiency and preference satisfaction (Green 2015). Full citation: Green, F. 2015. Nationally Self-Interested Climate Change Mitigation: A Unified Conceptual Framework, Centre for Climate Change Economics and Policy Working Paper No. 224; Grantham Research Institute on Climate Change and the Environment Working Paper No. 199.	text has been edited.	Stuart Bruce	Wilmer Cutler Pickering Hale and Dorr LLP	United Kingdom (of Great Britain and Northern Ireland)
13863	5	14			Inclusion of Indigenous governing systems is important in addressing the systemic complexities of climate change challenges. Indigenous laws and governance must be considered in parallel to colonial or nation/state laws and governance systems.	Noted	Bridget Doyle	Tsleil-Waututh Nation	Canada
13865	9	3		4	Include Indigenous policies	Could the reviewer clarify the core point and suggest references?	Bridget Doyle	Tsleil-Waututh Nation	Canada
13867	0	0			<i>Indigenous governing systems and the recognition and implementation of the United Nations Declaration of the Rights of Indigenous People (UNDRIP) should be worked into this chapter. Currently, there is zero reference to Indigenous People in Chapter 1.</i>	taken into account	Bridget Doyle	Tsleil-Waututh Nation	Canada
13869	12	30		39	Reference to a resurgence and/or continuation of Indigenous grassroots movements and activism partnerships related to climate change could be included here. Reference to Indigenous legal challenges against major fossil fuel projects (ex. Tsleil-Waututh v. Canada) or other climate change-inducing developments could also be made here. Indigenous Rights must be incorporated and part of climate action and climate justice.	Accepted - we added a sentence.	Bridget Doyle	Tsleil-Waututh Nation	Canada
13871	47	21	50	30	Opportunity to include Indigenous governing bodies in considering the need for innovation in governance and institutional arrangements. Indigenous governments inherently abide by sustainable development theories, tend to embody the SDGs, and decision making is founded on intergenerational obligations. True government to government recognition, respect and cooperation between Indigenous governing bodies and nation states, and/or with international governments, could forge effective new pathways for climate action.	Valid point. However we do not see what is distinctively different about indigenous governing bodies. In MLG all types of governing bodies, committees and other arrangements play or can play important roles.	Bridget Doyle	Tsleil-Waututh Nation	Canada
14229	13	32	18	37	The section is missing an important empirical study on the state of well-being indicators and environmental indicators around the globe, including climate change. The authors analyse more than 140 countries, comparing how complying with the well-being indicators compares with environmental pressures. See: O'Neill, D.W., Fanning, A.L., Lamb, W.F. et al. A good life for all within planetary boundaries. Nat Sustain 1, 88–95 (2018). <a href="https://doi.org/10.1038/s41893-018-0021-4">https://doi.org/10.1038/s41893-018-0021-4</a>	Thank you for the reference. However the point of the section is not to compare how "complying with well-being indicators compares with environmental pressures". It is simply to say that there are other ways of measuring well-being other than GDP.	Aljoša Slameršak	The Institute of Environmental Science and Technology (ICTA-UAB)	Spain



Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
14263	13	19	13	24	Addition: "Over the last 10 years, CCU technologies have also emerged as a solution that can contribute to climate mitigation and at the same time provide economic benefits. A multitude of incumbent fossil products (fuels, chemicals, building materials) can be replaced by CCU products thereby reducing reliance in fossil fuels (Ampeli et al. 2015, <a href="http://dx.doi.org/10.1098/rsta.2014.0177">http://dx.doi.org/10.1098/rsta.2014.0177</a> ). CCU technologies have considerably matured over the years and some of them are at close-to-industrial TRL level as we speak (e.g. mineralisation, e-methane, e-methanol), while others show large potential but still need more R&D efforts (e.g. artificial photosynthesis) (Jarvis et al. 2018, <a href="https://doi.org/10.1016/j.rser.2018.01.007">https://doi.org/10.1016/j.rser.2018.01.007</a> ; Rafiee et al. 2018; <a href="https://doi.org/10.1016/j.jece.2018.08.065">https://doi.org/10.1016/j.jece.2018.08.065</a> )."	Accepted - we added a sentence on this.	Anastasios Perimenis	CO2 Value Europe (Association) - CCU Offiver	Belgium
14265	13	19	13	24	Addition suite: " Life cycle assessment of CCU products and technologies are starting to appear to confirm their environmental benefits (mainly focusing on GWP) (Artz et al. 2018, <a href="https://doi.org/10.1021/acs.chemrev.7b00435">https://doi.org/10.1021/acs.chemrev.7b00435</a> ; Thonemann 2020, <a href="https://doi.org/10.1016/j.apenergy.2020.114599">https://doi.org/10.1016/j.apenergy.2020.114599</a> ; Cuéllar-Franca et Azapagic 2015, <a href="http://dx.doi.org/10.1016/j.jcou.2014.12.001">http://dx.doi.org/10.1016/j.jcou.2014.12.001</a> ) and studies of regional characterisation provide an overview of the potential to develop a CO2-based economy (Patricio et al. 2017, <a href="http://dx.doi.org/10.1016/j.jcou.2016.10.002">http://dx.doi.org/10.1016/j.jcou.2016.10.002</a> )."	Rejected - we shortened the text on technology in this subsection, and do not go into details on this.	Anastasios Perimenis	CO2 Value Europe (Association) - CCU Offiver	Belgium
14267	24	16	24	22	Addition: "On the other hand, CCU technologies are attracting increased attention the last years and projected CO2 amounts used by CCU can vary considerably between 1.7 and 8 GtCO2 yr-1 by 2030 (GCI, 2016; <a href="http://hdl.handle.net/2027.42/146529">http://hdl.handle.net/2027.42/146529</a> ) or 2050 (Hepburn et al. 2019, <a href="https://doi.org/10.1038/s41586-019-1681-6">https://doi.org/10.1038/s41586-019-1681-6</a> ). In a Limited CO2 Storage scenario, the International Energy Agency projects a CO2 use of approximately 0.9 GtCO2 annually by 2060 (IEA 2019, <a href="https://www.iea.org/reports/putting-co2-to-use">https://www.iea.org/reports/putting-co2-to-use</a> )."	Partly accepted - We added a sentence that the capacity is increasing every year.	Anastasios Perimenis	CO2 Value Europe (Association) - CCU Offiver	Belgium
14339	1	17	1	19	I am not sure that this statement should be here in the introduction. It would be more useful to state what level of warming would result if we only achieved current commitments.	rejected. Not clear why statement shouldn't be there, and warming depends on subsequent actions	Michael Bradshaw	University of Warwick	United Kingdom (of Great Britain and Northern Ireland)
14341	1	25			Evidence points	Exec Sum changed	Michael Bradshaw	University of Warwick	United Kingdom (of Great Britain and Northern Ireland)
14343	1	27			On a per capita basis	Exec Sum changed	Michael Bradshaw	University of Warwick	United Kingdom (of Great Britain and Northern Ireland)
14345	2	21			What are 'sustainable governance systems.	Goverance section developed	Michael Bradshaw	University of Warwick	United Kingdom (of Great Britain and Northern Ireland)
14347	2	32			Also about the distribution impacts of cost, the just transition.	Exec Sum changed	Michael Bradshaw	University of Warwick	United Kingdom (of Great Britain and Northern Ireland)
14349	5	7			It is confusing that the third element—transition analysis—is not described as a framework.	Hopefully this is clearer now	Michael Bradshaw	University of Warwick	United Kingdom (of Great Britain and Northern Ireland)
14351	8	16			Is it helpful to talk only of costs, transition will generate positives via green growth, surely it is net costs and even then the costs of doing nothing are even higher	The paragraph explicitly mentions benefits at the end.	Michael Bradshaw	University of Warwick	United Kingdom (of Great Britain and Northern Ireland)

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
14353	12				Figure needs a date for the data and Our World in Data is not the source of the underlying information?	Taken into account. Figure 1.2 has been replaced with Figure 1.3 a and 1.3 b in line with AR5.	Michael Bradshaw	University of Warwick	United Kingdom (of Great Britain and Northern Ireland)
14355	13	23			I would not describe shale as 'new cheap fuel resources' that are not really that cheap.	Amended (section 1.3)	Michael Bradshaw	University of Warwick	United Kingdom (of Great Britain and Northern Ireland)
14357	23	36	23	37	Need to say something about the negative geopolitical consequences of a loss of resource rents for oil and gas exporting economies. More generally, the geopolitical consequences of the energy transition are not sufficiently considered, see 2019 IRENA report.	Rejected - such a discussion will not fit into this subsection as it only briefly summarizes technological development.	Michael Bradshaw	University of Warwick	United Kingdom (of Great Britain and Northern Ireland)
14359	35	0	0	0	need to say something about the scenarios developed by the International Oil Companies as a guide to their strategic thinking, ie BP, Shell and Equinor. Also note the significant gap between the 4 AR5 scenarios and those developed by just about everyone else, particularly the international oil companies	An interesting point but more for Chapter 3 Scenarios chapter	Michael Bradshaw	University of Warwick	United Kingdom (of Great Britain and Northern Ireland)
14361	45	6	0	0	Where is 'geopolitics' in your framework of feasibility? This is not the same as Institutional feasibility. This is a major omission and a general failing with this chapter.	Good point but it is not obviously sufficiently separate - we have noted its importance, and that it comprises economic, cultural and institutional dimensions	Michael Bradshaw	University of Warwick	United Kingdom (of Great Britain and Northern Ireland)
14513	7	42	7	43	IPCC SR15 does not assess the peaking year in this way. With global CO2 emissions in 2030 in 1.5°C consistent emissions pathways at 45-60% below 2010 levels, suggesting that 1.5°C pathways could peak by 2025 seems to be quite a far stretch.	That sentence has been deleted.	Joeri Rogelj	Imperial College London	United Kingdom (of Great Britain and Northern Ireland)
14515	7	42	7	43	Please be specific when describing consistency with a temperature target. For example, for limiting warming below 2°C with at least 66% probability. "a 2C target" is too inaccurate to be useful.	This sentence has been deleted.	Joeri Rogelj	Imperial College London	United Kingdom (of Great Britain and Northern Ireland)
14517	8	2	8	3	State explicitly what you consider "paris consistent". The fact that this word was already put between between inverted comma's indicates that one cannot take this simply at face value. Be extremely specific in which assumptions the author team is making here.	This sentence has been deleted.	Joeri Rogelj	Imperial College London	United Kingdom (of Great Britain and Northern Ireland)
14519	8	5	8	6	This suggests that the authors have considered overshooting temperature limits to be "paris-consistent". This should not be second-guessed by the reader. Instead, make the assumptions made by the author team explicit.	This sentence has been deleted.	Joeri Rogelj	Imperial College London	United Kingdom (of Great Britain and Northern Ireland)
14521	8	12	8	13	This is not a necessary logical consequence. The near-term ambition of current NDCs implies first and foremost that the limits in the Paris Agreement (and in particular 1.5°C) will be missed, and that the world will end up with higher warming than deemed acceptable. The requirement for massive net negative emissions is conditional on society wanting to try to return warming to lower levels at a later point in time.	Sentence has been rephrased.	Joeri Rogelj	Imperial College London	United Kingdom (of Great Britain and Northern Ireland)
14523	8	12	8	13	Since IPCC SR15, the term Solar Radiation Modification is used instead of Solar Radiation Management	Changed	Joeri Rogelj	Imperial College London	United Kingdom (of Great Britain and Northern Ireland)
14525	7	21	9	21	It would be very useful to highlight in each instance in which chapter and section in the WG3 AR6 certain quantities that are being mentioned here are assessed or discussed by WG3 AR6 - for example the carbon price overview	We have extended cross-chapter referenes, but was still constrained by the fact that most chapters were still evolving very close to the deadline. To be reviewed further in final draft.	Joeri Rogelj	Imperial College London	United Kingdom (of Great Britain and Northern Ireland)
14527	8	29	8	31	Also further supported by IPCC WG1 AR6 - SPM, TS and Chapter 6	Are you refering to AR5? WG1 AR6 - SPM and TS and Chapter 6 are not available yet: <a href="https://www.ipcc.ch/site/assets/uploads/2020/06/00.-AR6_WGI_schedule_2020-21-1.pdf">https://www.ipcc.ch/site/assets/uploads/2020/06/00.-AR6_WGI_schedule_2020-21-1.pdf</a>	Joeri Rogelj	Imperial College London	United Kingdom (of Great Britain and Northern Ireland)

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
14529	3	4	3	5	Please use accurate wording from the Paris Agreement when using double quotes. For example, "towards" is not a word used in the long-term temperature target.	Accepted, text revised	Joeri Rogelj	Imperial College London	United Kingdom (of Great Britain and Northern Ireland)
14531	17	15	17	16	The "sustainability corridor" in this figure does not illustrate the requirement that emissions imperitatively have to go to net zero to halt further warming. It even seems to suggest that there is a given long-term (positive) GHG per capita corridor that would allow one to achieve the Paris Agreement goals and SDGs. I would rethink the visualisation of this corridor a bit further so that it clearly shows the low emissions levels implied by any temperature stabilisation target.	Figure has been revised.	Joeri Rogelj	Imperial College London	United Kingdom (of Great Britain and Northern Ireland)
14533	36	2	36	6	The 1.9 W/m <sup>2</sup> SSP scenarios were only published later, not in 2017, but in 2018: Rogelj, J., Popp, A., Calvin, K.V., Luderer, G., Emmerling, J., Gernaat, D., Fujimori, S., Strefler, J., Hasegawa, T., Marangoni, G., Krey, V., Kriegler, E., Riahi, K., van Vuuren, D.P., Doelman, J., Drouet, L., Edmonds, J., Fricko, O., Harmsen, M., Havlík, P., Humpenöder, F., Stehfest, E., Tavoni, M., 2018. Scenarios towards limiting global mean temperature increase below 1.5 °C. Nature Climate Change 8, 325–332. <a href="https://doi.org/10.1038/s41558-018-0091-3">https://doi.org/10.1038/s41558-018-0091-3</a>	Noted, thank you	Joeri Rogelj	Imperial College London	United Kingdom (of Great Britain and Northern Ireland)
14535	36	9	36	10	This description is inaccurate. The IPCC Special Report on 1.5°C did not develop these four pathways. It selected it from the available open, peer-reviewed literature. The two studies drawn from are: P1 (LED in SR15 Chapter 2): Grubler et al, <a href="https://doi.org/10.1038/s41560-018-0172-6">https://doi.org/10.1038/s41560-018-0172-6</a> P2, P3, P4 (S1, S2, and S5 in SR15 Chapter 2): Rogelj et al, <a href="https://doi.org/10.1038/s41558-018-0091-3">https://doi.org/10.1038/s41558-018-0091-3</a>	Noted, thank you	Joeri Rogelj	Imperial College London	United Kingdom (of Great Britain and Northern Ireland)
14537	36	14	36	15	The Low Energy Demand scenario did not have radiative forcing as a design criterion, but instead focussed on limiting actual global mean temperature increase to 1.5°C with as little overshoot at possible (see Grubler et al, <a href="https://doi.org/10.1038/s41560-018-0172-6">https://doi.org/10.1038/s41560-018-0172-6</a> )	Noted, thank you	Joeri Rogelj	Imperial College London	United Kingdom (of Great Britain and Northern Ireland)
14539	36	34	36	43	As supporting evidence for new scenario stakeholders linked to the TCFD one could consider the following commentary piece on precisely this topic by Weber et al: Weber, C., et al., 2018. Mitigation scenarios must cater to new users. Nature Climate Change 8, 845–848. <a href="https://doi.org/10.1038/s41558-018-0293-8">https://doi.org/10.1038/s41558-018-0293-8</a>	Noted, thank you	Joeri Rogelj	Imperial College London	United Kingdom (of Great Britain and Northern Ireland)
14541	37	34	37	35	Potential further reference for a study incorporating low-probability tipping point tail risks in a cost-benefit analysis framework. Lontzek, T.S., Cai, Y., Judd, K.L., Lenton, T.M., 2015. Stochastic integrated assessment of climate tipping points indicates the need for strict climate policy. Nature Clim. Change 5, 441–444. <a href="https://doi.org/10.1038/nclimate2570">https://doi.org/10.1038/nclimate2570</a> <a href="http://www.nature.com/nclimate/journal/v5/n5/abs/nclimate2570.html#supplementary-information">http://www.nature.com/nclimate/journal/v5/n5/abs/nclimate2570.html#supplementary-information</a>	Included related refs	Joeri Rogelj	Imperial College London	United Kingdom (of Great Britain and Northern Ireland)
14543	53	27	53	42	These paragraphs are internally inconsistent. In particular, the third paragraph confuses some concepts and the description of neutrality in that paragraph is directly inconsistent with what is defined in the first paragraph. Also, the reference in paragraph 3 seems not to work. A working, still active reference needs to be provided for one to use this in the report.	Thank you, noted, will be rewritten for the SOD. However, the instruction from the Technical Supporting Unit is not to cite references in FAQs, so all references will be deleted and non added.	Joeri Rogelj	Imperial College London	United Kingdom (of Great Britain and Northern Ireland)

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
14545	53	27	53	42	<p>The following text could serve as a potential alternative, revised and internally fully consistent FAQ response:</p> <p>Carbon neutrality means a balance between anthropogenic carbon emissions and removals, and is a synonym for net-zero CO2 emissions. Under such conditions, the net quantity of carbon released to the atmosphere by human activities would therefore be zero. This balance is achieved by strongly reducing carbon dioxide emissions and matching any remainder of CO2 emissions for which abatement is too expensive or for which no abatement options have been found with Carbon Dioxide Removal (CDR). CDR can be achieved either through the human enhancement of natural carbon sinks or by technological means, for example, by combining the production of bioenergy with the capture and subsequent storage (BECCS) of CO2 or by chemical means with so-called Direct Air-Capture and Sequestration (DACs) technologies.</p> <p>Carbon neutrality is not a synonym for climate of greenhouse gas neutrality in which the concept of carbon neutrality is further extended to other climate forcers. The IPCC (2019a) defines Net-zero (greenhouse gas) Emissions as “achieved when emissions of greenhouse gases (GHGs) to the atmosphere are balanced by anthropogenic removals”. Where multiple greenhouse gases are involved, the quantification of net-zero emissions depends on the climate metric chosen to compare emissions of different gases (such as global warming potential, global temperature change potential, and others, as well as the chosen time horizon)”. Further extending this concept to also include climate forcers other than greenhouse gases, including aerosols and land-use albedo changes is not supported in the published scientific literature but would be necessary to define a concept of “climate neutrality”.</p>	Thank you, accepted.	Joeri Rogelj	Imperial College London	United Kingdom (of Great Britain and Northern Ireland)
14547	1		3		<p><i>The executive summary is currently not in the usual assessment format. Evidence, agreement, and confidence, including line of sight to the underlying chapter is not implemented. This needs a significant rewrite so that traceability of the assessment can be ensured in line with IPCC standards.</i></p>	Addressed	Joeri Rogelj	Imperial College London	United Kingdom (of Great Britain and Northern Ireland)
15123	21	25	21	25	influence path of spatial production allocation is missing, one may as well differentiate between direct and indirect effects	Taken into account. The text has been substantially shortened leaving more detailed discussion to Chapter 2.4.5	Bettina Rudloff	German Institute for foreign and security affairs (SWP)	Germany
15537	4	7	4	7	It isn't really accurate to include the word "populism" in here. In developed nations (perhaps especially the US), populism is growing on not just the nationalistic right, as implied in this passage, but also on the left, and some left-wing populist movements are (or at least give the appearance of being) extremely aggressive about pursuing climate change action. More broadly, the authors may wish to rethink whether this general type of discussion, which could be read as having some politically partisan overtones, has a place in the objective professional context of an IPCC report. Our credibility depends heavily on being seen as third-party experts.	This is a valid point. However the sentence we have has been carefully constructed in a way that does not tie populism to the right or left of politics. The point made is that populism can hinder effective international cooperation for climate action and this statement is backed by literature which is provided in the text.	Sean Fleming	Oregon State University, University of British Columbia, US Department of Agriculture	United States of America

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
15539	4	27	4	29	Though I think electric cars are fantastic, I suggest being more circumspect about the role of electric vehicles in this passage. It is well-known that electric vehicles are a mixed bag, with significant potential for curbing greenhouse gas emissions, but only to the extent that the grid into which they are plugged sources its power from clean energy; and even if those sources are clean they are not necessarily green, e.g., hydropower, nuclear, etc. The ecological problems associated with battery production and disposal will also become very large; it is curious that these problems are not mentioned in the report. Electric vehicles are certainly part of the solution - but should not be presented as a panacea, which is how this passage currently reads.	Exec Sum completely redrafted	Sean Fleming	Oregon State University, University of British Columbia, US Department of Agriculture	United States of America
15541	5	3	5	4	This passage makes an excellent, and extremely important, point ("Climate policies that are considered unfair may be hard to implement, both in the national and international arenas"). I'd suggest adding the specific example of carbon taxes, which are well-known to be regressive taxes that disproportionately impact the less-affluent. This is worth flagging up front, because in many developed nations, carbon taxes are the predominant form of climate change action and their acknowledged economic injustice has made them deeply unpopular with working- and middle-class voters who are hit hardest. Explicitly incorporating this knowledge into the IPCC report provides an opportunity to educate and guide policy, political, and activist communities toward more balanced and egalitarian - and ultimately more successful - approaches.	The text has been revised	Sean Fleming	Oregon State University, University of British Columbia, US Department of Agriculture	United States of America
15543	5	13	5	13	Suggest either defining for a general readership what "super-wicked" means in this context or avoiding the jargon altogether.	Exec Sum completely redrafted	Sean Fleming	Oregon State University, University of British Columbia, US Department of Agriculture	United States of America
15545	9	7	9	9	Yes, ethics and morality are important drivers for action on climate change, but (obviously, one would hope) the way that this is tackled must honor democracy, freedom, and equity, as acknowledged elsewhere in the report. I suggest fine-tuning the messaging here a little bit - or else it could risk coming off sounding explicitly judgmental, and maybe even with some authoritarian overtones in its potential implications.	This is simply reporting what was stated in AR5.	Sean Fleming	Oregon State University, University of British Columbia, US Department of Agriculture	United States of America
15547	12	22	12	29	There appear to be several issues with this passage. First, as noted in comment 1 above, populism isn't synonymous with opposition to action on climate change; consider the current Bernie Sanders campaign for example. Second, singling out a single administration for criticism (line 28), however warranted it might seem from the perspective of the writers of this report, is not an effective path forward toward consensus-building around the need for action on climate change, and it even has the potential to be come across as politically partisan and slightly unprofessional. In fact, the entire "multilateral cooperation" section on lines 22-29 could benefit from being thoroughly re-written in a way that aims to reduce polarization, rather than embracing it.	Rejected. See the role of populist attitudes in explaining climate change skepticism and support for environmental protection (Robert. Huber 2020) US withdrawal from the Kyoto Protocol and its implication is referred to in AR4 WG3 Chapter 13.3 (page 768)	Sean Fleming	Oregon State University, University of British Columbia, US Department of Agriculture	United States of America

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
15549	13	1	13	3	Need to explain this \$(US)10 figure a lot more clearly, because it doesn't seem to connect in any meaningful on-the-ground way to the carbon taxes that Americans pay and could be perceived as being framed in a manner that is tone-deaf to some significant economic and social justice problems. Fuel taxes amount to far more than \$10 a month in many North American jurisdictions (due to municipal, county, or state/provincial carbon taxes for example) and are known to significantly impact many working-class families. That is, the kinds of punitive flat taxes on carbon that seem to be advocated here are well-recognized by the economics community as regressive (to illustrate, a billionaire pays exactly the same rate as a homeless family living in their van under an interstate bridge). Further, in North America, commuting distances are large in part due to gentrification, practical alternatives to personal cars are few, and the cost of even the cheapest electric vehicle is about on par with the median family annual income and some multiple of what most can afford, so the ability to respond to carbon tax signals are virtually non-existent for many working- and middle-class families, and this policy direction therefore has limited effect on combatting climate change. This report would benefit from being a little more empathetic and sensitive to the full range of economic justice issues that tie into climate change (it's good about recognizing north-south multinational differences but not intranational disparities) and perhaps a little more self-aware in the sense of understanding how certain statements and policies are likely to be perceived by readers.	Noted. \$10 is additional monthly electricity bill for tackling climate change. The argument of fuel taxes and their impact on working class is noted, but not relevant in this section since they were not introduced for climate policy objective. The issue of equity is more substantially discussed in 1.5.6	Sean Fleming	Oregon State University, University of British Columbia, US Department of Agriculture	United States of America
15551	19	5	19	5	Out of curiosity - and if I ask, others may too - does traditional free-range cattle ranching contribute less to climate change than the industrial corporate cattle industry? I've seen conflicting reports on this. The point is simply that if we broach this question of shifting diets toward more sustainable choices, which is certainly an interesting and potentially valuable point to make, it may be worth very briefly mentioning the range of options (and perhaps shades of gray, as it were) that are available.	This is a question for Chapter 11.	Sean Fleming	Oregon State University, University of British Columbia, US Department of Agriculture	United States of America
15553	23	15	23	34	As currently written in the first order draft, this passage seems to severely underestimate the downside of IT with respect to climate change. Only the (rather obscure) example of greenhouse gas emissions related to cryptocurrency are mentioned. In fact, the energy requirements of the information economy are gigantic. For example, according to several estimates, the collective carbon footprint of the internet is equivalent to that of a large industrialized country. Do the benefits outweigh the costs? Probably, but the costs do need to be somewhat better represented here if this document is to inform/guide important policy decisions.	Rejected. The science is not fully settled. we present a balanced approach.	Sean Fleming	Oregon State University, University of British Columbia, US Department of Agriculture	United States of America
15555	23	35	25	7	Calling batteries and nuclear a "clean technology" without providing even a hint of a caveat is, needless to say, a little misleading. My point here isn't to critique batteries, nuclear, or any other energy technology per se, as climate change mitigation will require a diverse suite of solutions. To successfully promote those solutions, however, our presentation of them needs to be perceived as credible, and that can only happen if this report offers a balanced assessment and acknowledges some of the pros and cons of each, or at least that both pros and cons exist. That should begin up front in chapter one.	Accepted - we changed the heading of this subsection to "Renewable technologies, batteries and mitigation technologies".	Sean Fleming	Oregon State University, University of British Columbia, US Department of Agriculture	United States of America

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
15557	24	23	24	23	The statement that "one sector that has seen little in the way of innovation for decades is agricultural" is a sweeping condemnation and seems a little inappropriate. Certainly, I think every agricultural science or engineering department at every university that has one would take offense at this assertion. Why alienate people who are potentially supportive of the IPCC's mission by needlessly offending them?	Accepted - that statement has been removed.	Sean Fleming	Oregon State University, University of British Columbia, US Department of Agriculture	United States of America
15559	29	18	30	11	This section should acknowledge domestic questions of economic justice as well. There is a growing sense among some climate change activists that greenhouse gas emissions cannot be achieved on the backs of our poor (please see comments 3 and 7 above). Understanding these facts is crucial to forming viable climate change mitigation policies domestically, which continue to be largely focused (at least in the US and Canada) on a normative philosophy of regressive carbon taxation, rather than on opportunity-building public transportation infrastructure improvements.	Accepted - we added a sentence, but this is further discussed in 1.6.3.2.	Sean Fleming	Oregon State University, University of British Columbia, US Department of Agriculture	United States of America
15561	1	1	85	1	Perhaps this introduction and framing chapter could stand to do a better job of recognizing the negative impacts of urbanization; for example, Chapter 2 notes that <i>urbanization</i> may have overtaken population growth as a driver of GHG production in G20 countries	Accepted. We have tried to better highlight the role of urbanization ad driver of emmissions not only in G20 countries but indeed globally.	Sean Fleming	Oregon State University, University of British Columbia, US Department of Agriculture	United States of America
15619	3	17	3	19	As it is, it is comparing different things. Can we phrase 52-58 GtCO2eq/yr in terms of % reduction or provide a value/range for emission reduction that is necessary?	This part of the Executive Summary (ES) has been edited out following a complete revamping of the ES.	Cheah Singfoong	Independent consultant, formerly more than 10 years with the National Renewable Energy Laboratory, USA	United States of America
15621	4	38	5	18	<i>The second half of the Executive Summary is mostly being "philosophical." It needs to spell out more concrete action plans and suggestions.</i>	The text has been revised	Cheah Singfoong	Independent consultant, formerly more than 10 years with the National Renewable Energy Laboratory, USA	United States of America
15659	3	30		31	Appears policy-prescriptive.	Text has been revised.	Nathan Gillett	Environment and Climate Change Canada	Canada
15661		7		8	This might be outside the scope of an IPCC assessment.	Sorry, what?	Nathan Gillett	Environment and Climate Change Canada	Canada
15663	5	13		14	Appears policy-prescriptive.	Couldn't identify which sentence	Nathan Gillett	Environment and Climate Change Canada	Canada
15665	3		5		<i>This Executive Summary is currently not written in the usual form of IPCC Executive Summaries. It is written in continuous prose rather than in bullet form, and it does not include any calibrated language, and there are no references to the chapters sections supporting elements of the text. Also given that this is a framing chapter for the whole WGIII report, I would expect this ES to outline the approach taken in this report, and what topics are dealt with, but I didn't get this from the current draft.</i>	This is a valid comment. The ES has now been revamped, and restrctured along the lines suggsted by the reviewer.	Nathan Gillett	Environment and Climate Change Canada	Canada

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
15729	3	10	3	11	Theory of constraints, popularized by Eliahu Goldratt, Detmetter and others, <i>shows that you cannot maximize 17 variables at the same time. You can only maximize 1 of the 17, the rest can be ideally maintained between reasonable levels.</i> Any organization can maximize only one of these variables. Speaking about Climate Change vs the rest of the SDGs, Climate Change obviously should be given priority because it affects humanity as a whole. References: 1) The goal: a process of ongoing improvement Eliyahu Goldratt-Jeff Cox - North River Press - 2014. 2) Goldratt's theory of constraints: a systems approach to continuous improvement H. Dettmer - Asqc Quality Press - 1997.	Implicitly trying to maximise progress across multiple objectives ... MCA, etc plus innovaiton - including climate change, the particular focus of this report, but then point to maximise co-benefits and minimise trade-offs. Analytically, In a world with many uncertainties, dynamic change and innovation, it may be entirely possible to meet multiple objectives over time. And in political reality, all pollicies need to be backed by coalitions of diverse interests, again implying need to meet multiple goals	EDUARDO PEDRO FRACASSI	ITBA Instituto Tecnologico de Buenos Aires	Argentina
15731	3	15	3	16	The fact that NDC are insufficient is in part a consequence of multiple goals trying to be maximized as I commented on lines of page 3, lines 10 and 11, it is impossible to maximize esveral goals at the same time, so other SDG goals might be competing with the need to solve the climate crisis. Reference: Goldratt's theory of constraints: a systems approach to continuous improvement H. Dettmer - Asqc Quality Press - 1997.	This is a valid comment. The chapter makes this very point in several sections, pointing for example, to the tension between sustiable development broadly and some SDGs and climate action. The chapter also discusses several drivers and barraiers that extert both "push" and "pull" forces on climate action and other aspects of sustainable development.	EDUARDO PEDRO FRACASSI	ITBA Instituto Tecnologico de Buenos Aires	Argentina
15733	4	32	4	37	<i>I think that also de benefits related to the transition should be included, for example, better air quality, more clean jobs, more climate change awareness showing that climate actions might benefit other SDGs as well as reducing emissions.</i>	The text has been revised. The new ES highlights benefits related to climate friendly transition.	EDUARDO PEDRO FRACASSI	ITBA Instituto Tecnologico de Buenos Aires	Argentina
15735	8	16	8	17	I suggest a change in framing from the word "cost" to "investment", so that the word "cost" be changed by the word "investment". Solar or wind farms are investments, not a cost. Most work and investment done for the energy transition for example invesments in energy efficiency, renewables, electrification will most certainly reap economic benefits, and should be considered investments, not costs. Projects are measured according to their internal return rate, present value and other metrics. I suggest that IPCC should look into this important framing change, instead of talking of "transition costs" start talking about "requied transition investments".	The term is not "cost" but "economic cost" i.e., opportunity cost. Investment (foregone consumption) is an opportunity cost.	EDUARDO PEDRO FRACASSI	ITBA Instituto Tecnologico de Buenos Aires	Argentina



Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
15737	19	3	19	6	The cited reference for paragraph on rows 3 to 6 of page 19 (IPCC 2019c) just doesn't match. It appears on page 42, not as the reference that lists the information on page 43 -, but still does not even mention diets at all. So the quote does not support the conclusion rows 3 to 6 on page 19. British Medical Journal BMJ reports WHO withdraw support for the "Planetary Diet" <a href="https://www.bmj.com/content/365/bmj.l1700">https://www.bmj.com/content/365/bmj.l1700</a> , so there seems to be some discussion on whether such a diet would be applicable to all the world's population and whether it is indeed healthy. I checked the WHO recommended diet at <a href="https://www.who.int/en/news-room/fact-sheets/detail/healthy-diet">https://www.who.int/en/news-room/fact-sheets/detail/healthy-diet</a> and there is no reference on recommended protein or carbohydrate intake, but it stresses that diets should be personalized according to each individual's caloric energy requirements: "Energy intake (calories) should be in balance with energy expenditure. " WHO is part of the UN so it should also be taken into account. There are Other critics state that the "EAT Lancet report not backed by rigorous science: <a href="https://www.nutritioncoalition.us/news/eatlancet-report-one-sided">https://www.nutritioncoalition.us/news/eatlancet-report-one-sided</a> The US Dietary Guidelines, one key pillar of the EAT Lancet report, is also questioned: <a href="https://www.nutritioncoalition.us/there-is-concern-about-the-dietary-guidelines">https://www.nutritioncoalition.us/there-is-concern-about-the-dietary-guidelines</a> Moreover the EAT Lancet Planetary diet might not be affordable to an important part of poor people in sub-Saharan Africa, parts of Asia and South America <a href="https://www.thelancet.com/journals/langlo/article/PIIS2214-109X(19)30447-4/fulltext">https://www.thelancet.com/journals/langlo/article/PIIS2214-109X(19)30447-4/fulltext</a>	Agreed. We have replaced the earlier reference with the following: Stehfest, et al., 2009; Van Vuuren, et al., 2018; van den Berg, et al. 2019	EDUARDO PEDRO FRACASSI	ITBA Instituto Tecnológico de Buenos Aires	Argentina
15739	30	20	30	20	British Medical Journal BMJ reports WHO withdraw support for the "Planetary Diet" <a href="https://www.bmj.com/content/365/bmj.l1700">https://www.bmj.com/content/365/bmj.l1700</a> , so there seems to be some discussion on whether such a diet would be applicable to all the world's population and whether it is indeed healthy. I checked the WHO recommended diet at <a href="https://www.who.int/en/news-room/fact-sheets/detail/healthy-diet">https://www.who.int/en/news-room/fact-sheets/detail/healthy-diet</a> and there is no reference on recommended protein or carbohydrate intake. There are Other critics state that the "EAT Lancet report not backed by rigorous science: <a href="https://www.nutritioncoalition.us/news/eatlancet-report-one-sided">https://www.nutritioncoalition.us/news/eatlancet-report-one-sided</a> The US Dietary Guidelines, one key pillar of the EAT Lancet report, is also questioned: <a href="https://www.nutritioncoalition.us/there-is-concern-about-the-dietary-guidelines">https://www.nutritioncoalition.us/there-is-concern-about-the-dietary-guidelines</a> Moreover the EAT Lancet Planetary diet might not be affordable to an important part of poor people in sub-Saharan Africa, parts of Asia and South America <a href="https://www.thelancet.com/journals/langlo/article/PIIS2214-109X(19)30447-4/fulltext">https://www.thelancet.com/journals/langlo/article/PIIS2214-109X(19)30447-4/fulltext</a>	Noted - We only discuss the emissions impacts of the diet, not the health impacts or impacts on different economic sectors.	EDUARDO PEDRO FRACASSI	ITBA Instituto Tecnológico de Buenos Aires	Argentina

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
15741	41	10	41	10	Referring to the "emotional dimension of decision making": Sterman, J. (MIT Sloan) states: "Research shows that showing people research doesn't work." quoted on <a href="https://www.climateinteractive.org/media-coverage/john-sterman-addresses-ban-ki-moon-on-the-need-for-deeper-emissions-cuts/">https://www.climateinteractive.org/media-coverage/john-sterman-addresses-ban-ki-moon-on-the-need-for-deeper-emissions-cuts/</a> Climate interactive published the following article on PLOS ONE <a href="https://mitsloan.mit.edu/press/key-to-sparking-climate-action-a-game-new-research-suggests-it-even-across-political-divide">https://mitsloan.mit.edu/press/key-to-sparking-climate-action-a-game-new-research-suggests-it-even-across-political-divide</a> showing that immersion in a game which results in "81% of participants in a role play simulation increased motivation to combat climate change, regardless of political orientation" So I think that this tipe of role playing games could really help to create more climate change awareness and climate action. The game touches people's emotions and in this way could foster more climate action. I think that it would have some merit to include this tool on page 42, line 12.	Noted but we have not made this point while avoiding the danger of being too prescriptive.	EDUARDO PEDRO FRACASSI	ITBA Instituto Tecnologico de Buenos Aires	Argentina
15743	41	20	42	22	I feel that the SDGs have an intrinsic fault: it is impossible to maximize 17 variables at the same time. You can only maximize 1 goal, and keep the other 16 goals within reasonable limits. Theory of constraints, popularized by Eliahu Goldratt, Detmetter and others, shows that you cannot maximize 17 variables at the same time. You can only maximize 1 of the 17, the rest can be ideally maintained between reasonable levels. Any organization can maximize only one of these variables. Speaking about Climate Change vs the rest of the SDGs, Climate Change obviously should be given priority because it affects humanity as a whole. References: 1) The goal: a process of ongoing improvement Eliyahu Goldratt-Jeff Cox - North River Press - 2014. 2) Goldratt's theory of constraints: a systems approach to continuous improvement H. Dettmer - Asqc Quality Press - 1997.	Rejected - This is not about maximizing 17 variables at the same time. We have 17 goals and the theory says that you need as many policy measures as goals to fulfill this.	EDUARDO PEDRO FRACASSI	ITBA Instituto Tecnologico de Buenos Aires	Argentina
15745	44	24	44	24	Social change might be helped by the use of "Change Management" techniques, as described here by the McKinsey staff: <a href="https://www.mckinsey.com/business-functions/organization/our-insights/the-psychology-of-change-management">https://www.mckinsey.com/business-functions/organization/our-insights/the-psychology-of-change-management</a> This paper describes the relationship between Social Change and Change Management <a href="https://journals.sagepub.com/doi/full/10.1177/0149206316633268">https://journals.sagepub.com/doi/full/10.1177/0149206316633268</a>	Interesting, cited, thanks	EDUARDO PEDRO FRACASSI	ITBA Instituto Tecnologico de Buenos Aires	Argentina
15747	48	40	48	41	Climate change mitigation should not be exclusively seen as a "burden". It should also be seen as an "excellent economic opportunity" For example, Forbes states that "Renewable energy jobs are booming across the US, creating high-wage employment for blue-collar workers" <a href="https://www.forbes.com/sites/energyinnovation/2019/04/22/renewable-energy-job-boom-creating-economic-opportunity-as-coal-industry-slumps/#37cd42c43665">https://www.forbes.com/sites/energyinnovation/2019/04/22/renewable-energy-job-boom-creating-economic-opportunity-as-coal-industry-slumps/#37cd42c43665</a> With this in mind, the conclusions from Teytelboym 2018 article might not be relevant at all.	Text has been edited. It should be noted that the section is providing the tenets and perspective of of a particular therotical approach. The authors are not seeking to make the claim that is noted in the review comment.	EDUARDO PEDRO FRACASSI	ITBA Instituto Tecnologico de Buenos Aires	Argentina

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
15749	49	24	48	24	The use of simulators to get the necessary intuition about "governance experiments" mentioned on line 24, Climate Interactive has developed the new EN ROADS simulator and the "Climate Action Simulation" which might help to train governance related officials, and the public in general to explore the different technological pathways available to maintain global main temperatures changes within the 1.5 to 2.0 range. Technological climate actions such as subsidy or taxing of different energy sources, such as fossils fuels, renewables, new technologies are explored, together with the impacts of energy efficiency, both at the infrastructure and transport levels, including options for electrification, population and GDP growth changes, carbon sequestration by trees or by artificial methods, planting trees and or reducing non CO2 GHGs from industry, land use and others. EN ROADS is freely available online and easy to use. Reference: "The Climate Action Simulation" Rooney Varga, J., Kapmeier, F. Sterman, J. Simulation & Gaming <a href="https://journals.sagepub.com/doi/full/10.1177/1046878119890643">https://journals.sagepub.com/doi/full/10.1177/1046878119890643</a>	Thank you. Text and reference were found useful. The conclusion is consistent with the assessment provided in the section.	EDUARDO PEDRO FRACASSI	ITBA Instituto Tecnológico de Buenos Aires	Argentina
16039	4	19	4	24	Consider linking this discussion to the language of development pathways of Ch 4	Valid point. Text has been revised.	Navroz Dubash	Centre for Policy Research	India
16041	4	41	4	44	Is Ch 1 proposing these three analytical frameworks as an assessment framework to be used across the WG? In Ch 13, we have our own metrics, which overlap but not entirely (Table 13.3): <i>Env effectiveness; econ eff; distributional effects, transformative potential; co-benefits/trade-offs and link with SDGs. This may be too long a list but perhaps that of CH 1 is too limited? Should env effectiveness not be explicitly part of the framework or is it subsumed in transformation? Are links to the SDGs and development dealt with at a meta level not needed here, or how is this conceptualised? Also, in the text, you have an additional framework, which is 1.5.5. Feasibility and desirability. Is this a fourth? How does it relate to the other three? It would be worth clarification at LAM3</i>	No. Chap 1 has not proposed that these analytical frames should be used by the rest of the chapters. Based on the assessment of extant literature, the chapter suggests that these analytical frameworks figure in different contexts as "frames" for analyzing, approaching and designing and evaluating, climate policy and action.	Navroz Dubash	Centre for Policy Research	India
16043	9	3	9	4	Is it worth adding other complementary perspectives to the global public good perspective and noting that they imply different policy approaches? Thus, the emergence of polycentric approaches, which is rooted in the idea that climate change is the aggregate effect of many individual, community and corporate actions, may be worth mentioning. The book by Andy Jordan, Harro Van Asselt et al would be a good cite.	Global public good has been replaced by global commons to more accurately define the problem. In the depletion/restoration of this shared global resource myriad actors at various scales are involved, for instance, individuals, communities, firms and states.	Navroz Dubash	Centre for Policy Research	India
16045	11	28	11	28	Do be aware that sorting emissions data by income grouping has been a minefield in the past. One problem with income groupings is that the picture changes dramatically every time a large country - notably China or India - jump income groups. While this graphic seems fine, the question is whether it becomes part of a larger debate about ways of representing and slicing data in IPCC reports, across other data categories.	Noted	Navroz Dubash	Centre for Policy Research	India
16047	13	25	13	29	Is it worth considering one more trend: the growing awareness of local environmental problems and linkages (sometimes) made to cc? For example, air pollution in Asia, global ocean pollution, plastics etc. The first of these, air, has particularly been tied conceptually and politically to climate action.	Accepted - we added a sentence on this under "Climate impacts"	Navroz Dubash	Centre for Policy Research	India

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
16049	13	32	13	32	Just a reminder that the ongoing cross chapter conversatoin on "development pathways" convened by CH 4 is salient to this section and its possible framing. To the extent it works for Ch 1, striving for convergence of language and concepts would be great.	Noted. Good suggestion	Navroz Dubash	Centre for Policy Research	India
16051	15	21	15	22	A paper that is possibly useful for a methodology for how to operationalise the SD-Climate link using Indian examples (so from a development perspective) drawing on multi criteria analysis is Khosla et al. ( <a href="https://www.epw.in/journal/2015/49/special-articles/towards-methodologies-multiple-objective-based-energy-and-climate?0=ip_login_no_cache%3Db35a485c4098011ee9aadb6e5c02a3fe">https://www.epw.in/journal/2015/49/special-articles/towards-methodologies-multiple-objective-based-energy-and-climate?0=ip_login_no_cache%3Db35a485c4098011ee9aadb6e5c02a3fe</a> ). Another located in a multi-country context is Cohen et al... ( <a href="https://www.tandfonline.com/doi/abs/10.1080/17565529.2018.1445612">https://www.tandfonline.com/doi/abs/10.1080/17565529.2018.1445612</a> )	Suggestion noted. Thank you.	Navroz Dubash	Centre for Policy Research	India
16053	15	39	15	41	I don't think it is quite accurate to link just transition only with developed countries. It is a large part of the South Africa Conversation. In India, see Ch 17 by Roy et al in the open access book at <a href="https://www.oxfordscholarship.com/view/10.1093/oso/9780199498734.001.0001/oso-9780199498734">https://www.oxfordscholarship.com/view/10.1093/oso/9780199498734.001.0001/oso-9780199498734</a>	Noted. We think the statement is accurate in broad terms. It is about emphasis.	Navroz Dubash	Centre for Policy Research	India
16055	17	16	17	16	This is a very interesting and potentially useful diagram. The authors may wish to consider the following points as they refine it: - is there a way of interpreting net zero targets in this diagram? - Is it the case that SDGs will always require positive per capita emissions as this diagram suggests? Is there a contradiction then between SDGs and net zero? - Would it be useful to make this more conceptual by limiting the numbers on cut offs for annual per cap income to avoid squabbling over these cut offs? This could potentially be useful for the WG as a whole.	Figure has been revised.	Navroz Dubash	Centre for Policy Research	India
16057	30	34	30	35	Please refer to the glossary. Ch 13 is using the glossary def of institutions which is broader and more expansive than Norths.	We do not think this is a problem.	Navroz Dubash	Centre for Policy Research	India
16059	31	15	31	15	Incomplete and incorrect citation. This is Iacabuto, Dubash, Upadhyaya and Hohne	Apologies. The rrelevant sentence and reference have been edited out.	Navroz Dubash	Centre for Policy Research	India
16061	31	42	31	42	In general, what is the approach to these sections that closely mirror chapters? Will they be re-written to provide a precis and road map to those chapters? This will be a tricky business as CH 1 colleagues will have to walk a line between redundancy and inconsistency!	We believe the chapter has provided effective introduction to the rest of the report with sign posts and cross references as deemed necessary.	Navroz Dubash	Centre for Policy Research	India
16063	47	37	47	38	Please check the glossary definition of governance for consistency	We have phrased it as "encompasses" not defined as. This allows for flexibility in the choice of words	Navroz Dubash	Centre for Policy Research	India
16065	48	7	48	7	Perhaps avoid formulations such as "obvious that". Such points still need to be argued rather than presumed.	This has been edited.	Navroz Dubash	Centre for Policy Research	India
16067	0	0	0	0	This is a very solid FOD. I would like to flag two overarching points that would be useful to get agreement on for use by other chapters (also covered in the detailed comments). <i>First, the three part assessment framework of economic, ethics and transition may need to be cross checked with other chapters. Ch 13, ch 5, and Ch 4</i> that I am aware of all have siilar but different enough assessment frameworks. Ideally they should all be broadly consistent with that in Ch 1. We may need some harmonisation on this. <i>2. The development pathways discussion could be a very useful one to carry across the chapters, but again may need some discussion and fine tuning.</i>	Accepted - addressed in revisions	Navroz Dubash	Centre for Policy Research	India

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
16147	3	18	3	18	Consider changing "...incompatible with 1.5°C..." to "...insufficient for the 1.5°C goal..." or something similar, to clarify that the national contributions are insufficient to meet the goal.	Noted	Daniel Helman	College of Micronesia-FSM	Micronesia, Federated States of
16149	8	13	8	13	Consider changing "...and/or Solar Radiation Management,..." to "...and/or Solar Radiation Management or other geoengineering," for clarity, since other non-SRM techniques, e.g. stratospheric injection of water ice, that may be useful are included.	As per SR1.5 (p. 71) SRM is used to refer to all direct interventions on the planetary radiation budget.	Daniel Helman	College of Micronesia-FSM	Micronesia, Federated States of
16151	8	39	8	41	In the sentence "When indirect emissions...of total greenhouse emissions." it is not clear whether military contributions are included in the analysis. Since global military emissions are significant, their omission casts doubt on the entire assessment. For example, if the four sectors are all reduced, will emissions continue to rise because of military contributions to GHG emissions? Therefore, if there is uncertainty in global military contributions to GHG emissions, this should be stated clearly.	Military emissions are embedded in other activities such as transportation. According to the Kyoto protocol and, subsequently, the Paris agreement, emissions from military activities are to be included in the national emissions inventory if they are accrued within national borders. Also see <a href="https://www.sciencedirect.com/science/article/pii/S0959652619340661">https://www.sciencedirect.com/science/article/pii/S0959652619340661</a>	Daniel Helman	College of Micronesia-FSM	Micronesia, Federated States of
16153	11	11	11	12	Consider changing "There is a need for a transition from the economy-driven approach taken by policy-makers to a more coherent and integrated approach..." to "There is a need for a transition from the short-term economy-driven approach taken by policy-makers to a more coherent, long-term and integrated approach..." for clarity and to emphasize that the common short-term economic approach is problematic, rather than any economic approach.	Accepted - text revised	Daniel Helman	College of Micronesia-FSM	Micronesia, Federated States of
16155	12	3	12	7	Consider adding additional impacts, e.g. species extinctions, Arctic ice loss, methane release, stronger storms, etc, to the section titled "Climate impacts." as a way of informing readers more broadly.	rejected. This is meant to be a non-exhaustive list of examples which, for the sake of brevity, must be kept short. For full assessment of impacts readers should look to WG1 report.	Daniel Helman	College of Micronesia-FSM	Micronesia, Federated States of
16157	12	14	12	21	Consider adding additional examples, e.g. lack of resources to address climate-related disasters, to the section titled "Distribution and climate impacts." for clarity.	Noted - we have added a reference to section 1.5.6 where we go more into detail.	Daniel Helman	College of Micronesia-FSM	Micronesia, Federated States of
16159	13	24	13	24	After the sentence ending "...not yet matched by the progress in CCS (Section 4)." consider adding information related to emerging energy and storage technologies that may make a strong contribution to the mitigation effort in the near future, e.g. power-to-hydrogen for storage and as a transportation fuel, lessening the impact of geophysical and environmental limits of mining materials for batteries, and the practical challenge of rapid transition away from internal combustion engines; pumped hydropower (including underground pumped hydropower) for storage; and enhanced geothermal energy (using closed-loop systems that don't require groundwater) which can be ubiquitous if prices for drilling wells and reservoir development come down, and which can serve as a focus for oil/gas companies wishing to transition away from fossil fuel production. These will give a broader and clearer picture of mitigation options related to technology.	Accepted - we added a sentence.	Daniel Helman	College of Micronesia-FSM	Micronesia, Federated States of

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
16161	14	23	15	44	In the section titled “1.3.1 Relevant Concepts and their limitations” consider including a treatment of sustainability within traditional knowledge contexts, e.g. after the sentence “Under a green economy,...undermine ecological systems.” [p. 15 lines 13-14] consider adding “This is consistent with traditional concepts of sustainability that often included ecological reserves and rules for economic exclusions based on ecological persistence needs.” for clarity. Further, e.g. the phrase “...of just transition which stresses the need to ensure that societal transformation...” [p. 15 line 40] might be rewritten as “...of just transition which stresses the need to ensure that societal transformation within a context of traditional knowledge...” Likewise, the concept of traditional knowledge ought to be introduced earlier in the passage. The inclusion of traditional knowledge would make the section more conceptually and historically accurate.	Rejected.	Daniel Helman	College of Micronesia-FSM	Micronesia, Federated States of
16163	15	45	18	37	Consider changing the section titled “1.3.2 Climate Mitigation, Equity and Sustainable Development Goals (SDGs)” to “1.3.2 Climate Mitigation, Equity, Traditional Knowledge and Sustainable Development Goals (SDGS)” or something similar, and adding a paragraph of text or more to emphasize the historical context of earlier colonial destructions and a stronger pathway forward. Allowing indigenous peoples and national traditions to have a place in sustainable development is both congruent with the current understanding of traditional knowledge as arising out of ecological contexts, and with a strong pathway forward that recognizes the human need to connect with past histories in a positive way.	Rejected as not necessary.	Daniel Helman	College of Micronesia-FSM	Micronesia, Federated States of
16165	19	17	19	20	In the bullet point starting “Policies, institutions and culture also shape emissions.” consider clarifying the text to include military contributions to greenhouse gas emissions, which themselves are large.	As part of edits made to the overall section, this sentence has been removed.	Daniel Helman	College of Micronesia-FSM	Micronesia, Federated States of
16167	19	23	19	25	In the sentence “Achieving the Paris goals...with technologies.” consider including military contributions to greenhouse gas in this list of emissions drivers which need to be changed, for the sake of both accuracy and clarity.	As part of edits made to the overall section, the line that this comment refers to has been removed.	Daniel Helman	College of Micronesia-FSM	Micronesia, Federated States of
16169	20	27	20	30	Missing from the list of the 8 explicit classes of services that energy provides are military services, and this ninth class is likely a major contributor of greenhouse gasses, despite accurate data not always being extant. For example, estimating the particulate and gas emissions related to launches of military satellites, or of rockets and bombs fired, or of troop transports, or of the development of novel weapons, all of which depend on usable energy, are important to include for an accurate description of services driving climate change via energy consumption.	Accepted - we have mentioned military services in the list.	Daniel Helman	College of Micronesia-FSM	Micronesia, Federated States of

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
16171	18	39	34	35	Consider adding a new subsection to Section 1.4 that addresses the global military contributions to greenhouse gas emissions, and the urgent need to reform how international conflicts are settled in light of the climate emergency. This subsection might emphasize the current size of global GHG emissions by militaries in the world, as well as unknowns and estimates, and the secrecy and constraints involved. It might also include a treatment of how military use of nuclear arms makes nuclear power a very risky mitigation strategy to address climate change, as nuclear holocaust remains an existential threat that is on par with the climate emergency. The establishment of an international framework that addresses military contributions to GHGs could also be seen as a tool for reducing nationalisms globally, and thus may have a synergistic effect on climate negotiations. The current level of secrecy involved makes for increased risk of not achieving stated PA goals. It is offered that the current subsection 1.4.10 be renumbered to 1.4.11, and that this section on military contributions to climate change be added as subsection 1.4.10 to align with the current organizational focus of the section, though other conceptions of numbering would also work well.	While this is an interesting and potentially a matter for research, this section does not have sufficient space to include this topic.	Daniel Helman	College of Micronesia-FSM	Micronesia, Federated States of
16173	24	2	24	2	Consider changing "...such as the supply of rare earth materials for electronics or lithium for batteries..." to "...such as the supply of rare earth materials for electronics or lithium for batteries, or the risk of increasing stock of militarily useful rare earths as a byproduct of increased mining for batteries and magnets..." for clarity.	Rejected -we do not find this relevant.	Daniel Helman	College of Micronesia-FSM	Micronesia, Federated States of
16175	24	9	24	15	After the sentence ending "...fail to fulfil their objectives (Manan et al. 2015)." a treatment of the increasing risk of nuclear arms proliferation could be included for clarity. See, for example, Goldemberg, J., 2009. Nuclear energy in developing countries. Daedalus, 138(4): 71-80. Notably missing from plans for adopting nuclear power in a widespread fashion to address climate change is a new international mechanism that would identify the most nuclear-arms-proliferation-resistant pathway and require that this pathway be followed. The current Non-Proliferation Treaty was not adopted to address climate change, and its utility is not up to the task. For example, Saudi Arabia is presently developing facilities for nuclear materials enrichment to fuel its planned new nuclear power program, and this may be a pretext for nuclear arms production.	Rejected: This level of detail is beyond the scope of Chapter 1.	Daniel Helman	College of Micronesia-FSM	Micronesia, Federated States of
16177	23	9	25	39	Consider adding a new category to Subsection 1.4.3 that addresses military technology and its current trends, to give a clearer idea of the various forms of technology which impact on climate. Its presence would allow for a stronger conceptualization of the challenges which lie ahead.	Rejected - we do not find this very relevant here.	Daniel Helman	College of Micronesia-FSM	Micronesia, Federated States of
16179	25	16	25	17	Consider changing "Innovation in low carbon technologies comes partly from direct public and private investments in research and development," to "Innovation in low carbon technologies comes partly from direct public, private and military investments in research and development," for clarity.	Rejected- military investments are part of public investments.	Daniel Helman	College of Micronesia-FSM	Micronesia, Federated States of
16181	28	23	29	17	For Section 1.4.5 (Political Economy) consider adding a brief treatment of the validity of GDP and alternative quantifications of economic growth as they influence decisions that affect climate, so as to include additional relevant information.	This point is made in other parts of the chapter.	Daniel Helman	College of Micronesia-FSM	Micronesia, Federated States of

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
16183	30	12	30	33	For Section 1.4.7 (Social innovation and behaviour change) consider adding a brief treatment of how social attitudes often follow economic stakeholding, and that social attitudes may lag green economic transition but eventually will become entrenched in the green economy if the transition occurs, for additional clarity.	Accepted - We read your comment as suggesting that, in many circumstances, changes in behavior will be driven by policies and technologies which get new behaviors entrenched. We propose the following text to make this useful point:  Henceforth, some behaviors that are harder to change will only be transformed by the transition itself: triggered by policies, the transition will bring about technologies that, in turn, will make new green behaviors entrenched (as in the case of a tax on red meat that facilitates the diffusion of meat alternatives that gain the favor of new generations).	Daniel Helman	College of Micronesia-FSM	Micronesia, Federated States of
16185	32	41	34	35	For Section 1.4.10 (International cooperation), consider adding a brief treatment of the risk of nuclear arms proliferation both from some countries adopting nuclear energy for the first time and also from increases in the availability of rare earth elements. In the first case (adopting nuclear energy), Saudi Arabia is a good example. They have recently started plans for an enrichment facility. Whether this is a pretext for arms production is unclear. In the second case (materials availability), the increased production of rare earth elements for magnets for wind power, and for batteries for storage, produce excess materials (other rare earth elements) as byproducts, and these can potentially be used for nuclear arms production. Thus increasing wind power, for example, comes with an increased risk of nuclear arms proliferation. The main path to contain nuclear arms proliferation is via international cooperation. Although the Non-Proliferation Treaty (NPT) is in force, it was not designed to handle increases in nuclear power or nuclear materials in response to climate change, and a new stronger framework is warranted.	We have not seen the literature suggesting that investment in renewable energy carries the risk of nuclear arms proliferation. The international community has a mechanism for monitoring and discouraging the proliferation of nuclear arms.	Daniel Helman	College of Micronesia-FSM	Micronesia, Federated States of
16187	40	21	41	36	For Subsection 1.5.3.1 (Ethics and value) consider adding a brief description of how a large amount of decision-making is now automated with computers and artificial intelligence, and that the machine-based frameworks making decisions related to the economy especially (e.g. in stock markets) provide both risks and opportunities for consistent application of values that are consistent with sustainable outcomes, for the sake of additional clarity.	We have not seen relevant literature on this.	Daniel Helman	College of Micronesia-FSM	Micronesia, Federated States of
16189	47	11	47	12	Consider changing "Decarbonising shipping may raise particular challenges for small island states that others do not face." to "Decarbonising shipping may raise particular challenges for small island states or for large military-focused countries that others do not face." for additional relevant information that may aid the reader.	Rejected. This seems excessive detail and not really sure what "large military focused countries" really are	Daniel Helman	College of Micronesia-FSM	Micronesia, Federated States of
16191	51	1	51	11	In the paragraph describing multiple assessment frameworks, consider adding reference to frameworks related to the outbreak of war. The transition to a sustainable future is challenging for nations that rely on a militaristic power basis, and charting a pathway forward that reduces the risk of the outbreak of new international aggressions is warranted, and can be helped via relevant assessment frameworks.	Didn't give any refs to what you have in mind, which sounds too niche, but we have included a broader Assessment Framework including politics ..	Daniel Helman	College of Micronesia-FSM	Micronesia, Federated States of
16489	29	25	29	27	It should note that the mitigation from IAMs is 'cost-optimal'. 'Optimal' and 'cost-optimal' are significantly different.	Accepted - We have tried to clarify this. We refer to optimal mitigation paths where there is a trade off between mitigation costs and damage costs.	Xunzhang Pan	School of Economics and Management, China University of Petroleum, Beijing 102249, China	China



Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
16693	23	9	23	34	The description of the three main levels (micro, meso and macro) in Figure 1.7 is not clear. Readers need to learn more information on the processes dominate at different scales, although this figure is adapted from other references.	This comment belongs to 1.5.4.	Leiming Ma	Shanghai Central Meteorological Observatory	China
16695	42	42	42	42	The organization of 2.7-2.9 is not quite consistent with the overall structure of this chapter. In particular, the introduction sections are somewhat odd here, which could be included in the Section 2.1 (Line 4)	I think this comment must be misplaced I cannot trace it to Chapter 1	Leiming Ma	Shanghai Central Meteorological Observatory	China
16725	14	24	15	40	The correct spelling is degrowth, not de-growth. Key references of this debate are: Demaria, F., Schneider, F., Sekulova, F. and Martinez-Alier, J. (2013). What is degrowth? From an activist slogan to a social movement. Environmental Values 22 (2): 191-215. D'Alisa, G., Demaria, F., Kallis, G. (eds) (2014) Degrowth: a vocabulary for a new era. Abingdon, UK: Routledge. Kallis, G., Paulson, S., D'alisa, G., Demaria, F. (2020) The case for degrowth. Cambridge: Polity Press. Anderson, K. & A. Bows-Larkin (2013.) "Avoiding Dangerous Climate Change Demands De-Growth Strategies from Wealthier Nations". Available at <a href="https://kevinanderson.info/blog/avoiding-dangerous-climate-change-demands-de-growth-strategies-from-wealthier-nations/">https://kevinanderson.info/blog/avoiding-dangerous-climate-change-demands-de-growth-strategies-from-wealthier-nations/</a> [Accessed November 19, 2019].  Degrowth fight against climate change does not rest with shrinking GDPs. Interactions among different proposals are vital: investments in Green New Deals that mobilize energy transitions and restore ecosystems that absorb carbon; guarantees of low-carbon public services to all; carbon fees and dividends; reduced working hours that reduce emissions; and support for low-carbon community economies and lifestyles. Related degrowth-minded proposals include a moratorium on new fossil fuel development; ban of fossil fuel advertising; phase-out of fossil fuel production, with just transition for workers in dependent industries; frequent flier levies; embargos on expansion of road networks and airports; policies for car-free cities; tight emission standards for new cars and power stations; passive-house standards for new houses; and efficiency standards for rented properties.	Edited.	Federico Demaria	Environmental Science and Technology Institute, Autonomous University of Barcelona	Spain
17157	11	33	11	33	This figure is hard to understand. Why do you show four blocks, but include the outer two in the values shown for the two center blocks? Please calculate and show the values for each block individually.	Taken into account. Figure 1.2 has been replaced with Figure 1.3 a and 1.3 b in line with AR5.	Joachim Rock	Thuenen-Institute of Forest Ecosystems	Germany
17159	17	15	17	16	Please indicate in the figure what the two curves are meant to indicate. It is also not clear, whether the SDG icons are assigned to specific groups of countries (low / mid / high income) or not. Please revise this figure.	Figure has been revised.	Joachim Rock	Thuenen-Institute of Forest Ecosystems	Germany
17161	20	44	20	45	This is too simple. Do you refer to managed or unmanaged forests? This could have strong influences on the ES provided, including substitution of fossil fuels. Please expand text and be more specific what is meant here.	This sentence has been replaced as a result of general editing undertaken in this section	Joachim Rock	Thuenen-Institute of Forest Ecosystems	Germany

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
17163	35	15	35	22	Please pay more attention to the difference between model and scenario. A model is not only an "abstraction of the key relationships", it is a set of rules that describes how e.g. a system works (or: is thought or believed to work). A scenario makes assumptions about parameter values within this model. Thus, a model cannot itself be a "consistent representation of (a) possible future". It would also be good to avoid the term "forecast" in any relation to scenarios. Scenarios project possible futures, using a term like "conditional ... forecast" might lead to misunderstandings.	Thank you, we now avoid using forecast and now we better qualify the idea behind the statement as in "consistent with the relationships and rules embedded in the models and with the caraterizations of key drivers and parameters embedded in the specific scenario"	Joachim Rock	Thuener-Institute of Forest Ecosystems	Germany
17165	36	19	36	21	Please check: "Scenarios and models that support ... national decision making are not ... those which are used to support ... national decision making" seems unlogic.	Modified, thank you	Joachim Rock	Thuener-Institute of Forest Ecosystems	Germany
17167	39	42	39	43	What is the message here? Just mentioning a study so it has been cited? What are the results from the study?	Noted to expand	Joachim Rock	Thuener-Institute of Forest Ecosystems	Germany
17169	43	1	43	4	There is no explanation in or with the figure, Please add, or delete figure.	There was an unfortunate technical error in conversion to PDF, however the Figure has been substnially reworked	Joachim Rock	Thuener-Institute of Forest Ecosystems	Germany
17351	7	39	7	40	The scenario of maintaining a temperature rise below 1.5°C is not practically achievable. Even advanced countries has not been able to implement its requirements. It is suggested throughout the report to focus more on maintaining a temperature rise below 2 degrees in place of the first scenario as an impractical solution.	This section is simply describing findings of previous IPCC reports. It does not discuss what "should" be done.	Zeyaeyan Sadegh	Islamic Republic of Iran Meteorological Organization (IRIMO)	Iran
17395	11	28		32	It would be better to show the share of developed and developing countries or continents in figure 1.2. according to referred description in second paragraph in 1.2.3 section.	Accepted. The literature is now cited.	Zeyaeyan Sadegh	Islamic Republic of Iran Meteorological Organization (IRIMO)	Iran
17397	11				The text of figure is not clear	Acceoted. The text of Figure 1.3.a and 1.3 b is clearer.	Zeyaeyan Sadegh	Islamic Republic of Iran Meteorological Organization (IRIMO)	Iran
17399	19				It is necessary to define part of output as effected items in figure 1.5.	This figure has been removed from the revised version.	Zeyaeyan Sadegh	Islamic Republic of Iran Meteorological Organization (IRIMO)	Iran
17425	28	31			In order to reflect the carbon leakage considerations and outsource of the emissions to less committed countries, I suggest to add a phrase of "trade status" or something more representative in the text, right after the word "production,": specifically the central role of structures of power, production, trade status, and a commitment to economic growth	Thank you. Valid point about carbon leakage. However, this statement is about the relationship between economic growth and GHG emissions. The role of trade is covered eslewehere in the chapter.	Zeyaeyan Sadegh	Islamic Republic of Iran Meteorological Organization (IRIMO)	Iran
17427	29	5			This sentence is recommended to be added before "in other contexts" : "Another example has been the emphasis of major OPEC countries with oil-reliant economies on the response measures needed to support their economies against the adverse effects of global climate actions."	We do not think that this suggested addition will work in the context of the paragraph.	Zeyaeyan Sadegh	Islamic Republic of Iran Meteorological Organization (IRIMO)	Iran

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
17429	30	11			Before ending the section 1.4.6, it is recommended to add a paragraph on the necessity of shared responsibility allocation approaches among the producers and consumers of the embodied emissions: "Ignorance of the producer and consumer equity considerations resulted in the adverse effects of carbon leakage on the global emissions during the enforcement of the Kyoto protocol. Therefore, there is an essential need for the development and application of shared responsibility allocation approaches among the producers and consumers of upstream and downstream emissions. Several approaches are recommended to reflect this equity consideration in the global allocation of the expected responsibilities of emitters and consumers in the design of integrated global climate action. (Feng, 2003, Rodrigues, Domingos, et al. 2006, Lenzen, Murray et al. 2007, Rodrigues and Domingos 2008, Zhou 2009, Hoeltl and Brandtweiner 2011, Marques, Rodrigues, et al. 2012, Berzosa, Barandica, et al. 2014, Csutora and Vetóné mőzner 2014, Kander, Jiborn et al. 2015, Liu and Fan 2017, Khajehpour et al. 2019) An effective approach which motivates both the producers toward greener production and the consumers toward less and greener consumption, simulataniously." Complete addresses of the references are provided in cell I-18.	The section highlights the role of equity and fairness anchored in the principle of shared responsibility.	Zeyaeyan Sadegh	Islamic Republic of Iran Meteorological Organization (IRIMO)	Iran
17431	30	11			<a href="http://dx.doi.org/10.1016/j.ecolecon.2006.05.018">http://dx.doi.org/10.1016/j.ecolecon.2006.05.018</a> , <a href="https://doi.org/10.1016/j.ecolecon.2007.12.010">https://doi.org/10.1016/j.ecolecon.2007.12.010</a> , <a href="http://dx.doi.org/10.1038/nclimate2555">http://dx.doi.org/10.1038/nclimate2555</a> , <a href="http://dx.doi.org/10.1016/j.ecolecon.2006.05.018">http://dx.doi.org/10.1016/j.ecolecon.2006.05.018</a> , <a href="https://doi.org/10.1016/S0921-8009(03)00104-6">https://doi.org/10.1016/S0921-8009(03)00104-6</a> , <a href="https://doi.org/10.3390/su9122220">https://doi.org/10.3390/su9122220</a> , <a href="https://doi.org/10.1016/j.jclepro.2017.08.013">https://doi.org/10.1016/j.jclepro.2017.08.013</a> , <a href="https://doi.org/10.1002/ieam.1489">https://doi.org/10.1002/ieam.1489</a> , <a href="https://doi.org/10.1007/978-3-319-89590-1_17">https://doi.org/10.1007/978-3-319-89590-1_17</a>	Thank you for the references which are all noted.	Zeyaeyan Sadegh	Islamic Republic of Iran Meteorological Organization (IRIMO)	Iran
17433	32	8			This sentence is recommended to be added before "international" : "For instance, the considerations of the response measures since COP 11 and especially in the Paris Agreement has been an important factor for participation of oil-reliant economies which demand this support to offset the adverse effects of global climate actions on their national economies."	Rejected. The value of this addition is not clear.	Zeyaeyan Sadegh	Islamic Republic of Iran Meteorological Organization (IRIMO)	Iran
17435	22	35			To be added before the "A comparison": "Also, some researchers propose that there is an essential need for the development and application of shared responsibility allocation approaches among the producers and consumers of upstream and downstream emissions. Several approaches are recommended to reflect this equity consideration in the global allocation of the expected responsibilities of emitters and consumers in the design of integrated global climate action. (Feng, 2003, Rodrigues, Domingos, et al. 2006, Lenzen, Murray et al. 2007, Rodrigues and Domingos 2008, Zhou 2009, Hoeltl and Brandtweiner 2011, Marques, Rodrigues, et al. 2012, Berzosa, Barandica, et al. 2014, Csutora and Vetóné mőzner 2014, Kander, Jiborn et al. 2015, Liu and Fan 2017, Khajehpour et al. 2019) An effective approach which motivates both the producers toward greener production and the consumers toward less and greener consumption, simulataniously." Complete addresses of the references are provided in cell I-18.	Accepted - [This comment has been addressed as follows: In recent years, other methods have been suggested as a way of accounting for emissions, such as shared responsibility (Lenzen et al. 2007), technology adjusted consumption based accounting (Kander et al. 2015), value added-based responsibility (Piñero et al. 2019) and exergy-based responsibility (Khajehpour et al. 2019).	Zeyaeyan Sadegh	Islamic Republic of Iran Meteorological Organization (IRIMO)	Iran

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
17441	12	5	12	5	after middle east we can bring some example about IRAN(Saboohi and et,al, WATERSHED ENGINEERING AND MANAGEMENT 2019 , Volume 11 , Number 1 #g00636; Page(s) 112 To 128.	Rejected - this is just a brief summary where we do not go into details.	Zeyaeyan Sadegh	Islamic Republic of Iran Meteorological Organization (IRIMO)	Iran
17443	26	33	26	34	after Union, we can add: through using of renewable energy and plannig to have use managing.	Accepted. Text deleted.	Zeyaeyan Sadegh	Islamic Republic of Iran Meteorological Organization (IRIMO)	Iran
17829	3	30			the word 'Aims' shoud not start with the capital letter since it is not the beginning of a sentence.	Exec Sum completely redrafted	Christy Cecilia Veronica Suhendy	Pattimura University	Indonesia
17831	6	34	6	45	inconsistency of writing. The word 'chapter(s) are inconsistence in writing. One written in italic (line 36), the other one just written as 'Chs' (line 40).	Noted and amended, thank you.	Christy Cecilia Veronica Suhendy	Pattimura University	Indonesia
17833	7	43			omit C on the 1.5 <sup>o</sup>	This sentence has been deleted.	Christy Cecilia Veronica Suhendy	Pattimura University	Indonesia
17835	8	20			the word 'Below' shoud not start with capital letter, it should written 'below 1.5 <sup>o</sup> C'	This text has been removed.	Christy Cecilia Veronica Suhendy	Pattimura University	Indonesia
17837	9	44			The Paris Agreement, hailed as an entered....	Noted	Christy Cecilia Veronica Suhendy	Pattimura University	Indonesia
17839	10	18			SGD 14: Live below Water; SDG 15: Life on Land	apologies we missed this, aim to correct in final	Christy Cecilia Veronica Suhendy	Pattimura University	Indonesia
17841	14	43			remove comma between 'sectors' and 'and'. ...approaches across sectors and countries are ...	Edited.	Christy Cecilia Veronica Suhendy	Pattimura University	Indonesia
17843	15	10	15	11	the year should be in the same bracket with the author's name. need no open bracket at the year, otherwise, another close bracket must be add in the end.	Corrected.	Christy Cecilia Veronica Suhendy	Pattimura University	Indonesia
17845	15	39			omit comma between 'part' and 'tend'	Edited.	Christy Cecilia Veronica Suhendy	Pattimura University	Indonesia
17847	16	31	16	31	keep the consistency from previous format. 2 <sup>o</sup> C, 1.5 <sup>o</sup> C	Edited	Christy Cecilia Veronica Suhendy	Pattimura University	Indonesia
17849	18	44			Figure 1.5 repeated twice	Figure has been removed in the revised version	Christy Cecilia Veronica Suhendy	Pattimura University	Indonesia
17851	20	12			City transformation services. I guess this sentence need to be in italic.	Noted. In the revised text, we have removed the sub-headings and integrated the sub-sections together.	Christy Cecilia Veronica Suhendy	Pattimura University	Indonesia
17853	23	28			reference sought from Chapter 16	Rejected - we just made a reference to where in the report one can read more about the topic.	Christy Cecilia Veronica Suhendy	Pattimura University	Indonesia
17855	30	4	30	4	the sentence 'see section 1.3 above and Chapter 17' should be in brackets. Keep the consistency from previous format.	Accepted	Christy Cecilia Veronica Suhendy	Pattimura University	Indonesia
17857	30	5	30	6	same as above	Accepted	Christy Cecilia Veronica Suhendy	Pattimura University	Indonesia

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
17859	30	29	30	30	same as above	Noted - See above.	Christy Cecilia Veronica Suhendy	Pattimura University	Indonesia
17861	36	5	36	6	Consistency. Use W m -2 or W/m2	Check throughout report, ask chapter 3	Christy Cecilia Veronica Suhendy	Pattimura University	Indonesia
17865	42	33	45	30	As a layman, my understanding is that 'Transition' and 'Transformation' are somehow inter linkages or overlapping each other. After reading subsection 1.5.4, I am still not clear about the relationship of these concepts and their linkages/boundaries for climate actions (mitigation, adaptation or policy measures). Need clarification for better understanding.	Accepted; clarified	Rawshan Ara Begum	Universiti kebangsaan Malaysia (UKM)	Malaysia
18047	11	32	12	2	Excellent idea to present these numbers here, in such a format highlighting inequality! However, given the multitude of different system boundaries used when calculating GHG/CO2 emissions per capita (e.g., only fossil-fuel combustion, LULUCF included, consumption-vs-production based etc.) it seems necessary to specify these, for these numbers to make sense. Also, I am not sure whether "Our World in Data" is a sufficiently robust source	Accepted. Figure 1.2 has been replaced with Figure 1.3 a and 1.3 b covering the whole GHG emissions	Helmut Haberl	Institute of Social Ecology, University of Natural Resources and Life Sciences, Vienna	Austria
18049	15	10	15	20	There are numerous critical discussions regarding the "green economy" concept. Basically, this concept relies on "eco-efficiency" and "decoupling", i.e. the idea that it were possible to decouple economic activity and growth (e.g. measured as GDP increment) from increasing use of biophysical resources (raw materials, energy) and GHG emissions. While there is some (limited) empirical support for this concept (e.g. Le Quéré, 2019, Nat. Clim. Change 9, 213–217), there is also a large community questioning these ideas (e.g. Hickel/Kallis, 2019. New Polit. Econ. 1–18; Jackson/Victor, 2019. Science 366, 950–951, Parrique et al., 2019. Decoupling Debunked. European Environmental Bureau). In a pair of systematic review articles forthcoming in Env. Res. Letters, we (Wiedenhofer, Haberl) present the evidence on decoupling based a large analysis of the literature, within a Special Issue organized among others by Ch5 CLA Felix Creutzig. Perhaps this can also be relevant here. In any case, I do not think it suffices to relatively uncritically present this concept here and not assess it against its critics or against other concepts, e.g. degrowth, steady state economics, and others	Suggestion adapted. Thank you.	Helmut Haberl	Institute of Social Ecology, University of Natural Resources and Life Sciences, Vienna	Austria
18051	18	1	18	4	I do not think (also in the light of the comment on p15, lines 10-20) that there is sufficient evidence to claim that attaining the "sustainability corridor" as defined in SDG13 solely through "investments in technology and social innovation"; rather I think that fundamental transformation will be required (e.g., Görg, et al., 2017. Sustainability, 9, 1045)	Figure edited.	Helmut Haberl	Institute of Social Ecology, University of Natural Resources and Life Sciences, Vienna	Austria

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
18053	19	23	19	27	In my perception, such far-reaching claims require much stronger corroboration based on the assessment of larger, controversial and diverging literatures. For example, claims such as that "the underlying desire of humans to make a change" could result in far-reaching changes in the way in which societal use of biophysical resources such as raw materials and energy are transformed towards zero-carbon society could be achieved through such an "underlying desire" is almost certainly no statement that would find broad support in the social sciences or in interdisciplinary literatures on resource use and socioecological transformation (e.g. Hausknost 2019, Env. Politics, doi: 10.1080/09644016.2019.1680062; there are large literatures in Political Ecology, Ecological Economics and related fields on these issues). Because patterns of resource use strongly depend on investment in long-lived material structures such as settlements, infrastructures etc., there is strong inertia resulting, among others, from profitability expectations of those who invested in such structures, that are strong barriers against changing social practices towards patterns of low-resource use living (e.g. Haberl et al., 2019 Nature Sust. 2, 173-184). While the "desire of humans to make a change" may result in some limited alterations of resource use, it seems very unlikely it would be a force strong enough to overcome such barriers of not supported by altered investment patterns into long-lived and large scale infrastructures such as highways, airports or large fossil-fueled powerplants, settlement patterns requiring lots of mobility, etc. By the way, this conceptualization is also at odds with key findings of chapter 5, e.g. p5, lines 26-31 of Chapter 5	As part of edits made to the overall section, the paragraph that this comment refers to has been removed.	Helmut Haberl	Institute of Social Ecology, University of Natural Resources and Life Sciences, Vienna	Austria
18055	20	22	20	36	While I fully agree with the benefits of a service perspective, but I also think this para could profit from a broader literature basis. Services, and also energy services, are notoriously hard to define and under-theorized, and this needs to show in an assessment of that literature. Perhaps helpful could be to also incorporate the concept of "material services" (Carmona, 2017, Sustainability 9, 1508; Whiting et al., 2020, Ecol Econ 169 106502); from reviewing the concept of an "energy service cascade" (Kalt et al., 2019, Energy Res. Soc. Sci, 11, 12-83-1297 and the literature cited therein), the "stock-flow-service nexus" (Haberl et al., 2017, Sustainability 9, 1049), as well as the concept of "human-scale energy services" (Brand-Correa et al. 2018, Energy Res & Social Sci 38, 178-187) and eudaimonia and "need decoupling" (Brand-Correa/Steinberger, 2017, Ecol Econ 141, 43-52).	We will provide these references to energy chapter for their inclusion.	Helmut Haberl	Institute of Social Ecology, University of Natural Resources and Life Sciences, Vienna	Austria
18057	28	23	29	17	In my view this is a very important topic, and I am glad it is included here. I suggest to broaden the literature basis and also include authors like Joan Martinez-Alier (e.g., the Environmentalism of the Poor and many other publications), Daniel Hausknost (e.g. Env Politics, doi 10.1080/09644016.2019.1680062; sustainability doi: 10.3390/su11020506; Env Policy and Governance 28, 371-382), Pichler (e.g., Env Politics, doi: 10.1080/09644016.2018.1547260; "Fairness and Justice in Natural Resource Politics, Routledge 2016) or Schaffartzik (e.g., Ecol Econ 163, 9-19, 2019).	These are relevant literature with which the authors are acquainted	Helmut Haberl	Institute of Social Ecology, University of Natural Resources and Life Sciences, Vienna	Austria

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
18059	39	21	40	8	I am glad this discussion is included here, but I think that it would be hugely valuable to also include the framework of "practice theory" or "theory of social practices", either to complement the approaches within that section under a slightly revised and broader subsection title, or as an own subsection. This is a broad field in social sciences and humanities conceptualizing behaviour not individualistically, but by considering the embeddedness of human activity in social structures and institutions. Prominent authors include Theodore Schatzki (e.g. "Social Practices, Cambridge Univ Press, 1996; article in History and Theory 42, 82-93 (2003); Elisabeth Shove (e.g., Energy Policy 123, 127-135, 2018); Martina Schäfer, Daniel Hausknost and Willi Haas (e.g., Environmental Policy and Governance 28, 371-382; sustainability 10(4), doi 10.3390/su10041047) and the literatures discussed in these papers	Seek to address a bit later in section	Helmut Haberl	Institute of Social Ecology, University of Natural Resources and Life Sciences, Vienna	Austria
18061	42	33	45	30	I very much welcome the review of these transformation/transition concepts, but there is a lot more than the two concepts discussed here, i.e. "socio-technical transformation" and "social transformation". There is a rapidly growing literature (predominantly but not only located in the German-speaking community) on "Socio-ecological transformations", with key authors being Ulrich Brand, Christoph Görg, Achim Grunwald and Uwe Schneidewind; there is the "resilience alliance"/resilience community (Elinor Ostrom, Carl Folke, Maja Schlüter and many others, e.g. in the Stockholm Environment Institute) discussing socioecological transformation from their specific perspective, and there is the large work by Fischer-Kowalski, Krausmann, Winiwarter and others on "socio-ecological transitions" (which is strongly related to the idea of fundamental transformation in resource use patterns in the sense discussed here, see e.g. the book "Socioecological Transitions and Global Change" edited by Fischer-Kowalski and Haberl, 2007, Edward Elgar and large literatures in peer-reviewed journals. There is also an explicit attempt by Fischer-Kowalski and Jan Rotmans to discuss the relation between socio-technical and socio-ecological transitions/transformation (Rotmans/Fischer-Kowalski, Ecol Society 14, 2009). In my view, hence, this section needs to be a lot more inclusive and comprehensive, which will require substantial redrafting.	Broadened, by inclusion of contributing author Jonathan Kohler	Helmut Haberl	Institute of Social Ecology, University of Natural Resources and Life Sciences, Vienna	Austria
18347					Chapter 1 focuses on the issues within the scope of the Paris Agreement, but <i>this chapter needs more broader perspectives beyond Paris. For example, the United States will withdraw from the Paris Agreement, and China has been pursuing coal-fired construction in Asia and African countries under the name of South-South cooperation.</i> The Paris Agreement is dealt with mainly in Chapter 14 (International Cooperation), and Chapter 1 should cover real global challenges without limiting to the Paris. See Steckel, Jan Christoph, et al. "Coal and carbonization in sub-Saharan Africa." Nature Climate Change 10.1 (2020): 83-88., Voituriez, Tancrede, Wang Yao, and Mathias Lund Larsen. "Revising the 'host country standard' principle: a step for China to align its overseas investment with the Paris Agreement." Climate Policy 19.10 (2019): 1205-1210., and Hannam, Phillip M., et al. "Developing country finance in a post-2020 global climate agreement." Nature Climate Change 5.11 (2015): 983-987.	We wrestled with the question of how to much to shape the Chapter around the Paris Agreement. We have sought to address the tensions in our section on Drivers, but broadly concluded the bulk of the chapter should continue to be framed substantially in relation to various dimensions of the Paris agreement particularly given its almost global participation (and those same governments are the prime recipients for the IPCC reports), but also without assuming adequate implementation, and emphasising that the goals also need to be set in context of competing priorities for governments, including for example around SDGs.	Kazuhiko Hombu	Graduate School of Public Policy, The University of Tokyo	Japan

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
18349	10	6	10	7	"other Parties are encouraged to provide or continue to provide such support voluntarily" should be added to the sentence for the sake of consistency with the Paris agreement.	NOTED	Kazuhiko Hombu	Graduate School of Public Policy, The University of Tokyo	Japan
18513	4	7	4	9	populism and nationalism do not necessarily obstruct all forms of international cooperation; reduced international trade (as a consequence of populism/nationalism) isn't necessarily bad for climate control. If you present populism/nationalism as opportunities rather than threats you may reduce their opposition. You catch more flies with honey etc.	This is a valid point. However the sentence we have has been carefully constructed in a way that does not tie populism to the right or left of politics or suggest that it hinder ALL forms of action on climate change. The point made is that populism can hinder effective international cooperation for climate action and this statement is backed by literature which is provided in the text.	Marcel Wissenburg	Radboud University, Nijmegen, The Netherlands	Netherlands
18515	8	25	8	25	Why Capital Letters for Sustainable Development? It's not a god...	This has been corrected.	Marcel Wissenburg	Radboud University, Nijmegen, The Netherlands	Netherlands
18517	12	24	12	25	See comments on p4 line 7: populism and nationalism do not necessarily obstruct all forms of international cooperation; reduced international trade (as a consequence of populism/nationalism) isn't necessarily bad for climate control. If you present populism/nationalism as opportunities rather than threats you may reduce their opposition. You catch more flies with honey etc. The one source you refer to here is simplistic and politically biased.	Rejected. See the role of populist attitudes in explaining climate change skepticism and support for environmental protection (Robert. Huber 2020) US withdrawal from the Kyoto Protocol and its implication is referred to in AR4 WG3 Chapter 13.3 (page 768)	Marcel Wissenburg	Radboud University, Nijmegen, The Netherlands	Netherlands
18519	14	47	14	47	Again: no need to use Capital Letters when you write Sustainable Development. Check the entire chapter.	Corrected.	Marcel Wissenburg	Radboud University, Nijmegen, The Netherlands	Netherlands
18521	18	11	18	27	Key problems with most or even all of these measures for well-being is that they focus on different interpretations of material well-being and cannot include virtually unquantifiable elements of the good life like liberty, autonomy, authenticity, security. Might it help to acknowledge these limitations but to add that no matter what, and no matter how it's measured, material well-being is a necessary part of the good life and (in particular for the developing world) an essential element of sustainable development?	This point has been made very well in previous sections.	Marcel Wissenburg	Radboud University, Nijmegen, The Netherlands	Netherlands
18523	21	8	21	10	There's a strong whiff of bias here - why give 'nature-based solutions' such special attention given that so many other, more creative and potentially more effective ways to manage ecosystem services and ecosystems in general exist? For an alternative view I refer you to Pena Rodrigues, P.J.F., Lira, C.F. The Bio-Evolutionary Anthropocene Hypothesis: Rethinking the Role of Human-Induced Novel Organisms in Evolution. Biol Theory 14, 141–150 (2019). <a href="https://doi.org/10.1007/s13752-019-00324-8">https://doi.org/10.1007/s13752-019-00324-8</a>	Thank you, noted. However, it is unclear how the proposed hypothesis offers ways of enhancing <i>existing</i> ecosystem services.	Marcel Wissenburg	Radboud University, Nijmegen, The Netherlands	Netherlands
18525	21	21	23	7	As I suggested in other comments, reduction of international (transport and) trade linked to rising populism/nationalism may also have a beneficial effect and may be the politically most viable option in/for some countries. This section ignores this.	Rejected. See the role of populist attitudes in explaining climate change skepticism and support for environmental protection (Robert. Huber 2020) US withdrawal from the Kyoto Protocol and its implication is referred to in AR4 WG3 Chapter 13.3 (page 768)	Marcel Wissenburg	Radboud University, Nijmegen, The Netherlands	Netherlands



Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
18527	50	45	50	46	Cf previous comments on the undiplomatic representation of populism/nationalism: the rise of populism/nationalism may be linked to opposition to (among many other things) climate policies, that does not mean pop/nat regimes cannot find their own ways to contribute to climate goals. It may not (only) be these regimes or ideologies that "impede effective international cooperation" but (also) a lack of flexibility and creativity on the part of 'vested' regimes and interests. In line with the recognition elsewhere in this chapter of legitimate concerns about and objections to 'unfair' climate policies in developed countries, here is another chance to present populism/nationalism not as a threat but as a challenge and an opportunity.	Accepted, deleted	Marcel Wissenburg	Radboud University, Nijmegen, The Netherlands	Netherlands
18825	1	1	23	16	Clean energy is pertinent in actualizing sustainable development goals on climate action. Unfortunately, the adoption of clean energy is slow in most parts of developing countries	Absolutely right. We have highlighted this point in relevant parts of the report.	Michael Ugom	University of Nigeria, Nsukka	Nigeria
19201	15	45	18	37	The UN SDGs are supposed to be "achieved" by 2030. The mitigation actions would need to be taken from now till way beyond 2030... Given that this AR6 report would be published in 2022, it would be useful if the authors could "spell out" how climate change may affect success/failures of achieving SDGs more clearly and going forward beyond 2030, how to integrate the goals.	Suggestion adapted.	Cheah Singfoong	Independent consultant, formerly more than 10 years with the National Renewable Energy Laboratory, USA	United States of America
19275	3	35	3	36	Good argument Keep it.	Thank you although the text has been edited anyway following a revamping of the ES..	Sumie Nakayama	Tokyo Institute of Technology	Japan
19277	4	6	4	6	"increase the capital at risk" is not supported by solid evidence. Should be deleted.	Text has been revised.	Sumie Nakayama	Tokyo Institute of Technology	Japan
19279	4	30	4	31	<i>"impeded more by incumbent interests and governance structures than by the fundamental economics" has no solid evidence. Slow progress of decarbonization is mainly the outcome of its economic cost rather than incumbents interests and governance structure.</i>	Text has been revised.	Sumie Nakayama	Tokyo Institute of Technology	Japan
19281	10	5	10	7	Add "other Parties are encouraged to provide or continue to provide such support voluntarily" in line with Article 9 of the Paris agreement.	Accepted, text revised	Sumie Nakayama	Tokyo Institute of Technology	Japan
19283	13	13	13	14	While cost of solar and wind power is declining, their competitiveness with fossil fuels is different across countries. For example, in India and ASEAN, coal is still competitive than VREs as presented in Figure 6.10 of WEO 2019 and IEEJ Outlook 2020. Correct "in many conditions" to "in some conditions (even if not applicable for all)".	Accepted - a sentence is added	Sumie Nakayama	Tokyo Institute of Technology	Japan
19285	13	19	13	20	There should be a reference to potential geopolitical risk of battery technologies such as growing dependence on imported rare metal/earth concentrated in several countries as described from line 45 of page 23 to line 3 of page 24.	Rejected - this is a short overview of developments. We refer to the other chapters the battery technology is discussed in more detail.	Sumie Nakayama	Tokyo Institute of Technology	Japan
19287	13	21	13	21	Given current penetration of battery electric vehicles, it is too exaggerating to say "have started to displace ICE cars" There is an evidence in Chapter 3 of IEA/WEO2019 that SUV is far more increasing than BEVs. Delete it.	Rejected - the sentence is not an exaggeration as most car companies have started to produce EVs, even if the EV share globally is still small, it is rapidly increasing in several countries. See also comment above.	Sumie Nakayama	Tokyo Institute of Technology	Japan
19289	14	40	15	3	There should be a reference to UN survey "my world". In its 2015 outcome ( <a href="http://data.myworld2015.org/">http://data.myworld2015.org/</a> ), climate change comes at the bottom of priority list. In the most recent survey ( <a href="http://about.myworld2030.org/">http://about.myworld2030.org/</a> ), priority for climate change is higher than the bottom, but still far below healthcare, education and job. It should also be noted that this priority is highly affected by the profile of respondents (high, middle, low HDI). When the share of mid-low HDI respondents is high, the priority on climate action tends to be low.	Thank you for the reference. It has been noted that countries have different priorities.	Sumie Nakayama	Tokyo Institute of Technology	Japan

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
19291	15	24	15	29	It states "climate mitigation can have many co-benefits" and "narrow climate focused policies can undermines sustainable developments". Delete "many" as it gives impression being written arbitrary or unfairly. Or show the evidence for "many co-benefits".	Edited.	Sumie Nakayama	Tokyo Institute of Technology	Japan
19293	15	39	15	39	"own" instead of "won"	Edited.	Sumie Nakayama	Tokyo Institute of Technology	Japan
19295	16	16	16	16	It is misleading to include SDG7 and SDG13 in "Climate Policy". SDG7 has multiple objectives, namely, "affordable, reliable and sustainable energy for all", which cannot always be achieved simultaneously. Ambitious climate policy could substantially raise energy cost, which could impede affordable energy access for low income people. SDG 7 has energy security objective (reliable) which are not always secured by intermittent REs. Therefore, it is wrong to treat SDG7 and SDG 13 as if they are always compatible. SDG7 should be deleted from this figure (under "climate policy" in the circle under SDG circle of 17 colours) .	Figure has been revised	Sumie Nakayama	Tokyo Institute of Technology	Japan
19297	17	14	17	15	This figure is misleading. Despite its title "SD is relevant for all countries even if challenges differ", it looks as if low income countries are preoccupied with SDG 1,2,3,4,5, 10 and 11, low to middle income countries are concerned about SDG 6 and 8. However, SDG7 is relevant not only for mid to high income developing countries but also low income countries. To avoid any misunderstanding, SDG logos should be eliminated or all the relevant SDG logo should be put in countries with each income category allowing duplication.	Figure has been revised.	Sumie Nakayama	Tokyo Institute of Technology	Japan
19299	22	40	22	42	"whilst others explore..." duplicates with line 38-39.	Duplicated text deleted	Sumie Nakayama	Tokyo Institute of Technology	Japan
19301	23	36	23	38	It is not appropriate to consider VRE cost simply with LCOE since system integration cost will increase in accordance with growing share of VRE out of total power generation. This issue should be clearly mentioned in the text.	Rejected - we do not go into this detail in the text. We refer to chapter 6.	Sumie Nakayama	Tokyo Institute of Technology	Japan
19303	24	5	24	5	This figure gives an impression that solar power is becoming competitive in all the regions. Despite its rapid LCOE cost reduction, relative competitiveness of solar power differs across regions (for example, coal is more competitive than solar in India and ASEAN as indicated in IEA/WEO 2018) Such difference should be clearly noted.	Partly accepted -we use a different figure now	Sumie Nakayama	Tokyo Institute of Technology	Japan
19305	25	10	25	10	"sometimes, wind" should be "sometimes solar and wind" . There is increasing opposition to mega solar projects in Japan.	Accepted - See above	Sumie Nakayama	Tokyo Institute of Technology	Japan
19307	27	4	27	11	The notion of "Value at Risk" is valid only when all the countries (including developing countries) put climate change as their first priority and introduce stringent carbon mitigation policies. This is far from reality. It is hard to imagine that developing countries will stop still usable coal power plants, for example, amid growing electricity demand just for climate mitigation and will pay huge compensation to power companies. In other words, VaR is irrelevant in reference scenarios of various energy outlook (IEA/WEO, DOE/EIA, IEEJ etc), where fossil fuel demand will continue to grow in coming decades. It is not appropriate to assert that "fossil fuel extraction and supply chains are particularly exposed to VaR".	The text has been deleted	Sumie Nakayama	Tokyo Institute of Technology	Japan

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
19309	28	19	28	20	"In this end, ....so political leadership is essential" is policy prescriptive and should be deleted.	Rejected. The assessment from Ch 15 points to the need for policy to lead the way. We are simply highlighting it in chapter 1. If chapter 15 changes it we will change it too. Thus, this comment is better directed at chapter 15. The line of sight links to the relevant section of chapter 15.	Sumie Nakayama	Tokyo Institute of Technology	Japan
19311	28	38	28	40	"in terms of the power of incumbent fossil fuel interests to block initiatives towards decarbonization" is unduly assertive based on conspiracy theory. In addition, political constraints do not just come from incumbent fossil fuel interests, but mostly from economic principles. It also comes from such factors as governments' priority placing decarbonization low and people's resistance to pay higher cost as indicated in "yello vest". This sentence should be "But there are various political factors which constrain decarbonization, such as priority of governments, people's willingness to pay, interests of incumbent fossil fuel industries and so forth"	The role of fossil fuel industry in blocking climate action is amply covered in the literature assessed. But the reviewer is correct that the literature also highlights several other constraints. But again many of these constraints are covered in the chapter.	Sumie Nakayama	Tokyo Institute of Technology	Japan
19313	29	1	29	17	Again, this entire paragraph overfocus on resistance from incumbent industries. Resistance from incumbent industries mainly comes from lack of "level playing field" where the entire world bears a unique carbon price, which is impossible in reality. The wicked nature of climate change, where mitigation benefit is distributed globally while mitigation cost occurs in each country, is the fundamental reason of slow progress of climate action. It is not balanced argument to attribute this slow progress narrowly to resistance from incumbent industries. Should be reconsidered.	We think the sentence is balanced in the context it is made and supported by the literature. It is not accurate to say that the chapter attributes slow progress to resistance from incumbent industries. The chapter covers several other drivers and constraints against ambitious climate action including the "collective action problem" nature of climate change.	Sumie Nakayama	Tokyo Institute of Technology	Japan
19315	37	31	37	33	This argument is too much biased encouraging current costly actions for the sake of future. Uncertainties entail not only climate damage, but also mitigation cost, future fossil fuel cost, technology development, geopolitical situation and so forth. Amid such multiple uncertainties, private companies could be hesitant to make huge investment. Show evidence or delete this sentence.	Additional evidence added	Sumie Nakayama	Tokyo Institute of Technology	Japan
19317	38	32	38	38	This entire paragraph is not well balanced suggesting "early expensive actions make sense" putting climate change as high priority over other SDGs. German FIT has been instrumental for growing Chinese solar industries and German people had to bear high FIT surcharges when PV cost was still high. Late comers could benefit from lower PV cost thanks to German people's early economic sacrifice. In this sense, "when starting with the most expensive option makes sense" may make sense globally but is not politically relevant in each country where actual policy is to be undertaken.	Major thrust of the section is global; a bit more noted in regional	Sumie Nakayama	Tokyo Institute of Technology	Japan
19319	39	17	39	20	This paragraph is misleading and should be deleted. It is not at all clear why economic case for more urgent action is amplified when uncertainty, heterogeneity, distributional implication, technological change and realistic damage function is taken into account.	Have reviewed literature and argumentation. The text notes "the studies above".. If you know of recent literature which suggests the opposite please point us to it.	Sumie Nakayama	Tokyo Institute of Technology	Japan
19321	43	1	43	1	This figure is hard to understand. Should be deleted.	There was an unfortunate technical error in conversion to PDF, however the Figure has been substantially reworked	Sumie Nakayama	Tokyo Institute of Technology	Japan
19323	45	11	45	13	"apocalypse" is too much relevant to one specific religion and not appropriate. Delete this sentence.	deleted	Sumie Nakayama	Tokyo Institute of Technology	Japan
19325	45	20	45	21	The term of "climate justice" is religious and not appropriate. Delete it	Not included but note that climate justice is not a religious term.	Sumie Nakayama	Tokyo Institute of Technology	Japan

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
19327	47	5	47	8	Electric vehicles powered by renewable energy could also cause additional cost thus widening disparity, not only helping to meet multiple goals of climate and others. Correct it to reflect such negative impact as well.	Rejected. The sentence is correct, and does not imply that EVs should be adopted in regions or by people who could not afford them (unless dynamics/innovation makes them more affordable)	Sumie Nakayama	Tokyo Institute of Technology	Japan
19329					Chapter 1 mentions too much about Paris Agreement, 49 times in total, and it makes this chapter too narrow and hamper the good balance. Reconsider and reduce mentioning PA to only when it is really necessary.	We have tried to slim our references on this	Sumie Nakayama	Tokyo Institute of Technology	Japan
19493	3		5		Format of executive summary is different from that of the report issued by other WGs. Is this OK?	This is a valid comment. The ES has now been revamped, and restructured along the lines suggested by the reviewer.	Hiroaki Kondo	National Institute of Advanced Industrial Science	Japan
19495	17	14	17	16	Is the location of each symbol of SDGs related to per capita income and per capita GHG emission in Figure 1.4? What is meant by red and brown arrow-lines in this figure?	Figure has been revised.	Hiroaki Kondo	National Institute of Advanced Industrial Science	Japan
19497	18	44	18	44	"Figure 5" is duplicated.	Figure and reference have been removed.	Hiroaki Kondo	National Institute of Advanced Industrial Science	Japan
19499	22	40	22	40	"whilst others ... 2019)" is duplicated.	Duplicated text deleted	Hiroaki Kondo	National Institute of Advanced Industrial Science	Japan
19501	23	10	23	10	Is "(section 2 above)" right? Which section 2 is referred here?	Accepted - section 1.2.3.	Hiroaki Kondo	National Institute of Advanced Industrial Science	Japan
19503	23	33	23	33	"cryptocurrencies" --> cryptocurrencies?	Accepted	Hiroaki Kondo	National Institute of Advanced Industrial Science	Japan
19505	40	43	40	45	The sentence "Acknowledging ... respect for" is difficult to understand.	Edited.	Hiroaki Kondo	National Institute of Advanced Industrial Science	Japan
19507	41	15	41	18	"Hackman (2016) ... Jolly et al. (2015)" is duplicated.	Duplicated text deleted	Hiroaki Kondo	National Institute of Advanced Industrial Science	Japan
19509	43	1	43	1	The Figure 1.7 is not understandable.	There was an unfortunate technical error in conversion to PDF, however the Figure has been substantially reworked	Hiroaki Kondo	National Institute of Advanced Industrial Science	Japan
19511	44	29	44	30	Adaptation 1, Adaptation 2: Concrete contents of adaptation should be written here.	to clarify this is a mitigation report not adaptation; but anyway the key points of the section were extracted to shorten and incorporated in the wider discussion of transition and transformation, and we have avoided use of word 'adaptation' to avoid any risk of confusion	Hiroaki Kondo	National Institute of Advanced Industrial Science	Japan
19513	51	14	52	47	Figure 1.8 shows that chapter 5 is in sectors, however, text does not say the ch.5 is in sectors.	Accepted. Thank you, we have revised the text and the figure.	Hiroaki Kondo	National Institute of Advanced Industrial Science	Japan
19515	51	15	51	15	The text said that "This Sixth Assessment Report covers Mitigation in three main parts, as follows (Figure 1.8).", however, the figure consists of six parts.	Accepted. Thank you, we have revised the text and the figure.	Hiroaki Kondo	National Institute of Advanced Industrial Science	Japan

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
20065	0		0		The chapter does not clearly explain how it is meant to be read and how it relates to the rest of the report. Right now it just reads like a mini report that touches on many topics, brings some examples, digs deeper at some places, but there is no apparent logic or framing the reader can easily understand. Please see the main purpose of C1 as an introduction to the rest of the chapter, providing an overview of how the other chapters fit together and what the main messages of the whole report are.	We hope this is now better addressed, including with the Report Structure figure brought up front and the development of new section 1.3.	Henry Neufeldt	UNEP DTU Partnership	Denmark
20067	0		0		In my view the chapter needs to put more emphasis on the fact that we essentially have <i>viable solutions for all sectors, but, due to political inertia, are not reaching the mitigation goals</i> . Overall: more ambition is needed. What are the viable pathways that get us toward the goal, and what are the tradeoffs and costs?	"All sectors" may be a bit strong, but main thrust accepted; we have also added an explicit section on political inertia	Henry Neufeldt	UNEP DTU Partnership	Denmark
20069	3	1	5	18	This ES lacks the URGENCY of action.	The revamped ES has references to urgency.	Henry Neufeldt	UNEP DTU Partnership	Denmark
20071	5	13	5	14	That's not enough. If you can't describe "new forms of governance" they're not viable.	Text has been revised.	Henry Neufeldt	UNEP DTU Partnership	Denmark
20073	8	19	8	21	Rather than only the range, also show the median	This text has been removed.	Henry Neufeldt	UNEP DTU Partnership	Denmark
20075	8	21	8	23	If you state the costs to reach 1.5C compared to 2C, please also mention the savings: according to the SR1.5 they are in the range of 30:1.	This text has been removed.	Henry Neufeldt	UNEP DTU Partnership	Denmark
20077	8	31		32	"... In ways not adequately compensated". What's that supposed to mean?	The sentence has been rephrased.	Henry Neufeldt	UNEP DTU Partnership	Denmark
20079	10	10		10	If you mention the capitalization (not the pledge) also mention the pledge: 100b per year	Done	Henry Neufeldt	UNEP DTU Partnership	Denmark
20081	9	21			Also mention the Montreal Protocol. By banishing ozone-depleting substances it also resulted in mitigating huge amounts of GHGs	Noted, due to words quota, we only focus on Recent Development (after AR5, 2014 onwards)	Henry Neufeldt	UNEP DTU Partnership	Denmark
20083	13	43		46	Don't forget to mention inequality and limits to development	Done. Thanks	Henry Neufeldt	UNEP DTU Partnership	Denmark
20085	18	7		10	I think that's a misconception, considering how social movements (gilets jaunes) can derail environmental policies if they are not perceived as fair or equitable. There's also plenty of literature on this, eg on different nexus dimensions.	This is entirely consistent with our statement: "Policies and measures including regulatory, fiscal, informational, can play a key role, but must be supported by an underlying desire of humans to make a change (Diringer et al. 2019)."	Henry Neufeldt	UNEP DTU Partnership	Denmark
20087	18	14		18	GDP also does not take natural capital into account	Agreed. However, we do not use GDP in section 1.5.1. Does this belong in section 1.4.2?	Henry Neufeldt	UNEP DTU Partnership	Denmark
20089	18	40			Shorten this section and get rid of redundancies	The section has been revised in light of comments	Henry Neufeldt	UNEP DTU Partnership	Denmark
20091	23	5		7	Seems to be out of place	This comment belongs to 1.4.2. This mention has been removed as part of general editing undertaken in this section.	Henry Neufeldt	UNEP DTU Partnership	Denmark
20093	25	36		39	It's hard for me to see how you draw a positive conclusion here. Why is the fact that innovation has led to more options positive as long as none of these options are being implemented at scale?	Accepted - we have deleted the conclusion	Henry Neufeldt	UNEP DTU Partnership	Denmark
20095	26	17		27	While there is clearly a lack of financial investments in LCD and CRD, the biggest elephant in the room is the fact that fossil fuel subsidies are in the range of mind-boggling USD 500b/yr and still outpace subsidies in renewables by nearly 4:1.	Accepted. But not much to do. This seems like an aside rather than a comment suggesting any changes to the text. Regardless, mention of subsidies is made elsewhere in the section.	Henry Neufeldt	UNEP DTU Partnership	Denmark
20097	27	18		20	Worth mentioning by how much the target was missed	thing to do and Ch 15 spends a lot of effort in addressing that issue. Thus, we provide the line of sight link to the relevant section in ch 15.	Henry Neufeldt	UNEP DTU Partnership	Denmark

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
20099	27	31			Never heard of a low-carbon SME before.	Accepted. This text has been removed.	Henry Neufeldt	UNEP DTU Partnership	Denmark
20101	29	24			Optimal emission reduction is a fallacy when the problem is the challenge of staying within levels of global heating that avoid the worst impacts	Accepted - we changed this to "an optimal tradeoff".	Henry Neufeldt	UNEP DTU Partnership	Denmark
20103	29	37		39	That's hardly the reason but rather the consequence of being less developed and poor. Poor people and poor countries tend to be more vulnerable (all else being equal).	Accepted - we have changed the wording.	Henry Neufeldt	UNEP DTU Partnership	Denmark
20105	29	42		44	A typical mistake of macro-economics; because it does not appropriately account for the much higher risks to investments and the absence of functioning markets and supply chains, which are typically a function of poor governance, weak institutions, and the lack of enabling environments. If the models would capture those effects properly, you'd realize that mitigation is often much cheaper in the Global North. But that would mean we'd have to do something rather than pretending we can outsource the problem to the Global South.	Accepted - The sentence is deleted.	Henry Neufeldt	UNEP DTU Partnership	Denmark
20107	33	47	34	5	I don't understand this line of argument. The NDCs are not MRV'd by other Parties to the Convention. They're only as ambitious as needed, and that is why peer pressure is so important to raise ambition over time. Domestic pressure is crucial to raising that ambition. As far as I know, none of the platforms mentioned play any role in assessing NDC ambition. In fact, the literature referenced is pre-PA.	Accepted, text revised	Henry Neufeldt	UNEP DTU Partnership	Denmark
20109	34	6	0	24	A lot of the rules of Art. 6 are unclear to date	Noted and reflected	Henry Neufeldt	UNEP DTU Partnership	Denmark
20111	35	1	0	0	Rather than an abstract, high-level description of what scenarios are, tie this to the way they are being used throughout the report.	Related to previous 4	Henry Neufeldt	UNEP DTU Partnership	Denmark
20113	37	2	0	8	This is the way all sections should present their case: start with AR5 (SR1.5; SRCCL; SRCO) evidence and then go into what the main chapter will deliberate in more detail - nice!	Thanks!	Henry Neufeldt	UNEP DTU Partnership	Denmark
20115	42	33	0	0	How is this being addressed in the rest of the report? What's the status from AR5 and SRs?	Ch.1 CLAs made significant effort to engage rest of report around transition concepts, with varied degrees of take-up	Henry Neufeldt	UNEP DTU Partnership	Denmark
20117	43	2	0	0	Looks like weird creatures of the deep sea	There was an unfortunate technical error in conversion to PDF, however the Figure has been substnially reworked	Henry Neufeldt	UNEP DTU Partnership	Denmark
20119	45	32	0	0	Shouldn't this be further up?	The whole subsection is now moved further up	Henry Neufeldt	UNEP DTU Partnership	Denmark
20121	47	9	0	14	All very high level and not really connected to the rest of the report	We have made effort to strengthen the connection with the rest of the chapter.	Henry Neufeldt	UNEP DTU Partnership	Denmark
20123	47	20			This is evidently true. But what does it mean? MLG is a fact everywhere, and in itself neither good or bad. It also does not necessarily lead to CC mitigation. Same with 'good governance': it's a precondition to mitigation (and other policies), but how do you get there? The section refers to many theoretical frameworks, but what is lacking fully is the link to the rest of the chapters. This needs to be central.	The section has been revised in light of comments. We think the section provides the value of MLG in climate mitigation.	Henry Neufeldt	UNEP DTU Partnership	Denmark
20125	47	43		46	What about our moral responsibility for our common future?	We don't understand this comment.	Henry Neufeldt	UNEP DTU Partnership	Denmark
20127	48	1		2	The risk of passing planetary boundaries arises foremost from over-consumption of finite resources and is driven by the growth paradigm. I don't think that there is an a-priori resistance of effective, cooperative governance; but there are other, more pressing interests ...	Text has been revised.	Henry Neufeldt	UNEP DTU Partnership	Denmark

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
20129	49	10		11	"... But equity has also widened to include impacts, adaptation, and support." What's that supposed to mean?	The point here is that equity based discssuion of climate governance focused mostly on climate mitigation but has now widened to include debates about impact, fairness in adaptation and support mechanims such as finance and technology. other aspects. Text has been revised to make this clearer.	Henry Neufeldt	UNEP DTU Partnership	Denmark
20131	49	16		20	I don't understand this.	Text edited.	Henry Neufeldt	UNEP DTU Partnership	Denmark
20133	49	24		26	How do governance experiments sit with limited time? We know what is needed to make transitions happen, the question is whether we have the political will.	Good point. This has not been considered here.	Henry Neufeldt	UNEP DTU Partnership	Denmark
20135	49	28		31	We know quite well what to do. It's action that's missing.	Experimentation is part of action.	Henry Neufeldt	UNEP DTU Partnership	Denmark
20137	50	4		7	Just wondering what kind of 'different governance structures' are needed to implement the PA. The paragraph makes no sense to me. What's the purpose?	changed to refer to levels of governacne	Henry Neufeldt	UNEP DTU Partnership	Denmark
20139	50	16		23	Another framework? Make a table of all frameworks and discuss them in the context of CC mitigation action and support.	Interesting idea - have sharpened the text, if the 'four analytic frameworks' prove robust in review maybe consider a table	Henry Neufeldt	UNEP DTU Partnership	Denmark
20141	50	27		30	Good starting questions!	Thanks	Henry Neufeldt	UNEP DTU Partnership	Denmark
20143	50	32			This is what the chapter should start with ... And then deconstruct the elements according to the report chapters.	Hopefully the new Exec Sum and sharper start helps	Henry Neufeldt	UNEP DTU Partnership	Denmark
20145	51	14			Move to the beginning of the chapter. Then we'll understand how things are meant to fit together.	Accepted. Thank you, the figure has been relocated.	Henry Neufeldt	UNEP DTU Partnership	Denmark
20147	53	1			FAQs are not relevant to the chapter or the report and look primarily at definitions, some of which belong into WG1	Noted, discussed with the Technical Supporting Unit and FAQ 1.4 and 1.5 have been deleted.	Henry Neufeldt	UNEP DTU Partnership	Denmark

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
20263	37	1	38	29	Emission pathways are defined as “plausible representation of the future based on coherent and internally consistent set of assumptions”. This is extremely vague. In order to make the scenarios plausible and consistent, all models optimize something. Optimization is required to make models plausible, because producers, governments and consumers optimize something. Optimization is also a requirement to make models consistent over time. The chapter should be clearer on what is optimized in the different scenarios. Here are the 4 most likely criteria: a)A mix of political feasibility and minimized costs. This leads to higher realism, but less transparency (unless the political constraints are clearly communicated). b)Discounted abatement costs in the period 2020-2100 for a given temperature target in 2100. This leads to large negative emissions in 2100, especially when the discount rate is high. These negative emissions are partly the result of the fact that optimization is indifferent to what happens after 2100 and are therefore time-inconsistent. c)Discounted abatement costs in the period 2020-infinity for a never to exceed temperature target. This is better than B), but the model is indifferent to the timing of the damages, which makes the model insufficiently ambitious at the start and too ambitious in the long run. (Dietz, S., & Venmans, F. M. J. (2019). Cumulative carbon emissions and economic policy: in search of general principles. Journal of Environmental Economics and Management, 96, 108–129.) d)Welfare over the period 2020-infinity. This is in theory leading to time-consistent paths, but is flawed with methodological difficulties: very large role for the discount rate, very large uncertainty for the damage function and difficult to integrate all the sources of uncertainty. The report should contain a brief discussion about the drawbacks of these	Very thoughtful comment - hop we have better addressed these points	Frank Venmans	UMons	Belgium
20269	53	25	53	25	There is no specific mention of waste or wastewater in Section 1.3.1 linked to reference link on line 25 on page 53 and there is no specific mention in Section 1.3.2 (albeit the SDGs which include waate are discussed). See suggested framing for Section 1.3.1 on p14 in next comment below.	Accepted, thank you.	Paul Dumble	Paul's Environmt Lentd	United Kingdom (of Great Britain and Northern Ireland)
20271	14		15		To frame the issue in comment no1 above "Waste and wastewater represent key indicators of human activity as are multisector sustainable resource use and waste hierarchical strategies to reduce or prevent waste or directly mitigate emissions"	Rejected.	Paul Dumble	Paul's Environmt Lentd	United Kingdom (of Great Britain and Northern Ireland)
20505	13	10	13	18	latest PV cost status and projections until 2050 has been discussed and summarised in Vartiainen et al. ( <a href="https://onlinelibrary.wiley.com/doi/full/10.1002/PIP.3189">https://onlinelibrary.wiley.com/doi/full/10.1002/PIP.3189</a> )	Accepted	Christian Breyer	LUT University	Finland
20541	3	3	3	4	the phrase " against many odds" adds an unnecessary value judgment. It also starts the report with a feeling of defeatism.	Accepted, changed	Vassilis Daioglou	Copernicus Institute of Sustainable Development	Netherlands
20543	5	13	5	13	The inclusion of the words "Super-wicked" is unnecessary, childish, and distracting. Also this problem was not foked upon us by an external ominous force bent on the destruction of the world of men (in the Tolkien sense).	Exec Sum completely redrafted	Vassilis Daioglou	Copernicus Institute of Sustainable Development	Netherlands
20545	6	15	6	15	The three reports do not "include", they "are".	Accepted, thank you.	Vassilis Daioglou	Copernicus Institute of Sustainable Development	Netherlands
20549	7	43	7	43	The term "plants" is ambiguous. Perhaps "capital as well".	Changed to "physical capital"	Vassilis Daioglou	Copernicus Institute of Sustainable Development	Netherlands



Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
20551	9	44	9	44	There seems to be something missing in the sentence "The Paris Agreement, hailed as a entered into force..."	Accepted, text revised	Vassilis Daioglou	Copernicus Institute of Sustainable Development	Netherlands
20553	12	18	12	21	The argument that warming increases inequality has to be substantiated better. What are the adverse impacts on growth in warm countries. Why does adverse impact on growth also increase inequality? Is it really climate that is increasing inequality or poor economic policies which mean that low growth leads to higher inequality? This is a very politically charged argument and its reasoning has to be both bullet proof and transparent.	Rejected - more details are found in the literature referred to. We have also added a reference to section 1.5.6 where we discuss mechanisms.	Vassilis Daioglou	Copernicus Institute of Sustainable Development	Netherlands
20555	13	22	18	24	The shale revolution did not "open up new cheap fossil fuel resources...". IT lowered the costs of a previously expensive resource. Combined with the overall higher oil price compared to pre-2010 (long term), shale resources have made significant headway in primary energy supply the past few years. I also object to the location of this sentence. It is placed in a section that highlights developments towards decarbonization, however shale has not contributed towards decarbonization under any pretext (it is very energy intensive, flaring has massive GHG emissions)	This seems a slightly semantic point but we have now just indicated shale with a sentence in section 3 - the point being that it has indeed increased access to more carbon, without commensurate progress in CCS and that is a problem	Vassilis Daioglou	Copernicus Institute of Sustainable Development	Netherlands
20557	19	22	19	22	In figure 1.5, I'm having difficulty with the blue box "The Physical World Characteristics" and their implied effect on the "Sectors". Don't the drivers "Resources" and "Technology" fall under physical world characteristics? What exactly is it that you are implying by this blue area. I suppose it is the characteristics of human systems of production, consumption and service delivery.	The figure has been removed from the revised version	Vassilis Daioglou	Copernicus Institute of Sustainable Development	Netherlands
20559	22	44	22	45	It is unclear what the 3-5% annual increase refers to. Is it the emission levels? The use of liquid fuels? The dependence on liquid fuels? The sectoral activity? Please clarify.	Accepted - [With Additional Explanation - To be completed. Emissions are growing at a rate of 3-5% annually])	Vassilis Daioglou	Copernicus Institute of Sustainable Development	Netherlands
20561	28	20	28	20	The expression "can only do some much" is vague and un-scientific. Please rephrase.	Accepted. Text deleted.	Vassilis Daioglou	Copernicus Institute of Sustainable Development	Netherlands
20563	35	5	35	7	It is mentioned at models are reproducible. I assume the authors are highlighting the fact that a model can be run multiple times returning the same results, however I feel that the term "reproducible" may be controversial. In fact the complexity, specialization and stylized nature of many of the models used to project climate change mitigation scenarios make them very opaque to outsiders with independent reproducibility being near impossible.	Models can range from abstract, theoretical models to extremely complex and numerically calibrated models. While the latter can clearly better represent important features of reality, this comes at the cost of increased opacity for external users. To minimize this important drawback, scenarios produced by the second category of models are extensively cross vetted, results are openly available on line and model features are described in Wiki-type pages, in an effort to increase transparency.	Vassilis Daioglou	Copernicus Institute of Sustainable Development	Netherlands

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
20565	35	17	38	18	<p>The authors first state (correctly) that scenarios are not absolute forecasts of the future. The following sentence states (again correctly) that scenarios are conditional on assumed external events. I feel this language may misrepresent the use of models in climate change scenario analysis. External events (beyond macro-trends such as population growth, regional policy harmonization etc.) are not included in these models. Droughts, social unrest, electoral upsets, etc. are nowhere in there. I also feel the language used by the authors still highlights the word "forecasts" in the use of these models which implies a specific outcome. It could be argued that the use of these models (especially in the SSP-RCP framework) is more about highlighting the "space" of outcomes, and how this space is affected by macro social, economic and environmental conditions.</p> <p>Note the language used in the 1st paragraph of section 3.2.2, particularly the sentence on lines 35-36 of page 11 of Chapter three. There the authors explicitly state that scenarios are no forecasts. I believe the language there is more appropriate.</p>	I hope we have improved the language and consistency, not least with explicit discussion of scenarios moved to section 1.3	Vassilis Daioglou	Copernicus Institute of Sustainable Development	Netherlands
20567	35	48	35	48	Please avoid the word "bin". I guess the authors use this term in its statistical sense, however a non-statistician British-English speaker would interpret it as "to get rid of existing and future scenarios".	Done	Vassilis Daioglou	Copernicus Institute of Sustainable Development	Netherlands
20569	43	2	43	2	Figure 1.7 makes no sense	An unfortunate technical error, but Figure now changed	Vassilis Daioglou	Copernicus Institute of Sustainable Development	Netherlands
20571	34	37	34	37	The title of section 1.5 lead one to expect a discussion.elaboration on analytical tools, but almost nothing is said about integrated assessment models which form a basis for many of the scenario projections. I would expect something of them here.	Does now have a bit more on IAMs but the major text on this is Annex C	Vassilis Daioglou	Copernicus Institute of Sustainable Development	Netherlands
20573	35	1	36	44	Following on my above comment, and the fact that the use of models (with no elaboration on the types of models used) are briefly mentioned in section 1.5.1, I would also expect the importance of inter-model comparison exercises to be mentioned. Model intercomparison projects have become extremely important to understand and contrast modeling methods as well as scenario sensitivities and uncertainties. Model comparison practices, methods , and databases have largely been standardised thorough multiple model intercomparison projects such as AgMIP, CMIP, ISIMIP, the SSP process, the Energy Modeling Forum, and multiple projects involving model consortia (AMPERE, ADVANCE, CDLinks, etc).	We now discuss model intercomparison in 1.5.1	Vassilis Daioglou	Copernicus Institute of Sustainable Development	Netherlands
20917	4	30	4	30	Capital letter on "Aims" while it should be written in lowercase letter	Exec Sum completely redrafted	MOUNIA MOSTEFAOUI	LMD - ENS- Sorbonne	France
20919	3	3	3	3	Add to the Paris Agreementé" that it is based on commitments coming from the Parties	Noted	MOUNIA MOSTEFAOUI	LMD - ENS- Sorbonne	France
20921	3	6	3	6	It's the first mention to the acronym GHG : it should be specified here that this acronym refers to "global greenhouse gas" not in line 12 of this same page	Accepted, text revised	MOUNIA MOSTEFAOUI	LMD - ENS- Sorbonne	France
20923	3	8	3	8	change "in the same year " by " in the course of the same year"	Exec Sum changed	MOUNIA MOSTEFAOUI	LMD - ENS- Sorbonne	France
20925	3	9	3	9	Capital letter on "World" while it should be written in lowercase letter	Exec Sum changed	MOUNIA MOSTEFAOUI	LMD - ENS- Sorbonne	France

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
20927	3	12	3	12	The first mention to the acronym GHG was made on line 6 of this page, it should be specified there that this acronym refers to "global greenhouse gas" not here in line 12 of this same page, so suppress "global greenhouse gas" and the parenthesis on GHG	Due to major revisions of the executive summary, editorial comments have been taken as noted and care was taken not to replicate the issues in the new version.	MOUNIA MOSTEFAOUI	LMD - ENS- Sorbonne	France
20929	3	16	3	16	add "global" in the expression "to meet its agreed aims" and transform it into "to meet its global agreed aims", otherwise the sentence isn't clear.	Noted	MOUNIA MOSTEFAOUI	LMD - ENS- Sorbonne	France
20931	3	27	3	27	Add "the ones from", therefore the corrected sentence becomes "than the ones from poorer countries per-capita"	Exec Sum completely redrafted	MOUNIA MOSTEFAOUI	LMD - ENS- Sorbonne	France
20933	3	30	3	30	Capital letter on "Aims" while it should be written in lowercase letter	Exec Sum completely redrafted	MOUNIA MOSTEFAOUI	LMD - ENS- Sorbonne	France
20935	3	38	3	38	suppress "in where they are in " by " regarding their situations towards reaching out"	Exec Sum completely redrafted	MOUNIA MOSTEFAOUI	LMD - ENS- Sorbonne	France
20937	3	40	3	40	replace approach "to" by approach "for the pursuit"	Exec Sum completely redrafted	MOUNIA MOSTEFAOUI	LMD - ENS- Sorbonne	France
20939	4	2	4	2	add an " s" to damage : damages	Exec Sum completely redrafted	MOUNIA MOSTEFAOUI	LMD - ENS- Sorbonne	France
20941	4	7	4	7	suppress the space after "protectionism"	Exec Sum completely redrafted	MOUNIA MOSTEFAOUI	LMD - ENS- Sorbonne	France
20943	4	7	4	7	suppress the capital letter in "illustrative" and put in a lower case	Exec Sum completely redrafted	MOUNIA MOSTEFAOUI	LMD - ENS- Sorbonne	France
20945	5	5	5	5	add " a" in the sentence which becomes "is viewed as a foundational component"	Exec Sum completely redrafted	MOUNIA MOSTEFAOUI	LMD - ENS- Sorbonne	France
20947	5	13	5	13	suppress the capital letter of " Supper-wicked" and transform it in a lower case "s"	Exec Sum completely redrafted	MOUNIA MOSTEFAOUI	LMD - ENS- Sorbonne	France
20949	5	9	5	9	specify the time scale after the expression "the temperature aim" : add " comparing to pre-industrial levels in the year 2100"	Exec Sum completely redrafted	MOUNIA MOSTEFAOUI	LMD - ENS- Sorbonne	France
20951	5	11	5	12	suppress" including that of reaching" and replace by "including the one of reaching"	Exec Sum completely redrafted	MOUNIA MOSTEFAOUI	LMD - ENS- Sorbonne	France
20953	6	28	6	28	replace "impact on human activity" by "impact of human activity"	Accepted and replaced, thank you.	MOUNIA MOSTEFAOUI	LMD - ENS- Sorbonne	France
20955	6	32	6	32	please add precision : "more slowly" comparing to what?	Clarified	MOUNIA MOSTEFAOUI	LMD - ENS- Sorbonne	France
20957	6	36	6	36	delete the italic type on "chapter 2"	Accepted and amended, thank you.	MOUNIA MOSTEFAOUI	LMD - ENS- Sorbonne	France
20959	6	40	6	40	replace Chs by " Chapters" for consistency with the format used before	Accepted and amended, thank you.	MOUNIA MOSTEFAOUI	LMD - ENS- Sorbonne	France
20961	6	44	6	44	add to in Paris : "in 2015"	Replaced Paris with COP21.	MOUNIA MOSTEFAOUI	LMD - ENS- Sorbonne	France
20963	7	5	7	5	About the fact that " science is clear, cite the article « Scientists Reach 100% Consensus on Anthropogenic Global Warming » by James Powell , First Published November 20, 2019 in the Bulletin of Science, Technology & Society	Accepted	MOUNIA MOSTEFAOUI	LMD - ENS- Sorbonne	France
20965	9	21	9	21	"the 2015 Agreement" not "agreements", it's singular	Accepted, text revised	MOUNIA MOSTEFAOUI	LMD - ENS- Sorbonne	France
20967	10	10	10	11	add : "but it is still far from the USD 100 billion promised at COP21"	accepted, text revised	MOUNIA MOSTEFAOUI	LMD - ENS- Sorbonne	France
20969	10	39	10	39	add : with "the " Paris Agreement target	No target in the PA	MOUNIA MOSTEFAOUI	LMD - ENS- Sorbonne	France
20971	12	18	12	18	Put the plural "inequalities" rather than simply "inequality" are they are on different levels	Accepted	MOUNIA MOSTEFAOUI	LMD - ENS- Sorbonne	France

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
20973	13	4	13	4	Add : it would be interesting to consider studies about the effects that education can have and its possible key role in resolving this contradiction.	Noted. The effect of education is briefly mentioned in 1.3.4.	MOUNIA MOSTEFAOUI	LMD - ENS- Sorbonne	France
20975	14	40	14	40	change "in where they are in their development path "by "in their respective situation regarding their development path"	Suggestion adapted.	MOUNIA MOSTEFAOUI	LMD - ENS- Sorbonne	France
20977	15	20	15	20	Add : "However Jouzel & Larrouturou (2017) did an considerable work in that direction with concrete proposals.	Rejected.	MOUNIA MOSTEFAOUI	LMD - ENS- Sorbonne	France
20979	16	31	16	31	1.5 degree ( singular) Celsius, it is less than two	Edited	MOUNIA MOSTEFAOUI	LMD - ENS- Sorbonne	France
20981	17	19	17	19	delete '1.5' and replace by "a stabilization towards a 1.5°C global warming target for 2100"	Edited.	MOUNIA MOSTEFAOUI	LMD - ENS- Sorbonne	France
20983	18	16	18	16	add "GDP " is therefore	edited.	MOUNIA MOSTEFAOUI	LMD - ENS- Sorbonne	France
20985	18	24	18	24	due "to"	Edited	MOUNIA MOSTEFAOUI	LMD - ENS- Sorbonne	France
20987	19	17	19	17	I suggest to add "education" to "policies, institutions and culture"	As part of edits made to the overall section, this sentence has been removed.	MOUNIA MOSTEFAOUI	LMD - ENS- Sorbonne	France
20989	29	15	29	15	It's a mistake to assimilate the "yellow vest" movement to a "pattern of opposition or support for climate policy among citizens" : statistics show that French citizens are largely preoccupied and in favor of climate policy, the problem of the carbon tax in France as it was set in 2018 was that it was done in an unfair way by which the poorest citizens would pay the higher tribute.	The point of the section and mention of the yellow vest is to highlight the political economy dimension of climate change policies of which the yellow vest movement was an indication. We agree that part of the opposition was based on the perceived unfairness of the prevailing climate policy but this is a separate point.	MOUNIA MOSTEFAOUI	LMD - ENS- Sorbonne	France
20991	29	47	29	47	But one may argue that a more equitable share of money/ GDP per capita could be a simple good universal starting point for more equity, right?	Noted	MOUNIA MOSTEFAOUI	LMD - ENS- Sorbonne	France
20993	30	15	30	15	This sentence is too long and we get lost. Cut after "friendly consumption" and start a new sentence; "The required behavioral changes..."	Accepted	MOUNIA MOSTEFAOUI	LMD - ENS- Sorbonne	France
20995	30	23	30	23	Additionally to Fresco et al. 2016, see also Attali ( 2019) Histoires de l'alimentation : De quoi manger est-il le nom?	Rejected - we mainly base on publications in English when available.	MOUNIA MOSTEFAOUI	LMD - ENS- Sorbonne	France
20997	31	19	31	19	change " a Treaty" by "a Treaty or an Agreement"	Accepted, text revised.	MOUNIA MOSTEFAOUI	LMD - ENS- Sorbonne	France
20999	31	27	31	27	replace " the PA obliges developed country parties to provide financial assistance" by the exact terminology within the PA : the PA states that "developed country Parties shall provide financial resources to assist developing country Parties"	Accepted, text revised.	MOUNIA MOSTEFAOUI	LMD - ENS- Sorbonne	France
21001	31	29	31	29	I don't agree with Bodansky, as there is no legal international jurisdiction for the Paris Agreement.	Noted	MOUNIA MOSTEFAOUI	LMD - ENS- Sorbonne	France
21003	33	25	33	25	About "organized hypocrisy" : cite the source.	Accepted, text revised.	MOUNIA MOSTEFAOUI	LMD - ENS- Sorbonne	France
21005	33	28	33	28	change " are necessary avoid " by "are necessary in order to avoid"	Accepted, text revised.	MOUNIA MOSTEFAOUI	LMD - ENS- Sorbonne	France
21007	33	36	33	36	change "such as an arrangement" by "such an arrangement"	Accepted, text revised	MOUNIA MOSTEFAOUI	LMD - ENS- Sorbonne	France
21009	34	23	34	23	specify this statement : there is actually no " NDC structure"	Text has been revised.	MOUNIA MOSTEFAOUI	LMD - ENS- Sorbonne	France
21011	35	37	35	37	the location is missing after "at"	Done	MOUNIA MOSTEFAOUI	LMD - ENS- Sorbonne	France
21013	35	44	35	44	Add "SPPs" were created	Done	MOUNIA MOSTEFAOUI	LMD - ENS- Sorbonne	France

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
21015	36	5	36	5	to be consistent, add the associated range of warming relative to 8.5 W/m2	Noted, thank you	MOUNIA MOSTEFAOUI	LMD - ENS- Sorbonne	France
21017	36	30	36	30	additionnally to positive and negative , isn't the 'neutral' option?	Noted, thank you	MOUNIA MOSTEFAOUI	LMD - ENS- Sorbonne	France
22081	1	1	5		I apologise but even as a social scientist I am struggling with the framing because I think I was looking for the mitigation pathways data first -I really welcome the empahsis on mitigation in the context of equity, justice, sustainable development, and ethics for example but <b>would it be helpful but have a feel overall for the scale of mitigation required via varying pathways to achieve 1.5, 2, 3, 4 degrees on average warming worlds and then be introduced to the social justice and ethical principles/dilemmas that these alternative pathways will present or require; then a discussion about framework of assessment that will be applied?</b> - I wonder for example if e Kowarsch and Edenhofer 2016 on principles and pathways or Lenzi Lamb et al 2018 Nature Climate might be useful- these are editorial organising comments- I think it might help to bring the argument to the fore and provide a launch pad for the chapter and report as a whole -as a reader I am looking both for the mitigation pathways and the assessment criteria- could the discussion in the executive summary be reorganised to orientate me first to the over all mitigation science changes since AR5, likely pathways and sources/risks then the framework for assessing mitigation approaches? see also Gasper D., Rocca S. (2020) Where Are Criteria of Human Significance in Climate Change Assessment?. In: Crabtree A. (eds) Sustainability, Capabilities and Human Security. Palgrave Macmillan, Cham	Addressed with inclusion of section 3, including the Illustrative Pathways	Bronwyn Hayward	University of Canterbury	New Zealand
22083	8	24		25	I welcome the point made about climate adaptation and mitigation seen as a means to advance Sustainable development and eradicate poverty and not as an end in themselves under the Paris Agreement- I wonder if this point could also be brought back up into the executive summary and whether the omission of that phrase when quoting the Paris Agreement in the Exec summary is a mistake (because it obfuscates the core point made here). Given this may be a contentious point, anchoring it in the Paris agreement and a review of recent literature may also assist eg Campagnolo and Davide 2019 <a href="https://doi.org/10.1016/j.worlddev.2019.05.015">https://doi.org/10.1016/j.worlddev.2019.05.015</a> and adding more nuance for eg Hubacek, K., Baiocchi, G., Feng, K. et al. Poverty eradication in a carbon constrained world. Nat Commun 8, 912 (2017). <a href="https://doi.org/10.1038/s41467-017-00919-4">https://doi.org/10.1038/s41467-017-00919-4</a>	Thanks for the comment and the references. We will consider including them at the appropriate place.	Bronwyn Hayward	University of Canterbury	New Zealand
22085	40	21	0	30	I wonder if in introducing ethics we could begin with changes in legislation or agreements since AR5 and in particular feature the human rights debates about mitigation (human rights as a key word is missing from the chapter at present but has emerged and is emerging as a key issue in eththical policy debate / see for example Lenzi et al 2018 or Gasper D. (2020) Human Development Thinking About Climate Change Requires a Human Rights Agenda and an Ontology of Shared Human Security. In: Crabtree A. (eds) Sustainability, Capabilities and Human Security. Palgrave Macmillan, Cham; and see the office of Human rights <a href="https://www.ohchr.org/EN/Issues/HRAndClimateChange/Pages/HRClimateChangeIndex.aspx">https://www.ohchr.org/EN/Issues/HRAndClimateChange/Pages/HRClimateChangeIndex.aspx</a>	The excellent suggestion on human rights has been incorporated.	Bronwyn Hayward	University of Canterbury	New Zealand

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
22087	3	12	3	12	Full form of GHG (greenhouse gas) should appear in Line 6	Due to major revisions of the executive summary, editorial comments have been taken as noted and care was taken not to replicate the issues in the new version.	Sabaruddin Kadir	Soil Science Department, Fac. of Agriculture, Universitas Sriwijaya, Inderalaya, South Sumatra	Indonesia
22089	4	7	4	7	Placement of a comma	Exec Sum completely redrafted	Sabaruddin Kadir	Soil Science Department, Fac. of Agriculture, Universitas Sriwijaya, Inderalaya, South Sumatra	Indonesia
22091	6	5	6	5	Is full form of "greenhouse gas" a necessitate to appear in stead of using abbreviation GHG because the full form has appeared in previous line as suggested in Page 3 Line 12	Accepted, thank you.	Sabaruddin Kadir	Soil Science Department, Fac. of Agriculture, Universitas Sriwijaya, Inderalaya, South Sumatra	Indonesia
22093	8	24	8	43	Is it possible to mention that AR6 will also address issues in peatsoil (GHG emission, fires, the importance of seeking good agricultural practices (GAP), etc.)?	Perhaps this point can be raised with Chapter 7 (AFOLU).	Sabaruddin Kadir	Soil Science Department, Fac. of Agriculture, Universitas Sriwijaya, Inderalaya, South Sumatra	Indonesia
22095	11	21	11	33	Why is only emission by energy sector addressed ?	See response above on including other GHGs.	Sabaruddin Kadir	Soil Science Department, Fac. of Agriculture, Universitas Sriwijaya, Inderalaya, South Sumatra	Indonesia
22097	12	30	12	39	Results of peer reviewed studied are required to support the roles of youth in boosting the importance to mitigate climate changes	Accepted -we have added some references	Sabaruddin Kadir	Soil Science Department, Fac. of Agriculture, Universitas Sriwijaya, Inderalaya, South Sumatra	Indonesia
22099	13	44	13	44	Typo on "specifically"	Corrected	Sabaruddin Kadir	Soil Science Department, Fac. of Agriculture, Universitas Sriwijaya, Inderalaya, South Sumatra	Indonesia
22101	15	5	15	5	Placement of a comma	Edited.	Sabaruddin Kadir	Soil Science Department, Fac. of Agriculture, Universitas Sriwijaya, Inderalaya, South Sumatra	Indonesia
22103	15	39	15	39	Typo on "won"	Corrected.	Sabaruddin Kadir	Soil Science Department, Fac. of Agriculture, Universitas Sriwijaya, Inderalaya, South Sumatra	Indonesia
22105	18	22	18	22	Full stop after the .....Sugiawan et al., 2019)	Edited.	Sabaruddin Kadir	Soil Science Department, Fac. of Agriculture, Universitas Sriwijaya, Inderalaya, South Sumatra	Indonesia
22107	18	44	18	44	Redundancy on Figure 1.5	Figure and reference have been removed.	Sabaruddin Kadir	Soil Science Department, Fac. of Agriculture, Universitas Sriwijaya, Inderalaya, South Sumatra	Indonesia
22109	25	8	25	14	How important as public education as part of social dimention of climate change issues?	Rejected - This is discussed in 1.4.7 (social innovation and behaviour change)	Sabaruddin Kadir	Soil Science Department, Fac. of Agriculture, Universitas Sriwijaya, Inderalaya, South Sumatra	Indonesia

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
22111	27	22	27	22	Placement of a period	Accepted. Corrected.	Sabaruddin Kadir	Soil Science Department, Fac. of Agriculture, Universitas Sriwijaya, Inderalaya, South Sumatra	Indonesia
22113	27	34	28	5	Financial use efficiency is also widely varied both by sectors and countries	Accepted. Indeed, we agree, and we think this is not in disagreement with the text.	Sabaruddin Kadir	Soil Science Department, Fac. of Agriculture, Universitas Sriwijaya, Inderalaya, South Sumatra	Indonesia
22115	30	14	30	14	Placement of a period	Accepted	Sabaruddin Kadir	Soil Science Department, Fac. of Agriculture, Universitas Sriwijaya, Inderalaya, South Sumatra	Indonesia
22117	30	24	30	30	The importance of early education on environment is also imporant to be enhanced. Paticipation of the youth is also crucial.	Noted - We think this is covered by our sentence.	Sabaruddin Kadir	Soil Science Department, Fac. of Agriculture, Universitas Sriwijaya, Inderalaya, South Sumatra	Indonesia
22119	31	42	32	39	It seems that this sub-chapter stresses only on energy. To be balanced, Policy Drivers on other sectors needs also to be adressed	Accepted and to be more fully reviewed in final	Sabaruddin Kadir	Soil Science Department, Fac. of Agriculture, Universitas Sriwijaya, Inderalaya, South Sumatra	Indonesia
22121	34	14	34	14	Placement of a comma	Text has been revised	Sabaruddin Kadir	Soil Science Department, Fac. of Agriculture, Universitas Sriwijaya, Inderalaya, South Sumatra	Indonesia
22123	41	18	41	18	Placement of a period	OK	Sabaruddin Kadir	Soil Science Department, Fac. of Agriculture, Universitas Sriwijaya, Inderalaya, South Sumatra	Indonesia
22125	41	8	41	22	What about social and economic resilience due to limited options in livelihood, e.g. poor individual skill, limited availability of land, poor understanding on climate change issue, etc.	Comment is unclear as to the change or edit that is required.	Sabaruddin Kadir	Soil Science Department, Fac. of Agriculture, Universitas Sriwijaya, Inderalaya, South Sumatra	Indonesia
22127	41	23	41	31	The importance of mainstreaming climate change issues into development planning is also important means to strengthen the commitment mainly of the government, e.g. in providing financial support to mitigate climate change issues	We agree. This point is made in serval sections in the chapter	Sabaruddin Kadir	Soil Science Department, Fac. of Agriculture, Universitas Sriwijaya, Inderalaya, South Sumatra	Indonesia
22129	43	29	43	31	Miss spelling on "levels" on the use of "is"	Corrected	Sabaruddin Kadir	Soil Science Department, Fac. of Agriculture, Universitas Sriwijaya, Inderalaya, South Sumatra	Indonesia
22131	43	33	44	19	What about the market demands that land-based raw material for industries must be traceable but not being accompanied by economically profitable prices to farmers	Sorry but I cant see what this refers to?	Sabaruddin Kadir	Soil Science Department, Fac. of Agriculture, Universitas Sriwijaya, Inderalaya, South Sumatra	Indonesia
22133	44	36	45	30	Transformation must also include paradigm shift from "Crisis Management" to "Risk Management"	Touched on both in new section on risk, and brief reference to "Rich-Opportunity" assessment	Sabaruddin Kadir	Soil Science Department, Fac. of Agriculture, Universitas Sriwijaya, Inderalaya, South Sumatra	Indonesia
22289	5	13	5	14	governance at different scale and levels	Text has been revised.	MD ABU SYED	Bangladesh Centre for Advanced Studies (BCAS)	Bangladesh

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22291	5	13	5	14	may like to rephrase the sentence to incorporate various scales and levels of governance required	Exec Sum completely redrafted	MD ABU SYED	Bangladesh Centre for Advanced Studies (BCAS)	Bangladesh
22293	6	23	6	30	Though we don't like to look back and spend time resources on what happened. Our global governance plan and process must address the concern of the commoners of the low income nations who have little to no contribution in emission and climate change. However, they are the one who face the brunt of climate induced extreme events. Hence, IPCC report must (possibly this part as well) emphasise on "differentiated and distributed responsibility" most emitting nations in mitigation and adaptation+mitigation efforts. How far the developed or emitting nations responding to PA calls for resources mobilization/promised.	Broad point accepted, text revised	MD ABU SYED	Bangladesh Centre for Advanced Studies (BCAS)	Bangladesh
22295	9	31	9	33	Though we don't like to look back and spend time resources on what happened. Our global governance plan and process must address the concern of the commoners of the low income nations who have little to no contribution in emission and climate change. However, they are the one who face the brunt of climate induced extreme events. Hence, IPCC report must (possibly this part as well) emphasise on "differentiated and distributed responsibility" most emitting nations in mitigation and adaptation+mitigation efforts. How far the developed or emitting nations responding to PA calls for resources mobilization/promised.	Noted	MD ABU SYED	Bangladesh Centre for Advanced Studies (BCAS)	Bangladesh
22297	10	9	10	11	If "pledges" don't translate into action or reality, prime objective of GCF remain unmet and PA as well. However, this is not addressed here.	noted	MD ABU SYED	Bangladesh Centre for Advanced Studies (BCAS)	Bangladesh
22299	10	38	10	43	Though we don't like to look back and spend time resources on what happened. Our global governance plan and process must address the concern of the commoners of the low income nations who have little to no contribution in emission and climate change. However, they are the one who face the brunt of climate induced extreme events. Hence, IPCC report must (possibly this part as well) emphasise on "differentiated and distributed responsibility" most emitting nations in mitigation and adaptation+mitigation efforts. How far the developed or emitting nations responding to PA calls for resources mobilization/promised.	This indeed well put. Not sure if this section is the place for us to address it adequately but we should review?	MD ABU SYED	Bangladesh Centre for Advanced Studies (BCAS)	Bangladesh
22301	14	6	14	9	should we include "development pathway" or "adaptation pathway" where we have all the sectors and context considered and options are examined so that in path of "development" or "adaptation" people/nations may change its route (Lawrence & Haasnoot 2017)	Discussion on pathways has been incorporated. Development Pathways is addressed extensively in chapter 4 of this report	MD ABU SYED	Bangladesh Centre for Advanced Studies (BCAS)	Bangladesh
22303	14	6	14	9	Lawrence, J. and Haasnoot, M. (2017). What it took to catalyse uptake of dynamic adaptive pathways planning to address climate change uncertainty ; Environmental Science & Policy, 68 (2017) 47–57	This comment is not fully understood.	MD ABU SYED	Bangladesh Centre for Advanced Studies (BCAS)	Bangladesh



Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
22341	12	30	13	4	<p>There is not only "pressure for stronger action" or "strong resistance by citizens", but also: Willingness, facing obstacles. Housing is a economic good as well as a social good. Regarding tenants it is not just about resistance, it is about social issues. Other examples are the national (or even Europe wide) obstacles for an intensive expansion of the generation of renewable energy in buildings and in neighborhoods.</p> <p>For German examples please see:  www.iw2050.de (challenge climate neutrality for housing companies with tenants with low and middle incomes)</p> <p>Hecking, Harald et. al.: dena-Leitstudie Integrierte Energiewende. Köln 2018 (dena lead study Integrated energy transition), Chapter 7.5.2.3 Picture 143: 30 to 40 billion EUR additional annual costs for the building sector (for 95%) - who will pay for it?) <a href="https://www.dena.de/fileadmin/dena/Dokumente/Pdf/9261_dena-Leitstudie_Integrierte_Energiewende_lang.pdf">https://www.dena.de/fileadmin/dena/Dokumente/Pdf/9261_dena-Leitstudie_Integrierte_Energiewende_lang.pdf</a></p> <p>Andreas Pfnür und Nikolas Müller (2013): Energetische Gebäudesanierung in Deutschland, Studie Teil II: Prognose der Kosten alternativer Sanierungsfahrpläne und Analyse der finanziellen Belastungen für Eigentümer und Mieter bis 2050. In: Andreas Pfnür (Hrsg.), Arbeitspapiere zur immobilienwirtschaftlichen Forschung und Praxis, Band Nr. 28. Chapter 6.2, chart 75 - Share of housing costs from household net income, before and after an energetic renovation</p>	Accepted - social issues are now stressed in this paragraph.	Ingrid Vogler	GdW Bundesverband deutscher Wohnungs- und Immobilienunternehmen e.V.	Germany
22921	14	32	18	37	This section would benefit from mentioning the ways in which sustainable development and gender overlap. Women in poverty often face an unequitable burden of responding to climate change. I think this section should incorporate a gender lens.	It has been noted that marginal and vulnerable people tend to bear the biggest brunt of climate impact. Other chapters develop this point and mention gender and other dimensions of inequality.	Kelsey Ross	The Center for Global Development	United States of America
22951	4	1	5	45	Green technologies include extremely complex and expensive advanced technology (high-tech) and the simplest technologies that serve basic human needs. ITC has identified renewable energy, green information technology and related services, and waste recycling and water treatment as the most promising sectors in terms of export growth and opportunities. The table opposite details exportable technologies and services and their potential for South-South trade.	Noted. Good comment but it wasn't clear if any recommendation action for our chapter - may be more for Ch.16 Also couldn't see the table	Denise Okpala	Mrs.	Nigeria
22953	13	33	14	46	Climate change aggravates the effects of population growth, poverty, and rapid urbanisation. Without serious adaptation, climate change is likely to push millions further into poverty and limit the opportunities for sustainable development and for people to escape from poverty.	Suggestion adapted. Thank you	Denise Okpala	Mrs.	Nigeria
24201	2	9	2	9	The page "1-11" has been misplaced.	Exec Sum changed	Mi Zhifu	University College London	United Kingdom (of Great Britain and Northern Ireland)
24203	2	29	2	30	The page "1-45" has been misplaced.	Exec Sum changed	Mi Zhifu	University College London	United Kingdom (of Great Britain and Northern Ireland)

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
24205	3	15	3	19	I suggest it will be better to include the global emission align with 2 and 1.5 degrees. Comparing them with the current national commitment can let the reader have a better understanding of how much emission we still need to mitigate.	We believe this point is now addressed through our section 1.3 and its inclusion of scenarios and the Illustrative Pathways. But also it is not job of AR6 to focus only the Paris goals (there was the SR1.5), we also need to present the wider spectrum	Mi Zhifu	University College London	United Kingdom (of Great Britain and Northern Ireland)
24207	4	7	4	7	An unexpected space after "protectionism".	The word makes sense in the context, we think.	Mi Zhifu	University College London	United Kingdom (of Great Britain and Northern Ireland)
24209	4	27	4	28	"Electric vehicles, communications, ..."	Text has been revised.	Mi Zhifu	University College London	United Kingdom (of Great Britain and Northern Ireland)
24211	3	12	4	45	Both "GHG (page 3 line 12)" "Greenhouse Gas emissions (page 3 line 35)" and "greenhouse gas emissions (page 4 line 36)" were used. I suggest it will be better to unify the word within the summary.	Exec Sum completely redrafted	Mi Zhifu	University College London	United Kingdom (of Great Britain and Northern Ireland)
24213	18	21	18	22	Figure 1.5 Some sectors are overlapped, while 'urbanization' is not a sector.	Figure revised.	Mi Zhifu	University College London	United Kingdom (of Great Britain and Northern Ireland)
24215	21	35	21	38	Formating ssue of "CO2" and the "y" of "Economy".	Accepted	Mi Zhifu	University College London	United Kingdom (of Great Britain and Northern Ireland)
24217	35	2	35	2	Delete the space at the beginning of the paragraph. "Scenarios are ..."	Noted, thank you	Mi Zhifu	University College London	United Kingdom (of Great Britain and Northern Ireland)
24219	35	30	35	30	"per-reviewed" - "peer-reviewed"	Done	Mi Zhifu	University College London	United Kingdom (of Great Britain and Northern Ireland)
24221	36	2	36	2	Do you mean "descriptive narratives and quantified scenarios"?	Noted, thank you	Mi Zhifu	University College London	United Kingdom (of Great Britain and Northern Ireland)
24223	36	27	36	27	Change "(Robust Decision Making, RDM)" to "Robust Decision Making (RDM)"	Noted, thank you	Mi Zhifu	University College London	United Kingdom (of Great Britain and Northern Ireland)
24225	43	1	43	1	Figure 1.7 can not display right on my computer as it totally black here.	An unfortunate technical error, but Figure now changed	Mi Zhifu	University College London	United Kingdom (of Great Britain and Northern Ireland)
24227	67	41	67	43	Format of the reference: use italics for the title.	Thank you, but this is the style chosen by the TSU, we cannot change it.	Mi Zhifu	University College London	United Kingdom (of Great Britain and Northern Ireland)
24229	68	6	68	8	Format of the reference: converts the uppercase to lowercase	Thank you, but this is the style chosen by the TSU, we cannot change it.	Mi Zhifu	University College London	United Kingdom (of Great Britain and Northern Ireland)
24231	68	45	68	46	Format of the reference: converts the uppercase to lowercase	This is an abbreviation which is part of the referencing style, which we cannot change because it has been determined for the whole of AR6 to use.	Mi Zhifu	University College London	United Kingdom (of Great Britain and Northern Ireland)
24233	78	20	78	23	Format of the reference: converts the uppercase to lowercase	This is an abbreviation which is part of the referencing style, which we cannot change because it has been determined for the whole of AR6 to use.	Mi Zhifu	University College London	United Kingdom (of Great Britain and Northern Ireland)
24271	3	26	3	28	The text mentioned that some developed countries have embarked on much lower GHG development pathways. While encouraging, the contention would more convincing if examples could be provided?	Exec Sum completely redrafted	David Houle	Environment and Climate Change Canada	Canada

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
24273	38	17	38	19	Not all readers will be familiar with Stern's (2015) six market failures that carbon pricing addresses. They should be briefly mentioned.	OK	David Houle	Environment and Climate Change Canada	Canada
24275	4	19	4	19	The authors make the general affirmation that: " <i>With existing technologies and practices, some difficult tradeoffs (sic) may be unavoidable.</i> " This is a good example of contentions about trade-offs that are not supported by evidence, citations, or examples. This one is also ambiguous, some trade-offs 'may' be unavoidable. I would either remove the contention or use evidence to substantiate it. In the process, I would seek to determine whether such unavoidable trade-offs are indeed present. If so, this would be indeed an important point. <i>Also, the notion of 'trade-offs within current practices and technologies' is not very helpful given constant technological evolution and variation in practices. It would be more important to point at trade-offs that would be unavoidable regardless of technological evolution (at least within what could be reasonably forecasted).</i>	Text has been revised.	David Houle	Environment and Climate Change Canada	Canada
24277	12	8	12	13	Now pandemics seem to be an omission in the discussion of macro-economic uncertainties.	Accepted - we have added a sentence on this	David Houle	Environment and Climate Change Canada	Canada
24687	3	3	3	4	Delete "against many odds"	Accepted, changed	Eleni Kaditi	Organization of the Petroleum Exporting Countries (OPEC)	Austria
24689	3	5	3	5	Replace "deal with the impacts of climate change" with "adapt to the adverse impacts of climate change and foster climate resilience"	Noted	Eleni Kaditi	Organization of the Petroleum Exporting Countries (OPEC)	Austria
24691	3	13	3	13	Delete "exceptionally"	Noted	Eleni Kaditi	Organization of the Petroleum Exporting Countries (OPEC)	Austria
24693	3	24	3	24	Replace "policy" with "action"	Exec Sum completely redrafted	Eleni Kaditi	Organization of the Petroleum Exporting Countries (OPEC)	Austria
24695	3	30	3	30	Replace "Aims" with "aims"	Exec Sum completely redrafted	Eleni Kaditi	Organization of the Petroleum Exporting Countries (OPEC)	Austria
24697	3	35	3	35	Replace "Gas" with "gas"	Exec Sum completely redrafted	Eleni Kaditi	Organization of the Petroleum Exporting Countries (OPEC)	Austria
24699	4	25	4	31	Add reference to energy efficiency improvement	Exec Sum completely redrafted	Eleni Kaditi	Organization of the Petroleum Exporting Countries (OPEC)	Austria
24701	6	18	6	18	Add (SRCCCL)	Added, thank you.	Eleni Kaditi	Organization of the Petroleum Exporting Countries (OPEC)	Austria
24703	6	37	6	37	Replace "cheap" with "low cost"	Accepted, reworded	Eleni Kaditi	Organization of the Petroleum Exporting Countries (OPEC)	Austria
24705	6	42	6	42	Replace "policy" with "action"	Accepted, thank you.	Eleni Kaditi	Organization of the Petroleum Exporting Countries (OPEC)	Austria
24707	7	11	7	12	Delete "Climate change will in turn ... carbon sinks (WGI)."	Can the reviewer provide evidence / eference if this is incorrect? We have included reference to IPCC Land Use report	Eleni Kaditi	Organization of the Petroleum Exporting Countries (OPEC)	Austria

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
24709	7	38	7	38	Replace "2-1.5°C" with "below 2°C"	SR1.5 studies scenarios that limit warming to 1.5 or 2°C. Text has been changed accordingly.	Eleni Kaditi	Organization of the Petroleum Exporting Countries (OPEC)	Austria
24711	9	6	9	7	Delete "- implying a need for equitable sharing of the effort"	This is simply reporting what was stated in AR5.	Eleni Kaditi	Organization of the Petroleum Exporting Countries (OPEC)	Austria
24713	9	9	9	9	Replace "or" with "and"	This is part of a verbatim quote from AR5 WG3 Box TS.1 p. 37.	Eleni Kaditi	Organization of the Petroleum Exporting Countries (OPEC)	Austria
24715	9	26	9	26	Replace "committed Parties" with "aims"	Accepted, text revised	Eleni Kaditi	Organization of the Petroleum Exporting Countries (OPEC)	Austria
24717	9	29	9	29	Delete "for eight specific steps forward"	Accepted, text revised	Eleni Kaditi	Organization of the Petroleum Exporting Countries (OPEC)	Austria
24719	9	44	9	44	Delete "hailed as a"	Accepted, text revised	Eleni Kaditi	Organization of the Petroleum Exporting Countries (OPEC)	Austria
24721	10	1	10	11	Refer to the Talanoa dialogue held in 2018	accepted, text revised	Eleni Kaditi	Organization of the Petroleum Exporting Countries (OPEC)	Austria
24723	10	1	10	11	Refer to Art 10 of the PA on technology	Accepted, text revised	Eleni Kaditi	Organization of the Petroleum Exporting Countries (OPEC)	Austria
24725	10	22	10	22	Delete "its Third 'Aim'"	Phrasing changed	Eleni Kaditi	Organization of the Petroleum Exporting Countries (OPEC)	Austria
24727	10	28	10	31	Delete "For low- and middle-income countries ... World Bank 2019a)."	amended	Eleni Kaditi	Organization of the Petroleum Exporting Countries (OPEC)	Austria
24729	10	43	10	46	Delete "To date, ... (Chapter 15, 15.6.3)."	Why? Unclear	Eleni Kaditi	Organization of the Petroleum Exporting Countries (OPEC)	Austria
24731	11	4	11	5	Delete "formed the basic ... which"	Accepted - text revised	Eleni Kaditi	Organization of the Petroleum Exporting Countries (OPEC)	Austria
24733	11	13	11	16	Delete "Initiatives launched for ... climate change (Mead 2015)."	Accepted - text revised	Eleni Kaditi	Organization of the Petroleum Exporting Countries (OPEC)	Austria
24735	12	10	12	13	Consider the latest developments on trade disputes	Taken into account. Trade dispute is mentioned under macroeconomic uncertainties and global trend contrary to multilateral cooperation.	Eleni Kaditi	Organization of the Petroleum Exporting Countries (OPEC)	Austria
24737	12	26	12	27	Delete "Despite great efforts to secure the Paris Agreement (...),"	Accepted	Eleni Kaditi	Organization of the Petroleum Exporting Countries (OPEC)	Austria
24739	14	42	14	44	Delete "The processes and politics ... in this report cover"	Edited.	Eleni Kaditi	Organization of the Petroleum Exporting Countries (OPEC)	Austria
24741	15	11	15	16	Delete "The green economy ... Kamuti 2015)."	Rejected.	Eleni Kaditi	Organization of the Petroleum Exporting Countries (OPEC)	Austria

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
24743	15	31	15	31	Delete "green building" and "green production"	Edited.	Eleni Kaditi	Organization of the Petroleum Exporting Countries (OPEC)	Austria
24745	16		16		Delete Figure 1.3	Figure revised	Eleni Kaditi	Organization of the Petroleum Exporting Countries (OPEC)	Austria
24747	16	26	16	26	Delete "the timelines"	Edited.	Eleni Kaditi	Organization of the Petroleum Exporting Countries (OPEC)	Austria
24749	17	18	17	27	Delete "While Figure 1.4 envisions ... national circumstances"	Revised.	Eleni Kaditi	Organization of the Petroleum Exporting Countries (OPEC)	Austria
24751	17		17		Delete Figure 1.4	Figure revised.	Eleni Kaditi	Organization of the Petroleum Exporting Countries (OPEC)	Austria
24753	18	4	18	10	Delete "Figure 1.4 also communicates ... malnutrition, health, etc."	Figure edited.	Eleni Kaditi	Organization of the Petroleum Exporting Countries (OPEC)	Austria
24755	18	33	18	35	Delete "This is more so important ... Raupach et al. 2004)."	Rejected.	Eleni Kaditi	Organization of the Petroleum Exporting Countries (OPEC)	Austria
24757	18	44	18	44	Delete "Figure 1.5"	Figure and reference have been removed.	Eleni Kaditi	Organization of the Petroleum Exporting Countries (OPEC)	Austria
24759	19	15	19	16	Delete "The challenge of mitigation would largely disappear if fossil fuels were small, or where zero carbon resources are cheap and plentiful."	Accepted, this sentence has been removed.	Eleni Kaditi	Organization of the Petroleum Exporting Countries (OPEC)	Austria
24761	19	17	19	18	Delete "Existing energy institutions have been largely shaped around fossil fuels, and"	As part of edits made to the overall section, this sentence has been removed.	Eleni Kaditi	Organization of the Petroleum Exporting Countries (OPEC)	Austria
24763	23	5	23	7	Refer to the tradeoffs related to the ocean renewables	The reference to ocean renewables has been removed as it does not fit with consumption and trade	Eleni Kaditi	Organization of the Petroleum Exporting Countries (OPEC)	Austria
24765	26	28	26	32	Delete "For example, ... in 2030 (IEA 2019)."	Rejected. There is robust evidence that shifts in investment patterns will need to occur and the IEA source cited is legitimate. However, the numerical values were deleted and replaced by order of magnitude statements.	Eleni Kaditi	Organization of the Petroleum Exporting Countries (OPEC)	Austria
24767	26	38	26	47	Delete "Increasing demand for transparency ... Monasterolo et al. 2017)."	Rejected. The TCFD is a major initiative on climate finance and is endorsed by several central banks, private and public actors. It has been widely documented and produced important literature supporting financial regulation.	Eleni Kaditi	Organization of the Petroleum Exporting Countries (OPEC)	Austria
24769	27	1	27	1	Delete "The TCFD provides guidance but leaves it to actors to chart the way forward."	Accepted. Text deleted.	Eleni Kaditi	Organization of the Petroleum Exporting Countries (OPEC)	Austria
24771	27	10	27	11	Delete "Fossil fuel extraction and supply chains .. Chapter 15, 15.6.3)."	The text has been deleted	Eleni Kaditi	Organization of the Petroleum Exporting Countries (OPEC)	Austria
24773	28	9	28	12	Delete "To improve financial flows ... de-risking measures."	Accepted. This text has been deleted.	Eleni Kaditi	Organization of the Petroleum Exporting Countries (OPEC)	Austria

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
24775	28	20	28	22	Delete "Reviewing the BRI ... to their overseas investments."	Rejected. The reference provided is from a credible source. The sentence has been edited slightly to read "Voituriez et al. (2019) identify significant mitigation potential if financing countries simply applied their own environmental standards to their overseas investments."	Eleni Kaditi	Organization of the Petroleum Exporting Countries (OPEC)	Austria
24777	28	38	28	40	Delete "But the constraint is also political, ... Levy 2009)."	Text revised	Eleni Kaditi	Organization of the Petroleum Exporting Countries (OPEC)	Austria
24779	29	1	29	17	Delete "One of the factors limiting ... one recent example)."	Text is revised	Eleni Kaditi	Organization of the Petroleum Exporting Countries (OPEC)	Austria
24781	30	7	30	7	Replace "public as private" with "public and private"	Accepted	Eleni Kaditi	Organization of the Petroleum Exporting Countries (OPEC)	Austria
24783	30	45	31	2	Delete "Several scholars have traced ... Wilhite 2016)."	We don't see the problem with this sentence.	Eleni Kaditi	Organization of the Petroleum Exporting Countries (OPEC)	Austria
24785	33	36	33	36	Delete "as"	Accepted, text revised	Eleni Kaditi	Organization of the Petroleum Exporting Countries (OPEC)	Austria
24787	34	6	34	24	Delete "Article 6 of the Paris Agreement ... increase ambition."	Text has been revised	Eleni Kaditi	Organization of the Petroleum Exporting Countries (OPEC)	Austria
24789	36	34	36	43	Delete "A new scenario user that has emerged ... alternative scenarios."	As multiple reviewer have appreciated this part, which is then extensively covered in the chapter on finance, we have decided to keep this here, but modifying it to make it more general.	Eleni Kaditi	Organization of the Petroleum Exporting Countries (OPEC)	Austria
24791	38	14	38	19	Delete "Carbon pricing is often seen ... certain assumptions."	We don't see the problem with this sentence.	Eleni Kaditi	Organization of the Petroleum Exporting Countries (OPEC)	Austria
24793	38	27	38	28	Delete "a study of 66 implemented ... windows of opportunity"	We don't see the problem with this sentence.	Eleni Kaditi	Organization of the Petroleum Exporting Countries (OPEC)	Austria
24795	41	12	41	22	Delete "Hackman (2016) has suggested ... on environmental limits."	Rejected. This point is made in the litratre cited.	Eleni Kaditi	Organization of the Petroleum Exporting Countries (OPEC)	Austria
24797	42	40	42	43	Delete "Each of these highlight ... meso and macro."	Reason for comment is not provided.	Eleni Kaditi	Organization of the Petroleum Exporting Countries (OPEC)	Austria
24799	43	0	43	0	Delete Figure 1.7	There was an unfortunate technical error in conversion to PDF, however the Figure has been substnially reworked	Eleni Kaditi	Organization of the Petroleum Exporting Countries (OPEC)	Austria
24801	46	37	46	39	Delete "As suggested by Figure 1.3 ... and actors within them."	Changed	Eleni Kaditi	Organization of the Petroleum Exporting Countries (OPEC)	Austria
24803	50	4	50	15	Delete "Rayner et al (2019) ...(Chandrashekeran 2016)."	We believe this statement is useful.	Eleni Kaditi	Organization of the Petroleum Exporting Countries (OPEC)	Austria
24805	52	14	52	14	Delete "Re -"	Accepted, has been removed, thank you.	Eleni Kaditi	Organization of the Petroleum Exporting Countries (OPEC)	Austria

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
25505	3		5		<i>Chapter 1's Executive Summary read more as the writings of an individual rather than the collective results of a group's assessment. Confidence language is missing, bolded first sentences in each paragraph are absent. Policy prescriptive sentences are present, for example, 'this shows the need for...' and some paragraphs read more as preempting some results of other chapters (but again with no confidence language being used. Each paragraph should contain Section callouts as {} to show which section / subsection the paragraph results can be traced to.</i>	The Executive Summary has been completely revamped and restructured along the lines suggested by the reviewer	Sarah Connors	IPCC WGI TSU	France
25513					Please take care not to use value-judgement terms such as 'important', 'significant' and also prescriptive terms such as 'need' and 'must'. Some readers will interpret these statements as policy prescriptive.	We have sought address this, but have made a note to review further in the final draft	Sarah Connors	IPCC WGI TSU	France
25547					As a reader who isn't familiar with all the topics being discussed in your chapter, it might help many Executive Summaries to include subheadings to cluster the statements by topic or overarching chapter themes.	There is a moderately standard format, but we hope it is clear now	Sarah Connors	IPCC WGI TSU	France
25675	6	33	6	34	The sentence "a few countries have substantially cut emissions... alongside sustained economic growth" refers to chapter 2 but that chapter is careful to caveat this finding by stating that absolute decoupling has only occurred in very high consumption countries and so is not a model that can be followed by other countries. Perhaps this sentence could be reworded to include a similar caveat.	We have sought provide more specific data. Reference to higher emissions is a bit complex as some reductions occurred in countries which have significantly lower emissions than eg. China, hence focused more on 'developed' country data	Tilman Hartley	Institute of Environmental Science and Technology, Autonomous University of Barcelona (ICTA-UAB)	Spain
25677	7	29	7	30	The prediction here is that "emissions could double or even triple... due to global population and economic growth", which suggests that we would expect economic growth to generally correlate with emissions (as evidenced in chapters 2 and 5 of this report). This again gives a reason to provide a suitable caveat to the statement made on the previous page (p.6 line 33) that "a few countries have substantially cut emissions... alongside sustained economic growth"( p.6 line 33).	The statement (on p. 6) being referred to is "However, national trends are diverse. A few countries have substantially cut emissions – both on their territory, and including their 'consumption footprint' - alongside sustained economic growth (Chapter 2)." The caveat is already implied - a few countries have decoupled emissions and economic growth. So by corollary others have not. We admit at the outset national trends are diverse.	Tilman Hartley	Institute of Environmental Science and Technology, Autonomous University of Barcelona (ICTA-UAB)	Spain
25679	11	22	11	27	Perhaps clarify whether the "temporary decoupling" was relative or absolute.	Rejected - It should be clear from the text that there is a decoupling when GDP grows while emissions fall.	Tilman Hartley	Institute of Environmental Science and Technology, Autonomous University of Barcelona (ICTA-UAB)	Spain
25681	13		17		It is strange that there is such focus in this report on sustainable development, and striking that in comparison there is much less emphasis on how rich countries plan to reduce their emissions. Section 1.3 is the first substantive section of the entire report, and the fact that it is on sustainable development really does frame the agenda for all that follows. I would suggest moving the discussion of sustainable development to after section 1.4. so that it comes after a more general discussion of the 'Drivers, systems...' etc behind climate change. Moreover, in order to maintain focus on the fact that reducing emissions from rich developed countries remains a priority, a section entitled 'Reducing emissions in rich countries' could be included alongside (or ideally preceding) any section that deals with sustainable development.	This suggestion has strong merits. It was extensively discussed but it was eventually decided to keep the current structure.	Tilman Hartley	Institute of Environmental Science and Technology, Autonomous University of Barcelona (ICTA-UAB)	Spain

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
25683	14	33			Great to see reference to the degrowth/postgrowth literature, this is very important. However, it is mentioned only once, grouped together with post-development in the context of discussion of the concept 'sustainable development'. This creates the false impression that degrowth/postgrowth critiques apply mainly to the developing world when in fact the main target of degrowth/postgrowth research is rich industrialised countries. Given that there is little evidence that absolute decoupling represent much of a solution (see chapters 2 and 5 of this report), degrowth and postgrowth deserves to be correctly presented, to have at least an entire paragraph devoted to it, and the discussion should be moved to a more appropriate place (e.g. as the second paragraph at p.28 line 36 of subsection 1.4.5 'Political economy'). Better references might include classics such as Jackson 'Prosperity without growth', Victor 'Managing without growth' and Kallis, Kerschner, Martinez-Alier 'The economics of degrowth' special issue of Ecological Economics. (The 2017 Kallis paper 'Socialism without growth' currently cited is not the most relevant to this debate, and might distract from the more central literature).	This very helpful suggestion has been adapted.	Tilman Hartley	Institute of Environmental Science and Technology, Autonomous University of Barcelona (ICTA-UAB)	Spain
25685	42	15	42	20	The argument that the 'benefits' of avoiding catastrophic climate change should be paid for by future generations via government debt is problematic, and it should be challenged (especially since this subsection is entitled 'Equity, just transition, and representation...'). First, the argument confuses the avoidance of harm with the gaining of benefits, which results in something resembling a protection racket: it is basically arguing that potential future victims should be made to pay so that we don't inflict harm upon them. Second, it is neither equitable nor just for a debt to be imposed upon future generations, who have no representation in the present. It is much more equitable and just for costs be assumed by those who currently benefit from causing harm; this is the 'polluter pays principle' that is the basis for environment law in jurisdictions across the world.	Partly accepted - we agree that this violates the polluter pays principle. However, whatever choice we make today places restrictions, burdens or costs on future generations, and they have no representation that can affect this. So this choice is no different than other choices in this respect.	Tilman Hartley	Institute of Environmental Science and Technology, Autonomous University of Barcelona (ICTA-UAB)	Spain
25687	49	34	49	35	The quote from He et al. (2015) is taken a little out of context, and seems to suggest that experiments have shown that emissions can be absolutely decoupled from growth and that this represents a solution for countries across the world. But what He et al. actually present is an argument that assumes both economic growth and the technology required to decarbonise such a continuously growing economy. The quote should therefore be cut, or qualified to make it consistent with the findings in chapters 2 and 5, i.e. that there is currently no empirical evidence that absolute decoupling represents any kind of solution to climate change.	This is not our understanding. The quote says that lessons learnt from experimentation in one jurisdiction can provide valuable insights for other jurisdictions.	Tilman Hartley	Institute of Environmental Science and Technology, Autonomous University of Barcelona (ICTA-UAB)	Spain
25807	7	33	8	6	The discussion here of carbon lock-in is necessary, but the concept and terms should be defined here, and I recommend fleshing it out a bit more, since lock-in is a crucial constraint on mitigation in the next few decades especially.	This paragraph is about the urgency of mitigation. Lock-in is only mentioned briefly and is discussed in greater detail in section 1.3	Jonathan Buonocore	Harvard University	United States of America
25809	11	32	11	33	I found this figure confusing since it's partially cumulative (as in, is cumulative for the first half, and then the second half). I like the point it is making though, but can something be done with the design or caption for the figure to help a reader navigate this?	Taken into account. Figure 1.2 has been replaced with Figure 1.3 a and 1.3 b in line with AR5.	Jonathan Buonocore	Harvard University	United States of America
25811	12	1	12	4	It might be worth bringing back the carbon prices compatible with those trajectories, just for the comparison.	Rejected - This is just a summary of context and recent developments.	Jonathan Buonocore	Harvard University	United States of America



Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
25813	18	5	18	5	missing "and"	edited.	Jonathan Buonocore	Harvard University	United States of America
25815	18	11	18	11	Does SD = SDG?	No,not necessarily	Jonathan Buonocore	Harvard University	United States of America
25817	23	36	23	43	It should be made abundantly clear that the cleanness of battery storage technology is dependent on what electricity sources are charging them.	Partly accepted - we changed the heading of this section. See also comment 15555 below.	Jonathan Buonocore	Harvard University	United States of America
25819	24	9	24	15	This might be more relevant for developed countries, but it is worth mentioning that the Generation III nuclear (or any nuclear for that matter) may not be very helpful if it acts as baseload. It is increasing becoming the case that dispatchable load is	Reject - This may be the outcome, but it may not.	Jonathan Buonocore	Harvard University	United States of America
25821	36	40	36	43	Might be useful – Daniel, Kent D., Robert B. Litterman, and Gernot Wagner. "Declining CO 2 Price Paths." Proceedings of the National Academy of Sciences 116, no. 42 (October 15, 2019): 20886–91. <a href="https://doi.org/10.1073/pnas.1817444116">https://doi.org/10.1073/pnas.1817444116</a> .	Add in chapter	Jonathan Buonocore	Harvard University	United States of America
25823	10	15	10	21	Where is SDG 3 – Health and Well-Being?	We had several suggestions for additional SDGs that should be mentioned, but struggle with an overly long list. May reconsider phrasing and cross-refer to the final outcome of Chapter 17 mapping of climate mitigation against other SDGs	Jonathan Buonocore	Harvard University	United States of America
25825	38	9	38	9	should say "recognises" I assume...	Thanks, done	Jonathan Buonocore	Harvard University	United States of America
25827	1	1	85	1	Related to the previous comment about not having SDG 3, it would be very nice to have <i>some mention of health benefits of mitigation here</i> . There is a serious body of literature on the subject, spanning from air pollution reduction to increased physical activity to benefits of an improved diet, and large enough that there is more than on review paper on it. Even if it isn't directly relevant to climate change per se, it can be a major driver of policy decision making, public engagement, relevant to many SDGs, and provide a way for scientists outside climate to contribute.	Accepted; to include reference to Lancet report - esp in SOD section 5 ?	Jonathan Buonocore	Harvard University	United States of America
25841	4	7	4	8	The scope of this particular document should not include political categorization nor judge the political inclinations of any country, unless these categorizations are formally evaluated or addressed. Furthermore, exclusively contextualizing the climate change phenomena to the Second World War does not send the message of an integrative world-based approach since many countries were not involved in this historic event.	The chapter to the best of our knowledge has not judged the political inclination of any country and we don't fully understand what is meant by the political inclination of a country in any case.	Jorge Hoyos-Santillan	University of Magallanes	Chile
25843	4	19	4	21	A brief mention to Natural Climate Solutions should be included in this section. Natural Climate Solutions will be of the utmost importance to mitigate emissions throughout the world (e.g., conservation of wetlands and peatlands carbon sinks). This topic is addressed later in the document but should be mentioned here.	The ES has completely revamped.	Jorge Hoyos-Santillan	University of Magallanes	Chile
25845	7	38	4	38	The is no need to repeat that the limit in global warming to 2 - 1.5 C is with respect to pre-industrial times. This has already been mentioned in the previous section and at this point it should be clear for the readers.	Accepted, thank you.	Jorge Hoyos-Santillan	University of Magallanes	Chile

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
25847	15	21	15	34	The concept of Natural Climate Solutions or Nature Based Solutions should be included in this section. These mechanisms will gain relevance in the near future. There are a couple of useful references that address the concept and definition. Griscom's (2017) seems to be the most adequate: Griscom, B.W., Adams, J., Ellis, P.W., Houghton, R.A., Lomax, G., Miteva, D.A., Schlesinger, W.H., Shoch, D., Siikamäki, J. V., Smith, P., Woodbury, P., Zganjar, C., Blackman, A., Campari, J., Conant, R.T., Delgado, C., Elias, P., Gopalakrishna, T., Hamsik, M.R., Herrero, M., Kiesecker, J., Landis, E., Laestadius, L., Leavitt, S.M., Minnemeyer, S., Polasky, S., Potapov, P., Putz, F.E., Sanderman, J., Silvius, M., Wollenberg, E., Fargione, J., 2017. Natural climate solutions. Proc. Natl. Acad. Sci. 114, 11645–11650. <a href="https://doi.org/10.1073/pnas.1710465114">https://doi.org/10.1073/pnas.1710465114</a>	We agree that nature based solutions are important but we don't think this is the right home for the concept	Jorge Hoyos-Santillan	University of Magallanes	Chile
25849	20	44	20	44	Regarding this particular observation, native forest has been recently recognized as a better alternative to store carbon compared to commercial plantations (e.g., Pinus spp., Eucalyptus spp.). To the following literature gives support to this statement: Carey (2020; doi: 10.1073/pnas.2000425117), Duran (2019; doi: 10.1126/science.aaz2170), Lewis (2019; doi: 10.1038/d41586-019-01026-8)	Thank you for the comment, and the reference. This sentence has been replaced as a result of general editing undertaken in this section	Jorge Hoyos-Santillan	University of Magallanes	Chile
26001	3	3	3	3	add UNFCCC citation to this first occurrence of the Paris Agreement, preferably both here and in the body of the Chapter (1.1)	Accepted, text revised	Pauline Midgley	Independent Consultant	Germany
26003	6	9	6	10	add UNFCCC citation to this first occurrence of the Paris Agreement here in the body of the Chapter	Accepted, citation added, thank you.	Pauline Midgley	Independent Consultant	Germany
26005	3	13	3	13	spell out AR5 at this its first occurrence	Noted	Pauline Midgley	Independent Consultant	Germany
26007	3	20	3	21	spell out AR6 WGI and AR6 WGII at these their first occurrences	Exec Sum completely redrafted	Pauline Midgley	Independent Consultant	Germany
26009	4	14	4	14	spell out SR 1.5 at this its first occurrence	Exec Sum completely redrafted	Pauline Midgley	Independent Consultant	Germany
26011	5	13	5	13	rather than just putting in inverted commas, should perhaps provide a simple explanation of what a "super-wicked problem" means here at its first occurrence; otherwise the reader is left hanging or has to interrupt their flow by looking it up. Alternatively drop its use here and just refer to a highly complex problem because "super-wicked" is well explained in the Chapter (1.5)	Exec Sum completely redrafted	Pauline Midgley	Independent Consultant	Germany
26013	5	16	5	16	I think you really mean AR6 WGIII here; if so, spell out as first use.	Accepted	Pauline Midgley	Independent Consultant	Germany
26015	3	1	5	18	congratulations on providing a very readable and (mostly) jargon-free Executive Summary	Thank you. The ES has been revamped. We hope the reviewer continues to like it.	Pauline Midgley	Independent Consultant	Germany
26017	7	28	7	28	define AFOLU here at its first occurrence	Done	Pauline Midgley	Independent Consultant	Germany
26019	9	44	9	44	this sentence needs editing: " hailed as a entered into force " is presumably " entered into force "	Accepted, text revised	Pauline Midgley	Independent Consultant	Germany
26021	18	1	18	1	isn't the word "pollution" redundant here?	text edited.	Pauline Midgley	Independent Consultant	Germany
26023	0				instead of just referring to AR5 (or AR6), it would be helpful to be specific about which WG contribution (or SYR) is intended	Noted and addressed.	Pauline Midgley	Independent Consultant	Germany
26025	37	24	37	24	to assist the more general reader, please provide a more specific description of what is meant by "fat-tail risks"	Thanks, done	Pauline Midgley	Independent Consultant	Germany
26027	41	15	41	18	this sentence is redundant as it is a repeat of the one before	Duplicated text deleted	Pauline Midgley	Independent Consultant	Germany

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
26029	43	2	43	2	please label the axes and provide a short caption explaining the numbers	An unfortunate technical error, but Figure now changed	Pauline Midgley	Independent Consultant	Germany
26235	53	30			Also DAC should be mentioned here, especially given it has been given some relevance later on in the report	Accepted, thank you.	Sara Budinis	International Energy Agency	France
26489	3	38	3	39	The idea and language of differing in where countries 'are' in a 'development path' gives the impression of a very linear and outdated vision of development.	We understand the concern. We agree that development path is not linear. However the literature does speak about development paths and there is nothing explicit in the term that says that the "path" or trajectory is linear.	Thomas Smith	Masaryk University	Czech Republic
26491	3	45	3	45	As with my comment above, ' <i>economic progress</i> ' is a very contentious term, with a loaded, politicised and often Eurocentric meaning. It could be preferable to stick to something more empirical, such as 'economic growth' or another term.	This is a valid point although no longer applicable as the text has been edited following a total revamp of the Executive summary.	Thomas Smith	Masaryk University	Czech Republic
26493	4	23	4	23	Again framing countries as at different 'stages of economic development', as if it were a linear and obvious metric.	It has not been suggested that stages of development are linear.	Thomas Smith	Masaryk University	Czech Republic
26531	12	43			p.12, l. 43, I think that the following sentence is better: "To be successful, climate policies will need to prove to people that the climate policy package is truly devoted to GG reduction and is part of a larger social policy package consistent with the assigned goals"	Noted.	Frédéric Livet	CNRS-France	France
26533	15	25			p. 15, l. 25 at "For example..", I suggest: "For example; energy efficiency, nuclear and renewable energy programmes can have..."	Noted.	Frédéric Livet	CNRS-France	France
26535	15	31			p. 15, l. 31 "...urban planning, organic agriculture.." On should not exclude technical innovations, and I think: "urban planning, organic agriculture, biotechnologies, green building,..." ...is better.	Noted.	Frédéric Livet	CNRS-France	France
26537	16	17			p. 16 Figure 1-3 is perfectly obscure. A social science product? to be suppressed?	Figure edited.	Frédéric Livet	CNRS-France	France
26539	17	16			p. 16 Figure 14 has no legibility. Are you sure you want to keep it??	Figure revised.	Frédéric Livet	CNRS-France	France
26541	20	24			p. 20 "coal, peat, uranium" (Missing a comma between peat and Uranium). I think that you reproduce the error of having two categories, not from their CO2 emissions, but from their being renewables or not. For you, the important subject is GG reduction, or nuclear phase out????	The whole subsection has been revised in ways that make the comment redundant.	Frédéric Livet	CNRS-France	France
26543	21	6			p. 21, l. 6 It is not serious to say (or is it too rough a sentence): "Pollinators, for example, have been shown to improve crop yields by 75%"	The whole subsection has been revised in ways that make the comment redundant.	Frédéric Livet	CNRS-France	France
26545	36	10	0	0	p. 36 l. 10 (end) " The 1.9 W m-2 the There ont "the" in excess.	Sorry could not identify	Frédéric Livet	CNRS-France	France
26547	43	2	0	0	p. 43 figure 1-7 is totally cabalistic to me. Maybe some technical problem???	Yes, sorry; Figure substantially amended anyway	Frédéric Livet	CNRS-France	France

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
26555	3	40	14	12	<p>Comment 1. Politics and ethics. p.1-3 (40-41) to p.14 (10-12) (first part of the comment) In these pages as well as in several passages of chapters 1 and 5 ethical considerations are introduced as indispensable remedy to the evils generated by a development (global warming) that politics has been unable to rein in or has even favoured.</p> <p>First, it is not clear what exactly the authors mean by 'ethics'; at times it looks like they use this notion in a very generic sense as a namesake of 'normativity'. I wish to remember that a normative approach to global warming (fighting against it on universal reasons, not one's own particular interest) does not need to be ethical, as it can as well be a case of political normativity. This would be based upon the (political) imperative to protect the community or polity as a life condition for everybody, or to practice solidarity as essential to social cohesion, a feature that makes living in society possible (this category is nowhere mentioned) .</p>	We think is this is a mis-characterization of the chapter. We see ethical considerations presented as being one of many vital aspects of climate policy. The role of other drivers and frameworks are also considered. These include technology, finance, value, psychology, transition, to name but only a few. At the same time, it is noted that questions of fairness can also delay climate policy. The summary of the assessment is that approaching climate action from multiple analytical frameworks can help to facilitate a fair and durable, and effective climate action. The fact that there is no universal agreement of what ethics mean in practice is also acknowledged in the chapter	Furio Cerutti	Univ. of Florence	Italy
26557	3	40	14	12	<p>(second part of the comment) Second, resorting to 'ethics' as a counterforce against business-as-usual sounds self-defeating. Resorting to supreme ethical principles such as justice may satisfy some philosophers, but has never changed the people's effective behaviour. Besides, public discourse such as the debate preceding the next AR is not intended to provide guidelines for the praxis of political, economic or scientific bodies rather than precepts for the individual's ethical behaviour.</p> <p>Third, suggesting that all normative considerations regarding global warming are to be embedded in the conventional wisdom of the 'theory of justice', the mainstream school of thought in the English-speaking world, is not exactly a sign of intellectual pluralism. More diversity with regard to theoretical approaches as well as to (European and non-European) languages would be welcome.</p> <p>For more explanations see F.Cerutti, Climate Ethics and the Failures of 'Normative Political Philosophy', "Philosophy and Social Criticism", 2016, Vol. 42(7) 707–726. For the problem of normativity in politics see my own How To Understand Normative Political Theory, in The SAGE Handbook of Political Science, edited by Dirk Berg-Schlosser, Bertrand Badie and Leonardo Morlino, London: Sage 2020, vol. 1, 153-169.</p>	Based on literature, we have highlighted the role of ethics as well as other analytical frameworks including economics, cost benefits analysis, transition, political economy as drivers of, and constraints against climate action.	Furio Cerutti	Univ. of Florence	Italy
26559	5	1	5	3	<p><i>Comment 2. p.1-5, (1-3). It is philosophically illegitimate to merge descriptive (attitudes, behaviours) and normative (ethics, values) into the same list of 'foundational frameworks'. This sentence sounds obscure and confuse.</i></p>	Exec Sum completely redrafted	Furio Cerutti	Univ. of Florence	Italy

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
26561	30	17	30	19	<p>Comment 3. Identity and future generations. Ch. 1, p.30 (17-19) and Ch. 5, p.71 (27)</p> <p>The notion of identity comes up several times in these two chapters, but it does so mainly as individual or even personal identity, which seems to be misplaced: with regard to political action aimed at fighting global warming it is rather group identity (in a movement or party, in the nation, or across the globe as humankind identity) that matters. A clarification of what is meant by 'identity' in the several passages in which this notion comes up would be welcome.</p> <p>The concept of identity and identification are particularly relevant to the question of what to do with future generations. Along with the existence of nuclear weapons and the related chance of an erasure of civilization, climate change with its possibly disastrous social and political consequences has created for the first time in history a potentially single community.</p>	Noted - This section studies behaviour change, meaning change in individual behaviour. This should be clear from the text.	Furio Cerutti	Univ. of Florence	Italy
26563	30	17	30	19	<p>. (second part of Comment 3) This community, defined by being affected by the same threat, is more and more aware of this new circumstance and thus open to common action – if the counterforces of denial and indifference can be neutralized. To make decisive action such as a worldwide and costly mitigation endeavour possible, a further condition must be however present: present actors must be capable to include generations of the far future (see below) in the humankind that should be protected. Without this act of identification with people that do not yet exist and will never come into a close relationship with us (as is the case with the generations of the near future – our children and children's children) there is no way to feel solidarity or enter a relationship of justice or fairness with them.</p>	Noted - Good point, but this section is not focusing on intergenerational preferences. This is discussed in the equity sections of this chapter.	Furio Cerutti	Univ. of Florence	Italy
26565	30	17	30	19	<p>(third part of Comment 3) Otherwise, if our aim is the protection of our contemporaries and our immediate offspring, people may tend to justify less costly adaptation policies over a serious mitigation effort that would require to change our whole model of production, consumption and social interaction.</p> <p>Furthermore, 'future generations' is a notion that needs more differentiation than it occurs in the passages of Chapter 1 such as p.3 (3), p.12 (34), p.37 (39) and p. 40 (14). Obligations towards or solidarity with generations of the near (our children and children's children) or far future are different and must be argued following different pathways. Climate policy is constrained by the well-known distance and difference between contemporaries (who are requested to pay the costs for climate policies whose expected benefits will not accrue to them in their lifespan) and future generations</p>	Noted - See above.	Furio Cerutti	Univ. of Florence	Italy

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
26567	30	17	30	19	fourth part of Comment 3 (who will hopefully take advantage of the slow-down in global warming due to the costs and sacrifices that were burdened on previous generations). On the other hand those costs, paid by the latter, may be seen as compensation for the damages inflicted on the posterity's life conditions by present and previous generations. There is a complex but determinant entanglement of agency, blame, debt, compensation between generations that should be at least mentioned in the AR when it comes to justify and motivate action in climate policy. In this regard, along with solidarity another category, empathy, should be introduced and put to test with regard to identification processes between present and future members of humankind.  The background to the points made here can be found in Furio Cerutti, Global Challenges for Leviathan. A Political Philosophy of Nuclear Weapons and Global Warming, Lanham, Md.: Rowman and Littlefield 2007, chapters 4-7.	Noted - See above.	Furio Cerutti	Univ. of Florence	Italy
26569	30	17	30	19	. End of Comment 3 In the domain of constitutional law, the right of future generations to live under civilized conditions is argued in my article Survival – Humankind's First Fundamental Right, in "Constellations", 22, 1, March 2015, 59-67.	Noted - See above.	Furio Cerutti	Univ. of Florence	Italy
26571	18	41	18	43	Comment 4, p. 1-18, 41-43. These lines seem to suggest that anthropogenic GHG emissions leading to global warming are a timeless, quasi-ontological feature of our relationship to nature. As a matter-of-fact this is untenable. To reinstate a measure of historical awareness, I suggest to add to the three lines quoted the following sentence: '...in which we live. They have skyrocketed following the scientific and industrial revolution of the seventeenth and eighteenth centuries, which in European modernity (and later everywhere) were guided by the project to achieve full and limitless dominance over nature, with no attention to externalities and perverse consequences.'	accepted. The word "unintended" has been removed. However, word limits preclude adding the recommended additional text.	Furio Cerutti	Univ. of Florence	Italy

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
26627					<p>see my afore-mentioned remark on institutions. It's a very important subject since a right definition of an institution allows to better grasp both opportunities and impediments to climate (or any other) policy. G. Peters writes: If institutions are indeed defined by routines and by values they can be extremely difficult to change, and a simple redesign of the operations may not affect the underlying patterns of performance. If, on the other hand, the preferences of individuals functioning within the institution are largely exogenous to the institution, then change may involve only altering the incentives and disincentives offered to those individuals by the institution.</p> <p>[...]changing environmental circumstances, and changing sets of actors within their domain. The usual critiques of institutions, and institutional theory, are that it is excessively rigid and does not permit responsiveness. Such a critique is based on a simplistic understanding of institutions and their capacity to maintain some core features of their structure and behavior while at the same time also adapting to their environment. The different approaches to institutions mentioned above conceptualize that responsive capacity in different ways, but all contain some means of describing and understanding change.</p> <p>If institutions are indeed defined by routines and by values they can be extremely difficult to change, and a simple redesign of the operations may not affect the underlying patterns of performance. If, on the other hand, the preferences of individuals functioning within the institution are largely exogenous to the institution, then change may involve only altering the incentives and disincentives offered to those individuals by the institution.</p>	The definition and use of institutions show that the importance of formal and informal rules, values and norms are recognised.	Belyi Andrei	University of Eastern Finland, Centre for Climate Change, Energy and Environmental Law	Estonia
26959	4	38	5	12	<p>The authors point on a need for diverse analytic frameworks. The authors suggest three analytic frameworks: economic, ethic and Explicit frameworks of transition analysis. I think that in this context it is important to include the psychological framework for analyzing individuals' choices. Recent psychological frameworks for pro-environmental actions take into consideration both financial and ethical considerations. For example: Steg, L., Bolderdijk, J. W., Keizer, K., &amp; Perlaviciute, G. (2014). An integrated framework for encouraging pro-environmental behaviour: The role of values, situational factors and goals. <i>Journal of Environmental psychology</i>, 38, 104-115.</p>	Point taken. We have added a fourth framework on psychology and risk though belatedly I realise we didn't include this reference	Keren Kaplan Mintz	Shamir Research Institute, University of Haifa	Israel
26961	30	24	30	26	<p>In these two lines, higher education is mentioned but very briefly. In my opinion a greater part of the report should address sustainability in higher education. The students are today's citizens, tomorrow's professionals and tomorrow's decision makers. If during their professional education they would be exposed to values and norms for sustainability and learn how they can lower their carbon emissions, this would have direct impact. There is a big body of research addressing this issue, and lots of recommendations, and I think it should be included in the IPCC report.</p>	Noted - We agree that education is important for reducing greenhouse gas emissions. However, we think that we made the point clear in this section.	Keren Kaplan Mintz	Shamir Research Institute, University of Haifa	Israel

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
27383	20	37	20	48	this passage should better align with the surrogate of the SRCCL. The literature quoted is relatively old, a sentence "There is a strong interaction between ecosystem services and human land use" is too generic and not a correct statement: "human" can be deleted, there is only "human" land use; the demand for ecosystem services is a driver of land use, and land-use is affecting the provision of ecosystem services by definition.	Thank you for the comment, and the reference. This sentence has been replaced as a result of general editing undertaken in this section	Karlheinz Erb	Institute of Social Ecology, Univ. of Natural Resources and Life Sciences Vienna	Austria
27385	53	24	53	24	maybe complement: deforestation and other land use, or change to forestry and other land uses, to be in line with "AFOLU" and because management has severe impacts beyond deforestation on e.g. C-stocks (see eg. 10.1038/nature25138)	Accepted, thank you.	Karlheinz Erb	Institute of Social Ecology, Univ. of Natural Resources and Life Sciences Vienna	Austria
27399	20	45	20	48	It needs to be mentioned also that bioenergy is associated with emissions, from processing and transport, but also from system-effects in ecosystems (reduction of carbon stocks). Furthermore, the counterfactual is important, sometimes the regrowth of vegetation simply provides stronger net-c-effects. There is plenty of literature on this issue, we contributed the following: 10.1088/1748-9326/ab6c2e, 10.1111/gcbb.12626) but also some key papers, e.g. 10.1111/gcbb.12643	Noted. In the revised text, we have removed the sub-headings and integrated the sub-sections together. We refer to Chapter 7.	Karlheinz Erb	Institute of Social Ecology, Univ. of Natural Resources and Life Sciences Vienna	Austria
27497	8	8	8	8	The GHG emissions for long-lived and short-lived need to be given separately (either give CO2 only, or give individual gases). The short-lived do not contribute to the allowable carbon budget (see chapter 2 box 2.2).	This is as stated in SR1.5 SPM D.1 (p. 18): "Estimates of the global emissions outcome of current nationally stated mitigation ambitions as submitted under the Paris Agreement would lead to global greenhouse gas emissions in 2030 of 52–58 GtCO <sub>2</sub> eq yr <sup>-1</sup> ."	William Collins	University of Reading	United Kingdom (of Great Britain and Northern Ireland)
27499	10	12	10	21	Air quality (and SDG 3) is missing from this discussion of co-benefits and broader context.	We had several suggestions for additional SDGs that should be mentioned, but struggle with an overly long list. May reconsider phrasing and cross-refer to the final outcome of Chapter 17 mapping of climate mitigation against other SDGs	William Collins	University of Reading	United Kingdom (of Great Britain and Northern Ireland)
27501	15	45			Section 1.3.2 seems to look only at the impact of UNFCCC measures on the SDGs. Some consideration is also need of the impact of how measures to achieve SDGs might affect climate. For instance the impact of congestion charging for air quality purposes having a side-benefit on reduced carbon emissions.	The point made is that these two are interconnected.	William Collins	University of Reading	United Kingdom (of Great Britain and Northern Ireland)
27503	36	6	36	6	I think this intends to refer to the 3.4 W/m2 intermediate scenario, not 3.7. This should say that 3.4 was chosen as an intermediate between 2.6 and 4.5. "greater policy variety" is to vague.	To be checked	William Collins	University of Reading	United Kingdom (of Great Britain and Northern Ireland)
27505	53	43	53	44	The "balanced by anthropogenic removals" doesn't make any sense for reactive gases. For these a balance between anthropogenic sources and chemical removal is sufficient for Climate Neutrality (Fuglestevedt et al. 2017 Phil. Trans. R. Soc. A)	Accepted, thank you.	William Collins	University of Reading	United Kingdom (of Great Britain and Northern Ireland)
27507	53	45	54	2	This discussion of climate metrics needs to refer to Chapter 2, Box 2.2 - and chapter 2, Box 2.2 needs to discuss this.	Accepted, thank you.	William Collins	University of Reading	United Kingdom (of Great Britain and Northern Ireland)
27897	13	5	13	9	Please mention the 100% renewable electricity commitments by over 155 towns and cities in the US alone - Table 9.1 of <a href="https://web.stanford.edu/group/efmh/jacobson/Articles/I/100PctCommitments.pdf">https://web.stanford.edu/group/efmh/jacobson/Articles/I/100PctCommitments.pdf</a> as well as 100% renewable electricity commitments across global operations for over 220 international businesses (same link, Table 9.4)	Accepted - added a sentence	Mark Jacobson	Stanford University	United States of America



Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
28199	13	20	13	21	Chapter 10 deals with status of battery technology, not with the uptake by car companies. I would argue that statement "car companies have STARTED decarbonization" is understating change. Several of the car companies like Volkswagen but also TESLA are increasingly fully committed - dependent on Electric Mobility for their future. Electric Light Duty cars are certainly now at the meso level with preparations underway to move to Macro level in terms of transition theory	Accepted	Cornie Huizenga	CESG	Germany
28201	32	3	32	4	Policies in China and EU aimed at promoting the zero emission vehicles are responsible for the rapid development of battery and EV technology - See Chapter 10 and will continue to drive the scaling up of Evs	Noted - we intended to review this sentence more fully w.r.t. other cases but apologies overlooked in SOD, will not for final draft	Cornie Huizenga	CESG	Germany
28403	3	2	3	3	perhaps remove "to present and future generations"	Exec Sum changed	Matt Lewis	Bangor University	United Kingdom (of Great Britain and Northern Ireland)
28405	3	4	3	4	perhaps remove "against many odds" this is unsubstantiated and better delth with in detail later	Accepted, changed	Matt Lewis	Bangor University	United Kingdom (of Great Britain and Northern Ireland)
28407	3	14	3	15	the context of the plateau, due to a global mean downturn or "recession - near zero growth relative to population rise" could be the cause so the sentence should be clear; irrespective of the driver, growth has slowed in absolute terms..	This part of the Executive Summary (ES) has been edited following the compalte revamping of the ES	Matt Lewis	Bangor University	United Kingdom (of Great Britain and Northern Ireland)
28409	4	11	4	11	eg. Or e.g. ?	Exec Sum completely redrafted	Matt Lewis	Bangor University	United Kingdom (of Great Britain and Northern Ireland)
28411	4	27	4	27	"and regions and costs continue to fall" or "and regions as costs continue to fall"	Exec Sum completely redrafted	Matt Lewis	Bangor University	United Kingdom (of Great Britain and Northern Ireland)
28413	4	25	4	31	yes - a very good paragraph. One point to consider adding here is the the compounding problem of Paris Accord is the amount of carbon needed to impliment low carbon strategies. i.e. EV roll out ; making timing critical and carbon budgets a difficult measure of a region's transition to a lower carbon state. Not sure but this section may wish to alude to this ?	Thank you. The ES has been revamped. We hope the reviwir continues to like it.	Matt Lewis	Bangor University	United Kingdom (of Great Britain and Northern Ireland)
28415	4	34	3	35	as the text aludes to: "[statement on trends in cost assessment to be added for the SOD]	Exec Sum completely redrafted	Matt Lewis	Bangor University	United Kingdom (of Great Britain and Northern Ireland)
28417	6	4	6	4	"Reports" should be "reports"	Thank you, accepted and changed in the text.	Matt Lewis	Bangor University	United Kingdom (of Great Britain and Northern Ireland)
28419	8	40	8	40	AFOLU please define	Defined earlier	Matt Lewis	Bangor University	United Kingdom (of Great Britain and Northern Ireland)
28421	10	12	10	12	define SDGs in this subtitle please	Rejected.	Matt Lewis	Bangor University	United Kingdom (of Great Britain and Northern Ireland)

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
28423	12	4	12	7	yeah it is acknowledge in this sentence, but a re-wording needed to avoid a conclusion of impact from an increase in driver (without first discussing pathway and receptor uncertainties). I suggest something like "Record high temperatures in the summer in the Australia, Middle East and North Africa, an increase in forest fires in North America and Australia, and large temperature increases, which affects regions as diverse as Australia and the tundra and ice sheet in the Arctic have helped with this public narrative	Accepted. Paraphrased text included.	Matt Lewis	Bangor University	United Kingdom (of Great Britain and Northern Ireland)
28425	12	40	12	45	I do not think the yellow vest movement is a good illustration of this point. Their cause was widely misrepresented in main stream media as the statement given in this report - however, much evidence indicates the movement was against the "climate tax burden being shifted off industries and to the public" i.e. the industries that profit from things like transport should have been taxed and not the individual. Please be careful in your assumptions for this paragraph. I strongly urge you to soften the tone, or use the media narrative in your example as a potential example but uncertainties remain....	Taken into account. Text has been modified to the effect that the yellow vest has broader aspects. At the same time, it is the fact that yellow vest was triggered by proposed tax hike and resulted in the delay of climate action	Matt Lewis	Bangor University	United Kingdom (of Great Britain and Northern Ireland)
28427	18	44	18	44	Typo "Figure 1.5Figure 1.5 "	Figure and reference have been removed.	Matt Lewis	Bangor University	United Kingdom (of Great Britain and Northern Ireland)
28429	43	1	43	1	Figure 1.7 has come out poorly in the pdf - it needs checking please	An unfortunate technical error, but Figure now changed	Matt Lewis	Bangor University	United Kingdom (of Great Britain and Northern Ireland)
28639	4	26	4	26	""Renewable energy" has become competitive with fossil fuels" I believe they speak about "Renewable Electricity", at least I have not yet heard that e.g. biofuels became cost competitive with fossil gasoline or diesel. The former still require tax breaks to be cost competitive.	Exec Sum completely redrafted	Wolfgang Schade	M-Five GmbH Mobility, Futures, Innovation, Economics	Germany
28641	3	46	3	46	The gap is true and correct to mention. On the other hand it would be easy to solve the GHG issue if policy-makers would simply successively forbid the least cost but environmentally harmful options by regulation (e.g. like with light bulbs in EU) then the willingness-to-pay of users would not matter anymore. Thus a similar statement on "policy-makers gap between setting (policy / GHG) objectives and implementing ambitious regulations bearing the "additional" cost at the election days" would be correct and honest.	Exec Sum completely redrafted	Wolfgang Schade	M-Five GmbH Mobility, Futures, Innovation, Economics	Germany
28827	15	4	15	9	Much like Sustainable Development, concepts like green growth(Capasso et al. 2019, Hille et al. 2019, Danish et al. 2020, Song et al. 2020), low-carbon development (Mulugetta and Urban 4 2010; Yuan et al. 2011; Wang et al. 2017; Tian et al. 2019) ,	Noted and adapted.	Eui-Chan Jeon	Sejong University	Republic of Korea
28833	3	4	3	7	There are 3 aims of Paris Agreement, please make it more to the point and concise	Accepted, text revised	Marissa Malahayati	National Institute for Environmental Studies	Japan
28835	3	14	3	14	"After a period of exceptionally rapid growth as charted in AR5, energy-related CO2 emissions plateaued between 2014 and 2016 while the global economy continued to expand" Is it only energy related CO2?	Exec Sum completely redrafted	Marissa Malahayati	National Institute for Environmental Studies	Japan
28837	11	33	12	1	Figure 1.2. The font is still too small. Also, please make sure that the caption and the source are in the same page with the figure	Accepted. Figure 1.2 has been replaced with Figure 1.3 a and 1.3 b in line with AR5.	Marissa Malahayati	National Institute for Environmental Studies	Japan
28839	16	15	16	22	Figure 1.3. I don't understand the correlation between the figure and the paragraph. In the paragraph, you mention about economic growth and stuff but it seems not captured on the Figure.	Figure has been revised.	Marissa Malahayati	National Institute for Environmental Studies	Japan
28841	17	14	17	18	Figure 1.4. Make it bigger and please provide the source.	Figure has been revised.	Marissa Malahayati	National Institute for Environmental Studies	Japan

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
28843	18	44	18	44	Double "Figure 1.5" words	Figure and reference have been removed.	Marissa Malahayati	National Institute for Environmental Studies	Japan
28845	18	44	19	27	There is also lack explanation of what is the connection of the figure with the paragraph written	Figure and reference have been removed.	Marissa Malahayati	National Institute for Environmental Studies	Japan
28847	27	0	27	0	I think the footnote is better to be reference. Even if you decide it for footnote, please give the title of the document too (not only the link)	Accepted. Corrected.	Marissa Malahayati	National Institute for Environmental Studies	Japan
28849	24	4	24	5	Figure 1.6. US is divided into 4 region, I suggest to make it average so the figure is comparing the trend of several countries. If it possible kindly compare it with any other developing countries.	Partly accepted -we use a different figure now.	Marissa Malahayati	National Institute for Environmental Studies	Japan
28851	51	15	51	18	Figure 1.8. Make it consistent, e.g. bold for the chapter name, non-bold for the explanation	Noted, thank you. The figure has been revised according to the combination of different comments.	Marissa Malahayati	National Institute for Environmental Studies	Japan
28853	43	1	43	4	Figure 1.7. can't be seen at all	There was an unfortunate technical error in conversion to PDF, however the Figure has been substnially reworked	Marissa Malahayati	National Institute for Environmental Studies	Japan
28855	0	0	0	0	As this chapter is introduction and like a summary in linkage to the other, I found the the example and study cases are mostly for developed countries. <i>I hope you can add more example related to the developing countries. Or at least mention how the condition is different between developing and developed countries.</i>	taken into account	Marissa Malahayati	National Institute for Environmental Studies	Japan
29235	3	20			emphasis here is on transitions, however, below in the chapter and elsewhere in the report it is about transformations (and following on from the Special Report on Climate Change of under 1.5 degrees)/ transformative pathways. Are they that different? Please check for consistency across the report, and perhaps consider explaining the difference between transitions and transformations.	This is a valid point. The chapter and, to the best of our knowlledge, reflects on the link as well as the differences between transition and transformation.	Vanesa Castan Broto	University of Sheffield	United Kingdom (of Great Britain and Northern Ireland)
29237	4	38			diverse analytic framework or diverse epistemologies (or as they say in ecological economics, diverse scales of valuation)? It seems to me that this formulation skirts around the issue of having multiple ways of looking at the world. Also, please check the debates on indigenous knowledge and local knowledge which are taking place in WGII.	The analytic frameworks are definitely more than just epistemologies, they encompass both ways of understanding and foci of attention. Indigenous knowledge wouldn't seem to be a category in itself, also potentially not as centrally relevant as for impacts & local adaptation	Vanesa Castan Broto	University of Sheffield	United Kingdom (of Great Britain and Northern Ireland)
29239	11	14	11	16	I wonder if mentioning the New Urban Agenda is useful here? During the last year the UN has adopted guidelines for its implementation, and climate change features prominently. The NUA provides a comprehensive support for those initiatives mentioned such as NAZCA etc.	Accepted - text revised. The mention of the New Urban Agenda fits in Section 1.5.1. We've included additional text to address this comment in that section	Vanesa Castan Broto	University of Sheffield	United Kingdom (of Great Britain and Northern Ireland)
29241	12	40	12	41	perhaps in the second order draft there could be a deeper analysis of these processes of social mobilization. As I understand the 'yellow vests' was a more complicated movement than one of resisting fuel taxes, as it was a movement against the economic politics of Macron (See the literature on social movements, for example: Kinniburgh, Colin. "Climate Politics after the Yellow Vests." Dissent 66, no. 2 (2019): 115-125).The social movement of climate denialism is different from protests which are really about marginalisation and class, and the report needs to convey those nuances. As it is written, it paints a Manichean world that does not exactly correspond to my understanding of social movements around climate change.	Taken into account. The text has been modified that the yellow vest has broader aspects	Vanesa Castan Broto	University of Sheffield	United Kingdom (of Great Britain and Northern Ireland)

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
29243	14	24	14	27	there seems to be an assumption that the 'economic' part of sustainable development is tied to growth, but actually it is not like that at all. Livelihoods and prosperity is not the same as necessarily growth- and the question is not only whether we need degrowth but more fundamentally, whether growth measures something that matters. Here the discussions on prosperity led by Tim Jackson and colleagues are relevant, but also the debates on prosperity and the good life that are taking place within anthropology. See for example the work on the prosperity index in Lebanon made at UCL's Institute for Global Prosperity, which looks into renewable projects	This is a valid point but we don't agree that the assumption is made that the economic part of sustainable development is tied to growth (in fact the meaning of this sentence is not very clear to us). We agree that growth does not always equal prosperity. The section clearly indicates GDP is an imperfect way of measuring growth and that other measures of wellbeing are relevant.	Vanesa Castan Broto	University of Sheffield	United Kingdom (of Great Britain and Northern Ireland)
29245	15	4	15	6	also deep mitigation is a concept closely related to development	Yes. This point is made in the section.	Vanesa Castan Broto	University of Sheffield	United Kingdom (of Great Britain and Northern Ireland)
29247	17	7	17	10	a discernible innovation of the SDGs is their space to place addressing inequality at the top of the development agenda, whether it is income inequality, health inequalities, or more broad approaches related to human rights. For income inequality there is this book: van Bergeijk, Peter AG, and Rolph van der Hoeve, eds. Sustainable development goals and income inequality. Edward Elgar Publishing, 2017. The link of that literature with climate change is not always obvious, but perhaps a strong engagement with more traditional debates on environmental justice could help? The work of Timmons Roberts comes to mind.	Suggestion has been adapted.	Vanesa Castan Broto	University of Sheffield	United Kingdom (of Great Britain and Northern Ireland)
29249	18	11	18	27	the literature on 'prosperity' has some interesting thoughts on this, for example, the idea that prosperity has to be defined by communities that then can collectively find ways to advance their own definition of what prosperity is.	Suggestion adapted.	Vanesa Castan Broto	University of Sheffield	United Kingdom (of Great Britain and Northern Ireland)
29251	19	3			These desires are however immersed in systems of practice, with cultural and material baggage, which is what we do not want to change – the desire to enhance human well-being comes accompanied by a reticence to actually explore alternatives to that enhancement (also because of their congealment in institutions and other structures of social and economic organization)	As part of edits made to the overall section, the paragraph that this comment refers to has been removed.	Vanesa Castan Broto	University of Sheffield	United Kingdom (of Great Britain and Northern Ireland)
29253	20	12			actually, the question is not cities but urbanization, and how it happens. Please coordinate for coherence with relevant chapters in WGIII and WGII.	This section is no retitled Urbanization.	Vanesa Castan Broto	University of Sheffield	United Kingdom (of Great Britain and Northern Ireland)
29255	22	10	22	16	this is so right, well done for stating it so boldly!	Noted	Vanesa Castan Broto	University of Sheffield	United Kingdom (of Great Britain and Northern Ireland)
29257	23	29	23	34	it is fair to say that the environmental and climate change impacts of the IT industries have not yet comprehensively assessed and this is an important gap that we should be researching now	accepted: we have added the sentence, Technological change has enabled both emissions reductions and increases in emissions.	Vanesa Castan Broto	University of Sheffield	United Kingdom (of Great Britain and Northern Ireland)
29259	23	35			I am not seeing in the text offgrid energy developments, do you consider that has not been developed since the last assessment (in my opinion it has changed dramatically but maybe there is not so much evidence to draw upon)- how do these highlights map into the rest of the report? (I am thinking that this kind of section could lead to some headline messages about technological progress)	Accepted - we added a few words on off-grid development.	Vanesa Castan Broto	University of Sheffield	United Kingdom (of Great Britain and Northern Ireland)
29261	29	19			this seems to respond some of my comments about inequality above, please link	Noted	Vanesa Castan Broto	University of Sheffield	United Kingdom (of Great Britain and Northern Ireland)

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
29263	30	13			now there is a very well established critique on the idea of behaviour change coming from the literature on practice theory, that looks at how change occurs as a collective endeavour. Shove's article 'beyond the ABC' is now almost 10 years, but it has generated an enormous body of scholarship which is not reflected in this conceptualisation (see: Shove, E., 2010. Beyond the ABC: climate change policy and theories of social change. Environment and planning A, 42(6), pp.1273-1285.). Do let me know if you want more suggestions in this area.	Good point. We have decided to shift the behaviour section away from 'behavioural economics' into a new subsection on behaviour and politics, with our existing contributing author Mat Paterson. [A PS after submission: apologies but in the course of this shift, I am afraid we lost track of these comments. Will have to do them justice in the final draft though space as ever is a challenge]	Vanesa Castan Broto	University of Sheffield	United Kingdom (of Great Britain and Northern Ireland)
29265	37	1	40	8	This whole section represents a very discipline-oriented vision of societal change. Thinking of sustainable development and the SDGs, broader views about societal change are needed. While this may be a great analysis within the context of economics, it fails short of providing a framework to understand social change in a manner than it can support actual action; it veers on the policy prescriptive, while at the same time providing a narrow interpretation of how social change is being looked at. At the very least it should be presented as a perspective in contrast to other perspectives	This subsection that is indeed focused on system quantification techniques largely using econ nd modeling toolbox - have tried to signpost the whole section (and report!) better	Vanesa Castan Broto	University of Sheffield	United Kingdom (of Great Britain and Northern Ireland)
29273					<i>A lot of my comments are actually addressed in Chapter 5; would it be possible to develop a stronger dialogue between both chapters?</i>	Chapter 5 has continued to evolve (like Ch.1). We have expanded some cross-reference but may be more work to be done	Vanesa Castan Broto	University of Sheffield	United Kingdom (of Great Britain and Northern Ireland)
30009	5	13	5	14	I'm not sure "super-wicked" is a good choice of words, or the use of inverted commas. This implies ambiguity and should be avoided, explained, or alternatively phrased.	Exec Sum completely redrafted	Grant Allen	University of Manchester	United Kingdom (of Great Britain and Northern Ireland)
30011	3	12	5	7	Climate impacts summary: I would also raise that increased frequency and severity of flooding, especially in Europe and the UK, should be highlighted briefly here.	This comment has been overtaken by the complete revamping of the ES. The chapter makes reference to impacts and provides a link to WGII report which is concerned with the impacts of climate change.	Grant Allen	University of Manchester	United Kingdom (of Great Britain and Northern Ireland)
30013	16	15	16	18	This graphic (figure 1.3) does not look great on my screen. Font thicknesses could be increased.	Edited.	Grant Allen	University of Manchester	United Kingdom (of Great Britain and Northern Ireland)
30015	18	44	18	45	Typo - Figure 1.5 is repeated.	Figure and reference have been removed.	Grant Allen	University of Manchester	United Kingdom (of Great Britain and Northern Ireland)
30017	24	16	24	23	I think more could be said about the risks of relying on CCS here. Many net zero strategies rely on scaled CCS as a silver bullet but there is absolutely no certainty that they can be fit for purpose at scale to offset carbon. More research, engineering and testing is needed. I would recommend a strong statement on this risk - i.e. of relying on the success of CCS (especially geological storage CCS) in national strategies. Also, hydrogen is a very long way off. I think more context and messaging is needed here.	Accepted - we added a sentence on why we have not seen deployment as suggested by scenarios.	Grant Allen	University of Manchester	United Kingdom (of Great Britain and Northern Ireland)
30019	43	1	43	4	Figure 1.7 - needs to be replotted (says "chart title" on the figure. Figure makes no sense to me - doesn't look finished?	There was an unfortunate technical error in conversion to PDF, however the Figure has been substnially reworked	Grant Allen	University of Manchester	United Kingdom (of Great Britain and Northern Ireland)

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
30021	1		54		I can see no mention of the risks of natural drivers/feedbacks in the framing overview. I know this comes in the later chapters, but it does deserve some brief acknowledgement in the opening chapter, which is currently dominated by CO2 anthropogenic emissions discussion. Methane is rising fast of course, and the causes are debated, with many suggesting that a natural positive feedback is now active and accelerating in wetlands etc, especially in the tropics. Nisbet et al., 2019 (ref below) describes the implications of this for the Paris agreement and suggests CH4 mitigation strategies. I would recommend a very brief discussion of natural feedbacks as compounding risks, and the relevance of methane and methane mitigation strategies alongside CO2. Reference: Nisbet, E.G., Manning, M.R., Dlugokencky, E.J., Fisher, R.E., Lowry, D., Michel, S.E., Myhre, C.L., Platt, S.M., Allen, G., Bousquet, P. and Brownlow, R., 2019. Very strong atmospheric methane growth in the 4 years 2014–2017: Implications for the Paris Agreement. Global Biogeochemical Cycles, 33(3), pp.318-342.	Touched upon in new section on Risks in section 3, and later references to tipping points.	Grant Allen	University of Manchester	United Kingdom (of Great Britain and Northern Ireland)
30379	3	5	3	5	the actual language/verb tense is different (pursuing efforts to limit the temperature increase to 1.5°C) and it would be best, for trust at a politically sensitive time, to keep to actual language/verb tense even if editing the length of the quote.	Accepted, text revised	Lindsey Cook	Quaker United Nations Office / Friends World Committee for Consultation (IPCC Observer)	Germany
30381	3	32	3	32	As a reader, these introductory paragraphs do not sufficiently reflect the delicate Paris Agreement (PA) language that emphasises leadership of developed countries and support for developing (outside of the point on finance, which is still vague). This intro thus reads as overriding what were important balances, and i think, with a few additional words such as 'lead' (to quote the PA: "Developed country Parties should continue taking the lead by undertaking economy-wide absolute emission reduction targets) would help build trust overall in the mitigation process as agreed globally.	Accepted, text revised	Lindsey Cook	Quaker United Nations Office / Friends World Committee for Consultation (IPCC Observer)	Germany
30383	4	8	4	8	For those of us working in multilateral environments during the worst of the cold war, this sentence is not quite accurate.	Text has been revised.	Lindsey Cook	Quaker United Nations Office / Friends World Committee for Consultation (IPCC Observer)	Germany
30385	5	3	5	3	To strengthen this statement, would suggest integrating some tested language from the Human Rights Council - "Integrating a rights-based approach to local, national and international policies promotes policy coherence, legitimacy and sustainable outcomes" (see - Knox, J., (2016). Report of the Special Rapporteur on the issue of human rights obligations relating to the enjoyment of a safe, clean, healthy and sustainable environment. In: Report to the 31st session of the UN Human Rights Council. p. 13. <a href="https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2729611">https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2729611</a> ) Also, the paragraph on ethical should include the concept of 'responsibility'. Otherwise, this first section reads as very 'developed', without clear recognition of roles/responsibilities, and ethics, achieved in the PA to adopt a universal agreement, where industrialised wealthier countries recognised the need to support poorer countries in the transition and in facing the consequences of rising temperatures not due to their making.	The ES has been completely revamped. The new ES highlights the centrality of sustainable development and attaining the SDGs when considering climate action.	Lindsey Cook	Quaker United Nations Office / Friends World Committee for Consultation (IPCC Observer)	Germany

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
30387	5	7	5	7	Is it possible to write this in a way that helps the reader grasp the existential nature of this threat? The current language 'avoid widespread negative impacts' lacks visual of what we are really talking about.	Exec Sum completely redrafted	Lindsey Cook	Quaker United Nations Office / Friends World Committee for Consultation (IPCC Observer)	Germany
30389	7	9	7	9	To catch readers' attention, you need to spell out some 'costs and risks', as outlined for example in the SR1.5C of level of species extinction, human suffering, and triggering irreversible melting of the Greenland Ice cover. These words wake people up in ways that 'costs' do not, and also, that important to educate readers that over-shoot cannot bring overturn species extinction and human suffering. You need to bridge science with consequence that reaches hearts.	Not clear that is the role of WG3, though we have tried to have a sharper opening, and a specific section on risk	Lindsey Cook	Quaker United Nations Office / Friends World Committee for Consultation (IPCC Observer)	Germany
30391	7	41	7	41	Responsible/low intensive consumption' - which ever word choice you prefer, ought to be in this list, highlighted in SR1.5C D4.1 and D4.2 and increasingly in the SRCLL.	Responsible consumption, etc. is mentioned in SR1.5C D4.1 and D4.2 in the context of synergies with SDGs. That is not the context for this sentence. Which is not to minimise the importance of responsible consumption.	Lindsey Cook	Quaker United Nations Office / Friends World Committee for Consultation (IPCC Observer)	Germany
30393	8	10	8	11	I believe that you are talking about NDCs in this sentence - 'at present, the national goals declared under the Paris Agreement are thus not sufficient to meet the stated objective of the Agreement'. If so, please specify. Otherwise the sentence could be read as the actual language in the Paris Agreement is not sufficient, which I do not think you mean and would not have been a message in the three recent IPCC SRs.	Sentence has been rephrased to mention NDCs specifically.	Lindsey Cook	Quaker United Nations Office / Friends World Committee for Consultation (IPCC Observer)	Germany
30395	8	23	8	23	To wake the reader to the enormity of what is included in your statement, could you include a few words that reflect the human impact - for example, 'before taking account of co-benefits, including significant reduction in loss of life and livelihoods, and avoided climate impacts'.	Done	Lindsey Cook	Quaker United Nations Office / Friends World Committee for Consultation (IPCC Observer)	Germany
30397	8	40	8	43	The 'four main consumption end-use drivers' statement does not include 'diet', but after the three SRs, is a clear 'main consumption end use driver' in mitigation calculations - i.e.: SR1.5C, Chapter 4 p.327, 'Dietary shifts could contribute one-fifth of the mitigation needed to hold warming below 2°C, with one-quarter of low-cost options'. While I appreciate 'individual behavior' is mentioned on the next page, having it missing in this earlier list reads incomplete.	The point is well taken. However, the purpose of this paragraph is to simply inform the reader about the motivation for the sectoral chapters in the AR6 report.	Lindsey Cook	Quaker United Nations Office / Friends World Committee for Consultation (IPCC Observer)	Germany
30399	9	15	9	19	Wonderful! This is the needed research to help people worldwide understand they can make a difference, rather than feel paralysed by a sense of helplessness.	Noted	Lindsey Cook	Quaker United Nations Office / Friends World Committee for Consultation (IPCC Observer)	Germany
30401	12	1	12	45	This is really helpful information and clearly written, thank you.	Noted	Lindsey Cook	Quaker United Nations Office / Friends World Committee for Consultation (IPCC Observer)	Germany
30403	13	1	13	1	This analysis misses an important point, that the climate policy was also considered 'unfair' as it taxed people rather than the fuel companies making money at 'extraction'. This addition is important for a wider conceptualization of what 'just transition' means.	Rejected. This comment is not supported by reviewed literature	Lindsey Cook	Quaker United Nations Office / Friends World Committee for Consultation (IPCC Observer)	Germany

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
30405	13	37	13	40	This is a strangely weak description of what is at stake, in relation to even SR1.5C outcomes for a 2C difference. Words like loss of life, health, territory, significant species extinction, tipping points on eco-system collapse, to have the phrase 'among others' does not capture what is at stake with insufficient action.	Suggestion adapted. Thank you	Lindsey Cook	Quaker United Nations Office / Friends World Committee for Consultation (IPCC Observer)	Germany
30407	16	18	16	19	Good engagement on SDGs, thank you.	Thank you.	Lindsey Cook	Quaker United Nations Office / Friends World Committee for Consultation (IPCC Observer)	Germany
30409	22	43	22	43	TOO MANY WORDS, not enough visual. This line gives a % on CO2 for aviation - thank you - but it would help in this first chapter to have visual clarity on all the major drivers of emissions, the root causes of anthropogenic climate change in a pie chart with % as was in the AR5. This helps policy makers focus. Otherwise, these are pages of words that, after a while of reading (and I am a native English speaker), one is muddled as to what really are now the main drivers, how have they shifted (or not) from the AR5 analysis, where to begin to transform the drivers that brought us into this mess.	I believe the reviewer is referring to Figure SPM.2. Such a graph exists in Chapter 2 (Fig. 2.7 Total annual anthropogenic GHG emissions by major economic sector and their underlying drivers). We refer to this graph in the SOD version of this section.	Lindsey Cook	Quaker United Nations Office / Friends World Committee for Consultation (IPCC Observer)	Germany
30411	24	16	24	16	Would be helpful for more analysis on this point in comparison to the focus it is given in projected policy (i.e.:USA and UK) to emphasise for policy makers what this means.	Rejected - This means that mitigation has to rely on other technologies or by using policy measures directed to other ways to reduce emissions. We think this should be clear from the text.	Lindsey Cook	Quaker United Nations Office / Friends World Committee for Consultation (IPCC Observer)	Germany
30413	25	3	25	3	Again, a critical statement that deserves more analysis - in this case, the SR1.5C stated that 1/5th of emissions under 2C could come from diet changes. Would a policy maker have any idea of the potential of this statement, the way it stands? This links again to the need for some visuals on drivers, so non-specialists effectively grasp the depth of various drivers.	This material has been dramatically shortened and the detailed discussion left to the land-use chapter.	Lindsey Cook	Quaker United Nations Office / Friends World Committee for Consultation (IPCC Observer)	Germany
30415	30	23	30	23	While this all has a resistant/negative tone, there may well be research now on the positive psychological affects of behavior change, including reduction of anxiety, to feel that one is contributing to the efforts to stem climate change. We see evidence of this in segments of society, especially in developed countries.	Noted - We do not have these references. We removed the word "extremely" to make the tone less negative.	Lindsey Cook	Quaker United Nations Office / Friends World Committee for Consultation (IPCC Observer)	Germany
30417	40	37	40	37	'Dangerous climate change' is already a reality in some regions - past averting. The language dampens the urgency before us, when a +4.8C by 2100 (under current GHG emission rates, RCP8.5) would be unmanageable/catastrophic even at levels lower than average 4.8C. Overall, the urgency at stake seems missing in the tone of this chapter. It reads like an excellent academic overview, but these are policy people reading, not academics.	This point is relevant for earlier sections of the chapter and has been addressed there. At the same time the section highlights the need for urgency.	Lindsey Cook	Quaker United Nations Office / Friends World Committee for Consultation (IPCC Observer)	Germany



Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
30419	42	14	42	14	Just transition is one of a group of 'rights-based approaches' which research through the Special Rapporteurs at the Human Rights Council have found to make climate action 'more legitimate, coherent and sustainable'. It would be important to include this overarching approach when engaging in 'just transition', as these approaches are more likely to receive society support and therefore lead to more effective mitigation. See page 16, in particular footnote 79, for more information - <a href="https://quno.org/sites/default/files/resources/QUNO_A%20Government%20Official%27s%20Toolkit%20-%202020%20Edition_0.pdf">https://quno.org/sites/default/files/resources/QUNO_A%20Government%20Official%27s%20Toolkit%20-%202020%20Edition_0.pdf</a>	Rejected - while we agree that this makes climate action "more legitimate, coherent and sustainable", just transition is not only about human rights. It is also about distributional impacts.	Lindsey Cook	Quaker United Nations Office / Friends World Committee for Consultation (IPCC Observer)	Germany
30421	42	31	42	31	It would be helpful here to include taxation at extraction of FF (not sure this is clearly included), in turn distributing tax collection to support most vulnerable affected, an approach likely more supported by citizens.	Noted - this is implicitly included as taxation of extraction will make fossil fuels more expensive for consumers.	Lindsey Cook	Quaker United Nations Office / Friends World Committee for Consultation (IPCC Observer)	Germany
30423	43	5	43	33	Again, this is reading like an erudite academic essay, but for a policy maker, especially for the majority of countries, this is likely to be very frustrating to read - how does this summary really help a policy maker better understand the economic reality of an economic system based on unlimited growth, on a planet with limited natural resources?	We have tried to streamline the text to make it more accessible. We have indicated the utility and limits of market and economic growth in tackling the climate challenge.	Lindsey Cook	Quaker United Nations Office / Friends World Committee for Consultation (IPCC Observer)	Germany
30425	44	23	44	23	I believe past IPCC reports have noted the WW1 and WW2 country examples, of social transformation via government policy/regulation that are helpful examples on a country scale?	Have added in a WWII example	Lindsey Cook	Quaker United Nations Office / Friends World Committee for Consultation (IPCC Observer)	Germany
30427	45	13	45	13	There is also social transformation on the 'greater good' scale, which has positive connotations rather than only the apocalyptic. See sugar strike <a href="http://abolition.e2bn.org/campaign_17.html">http://abolition.e2bn.org/campaign_17.html</a>	addressed	Lindsey Cook	Quaker United Nations Office / Friends World Committee for Consultation (IPCC Observer)	Germany
30429	46	21	21	46	Could you add 'benefits', as also requested by Parties at the IPCC52, so that the benefits of urgent over insufficient action are clear.	Sorry but couldn't see where this fitted - costs and benefits are now covered more explicitly in SOD section 1.6	Lindsey Cook	Quaker United Nations Office / Friends World Committee for Consultation (IPCC Observer)	Germany
30431	48	1	48	1	Planetary risks' is a very helpful, clear and to the point phrase. Yet it is only used once in this chapter. Please consider using such language, that speaks clearly to what is at stake.	Thank you. The concept of risk has been elaborated in the chapter.	Lindsey Cook	Quaker United Nations Office / Friends World Committee for Consultation (IPCC Observer)	Germany
30433	50	17	50	17	Again, inclusion of the 'rights-based approaches' is critical to 'shifting perceptions', but in this chapter is barely mentioned. Why?	The idea of rights to development is covered in the chapter.	Lindsey Cook	Quaker United Nations Office / Friends World Committee for Consultation (IPCC Observer)	Germany
30435	50	38	50	38	Emission reductions and behavior patterns being experienced in reaction to the C-19 virus may be important research to bring into the AR6 before publishing, if possible.	Have done our best on this	Lindsey Cook	Quaker United Nations Office / Friends World Committee for Consultation (IPCC Observer)	Germany

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
30437	53	36	53	36	Thank you, very helpful to state, considering some Parties' definition of biomass being 'carbon neutral' even when wood is shipped across oceans to be burnt for energy creation.	Noted, thank you.	Lindsey Cook	Quaker United Nations Office / Friends World Committee for Consultation (IPCC Observer)	Germany
30439	1	1	53	1	I am concerned that while this chapter would be powerful in the academic world, it reads less helpfully for policy makers. <i>It lacks a tone of urgency that policy makers and their citizens (mixed group of readers) will expect, considering the situation facing humanity. It also reads very global north in engagement vis a vis daily realities. And while mitigation of GHG emissions is of course the core focus here, where possible please highlight for policy makers how the very economic, social and political systems we uphold continue to drive these crises; there is a reason we (humanity) are in this mess</i> and we need clear and courageous engagement on what is happening and why, to have a chance at stabilizing global temperature rise to a safe-ish limit.	It isn't really the IPCC's job to stress urgency indeed IPCC is explicitly required <i>not to be policy prescriptive</i> , but to assess the state of knowledge, with governments drawing the policy implications. We have expanded the analytic points around the role of wider development, social and political systems in explaining 'why we are in this mess'	Lindsey Cook	Quaker United Nations Office / Friends World Committee for Consultation (IPCC Observer)	Germany
30919	13	23	13	23	I wouldn't say shale gas is "cheap". I would cut this word.	Accepted	Pietro Bartocci	University of Perugia	Italy
30921	25	3	25	3	I would add together with "plant meat" also "plant factories"	Rejected - we find the sentence to be precise enough.	Pietro Bartocci	University of Perugia	Italy
30923	54	12	54	25	I would increase the detail of the paragraph indicating the already available IO database (eg EXIOBASE)	Thank you, but the Technical Supporting Unit has suggested to delete FAQ 1.5 and the chapter has accepted the suggestion.	Pietro Bartocci	University of Perugia	Italy
31157	6	14	6	14	It is possible to use the term "climate crisis" or "climate emergency" instead climate change	Neither crisis or emergency are really scientific terms and usually imply short-term whereas the underlying challenge of climate change lasts over decades	Karla Fabiola Rangel Moreno	National Institute of Public Health	Mexico
31691	13	2	13	2	What charges are increased to \$10 / month? Or, should it read "increased by \$10 / month"?	Taken into account. The text has been modified explaining \$10 more clearly.	Ashok Sreenivas	Prayas (Energy Group)	India
31693	16	17	16	17	The figure is not very clear / understandable.	Figure has been revised	Ashok Sreenivas	Prayas (Energy Group)	India
31695	17	16	17	16	This figure too is not very clear / understandable	Figure has been revised.	Ashok Sreenivas	Prayas (Energy Group)	India
31697	20	22	20	22	It may be useful to clarify that "Energy" here is meant to be energy for economic activities, and not energy for human (or animal) nutrition	Accepted - text revised	Ashok Sreenivas	Prayas (Energy Group)	India
31699	23	5	23	7	This para probably doesn't fit here as it has nothing to do with international trade, leakage etc.	Agreed, deleted now.	Ashok Sreenivas	Prayas (Energy Group)	India
31701	26	30	26	30	The decrease to less than 50 bn USD per year is by which year - 2030?	Accepted. Numerical estimates were deleted.	Ashok Sreenivas	Prayas (Energy Group)	India
31703	27	39	27	41	It's not clear why considering differentiated cost of capital around the world leads to increased burden on developed countries, when cost of capital is typically lower in such countries. It would be good to elaborate.	Accepted. This section has been substantially rewritten and the sentence has been deleted.	Ashok Sreenivas	Prayas (Energy Group)	India
31705	28	23	28	23	One important aspect that doesn't seem to have been covered in this section is the tension between levels of governance/government, i.e. across federal, state and city levels.	This is covered in the multi-level governance section.	Ashok Sreenivas	Prayas (Energy Group)	India
31707	43	2	43	3	Figure not clear at all	There was an unfortunate technical error in conversion to PDF, however the Figure has been substantially reworked	Ashok Sreenivas	Prayas (Energy Group)	India

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
31911	7	1	7	4	This would be an opportunity to note that future anthropogenic warming over a multi-decade period is given by a very simple equation: $\Delta T = TCRE \times [\text{Sum}_t(E\_LLCP(t) + 4 \times E\_SLCP(t) - 3.75 \times E\_SCLP(t-20)) + \Delta F_{\text{other}}]$ where $E\_LLCP(t)$ and $E\_SLCP(t)$ are emissions in year $t$ of long-lived and short-lived climate pollutants respectively, both in units of TtCO <sub>2</sub> -e using GWP100, and $\Delta F_{\text{other}}$ is other radiative forcing in W/m <sup>2</sup> . The AR5 range on TCRE was 0.23-0.68°C/TtCO <sub>2</sub> , but this may well be updated. This formula reproduces the behaviour of simple climate models like MAGICC surprisingly well (certainly as well as MAGICC reproduces the behaviour of more complex models). If used in schematic illustrations, it is much more transparent than relying on a specific simple model. See Jenkins et al (2020), submitted, but available on the WG1 TSU website. It would also be worth observing at this point that the time of reaching 1.5C is sensitive to the definition of global temperature used (Global Mean Surface Temperature versus Global Surface Air Temperature) and that the UNFCCC has not agreed on this.	This seems far too technical and detailed for Intro section of the Intro chapter for a Mitigation report. Reading it several times I still wasn't clear about the really important in here for our context?	Myles Allen	University of Oxford	United Kingdom (of Great Britain and Northern Ireland)
32097	0				It's suggested to include more information on the role of green finance and responsible investment in mitigating climate change, especially for clean and green technology transfer	Noted; finance in section 5 tightened; also significant element in a new Box on Covid	Ru GUO	Tongji University	China
32099	3	30	3	30	It's suggested to change "Aims" to "aims", and change "overall actual action" to "overall actual actions"	Exec Sum completely redrafted	Ru GUO	Tongji University	China
32101	3	36	3	36	It's suggested to change "wellbeing" to "social wellbeing"	Exec Sum completely redrafted	Ru GUO	Tongji University	China
32103	3	39	3	39	It's suggested to change "capability, goals" to "goals, capability"	Exec Sum completely redrafted	Ru GUO	Tongji University	China
32105	7	18	7	18	It's suggested to change "the aims of the Paris Agreement" to "the aims of the Paris Agreement and the 2030 Agenda for Sustainable Development"	Accepted with adjustment	Ru GUO	Tongji University	China
32107	23	15	23	34	It's suggested to include the examples of GIS and RS applications in mitigating climate change because these kinds of information technology can greatly change people's cognitions and behaviours by obtaining and sharing relevant spatial-temporal information on human activities (both emissions and sinks) and their impacts.	rejected - we do not go into this detail in the text. We refer to chapter 6.	Ru GUO	Tongji University	China
32109	24	16	24	22	It's suggested to include the reasons why CCS technologies has been much slower than projected in previous assessments, such as cost, risk or political concerns.	Accepted - we added a sentence	Ru GUO	Tongji University	China
32111	51	1	51	11	Multiple assessment frameworks are needed, however, it's difficult to understand the explicit frameworks.	text edited to enhance clarity.	Ru GUO	Tongji University	China
32175	3	3	3	6	<i>Why the narrative starts with PA? Why pre-2020 commitments and actions being ignored. It may start with the collective global efforts to reduce GHG emissions since Convention and its Kyoto Protocol.</i>	Broadly acknowledge, but We are addressing more than anything "what has changed" since AR5? What is meaning in comment of "why pre-2020 commitments and actions being ignored"? Many but not all pre-Paris commitments (eg. KP, 2020 Cancun goals??) have been delivered - but we don't go into this - should we? Refer Chs 2 and 14?	LOKESH CHANDRA DUBE	NATCOM Cell, Ministry of Environment, Forest and Climate Change, Government of India	India
32177	4	7	4	13	This paragraph is too general and vague. May be deleted.	Text has been revised.	LOKESH CHANDRA DUBE	NATCOM Cell, Ministry of Environment, Forest and Climate Change, Government of India	India
32179	31	25	31	26	Meaning of the sentence "The PA does not require parties to implement their NDCs but requires them to pursue domestic mitigation measures." is not clear. Parties are supposed to implement and achieve their NDCs.	Accepted, text revised.	LOKESH CHANDRA DUBE	NATCOM Cell, Ministry of Environment, Forest and Climate Change, Government of India	India

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
32287	21	22	22		Clarify/define the term "carbon leakage". There are several definitions for the term "carbon leakage" in the literature. Usually the the distinction is made between "weak" and "strong" carbon leakage. See e.g. Peters and Hertwich (2008) (which is cited in this chapter) which notes that: "The weakness of the IPCC definition of carbon leakage is that it ignores the fact that production may increase in non-Annex B countries for reasons totally disconnected to climate mitigation in Annex B countries — "weak" carbon leakage".	Taken into account. The text has been modified referred to Box 5.4 of the AR5 with regard to the definition of carbon leakage.	Viktoras Kulionis	ETH Zürich, Ecological Systems Design	Switzerland
32289	22	8	22	10	Production-based perspective is simiiliar but not the same as the territorial perspective. They are often treated as the same in the literature, but it has to be clarified that they are not the same. Here are the definiitions taken from the European Environmental Agency (EEA) technical report No 20/2013: The territorial perspective considers emissions that are released to the atmosphere from within a country's borders and from areas that are under a country's jurisdiction. This perspective is the only method accepted by international environmental law to account for a country's emissions and mitigation efforts. Territorial-emission datasets that focus on the physical location of emissions are also used as the basis for the atmospheric modelling of environmental impacts. The production perspective considers those emissions from companies that have their economic interest within the economic territory of the country (known as being 'resident') irrespective of the geographic location where their activities take place. It also considers emissions from resident households in relation to their economic output (production), irrespective of the geographic location where these activities take place. The production perspective stems from the System of Environmental Economic Accounting (SEEA), and a legal basis for reporting of environmental economic accounts has recently been implemented in the EU. Document can be found here: <a href="https://www.eea.europa.eu/publications/european-union-co2-emissions-accounting">https://www.eea.europa.eu/publications/european-union-co2-emissions-accounting</a>	Noted and Further Clarification Provided - [With Additional Explanation - To be completed])	Viktoras Kulionis	ETH Zürich, Ecological Systems Design	Switzerland

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
32291	22	5	22	36	<p>Consider mentioning that there are also other accounting methods, such as: shared responsibility (Lenzen et al, 2007); technology adjusted consumption based accounting (Kander et al, 2015); value added-based responsibility (Pinero, et al 2019). It is also important to mention the strenghts and weakness of production and consumpiton acocunting methods. Especially the political and practical complications/incompatabilities related to the consumption based accounting method ( Afionis et al 2017 provides an excelent overview and discussion). Lenzen,M., J. Murray,F.SackandT.Wiedmann(2007) Shared Producer and Consumer Responsibility – Theory and Practice. Ecological Economics, 61, 27–42</p> <p>Kander, A., M. Jiborn, D.D. Moran and T.O. Wiedmann (2015) National Greenhouse-Gas Accounting for Effective Climate Policy on International Trade. Nature Climate Change,5, 431–435.</p> <p>Piñero, P., Bruckner, M., Wieland, H., Pongrácz, E., &amp; Giljum, S. (2019). The raw material basis of global value chains: allocating environmental responsibility based on value generation. Economic Systems Research, 31(2), 206-227.</p> <p>Afionis, S., Sakai, M., Scott, K., Barrett, J., &amp; Gouldson, A. (2017). Consumption-based carbon accounting: does it have a future?. Wiley Interdisciplinary Reviews: Climate Change, 8(1), e438</p>	Accepted - [Due to strict word limits, we are unable to provide a comprehensive discussion in Chapter 1. We have now added these references in the revised section.]	Viktoras Kulionis	ETH Zürich, Ecological Systems Design	Switzerland
32293	54	14	54	16	<p>Note that there is no Nobel Prize in Economic Sciences instead there is the Nobel Memorial Prize in Economic Sciences. So, Wassily Leontief received the Nobel Memorial Prize in Economic Sciences. More info here: <a href="https://en.wikipedia.org/wiki/Nobel_Memorial_Prize_in_Economic_Sciences">https://en.wikipedia.org/wiki/Nobel_Memorial_Prize_in_Economic_Sciences</a></p>	Thank you, but the Technical Supporting Unit has suggested to delete FAQ 1.5 and the chapter has accepted the suggestion.	Viktoras Kulionis	ETH Zürich, Ecological Systems Design	Switzerland
32295	54	21	54	22	<p>Please provide a refernce to one the first environmental extensions. Leontief, W. (1970). Environmental repercussions and the economic structure: an input-output approach. The review of economics and statistics, 262-271.</p>	Thank you, but the Technical Supporting Unit has suggested to delete FAQ 1.5 and the chapter has accepted the suggestion.	Viktoras Kulionis	ETH Zürich, Ecological Systems Design	Switzerland
32361	3	12	3	15	<p>Consider including the recent growth of energy-related CO2 emissions since 2016, with cite to IEA as done later in the chapter.</p>	The text accuretaly captures the growth of GHG and CO2 emissions based on the latest avaiable data.	Durwood Zaelke	Institute for Governance & Sustainable Development	United States of America

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
32363	7	3	7	12	Speed is a key metric, and climate solutions must be measured along this dimension as well as along the conventional metrics. The question that needs to be answered is how quickly a climate solution can deliver avoided warming. Molina M., et al. (2009) Reducing abrupt climate change risk using the Montreal Protocol and other regulatory actions to complement cuts in CO2 emissions, PROC. NAT'L. ACAD. SCI. 106(49):20616–20621. It is important to note that SLCPs are a critical part of that solution, and that cutting them can avoid warming at 2050 of up to 0.6 °C, while cutting CO2 can avoid between 0.1–0.3 °C; at 2100, SLCPs avoid 1.2 °C warming and CO2 avoids 1.6–1.9 °C. SLCP reductions are critical for vulnerable areas like the Arctic and because they can slow progression of tipping points and self-reinforcing feedbacks. See Xu and Ramanathan (2017) Well below 2 °C: Mitigation strategies for avoiding dangerous to catastrophic climate changes, Proc. Natl. Acad. Sci. 114(39):10315–10323; Ramanathan and Xu (2010) The Copenhagen Accord for limiting global warming: Criteria, constraints, and available avenues, Proc. Natl. Acad. Sci. 107(18):8055–8062; Ramanathan and Feng (2008) On avoiding dangerous anthropogenic interference with the climate system: Formidable challenges ahead, Proc. Natl. Acad. Sci. 105(38):14245–14250.	We have included Ramanathan and Xu reference but on final review I realise we may not have done this point justice, partly because of greater focus on the long-lived gases in context of stabilisation / temperature goals. Also most of references here were a bit dated, I was waiting for additional insight from WG1 report but then didnt get back to this comment. Will review again in final	Durwood Zaelke	Institute for Governance & Sustainable Development	United States of America
32365	7	3	7	12	It is critical to slow feedbacks in the coming decade, including by cutting the SLCPs, as well as by protecting sinks, enhancing urban albedo, and other fast mitigation strategies. Molina M., et al. (2009) Reducing abrupt climate change risk using the Montreal Protocol and other regulatory actions to complement cuts in CO2 emissions, PROC. NAT'L. ACAD. SCI. 106(49):20616–20621; Lenton T. M., et al. (2019) Climate tipping points—too risky to bet against, NATURE, Comment, 575:592–595 (“In our view, the consideration of tipping points helps to define that we are in a climate emergency and strengthens this year’s chorus of calls for urgent climate action — from schoolchildren to scientists, cities and countries.”); and Steffen W., et al. (2018) Trajectories of the Earth System in the Anthropocene, PROC. NAT'L. ACAD. SCI. 115(33):8252–8259, 8254.	Accepted	Durwood Zaelke	Institute for Governance & Sustainable Development	United States of America

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
32367	7	3	7	12	Any overshoot will cause some irreversible impacts, including SLR and glacial and ice sheet melt that will not be corrected when the overshoot is corrected. Tokarska K. B., et al. (2019) Path Independence of Carbon Budgets When Meeting a Stringent Global Mean Temperature Target After an Overshoot, EARTH'S FUTURE 7:1283–1295, 1283 (“Emission pathways that are consistent with meeting the Paris Agreement goal of holding global mean temperature rise well below 2 °C often assume a temperature overshoot. In such overshoot scenarios, a given temperature limit is first exceeded and later returned to, under the assumption of large-scale deliberate carbon dioxide removal from the atmosphere. Here we show that although such strategy might result in a reversal of global mean temperature, the carbon cycle exhibits path dependence. After an overshoot, more carbon is stored in the ocean and less on land compared to a scenario with the same cumulative CO2 emissions but no overshoot. The near-path independence of surface air temperature arises despite the path dependence in the carbon cycle, as it is offset by path dependence in the thermal response of the ocean. Such behavior has important implications for carbon budgets (i.e. the total amount of CO2 emissions consistent with holding warming to a given level), which do not differ much among scenarios that entail different levels of overshoot. Therefore, the concept of a carbon budget remains robust for scenarios with low levels of overshoot (up to 300 Pg C overshoot considered here) but should be used with caution for higher levels of overshoot, particularly for limiting the environmental change in dimensions other than global mean temperature rise.”); Solomon S., et al. (2010) Persistence of climate changes due to a range of greenhouse gases, PROC. NAT'L. ACAD. SCI. 107(43):18354–18359, 18356 (“The transfer of heat from the atmosphere to the ocean’s mixed layer (top 100 m or so) is thought to occur on timescales on the order of a decade or less (30),	Accepted	Durwood Zaelke	Institute for Governance & Sustainable Development	United States of America
32369	7	37	7	39	Alter phrasing of “2-1.5°C” to be “1.5–2 °C” because the former is confusing.	Corrected	Durwood Zaelke	Institute for Governance & Sustainable Development	United States of America

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
32371	20	45	20	48	BECCS is not carbon negative in the near-term because bioenergy leaves a carbon deficit for several decades to a century—far longer than the window of a decade or two available for slowing feedbacks and avoiding crashing through the 1.5C guardrail. See, e.g., IPCC AR5 WG III (2014) 11.13.4 GHG emission estimates of bioenergy production systems (“The combustion of biomass generates gross GHG emissions roughly equivalent to the combustion of fossil fuels. If bioenergy production is to generate a net reduction in emissions, it must do so by offsetting those emissions through increased net carbon uptake of biota and soils...Hence, the total climate forcing of bioenergy depends on feedstock, site-specific climate and ecosystems, management conditions, production pathways, end use, and on the interdependencies with energy and land markets...For example, in the specific case of existing forests that may continue to grow if not used for bioenergy, some studies employing counterfactual baselines show that forest bioenergy systems can temporarily have higher cumulative CO2 emissions than a fossil reference system (for a time period ranging from a few decades up to several centuries”). Subsequent analysis since AR5 further strengthens the case that bioenergy is not carbon neutral in the critical next decade or two. Danielle Venton, Core Concept: Can bioenergy with carbon capture and storage make an impact?, PNAS (2016); Mary S. Booth, Not carbon neutral: Assessing the net emissions impact of residues burned for bioenergy, ENVIRON. RES. LETT. 13 (21 February 2018); Sterman J. D., et al. (2018) Does replacing coal with wood lower CO2 emissions? Dynamic lifecycle analysis of wood bioenergy, ENVTL. RESEARCH LETTERS 13(015007):1–10, 1 (“We simulate substitution of wood for coal in power generation, estimating the parameters governing NPP and other fluxes using data for forests in the eastern US and using published estimates for supply chain emissions. Because combustion and processing efficiencies for	Thank you for the comment, and the references. We have removed the mention of negative emissions from this section. Due to word limit constraints, we were unable to further expand on the discussion related to BECCS as the aim of Chapter 1 is to provide framing for the IPCC report. I agree with your comments, and this discussion should be included in the IPCC report.	Durwood Zaelke	Institute for Governance & Sustainable Development	United States of America
32373	22	43	23	4	This section should note that there are other emissions associated with shipping and aviation beyond just CO2, including black carbon. Shipping emits short-lived cooling aerosols (sulfates) and short-lived warming aerosols (black and brown carbon), as well as long-lived CO2. Black carbon adds further warming by reducing albedo of snow and ice when it reaches these surfaces. The goal should be to ensure that reductions of black and brown carbon occur faster than reductions of the cooling sulfates. Qian Y., et al. (2014) Light-absorbing Particles in Snow and Ice: Measurement and Modeling of Climatic and Hydrological impact, ADVANCES IN ATMOSPHERIC SCIENCES 32:64–91; Arctic Monitoring and Assessment Programme (AMAP) (2017) ADAPTATION ACTIONS FOR A CHANGING ARCTIC: PERSPECTIVES FROM THE BARENTS AREA; International Energy Agency (IEA) (2016) WORLD ENERGY OUTLOOK SPECIAL REPORT: ENERGY AND AIR POLLUTION; World Bank & International Cryosphere Climate Initiative (2013) ON THIN ICE: HOW CUTTING POLLUTION CAN SLOW WARMING AND SAVE LIVES; Ramanathan V. & Xu Y. (2010) The Copenhagen Accord for limiting global warming: Criteria, constraints, and available avenues, Proc. Nat'l. Acad. Sci. 107(18):8055–8062.	Accepted - [We have added a brief explanation (with references), and have referred to Chapter 10]	Durwood Zaelke	Institute for Governance & Sustainable Development	United States of America



Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
32375	22	43	23	4	The impact on the climate from aviation can be further managed by adjusting timing, altitudes, and routes of flights. Flights that occur over night lead to more climate forcing than in the day because the contrails that the planes form at night trap more infrared energy without being offset by sunlight like in the day. Winter flights also have a bigger overall warming effect than those during the rest of the year because contrails are more likely to form when it is cold. Stuber N., et al. (2006) The importance of the diurnal and annual cycle of air traffic for contrail radiative forcing, Nature 441:865–867. Lowering the altitude of aircraft by a little over 600 meters could reduce radiative forcing from nitrogen oxides by two-fifths. Sovde O. A., et al. (2014) Aircraft emission mitigation by changing route altitude: A multi-model estimate of aircraft NOx emission impact on O3 photochemistry, Atmospheric Environment 95:468–479. Further, re-routing flights to avoid regions that are more sensitive to changes in CO2 emissions could lower climate impact by 25% with a cost increase of 0.5%. Grewe V., et al. (2014) Reduction of the air traffic's contribution to climate change: A REACT4C case study, Atmospheric Environment 94:616–625.	Noted	Durwood Zaelke	Institute for Governance & Sustainable Development	United States of America
32377	22	43	23	4	Additional pollution from increased shipping can be especially harmful for the Arctic. More traffic within the Arctic and global climate because increased tourism or shipping will lead to increased pollution, including that of GHGs and SLCPs including black carbon that can further enhance warming in the region that is already warming twice the global average. Declining sea ice is already increasing shipping and tourism within the delicate Arctic region, where increased pollutants—including emissions of black carbon that can decrease the reflectivity of the surface in the region when it lands on snow and ice, which allows greater warming—could further endanger the Arctic, and as such, policies should be developed that will limit and minimize climate impacts in the Arctic. Given the current climate emergency, continued warming in the Arctic will continue to deplete sea ice—to which, if all of the sea ice is lost, it would be like adding an additional trillion tons of CO2 to the atmosphere—and thaw permafrost, which will also amplify warming through its release of stored carbon dioxide and methane; all together, these and other feedbacks will lead to a hothouse Earth. Stephenson S. R., et al. (2018) Climatic responses to future trans-Arctic shipping, GEOPHYSICAL RESEARCH LETTERS 45:9898–9908; Arctic Council Secretariat (2017) EXPERT GROUP ON BLACK CARBON AND METHANE: SUMMARY OF PROGRESS AND RECOMMENDATIONS 2017, 17 (“Arctic shipping currently accounts for about 5 percent of black carbon emissions within the Arctic; absent emission controls, shipping emissions within the Arctic could double by 2030 under some projections of Arctic vessel traffic.”); Arctic Monitoring and Assessment Programme (AMAP) (2017) ADAPTATION ACTIONS FOR A CHANGING ARCTIC: PERSPECTIVES FROM THE BARENTS AREA, 1 (“Changes in climate will have direct impacts on snow and ice, as well as on terrestrial, freshwater and marine ecosystems. In addition to climate change, the region’s ecosystems are also	Accepted - [Due to strict word limits, we were unable to include a comprehensive discussion of additional pollution caused by shipping. We have therefore made a brief mention, and have included the references provided.]	Durwood Zaelke	Institute for Governance & Sustainable Development	United States of America

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
32379	37	24	37	43	<p>With climate impacts continuing to accelerate, generally ahead of model predictions (Ripple W. J., et al. (2019) World Scientists' Warning of a Climate Emergency, BIOSCIENCE biz088:1–5), and self-reinforcing feedback starting to add additional warming beyond the initial anthropogenic warming (Lenton T. M., et al. (2019) Climate tipping points—too risky to bet against, NATURE, Comment, 575:592–595, 594; and Steffen W., et al. (2018) Trajectories of the Earth System in the Anthropocene, PROC. NAT'L. ACAD. SCI. 115(33):8252–8259, 8254; and Richter-Menge J., et al. (2019) Executive Summary, in ARCTIC REPORT CARD 2019, 3–4), it is important to include discussion of the fat tail risk, including for both mitigation and for adaptation policies. At the same time, we are quickly approaching—and possibly have already passed—some tipping points that demand swift climate mitigation that can lessen the need for more drastic adaptation measures. Xu and Ramanathan (2017) Well below 2 °C: Mitigation strategies for avoiding dangerous to catastrophic climate changes, Proc. Natl. Acad. Sciences; Committee to Prevent Extreme Climate Change (2017) Well Under 2 Degrees Celsius: Fast Action Policies to Protect People and the Planet from Extreme Climate Change; Ramanathan and Feng (2008) On avoiding dangerous anthropogenic interference with the climate system: Formidable challenges ahead, Proc. Natl. Acad. Sci., doi: 10.1073/pnas.0803838105; Weitzman M. (2011). Fat-Tailed Uncertainty in the Economics of Catastrophic Climate Change. Review of Environmental Economics and Policy 5(2):275-292; Lenton T. M., et al. (2019) Climate tipping points—too risky to bet against, NATURE, Comment, 575:592–595, 592 (“In our view, the consideration of tipping points helps to define that we are in a climate emergency and strengthens this year’s chorus of calls for urgent climate action — from schoolchildren to scientists, cities and countries.”); Ripple W. J., et al. (2019) World Scientists' Warning of a Climate Emergency,</p>	Included in context of econ of risk, but note this section is about analytic approaches more than scientific specifics	Durwood Zaelke	Institute for Governance & Sustainable Development	United States of America

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
32381	53	18	53	25	Black and brown carbon aerosols also are important climate forcers and often comes from some similar sources that should be considered part of this discussion. While organic carbon is reflective, the warming effect of black and brown carbon components overall amplify warming. Black carbon is a powerful climate-warming aerosol that directly warms the atmosphere by absorbing solar radiation and indirectly by darkening snow and ice surfaces. Nearly 90% of black carbon emissions come from residential solid fuels, diesel engines, and residential coal; the rest of the emissions come from aviation, shipping, and flaring. Reducing black carbon is especially beneficial for the Arctic because black carbon not only warms the atmosphere but also facilitates additional warming. Once black carbon is deposited on the snow and ice, it reduces the reflectivity (albedo) and absorbs extra solar radiation, which leads to further melting than pristine snow and ice. Since 1890, black carbon has contributed about 0.5–1.4 °C of warming to the Arctic. Bond T. C., et al. (2013) Bounding the role of black carbon in the climate system: A scientific assessment, J. GEOPHYSICAL RESEARCH–ATMOSPHERES 118(11):5380–5552; Myhre G., et al. (2013) CHAPTER 8: ANTHROPOGENIC AND NATURAL RADIATIVE FORCING, in IPCC (2013) CLIMATE CHANGE 2013: THE PHYSICAL SCIENCE BASIS, Working Group I Contribution to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change, Table 8.A.6; Qian Y., et al. (2014) Light-absorbing Particles in Snow and Ice: Measurement and Modeling of Climatic and Hydrological impact, ADVANCES IN ATMOSPHERIC SCIENCES 32:64–91; Arctic Monitoring and Assessment Programme (AMAP) (2017) ADAPTATION ACTIONS FOR A CHANGING ARCTIC: PERSPECTIVES FROM THE BARENTS AREA; International Energy Agency (IEA) (2016) WORLD ENERGY OUTLOOK SPECIAL REPORT: ENERGY AND AIR POLLUTION; World Bank & International Cryosphere Climate Initiative (2013) ON THIN	Noted, thank you.	Durwood Zaelke	Institute for Governance & Sustainable Development	United States of America
32669	9	15	9	19	Throughout the report we never speak clearly about sobriety (promoted in France today by Negawatt institution). Indeed the three pillars to achieve significant decarbonation through reducing energy consumption are in this order, sobriety, efficiency and renewable. The introduction show that an increase in efficiency and renewables technologies have an effect on decreasing GHG emissions, however this effect will not last/be significant if we do not decrease our energy consumption. This is very important to promote.	Noted	Tahina Lehmann	Altern SA	Switzerland
32671	4	14	4	18	The decrease in energy demand (sobriety) should also be mentionned here before the technologies and practices. It is an important first step to decarbonization, to avoid oversizing of technological solution in near-long term futur. Maybe link here to ch. 5.	The ES has been revised	Tahina Lehmann	Altern SA	Switzerland
32747	3	12	3	15	Consider including the recent growth of energy-related CO2 emissions since 2016, with cite to IEA as done later in the chapter.	The text accurately captures the growth of GHG and CO2 emissions based on the latest available data.	Kristin Campbell	Institute for Governance & Sustainable Development	United States of America

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
32749	7	3	7	12	Speed is a key metric, and climate solutions must be measured along this dimension as well as along the conventional metrics. With that the question that needs to be answered is how quickly a climate solution can deliver avoided warming, and SLCPs are part of that solution. With SLCPs providing avoided warming at 2050 of up to 0.6 °C and CO2 avoiding up to 0.1–0.3 °C; at 2100, SLCPs avoid 1.2 °C warming and CO2 avoids 1.6–1.9 °C. SLCP reductions are critical for vulnerable areas like the Arctic and because they can slow progression of tipping points and self-reinforcing feedbacks. See Xu and Ramanathan (2017) Well below 2 °C: Mitigation strategies for avoiding dangerous to catastrophic climate changes, Proc. Natl. Acad. Sci. 114(39):10315–10323; Ramanathan and Xu (2010) The Copenhagen Accord for limiting global warming: Criteria, constraints, and available avenues, Proc. Natl. Acad. Sci. 107(18):8055–8062; Ramanathan and Feng (2008) On avoiding dangerous anthropogenic interference with the climate system: Formidable challenges ahead, Proc. Natl. Acad. Sci. 105(38):14245–14250; Ramanathan, Molina, and Zaelke (2017) Well Under 2 Degrees Celsius: Fast Action Policies to Protect People and the Planet from Extreme Climate Change.	We have included Ramanathan and Xu reference but on final review I realise we may not have done this point justice, partly because of greater focus on the long-lived gases in context of stabilisation / temperature goals. Also most of references here were a bit dated, I was waiting for additional insight from WG1 report but then didnt get back to this comment. Will review again in final	Kristin Campbell	Institute for Governance & Sustainable Development	United States of America
32751	7	37	7	39	Alter phrasing of “2-1.5°C” to be “1.5–2 °C” because the former is confusing.	Corrected	Kristin Campbell	Institute for Governance & Sustainable Development	United States of America
32753	22	43	23	4	Should note that there are other emissions associated with shipping and aviation beyond just CO2, particularly black carbon.	Accepted - [We have added a brief explanation (with references), and have referred to Chapter 10]	Kristin Campbell	Institute for Governance & Sustainable Development	United States of America
32755	22	43	23	4	Additional pollution from increased shipping can be devastating for the Arctic. More traffic within the newly ice-free regions is a serious threat to the Arctic and global climate because increased tourism or shipping will lead to increased pollution, including that of GHGs that can further enhance warming in the region that is already warming twice the global average. Declining sea ice may tempt people to increase shipping and tourism within the delicate Arctic region, where increased pollutants—including emissions of black carbon that can decrease the reflectivity of the surface in the region when it lands on snow and ice, which allows greater warming—could further endanger the Arctic, and as such, policies should be developed that will limit and minimize climate impacts in the Arctic. Stephenson S. R., et al. (2018) Climatic responses to future trans-Arctic shipping, GEOPHYSICAL RESEARCH LETTERS 45:9898–9908; Arctic Council Secretariat (2017) EXPERT GROUP ON BLACK CARBON AND METHANE: SUMMARY OF PROGRESS AND RECOMMENDATIONS 2017, 17 (“Arctic shipping currently accounts for about 5 percent of black carbon emissions within the Arctic; absent emission controls, shipping emissions within the Arctic could double by 2030 under some projections of Arctic vessel traffic.”); Arctic Monitoring and Assessment Programme (AMAP) (2017) ADAPTATION ACTIONS FOR A CHANGING ARCTIC: PERSPECTIVES FROM THE BARENTS AREA, 1 (“Changes in climate will have direct impacts on snow and ice, as well as on terrestrial, freshwater and marine ecosystems. In addition to climate change, the region’s ecosystems are also influenced by several other impacts of human activities, such as chemical pollution, invasive species, and increased shipping and industrial developments. The end result is cumulative and cascading impacts on ecosystems and societies in the area.”); Qian Y., et al. (2014) Light-absorbing Particles in Snow and Ice: Measurement and Modeling of Climatic and Hydrological impact, ADVANCES IN ATMOSPHERIC	Accepted - [Due to strict word limits, we were unable to include a comprehensive discussion of additional pollution caused by shipping. We have therefore made a brief mention, and have included the references provided.]	Kristin Campbell	Institute for Governance & Sustainable Development	United States of America

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
32757	37	24	37	43	<p>Low probability, high impact risks are important to the conversation on uncertainty because they highlight the extent of the potential risk, which is important to consideration of adaptation measures. At the same time, we are quickly approaching—and possibly have already passed—some tipping points that demand swift climate mitigation that can lessen the need for more drastic adaptation measures. Xu and Ramanathan (2017) Well below 2 °C: Mitigation strategies for avoiding dangerous to catastrophic climate changes, Proc. Natl. Acad. Sciences; Committee to Prevent Extreme Climate Change (2017) Well Under 2 Degrees Celsius: Fast Action Policies to Protect People and the Planet from Extreme Climate Change; Ramanathan and Feng (2008) On avoiding dangerous anthropogenic interference with the climate system: Formidable challenges ahead, Proc. Natl. Acad. Sci., doi: 10.1073/pnas.0803838105; Weitzman M. (2011). Fat-Tailed Uncertainty in the Economics of Catastrophic Climate Change. Review of Environmental Economics and Policy 5(2):275-292; Spratt D. &amp; Dunlop I. (2019) Existential climate-related security risk: A scenario approach, Policy Paper, Breakthrough – National Centre for Climate Restoration; Lenton T. M., et al. (2019) Climate tipping points—too risky to bet against, NATURE, Comment, 575:592–595. Lenton T. M., et al. (2019) Climate tipping points—too risky to bet against, NATURE, Comment, 575:592–595, 592 (“In our view, the consideration of tipping points helps to define that we are in a climate emergency and strengthens this year’s chorus of calls for urgent climate action — from schoolchildren to scientists, cities and countries.”); Ripple W. J., et al. (2019) World Scientists’ Warning of a Climate Emergency, BIOSCIENCE biz088:1–5, 1 (“Especially disturbing are concurrent trends in the vital signs of climatic impacts (figure 2, supplemental file S2). Three abundant atmospheric GHGs (CO<sub>2</sub>, methane, and nitrous oxide) continue to increase (see figure S1 for ominous 2019 spike in CO<sub>2</sub>), as does global</p>	Noted in econ of risk section thanks	Kristin Campbell	Institute for Governance & Sustainable Development	United States of America

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
32759	53	18	53	25	While not a GHG, black carbon is also an important influence on warming and comes from some similar sources that should be considered part of this discussion. Black carbon is a powerful climate-warming aerosol that directly warms the atmosphere by absorbing solar radiation and indirectly by darkening snow and ice surfaces. Nearly 90% of black carbon emissions come from residential solid fuels, diesel engines, and residential coal; the rest of the emissions come from aviation, shipping, and flaring. Reducing black carbon is especially beneficial for the Arctic because black carbon not only warms the atmosphere but also facilitates additional warming. Once black carbon is deposited on the snow and ice, it reduces the reflectivity (albedo) and absorbs extra solar radiation, which leads to further melting than pristine snow and ice. Since 1890, black carbon has contributed about 0.5–1.4 °C of warming to the Arctic. Bond T. C., et al. (2013) Bounding the role of black carbon in the climate system: A scientific assessment, J. GEOPHYSICAL RESEARCH–ATMOSPHERES 118(11):5380–5552; Myhre G., et al. (2013) CHAPTER 8: ANTHROPOGENIC AND NATURAL RADIATIVE FORCING, in IPCC (2013) CLIMATE CHANGE 2013: THE PHYSICAL SCIENCE BASIS, Working Group I Contribution to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change, Table 8.A.6; Qian Y., et al. (2014) Light-absorbing Particles in Snow and Ice: Measurement and Modeling of Climatic and Hydrological impact, ADVANCES IN ATMOSPHERIC SCIENCES 32:64–91; Arctic Monitoring and Assessment Programme (AMAP) (2017) ADAPTATION ACTIONS FOR A CHANGING ARCTIC: PERSPECTIVES FROM THE BARENTS AREA; International Energy Agency (IEA) (2016) WORLD ENERGY OUTLOOK SPECIAL REPORT: ENERGY AND AIR POLLUTION; World Bank & International Cryosphere Climate Initiative (2013) ON THIN ICE: HOW CUTTING POLLUTION CAN SLOW WARMING AND SAVE LIVES.; Shindell D. & Faluvegi G. (2009) Climate response to regional radiative	Noted, thank you.	Kristin Campbell	Institute for Governance & Sustainable Development	United States of America
32999	11	32	12	2	Percentages of global CO2 in figure 1.2 seem to sum to greater than 100%.	Taken into account. Figure 1.2 has been replaced with Figure 1.3 a and 1.3 b in line with AR5.	Peter Levi	International Energy Agency	
33085	1	20	3	32	Lines 20-32 should be the same paragraph	Revised	Edris Alam	Rabdan Acadmey	United Arab Emirates
33087	1	28	7	28	the AFOLU has been used fhe first time, please provide full construction: Agriculture, Forestry and 6 Other Land Use	Accepted, checked	Edris Alam	Rabdan Acadmey	United Arab Emirates
33089	1	38	7	38	2-1.5°C should be 1.5-2 °C	Addressed	Edris Alam	Rabdan Acadmey	United Arab Emirates
33091	1	5	8	5	Remove 'Agriculture, Forestry and Other Land Use' just use AFOLU	First use needs explanation	Edris Alam	Rabdan Acadmey	United Arab Emirates
33093	1	34	8	37	The findings should relate to national-level land management, land use and other activities	Accepted, changed	Edris Alam	Rabdan Acadmey	United Arab Emirates
33095	1	26	9	26	To substantiate timeline, the paris agreement can be writteen as ' The 2015 Paris Agreement'	noted	Edris Alam	Rabdan Acadmey	United Arab Emirates
33097	1		31		It is better to have international exchange of polcies among countries to enhance climate change mitigation and adaptation. For example, how we can use the UK experience to other countires...	This didn't suggest specific points or literature, the generall issue falls mainly within section 7	Edris Alam	Rabdan Acadmey	United Arab Emirates
33099	1	1	32		<i>The reader may be interested in understanding progress toward such cooperation, limitation observed and way forward to the future. On many many occations, different sections are too wordy which can be substantially improved by focusing on key issues for discussion</i>	Noted, but implication for text unclear	Edris Alam	Rabdan Acadmey	United Arab Emirates

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
33177	3	10	3	11	The SDG's have been decided at Rio+20, 2012, they are defined by article 247. In the process of developing these action oriented goals, it has been necessary to form groups of items, which now follow in a different order the elements of the Agenda 21 (Rio 1992). Therefore, the concrete actions called by art 247 are the "targets". Therefore it should be written instead of: "with 17 non-legally binding....to support" " which consists of 169non-legally binding targets to be reached by 2030 grouped in 17 Sustainable development goals to support" ... <i>This distinction is important in order not to limit the sustainable matrix which is referenced later with the coloured square to 2030, and conversely to maintain clarity on what should be achieved by 2030.</i> see Marc Darras Les objectifs du développement durable (ODD) : Outils d'une stratégie mondiale à l'horizon 2030 . Octobre 2018 Encyclopédie du Développement Durable. <a href="http://encyclopedie-dd.org/encyclopedie/neige-neige-territoires-neige/3-3-les-dechets/les-objectifs-du-developpement.html">http://encyclopedie-dd.org/encyclopedie/neige-neige-territoires-neige/3-3-les-dechets/les-objectifs-du-developpement.html</a>	Good suggestion but this whole part of the ES has been edited and the comment is not longer relevant.	Marc Darras	Association 4D	France
33179	3	44	3	46	"The demand for most services..." should read "The demand for products and services continues to soar with economic growth, simultaneously with an increase of social demand for environmental quality and sustainability. There is a gap between climate ambition and people's willingness to reconsider their techno-economic path of development." The sentence suggest a simple economic burden.	Exec Sum completely redrafted	Marc Darras	Association 4D	France
33181	4	2			The control of environmental damage is not only a question of pricing, it may be controlled by norms as mentioned later in the paragraph, event if this as a cost aspect. Therefore it should read: "and amplify environmental damage when not politically controlled."	Exec Sum completely redrafted	Marc Darras	Association 4D	France
33183	4	31			It should be added at the end of the paragraph: However, these technologies and their deployment will effectively reduce and limit emission if implemented within scenarios of development including demand side management of products and services.	Exec Sum completely redrafted (and space very limited)	Marc Darras	Association 4D	France
33185	4	43			Before introducing the economic frameworks, it should be underlined in a paragraph that the climate policies should be developed taking into account the other dimensions of sustainability, i.e. environmental ( biodiversity, air, water and soil quality...) and social (development of capacities, employment...). Then the introduction of co-benefits in the following paragraph will be easier. see p8   24-37	Exec Sum completely redrafted (and space very limited). See addition of a brief remark on the relationship of frameworks to co-benefits in concluding section 6	Marc Darras	Association 4D	France
33187	5	1			Ethical frameworks. Without going into the definition of the concept of ethic, this paragraph should underline the needed evaluation of the shared well being; The text of Rio+20, as the text of Agenda 2030, refer here directly to the Human rights, which give consistence to fairness.	This struck us as too much for short introduction. In the very next section we quote from AR5: "People and countries have rights and owe duties towards each other. These are matters of justice, equity, or fairness." The role of AR6 is primarily to assess what is new but we have ensured to cover ethics in our chapter	Marc Darras	Association 4D	France
33189	5	7			This paragraph should underline that to achieve the objective of the Paris Agreement and stabilize climate, a global systemic change is needed: this is not an incremental evolution. It should be noted that most of the structure and concepts have been built to solve problem in the past, not the problem we are facing.	Noted	Marc Darras	Association 4D	France

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
33191	8	27			add: to incorporate climate issues globally and into... If adaptation and mitigation options have been analysed separately in policies and within IPCC reports, the research of long term pathways shows that remediation options should be thought in the framework of adaptation, notably concerning AFOLU.	It is unclear why the word "globally" must be inserted here.	Marc Darras	Association 4D	France
33193	8	28			In a more coherent way, the sentence should be: Thus, some climate policies not designed in this broader framework can run counter sustainable development or poverty eradication aims: there are...	Climate policies can be inconsistent with sustainable development by accident or by design. The simple point here is that there are both synergies and tradeoffs between the two.	Marc Darras	Association 4D	France
33195	8	38	8	43	This paragraph is descriptive of the chapter in the report. However, since I wanted to review the energy chapter, I was surprised not to find a section on energy efficiency, and demand side management. These part should be associated with the more final sectors as described ( nota: AFOLU is both an end use consuming sector an an emitter on its own processes, as some part of industry). A larger view, in a sustainable framework, should consider the development of capacities provided by the products/services. See IASAA work for instance. Furthermore, at a global level, energy is not an intermediary good as other like steel, concrete or food. Its demand is governed by entropy, and the level of order we develop in matters, products and global organisation. (see interesting book: why information grows, Cesar Hidalgo, 2015. This is quite important in a systemic approach, and should impact the chapters organisation. To be noted that urban system is the only systemic approach, which can be complemented by the question of alimentation as considered in the SR on soil etc. Through such chapter the demand for transport, buildings and industry goods is determined. Finally, data management in the present world could be a topic on its own, as industry, building, transport...	Noted. Thanks for these observations. Sector specific comments may be directed to the relevant chapters.	Marc Darras	Association 4D	France
33197	9	31	9	32	The Common but differentiated responsibilities principle is part of the Climate convention, as develop in Rio 92. The PA on this respect is interesting because it tries not to define the level of responsibilities, but demand through the NDC's an evaluation by each Party, and reviewed by others. This relates to the management of Commons.	Noted	Marc Darras	Association 4D	France
33199	9	5	9	10	This paragraph is to be read in the framework of management of Commons. The ethics is procedural, and the question of fairness and equity is more a question of agreement than of moral judgment.	This (and the next) paragraph simply describe the perspective of AR5, WG3.	Marc Darras	Association 4D	France
33201	9	39			In this part the NDC approach is underlined, as the stocktaking. In parallel and not directly related to the GCF, the PA has some fundamental financial elements: the alignment of finance on climate; the review of the financing plan of "developed" countries for climate change adaptation and mitigation in "developing" country. Emerging country having no formal constrains. As with NDC's all this is "non binding" in term of content and only procedural.	Accepted, text revised	Marc Darras	Association 4D	France
33203	10	13	10	14	See remark 1 above	Unfortunately with over 2000 comments on the chapter it was hard to track comments like this - if still relevant please flag for SOD review	Marc Darras	Association 4D	France



Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
33205	10	15	10	21	The SDG 13, which has been reduced to a minimum because of the role of UNFCCC to define priorities for 2030, impact social targets as well for it calls for a transition which impact industrial activities and employment, and adaptation or mis adaptation may impact poverty and peace. The question of climate refugee under the Warsaw International mechanism is another aspect of sustainable development.	We had several suggestions for additional SDGs that should be mentioned, but struggle with an overly long list. May reconsider phrasing and cross-refer to the final outcome of Chapter 17 mapping of climate mitigation against other SDGs	Marc Darras	Association 4D	France
33207	12	40	12	43	The yellow vest movement has been more a social movement of middle-lower rural or peri urban people against the suppression of social services and administration, and a politics in favor of the 'start-upers'. The increase in gas and diesel oil price triggered the movement with a very little change compared to the fluctuation due to the international oil price. Furthermore, it has not been presented as a part of a more global policy package, as mentioned in the next sentence. Most of the yellow vest have made declaration in favor of fair climate policy. You should present the yellow vest movement as an example of the next sentence.	Taken into account. The text has been modified that the yellow vest has broader aspects	Marc Darras	Association 4D	France
33209	16	7	16	15	Here again a clarification is needed on SDG's, and rather on Agenda 2030. If the analysis is based only on the Goals titles, it is more related to Sustainable Development in general, and there Agenda 21 is renewed somehow, at least in its title. If we go to targets, this is more complex. I made the same reflexion to some author on the chapter on SD in SR 1.5. Furthermore, Agenda 2030 in its different articles gives the manner to read and implement the targets of the SDG's. The analysis of Makomere and Mbeva is not proper, because Agenda 2030 underline the interdependency of all targets. SDG 13 cannot be read as a stand alone. Only UNFCCC makes it as a stand alone issue, however there is a strong interest to intertwine Climate policies with other major environmental policies (biodiversity for instance). note: as mentioned in my reference above, I have been part of the process before Rio+20 until the final development of Agenda 2030.	The point has been clarified that the two goals are connected.	Marc Darras	Association 4D	France
33211	13	32	18	37	The Chapter 1.3 on SD and Climate policies is an important chapter. It has still to be clarified on key points: what is called SDG's in comparison to Agenda 2030 text. Is it solely the structure or the targets themselves which are temporary, and seen as urgent to implement to allow the technological transition to start a turn? One important point to consider and which has not been tackled is the importance of LDC and notably Sub Sahelian Africa. Its demand of development will be huge in the coming years when the demographic factor is concerned. These countries and some others have 2 choices either to follow our path where energy consumption provides the strength for a heavily material society even taking into account technical progress or recycling of materials ( see UNEP IRP reports for instance for elements), or are they to re-invent a new path of development, which includes simultaneously the question of adaptation and mitigation, a sustainable and fair development. This aspect is not underlined in 1.3.1. Thus, it means that the finality of development for human society is more deeply analysed: is that contained in the sole Human Right Universal Declaration? Should questions of protection of the biosphere be added? Last point: the question of natural resources notably minerals is not mentioned at any time in this section: more we need, more we dig for unconcentrated ores, more energy we need for extraction.	Some of the suggestions (eg inclusion of the LDCs ) have been adapted. A clarification of the relationship between SDGs and sustainable development has been made	Marc Darras	Association 4D	France

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
33213	16	15			Figure 1.3 in the bubble which includes Climate policy, why include SDG 7 specifically? The question is more how much energy one needs through the other policies in general. Question of access exists but solutions are not specifically related to climate policies. It is included in the general SDG's circle. I further do not understand the role of equity (see SDG 16, and all access options in SDG 1, 2....)	Figure revised	Marc Darras	Association 4D	France
33215	17	14			Figure 1.4 On the flow to low income, financing should be added. If I understand the global Idea of the picture, I have a difficulty in clarifying the 2 curves. For sustainability, the reduction of emission in developed countries should be more important. An idea could be to trace the trajectory of different types of countries depending of their point of start, but since the horizontal axis is in \$, then the idea of development is strongly associated with GDP/cap which goes back on the debate on indicator. What about the human development indicator? ....	Figure edited.	Marc Darras	Association 4D	France
33217	18	17	18	21	In the KL model one question is the nature of the technical progress: one element which is not mentioned here is the part of natural resources in the value of the production. The question of repartition is essential for defining a fair society.	Noted	Marc Darras	Association 4D	France
33219	20	22	20	36	Energy is not a pure intermediate good, it is the factor of transformation. In physics this relates to 2nd principle in thermodynamics and entropy. Its concept has been largely extended to open systems, and entropy is a measure of order. Bringing order needs energy. therefore, while energy system can be optimized in terms of emissions of GHG, the question is how much energy we need, noting that the systems that are needed to collect and store renewable energy need energy to be built and maintain. It seems important not to consider energy as an intermediate good as other, but build a reflexion on demand side of societies. As mentioned earlier.	Accepted - text revised. In the revised text, we have removed the sub-headings and integrated the sub-sections together.	Marc Darras	Association 4D	France
33221	24	9	24	15	The present nuclear power plant park provides only 2% of final energy, and resources are estimated 60 years. See IEA and NEA. Thus the projection here is of massive deployment in 2025-2065 should be considered with prudence.	Comment noted. No change made.	Marc Darras	Association 4D	France
33223	23	29	23	34	It is under a lot of pressure. If the data for crypto currency are well known, evaluations of GHG cost of flow and storage of data for online streaming or connected objects are being made, which show an exponential growth. This question the pertinence of the use of data technologies. see "Lean ICT – Towards Digital Sobriety" (2019) The Shift Project	This comment appears to be a comment as opposed to a suggested change in the document. As a consequence we do not take the comment. However, no text was changed.	Marc Darras	Association 4D	France
33225	30	13	30	33	Reference can be made as well to the cognitive sciences and the functions of the human brain part is mentioned in 1.5.3.1. Other element in the transition, is the social status of the technology in the transition and the individual benefits one can have. See experiences Our Life 21 presented at UNFCCC COP 22. Final point is the construction of desires through advertisement, which value ownership as a capacity.	Accepted - We made a reference to 1.5.3.1 (now 1.6.3.1). In addition social status and advertising are mentioned.	Marc Darras	Association 4D	France

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
33227	1		85		I reviewed this chapter in a short time and without having read the various chapters, which give the basis to this introduction. In synthesis, since many chapters follow the same pattern as previous AR, one should ask if this is pertinent, because <i>the change needed to achieve a zero net ghg development pathway in the 30 years to come need to consider different approaches based on values (global or fragmented world; preference for economy or environment... as it has been done in the preparation of previous scenarios)</i> , consider the benefit for human development needed in terms of well being and dignity in society. This finally need to examine more global systems some of them are the known Nexus, but other such as natural resource and industrial processes for products/services are new. <i>The urban chapter is one of such if it includes all the flows which make a city to deliver in society, i.e. global information and governance. Such analysis should include</i> for developing countries notably an approach which combines adaptation and "remediation" in order to examine the potential of an alternative path, leap-frogging the energy intensive phase of the development of the OECD countries. Finally, I suggest that energy should be considered, beside energy system, in its role in an <i>entropic approach of the organisation of societies: this will lead to a stronger emphasis on a global energy demand</i> perspective. Last a chapter on data, data processing could find a place on its own.	Accepted. The role of values are addressed particularly in parts of sections 4 and 6. The analytical framework points to the role of different drivers and frameworks in both understanding and tackling the climate challenge. Several sections highlight the role of nexus thinking as well as the role of political economy as both a driver of and barrier against climate action.	Marc Darras	Association 4D	France
33355	0				This chapter now does a much better job communicating complex arguments than the ZOD did.	Thanks	Debra Roberts	EThekweni Municipality	South Africa
33357	0				<i>It is recommended to use fourth level document headings.</i>	We try to minimise this but in practice have often needed to in SOD	Debra Roberts	EThekweni Municipality	South Africa
33359	3	1	5	18	<i>At the FOD phase, one would expect a more mature ES. This current version of the ES lacks the level of rigour expected. Line line of sight provided to the underlying chapter is required, and there is no evidence that the ES is based on the assessment of the literature.</i>	Comment is valid. We hope the revised ES meets the reviewers expectation.	Debra Roberts	EThekweni Municipality	South Africa
33361	3	1	52	46	<i>Overall, this chapter is in much better shape than in the ZOD. While there has been an attempt to demonstrate how the chapter frames the entire report, it still reads largely like a stand-alone chapter with limited evidence of how it provides the roadmap for the rest of the chapter. In addition, the chapter does not assess the literature. In its current form, the chapter is an excellent literature review. The authors should aim for the assessment of the literature in the SOD as is expected of an IPCC report. The Executive Summary should also be written in the IPCC format with clearly delineated headline statements and traceable line of sight to the underlying chapters.</i>	The chapter has been revised accordingly. The structure of the ES has been revised to reflect IPCC format.	Debra Roberts	EThekweni Municipality	South Africa
33363	3	13	3	15	Wherever possible in this chapter, it is recommended that you provided quantitative information rather than descriptors such as 'rise', 'reduce', 'reduce', etc. as these are subjective terms.	Noted in the revision process thank you	Debra Roberts	EThekweni Municipality	South Africa
33365	4	32	4	37	<i>Is the said cost only in economic terms? The current phrasing seems to suggest that there are only economic costs associated with transitions with no consideration to non-economic tradeoffs</i>	Text has been revised.	Debra Roberts	EThekweni Municipality	South Africa
33367	4	43	4	45	This is an important statement but as there is no reference to the underlying chapter(s), it is not evident if this statement is based on your assessment of the literature.	The revised ES now makes references to chapters and sections. Thank you	Debra Roberts	EThekweni Municipality	South Africa

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
33369	5	13	5	14	What might these forms of governance be? Already established in the literature or just being postulated here?	Text has been revised. The chapter covers the developments in the "new" forms of governance including the role of experimentation.	Debra Roberts	EThekweni Municipality	South Africa
33371	5	15	5	18	Since it is highly likely that some readers will only read the ES, it is recommended that you touch on what the frameworks are in the ES.	The text has been revised	Debra Roberts	EThekweni Municipality	South Africa
33373	6	3			A more powerful and clearer, easy to understand, opening sentence and paragraph is recommended. At this point in history it is important not to point to the risks (things that 'could happen') but the catastrophe that is currently unfolding, with a plethora of observed and ongoing, severe and worsening impacts on natural and human systems, on humans and other species. The urgency of the moment must come out from the first line. This is the report that must make a difference. If AR6 can't get the world moving, AR7 will be too late.	Amended	Debra Roberts	EThekweni Municipality	South Africa
33375	6	14	6	19	'rising threat' is too mild. 'escalating reality' is more like it. The WGIII report is the most important in AR6. Immediate, extreme, all-encompassing mitigation is required to save this world. This needs to come across unambiguously in the opening section. Remember the chapter text does not go through government approval in the end, only the SPM. At this point in history authors can be more emphatic, without becoming policy prescriptive.	Accepted - text revised	Debra Roberts	EThekweni Municipality	South Africa
33377	6	20	6	30	'This report aims to assess new literature' – that would be only the academic aim. Consider the urgency of the moment. Third paragraph talks about new developments in international climate action. Highlight what has been achieved, but that it simply isn't enough yet. Current NDCs won't solve the problem. Need for doubling ambitions. The aim of this report should be to provide the evidence to inform, guide, underpin ambitious action.	Accepted - text revised	Debra Roberts	EThekweni Municipality	South Africa
33379	6	32			'has continued upwards, but more slowly' – is too optimistic, given that we are still heading for 3degrees plus. Rephrase to say there are tentative signs that countries are responding, but that this is not enough, emissions are still too high, and still rising. And that in some up-and-coming economies emissions are accelerating. The reader should be left in no doubt whatsoever about what the current state of play is.	Accepted overall in Intro	Debra Roberts	EThekweni Municipality	South Africa
33381	6	34	6	34	Cross-chapter referencing will be more useful to your reader if you refer to the actual section of the chapter where the subject matter is assessed.	Noted, thank you. Unfortunately this continued to be difficult as many other chapters were still in flux to a late stage, with structural changes since the FOD which it was hard to keep track of along with everything else	Debra Roberts	EThekweni Municipality	South Africa
33383	6	36		38	'prospects for cheap...' – this is a very important point that brings a ray of hope. Elaborate.	Not just in this chapter, we have worked to try and embed this point across WG3	Debra Roberts	EThekweni Municipality	South Africa
33385	6	36	6	39	The notion of 'cheap mitigation' should be interpreted in the context of the different economic realities around the world. What is qualified as 'cheap' for some countries might be too costly for others?	Amended	Debra Roberts	EThekweni Municipality	South Africa
33387	6	44			Be specific. Where are we heading, why is it unthinkable, what is required to achieve the Paris Agreement? Also point to indications (coming out of WGII) that we are underestimating impacts at 1.5, as some regions have already 'tipped over the edge' even at 1deg global warming, eg Australia.	Tone point broadly accepted. We engaged Rob Lempert from WG2 as Contributing Author to help address these points	Debra Roberts	EThekweni Municipality	South Africa
33389	7	12			... and by reducing the carbon uptake by plants, ecosystems and soils, e.g. drying, burning forests, dwindling grasslands in drylands, degraded mangroves and kelp forests etc.	Subsumed under terrestrial carbon sinks.	Debra Roberts	EThekweni Municipality	South Africa

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
33391	7	22		24	Please avoid convoluted academic phrasing, and use plain English (as in line 33-34 for instance). The opening pages and sections of the opening chapter are where some of the most important messages of this cycle can and must be brought across, clearly, plainly, for everyone to understand.	Sentence has been rephrased.	Debra Roberts	EThekwini Municipality	South Africa
33393	7	33			'recent reports' – is that referring to special reports SR15, SROCC and SRCCL? It would be good to call out the particular key messages of these three reports, e.g. 'every degree matters...', etc	References are provided for "recent reports". Space constraints preclude further elaboration.	Debra Roberts	EThekwini Municipality	South Africa
33395	7	34			'Successive...' should be a new paragraph that discusses models.	Doing so would create an orphan sentence - the one immediately preceding "Successive...". The positioning of the sentences is OK.	Debra Roberts	EThekwini Municipality	South Africa
33397	7	36		37	Probably need to reword 'possible emissions pathways that may be able to meet targets'	Looks OK to me	Debra Roberts	EThekwini Municipality	South Africa
33399	7	43			Mention 1.5 first. By all indications 2 would be a disaster. Mention that based on currently observed impacts, it seems not even 1deg warming can be considered 'safe'. Check new messaging up until the point of publication.	Noted	Debra Roberts	EThekwini Municipality	South Africa
33401	8	13			Add 'with attendant costs, possible ecological and social fall-out, ...'	Attendant 'costs' and uncertainties subsumes ecological and social fallouts (and other adverse outcomes).	Debra Roberts	EThekwini Municipality	South Africa
33403	8	24			What is meant with 'not a means in themselves'? Is that a real concern? to stop burning fossil fuels just because?	The sentence has been rephrased.	Debra Roberts	EThekwini Municipality	South Africa
33405	8	30			Number one benefit must be keeping global warming and with it extreme weather and events to a minimum, thus saving lives, ecosystems and infrastructure and ensuring the world survives. Perhaps this is so obvious, but somehow it is not always said so clearly. People are dying and suffering, livelihoods are being destroyed, from climate change related impacts.	Extreme weather events are undoubtedly important as highlighted in IPCC SREX 2012. The example of air quality is to focus on just one example. The wording has been changed to focus on lives saved rather than generic "better health."	Debra Roberts	EThekwini Municipality	South Africa
33407	8	39		40	Why is it necessary to say 'if you include energy', if energy is the no 1 source of emissions by far? This must come across more clearly. Something like AR5 WGIII Fig 10,1 but get updated figures from AR6 WGI. The main 'culprits' need to be listed in descending order, starting with energy and industry. One could mention here how important urban is – percentage of emissions associated with urban. The main message in this respect is that mitigation is most important in sectors that contribute most to global warming = bang for buck.	The purpose of this paragraph is to simply inform the reader about the motivation for the sectoral chapters in the AR6 report, each accounting for over 20 percent of total GHG emissions.	Debra Roberts	EThekwini Municipality	South Africa
33409	9	3			A stronger argument is that what you put into the atmosphere affects people in other parts of the world, through climate change.	removed this sentence; a brief reference to the 'public good' framing in the Econ Frameworks section	Debra Roberts	EThekwini Municipality	South Africa
33411	9	6			Re 'equitable sharing of efforts' – this could mean two things. It could mean that because America and Europe are most to blame for climate change, they are most responsible to fix it. But to America this can mean – 'Everyone has to participate, even Africa, or else we won't do it. Everyone has to share the effort'. Which is meant here? Perhaps spell things out a bit more clearly.	This text has been removed.	Debra Roberts	EThekwini Municipality	South Africa
33413	9	14			'much more briefly' – did you mean 'in more detail'?	changed	Debra Roberts	EThekwini Municipality	South Africa
33415	9	33			The Paris Agreement also has paragraphs about transfer of resources that are often forgotten. – ok mentioned on pg 10. Please cite them here, as it is related to the question of 'equity'.	Noted	Debra Roberts	EThekwini Municipality	South Africa
33417	11	31			'far above' – how much? Give number.	Accepted. The text has been changed and numbers are given in revised figures.	Debra Roberts	EThekwini Municipality	South Africa

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
33419	11	31	11	32	The intended message of the phrase 'the rise of east Asia in particular; and continued 32 rapid population growth mainly in south Asia and Africa' is not clear'.	Accepted. The text has been removed	Debra Roberts	EThekwini Municipality	South Africa
33421	12	3			Reword first sentence into plain English.	Accepted. Assuming the sentence referred to was this one: "Rising global temperatures and extreme events have helped to maintain the political profile of climate change in many regions." It has been cut.	Debra Roberts	EThekwini Municipality	South Africa
33423	12	8	12	13	How is this linked to climate change?	Noted - economic development is strongly linked to climate change	Debra Roberts	EThekwini Municipality	South Africa
33425	12	19			'mild warming' – rather say '1 degree of global warming' since it seems 1degree is not so mild after all.	Accepted	Debra Roberts	EThekwini Municipality	South Africa
33427	12	40	13	4	Contrasting with the positive global grassroots movement provides an opportunity for exploring the implications of the hardening of positions on the climate issue for global climate action.	Taken into account. Both active movement of civil societies and resistance to climate actions are referred to in the text	Debra Roberts	EThekwini Municipality	South Africa
33429	12	44			Is there also a mismatch between how much people are currently emitting/depending on fossil fuels and the extent to which they are willing to cut back?	Noted. People may support deeper emissions cut so long as it does not substantially raise their energy expenses.	Debra Roberts	EThekwini Municipality	South Africa
33431	13	10	13	31	While the progress in renewable technology is highly impressive, it would also be useful here to discuss issues relating to technology transfer and barriers to the acquisition of renewable energy systems.	Accepted	Debra Roberts	EThekwini Municipality	South Africa
33433	13	21			Please call out here that this is not yet true in low and many middle income countries, where car ownership is rising steeply. It is important to accelerate availability of affordable electric cars everywhere, so we don't miss this important opportunity, because once people have bought a car, they have it for 10-20 years. For example in South Africa EVs are very much still a luxury item and unaffordable for all but the richest sector of society. Also call out here the particular opportunity to combine with solar charged EVs where the grid-recharge stations are not yet available, e.g. solar car parks. Many cars are parked all day while owners are at work.	The intent was to illustrate that technologies requiring advanced industrial capability - including some currently beyond reach of developing countries at scale - could be important in reconciling wellbeing and climate change	Debra Roberts	EThekwini Municipality	South Africa
33435	13	22		24	The meaning of this sentence is not clear. Is this good or bad? How does this relate to battery technology? Does this mean the advances in cheap renewables is offset and threatened by parallel advances in cheap fossil fuels?	The intent was to illustrate that technologies requiring advanced industrial capability - including some currently beyond reach of developing countries at scale - could be important in reconciling wellbeing and climate change	Debra Roberts	EThekwini Municipality	South Africa
33437	14	23			One additional point this section could make is the concept of 'irreversible' change. The danger that some systems could, or have already, changed irreversibly is an additional factor that needs to be considered in decision making. Some things can be reversed, others cannot – ever (like species or ecosystem extinctions) or in the long term (like primary forests and other key ecosystems). Avoiding irreversible changes is more important than avoiding reversible ones.	Thank you. This has now been covered in the section on risks.	Debra Roberts	EThekwini Municipality	South Africa
33439	15	24			It is worth mentioning here (for non-industrial countries) that developing renewable energy often provides energy for the first time to kick-start or accelerate economic development (eg solar power in non-electrified areas would make new industry possible).	This point has been made elsewhere in the chapter.	Debra Roberts	EThekwini Municipality	South Africa
33441	15	28			'land that can', insert 'land and crops that can'. 'land-based mitigation', add 'such as re/afforestation'. Add example: ...or when demand for biogas (for 'mitigation' purposes) leads to deforestation and ecosystem degradation to make space for bioenergy crops.	Edited.	Debra Roberts	EThekwini Municipality	South Africa
33443	15	31			'organic agriculture' is too narrow. say 'conservation agriculture' or 'regenerative agriculture'.	Edited.	Debra Roberts	EThekwini Municipality	South Africa

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
33445	16	17	16	17	Does the shading on the bars in Figure 1.3 mean anything? If yes, a legend explaining this will be very useful.	Figure has been revised.	Debra Roberts	EThekwini Municipality	South Africa
33447	17	16	17	16	What is the intended meaning of + & - in figure 1,4? Does it imply that low-income countries should ignore mitigation and high-income countries should ignore adaptation? If that is the case, it is not consistent with the SR15 message which emphasises the need for collective action in addressing both adaptation and mitigation. Careful crafting of the message is required.	Figure has been revised.	Debra Roberts	EThekwini Municipality	South Africa
33449	17	27			However, also consider the experience of Australia that is seeing huge impacts and shows we have underestimated the needs for adaptation in developed countries.	Suggestion adapted.	Debra Roberts	EThekwini Municipality	South Africa
33451	18	15			GDP also neglects services that go unpaid, like parenting, care-giving, subsistence farming, etc. – very important! See Gender box in WGII as it develops further in SOD.	Agreed. These are an important. Major elements not part of GDP include household services and illegal transactions. However, goods and serviced produced for own final use are valued at the market prices of similar products or by their cost of production. We do not discuss GDP calculation in section 1.5.1.  Does this belong in section 1.4.2?	Debra Roberts	EThekwini Municipality	South Africa
33453	18	33		35	Please elaborate re access to remaining carbon budget – what are the different arguments? As you say, “this is more so important”	Text has been revised.	Debra Roberts	EThekwini Municipality	South Africa
33455	18	39			Currently this section 1.4.1 is very general, with few specifics, few links to recent special reports. It could be improved by providing more punchy, interesting details, a systems approach.	Text has been revis.ed	Debra Roberts	EThekwini Municipality	South Africa
33457	18				Please check grammar in this section	We will check grammar.	Debra Roberts	EThekwini Municipality	South Africa
33459	19	8			Also make the link here to emissions of individuals (rich versus poor people within countries), ie taking account of inequalities within and not just between countries.	As part of edits made to the overall section, the paragraph that this comment refers to has been removed.	Debra Roberts	EThekwini Municipality	South Africa
33461	19	9			In this bullet one might mention total lifecycle carbon emissions of different products, e.g. metal and plastic has higher footprint than glass or wood.	As part of edits made to the overall section, the paragraph that this comment refers to has been removed.	Debra Roberts	EThekwini Municipality	South Africa
33463	19	23		29	Can we differentiate here between needs and desires? Shelter is a need, a flat screen TV is a desire. See Chapter 5 introductory section.	Thank you, we have edited the sentence: "Human societies and individuals value a wide range of services for satisfying their needs and desires, ranging from nutrition to shelter to health to mobility and so forth (see Chapter 5). "	Debra Roberts	EThekwini Municipality	South Africa
33465	20	6	20	6	Drop acronyms 'LEW' and 'CLEW' as these were used only once in the chapter. Please check the entire chapter and ensure that acronyms with single/limited usage are deleted.	Accepted - text revised	Debra Roberts	EThekwini Municipality	South Africa
33467	20	12	20	21	Here is an important opportunity to provide a framing for and linkage to chapter 8	Accepted. We now reference Chapter 8.	Debra Roberts	EThekwini Municipality	South Africa
33469	20	29			List in order of magnitude, e.g. heating is high on the list in terms of emissions, see AR5 WGIII Fig 10.1	We have rewritten the sentence to indicate that these are only examples. There are manyt classifications of energy services and not just 8.	Debra Roberts	EThekwini Municipality	South Africa
33471	21	22		29	What is ‘trade opening’ and ‘tariff cut’ or ‘tariff reduction’? Define ‘marginal abatement costs’. What is ‘WTO’?	Rejected. These terms are widely used and not require explanation.	Debra Roberts	EThekwini Municipality	South Africa
33473	21	28			Please explain the withdrawal in relation to the legally binding nature of the Kyoto protocol. Which part was legally binding? Or can countries withdraw from the legally binding bit when it suits them? Then what does legally binding mean?	Rejected. Withdrawal of legally binding nature of Kyoto Protocol is not relevant for this section.	Debra Roberts	EThekwini Municipality	South Africa

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
33475	22	7			20-33% is a very high figure. Please elaborate what exactly this means and entails. Please ensure these figures are assessed, and accurate, and check with WGI.	Further clarification is provided. The figure is correct	Debra Roberts	EThekwini Municipality	South Africa
33477	22	20			Does this mean OECD countries are importing less now than they used to?	The cited references states " emission transfers between OECD and non-OECD countries peaked in 2006, and have been declining since. The reversal is principally due to the reduction in the emissions intensity of traded goods, rather than the volume of trade", hence it is not the volume but reduction in emissions intensity of traded goods. We have now clarified this in the text.	Debra Roberts	EThekwini Municipality	South Africa
33479	22	41		42	Sentence is repeated	Fixed in the revised version	Debra Roberts	EThekwini Municipality	South Africa
33481	23	4			Again, 8% is a very high figure, and differs from other reports where entire air transport is less than 2%. These figures need to be assessed not just cited from the one piece of literature, as they have high relevance and consequences for where mitigation is most important. Check with WGI	This comment belongs to 1.4.2. This sentence has been removed as part of general editing undertaken in this section.	Debra Roberts	EThekwini Municipality	South Africa
33483	23	6			What are 'ocean renewables' in this context?	This comment belongs to 1.4.2. This mention has been removed as part of general editing undertaken in this section.	Debra Roberts	EThekwini Municipality	South Africa
33485	24	6	24	6	It seems problematic to have country level and state/city level information in one figure as the different levels of comparison might communicate the wrong message. It is recommended that the author team limit this to country-level information	Partly accepted -we use a different figure now.	Debra Roberts	EThekwini Municipality	South Africa
33487	24	23			"little innovation in agriculture": this is not quite true, and also contradicts the rest of paragraph. This paragraph needs to be framed positively. There is increasing evidence that methods like intercropping, conservation agriculture, crop-livestock mixes, agro-forestry, rainwater harvesting in drylands, etc can reduce need for input (fertilizers, biocides), improve profitability, produce higher quality (and per ha quantity) of food, while improving soil quality, soil carbon, ecosystem health, biodiversity and biomass. These developments deserve a detailed assessment, especially without the blinkered conventional industry-technology approach, which has led to the high AFOLU related problems we see today. These are particularly important in areas that are not highly industrialized. These are more important and relevant than precision agriculture (which still works in the industrial-technological framework).	Accept. The statement about little innovation in agriculture has been dropped.	Debra Roberts	EThekwini Municipality	South Africa
33489	24	23	25	2	Also worth considering here is addressing problems such as post-harvest loss (a big problem for low-income countries) and food waste (for some high-income economies).	Point noted, however this level of detail belongs in the main chapter.	Debra Roberts	EThekwini Municipality	South Africa
33491	24	23	25	3	While an important message, it is important to emphasise the relevance of this message to different audiences particularly in a context where meat consumption is low and meat-based diets are important sources of protein.	Point noted. No change made.	Debra Roberts	EThekwini Municipality	South Africa
33493	25	26			Include mention of innovative mandatory policies. There are already policies and standards around health and safety, pollution, or in SA companies are mandated to build capacity (spend it or lose it), around 'BEE' or 'affirmative action'. Apart from carbon tax governments could make it mandatory that industry undergo energy-audits, or be penalized. Mandatory energy efficiency policy.	Noted - we have shortened this paragraph, so we do not go into details here.	Debra Roberts	EThekwini Municipality	South Africa



Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
33495	27	18	27	19	It will be useful to consider using this opportunity to unpack why the financial pledges have not been met.	Accepted. While we agree it would be useful to unpack the reasons for this, there is simply no space to do so in chapter 1 and a line of sight link is included to the relevant section in Ch 15.	Debra Roberts	EThekwini Municipality	South Africa
33497	28	21		22	This seems to be a hugely important conclusion. Can this be elevated? Currently it reads rather like an after-thought.	The fact that emissions could be significantly reduced if China applied its own standards to BRI countries does indeed seem important. Unfortunately it is probably both too specific, and too country-specific, to be given higher profile in an IPCC introductory chapter	Debra Roberts	EThekwini Municipality	South Africa
33499	28	23			It would be useful if this section included more examples of solutions to the sort of political stalemates discussed here.	Section 6 and 7 contains suggestions of potential solutions to overcoming political stalemates.	Debra Roberts	EThekwini Municipality	South Africa
33501	29	4			The example of state capture in South Africa is another important example.	Thank you.	Debra Roberts	EThekwini Municipality	South Africa
33503	30	14		23	“Religion, culture, identity and habits” – these should be mentioned in order from most to least impactful. Religion cannot possibly be the main reason why people in highly industrialized countries with huge carbon footprints don’t want to change their ways. It is likely to be convenience, expectation, not wanting to give up what they have, the constant desire for more, advertising, etc. perhaps this is meant by “habit”. Perhaps it would be best to say it in very plain language to clarify. These are powerful human motivators. Without a clear handling, there will not be a clear path to solutions. Similarly, general consumerism and its demand on industry is more important than food. This section needs to focus on the high end of the emission spectrum, currently it focuses on the mid-low end (e.g. fertility is already lowest in highly industrialized nations, and highest in low-emissions countries).	We inserted values. The point here is on the macro context of behaviours ...	Debra Roberts	EThekwini Municipality	South Africa
33505	30	24			Education, reduced poverty, and improvements in health are not “social innovations”. They are basic human rights. The fact that some regions do not benefit from them yet is a travesty, but building these into society should not be considered an ‘innovation’ but a very belated righting of deep injustice.	Accepted (though implementation eg. of education has in big picture been a social innovation) - but apologies that in wrapping thing up we realise we failed to amend our wording. Will do for final.	Debra Roberts	EThekwini Municipality	South Africa
33507	34	37	47	18	The review of Frameworks, Methods and Analytical Tools is quite useful. However, this sub-section will remain a purely academic exercise if an attempt is not made to indicate their applicability to subsequent chapters of the report.	We have now changed the structure of the report to create a clearer link between frameworks and the substance in the rest of the report	Debra Roberts	EThekwini Municipality	South Africa
33509	37	1	0	0	Check: one needs to find here a discussion on relative value of money in different parts of the world, e.g. USDx damages in US is not the same as the same damages in Mozambique. The same impact can put a dent in one economy and cripple another. This just needs some clear discussion.	Accepted, in distributional	Debra Roberts	EThekwini Municipality	South Africa
33511	37	1	0	0	Should the question of state subsidies of fossil fuels have been mentioned alongside carbon taxes? Stop subsidising and start taxing.	Accepted	Debra Roberts	EThekwini Municipality	South Africa
33513	37	23	0	33	This paragraph, and those that follow, seem to be a very important section. Every attempt should be made to make this material as easy to understand as possible. It is difficult to read currently, and quite theoretical.	Noted, have tried to clarify	Debra Roberts	EThekwini Municipality	South Africa
33515	38	11	0	0	What are the six market failures?	Clarified	Debra Roberts	EThekwini Municipality	South Africa
33517	39	1	0	0	What literature is there on re-using fossil power plants for renewables? Can you repurpose some of the infrastructure and thus reduce the switching costs?	Not aware of literature would be interested to see?	Debra Roberts	EThekwini Municipality	South Africa
33519	39	41	0	0	In this instance it would be good to discuss how to communicate better about the short-term benefits of mitigation, eg cost-saving solar power.	OK	Debra Roberts	EThekwini Municipality	South Africa

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
33521	42	33	0	0	This section is very difficult to understand. What is the main message of this section? And does it come across?	Point taken - redrafted	Debra Roberts	EThekwini Municipality	South Africa
33523	43	2	43	2	A guide for interpreting Figure 1.7 will be useful. Without a legend explaining the different elements of the figure, it is extremely difficult to understand the intended message of the figure.	There was an unfortunate technical error in conversion to PDF, however the Figure has been substnially reworked	Debra Roberts	EThekwini Municipality	South Africa
33807	12	40	12	43	Could also use the global South example of Labour Union protests in South Africa about the deployment of increased renewable energy production.	Accepted. This example has been added	Debra Roberts	EThekwini Municipality	South Africa
33809	16	22			Need to highlight that "achieving both the SDGs and long term climate goals lie in the development paths that maximises the synergy between climate mitigation and broader sustainable development" AND adaptation.	Revised.	Debra Roberts	EThekwini Municipality	South Africa
33811	16	31			Should not use the word "target" in relation to 1.5C - very politically sensitive.	Edited	Debra Roberts	EThekwini Municipality	South Africa
33829					<i>There is a strong urban element in the report but Ch1 is still very light on urban issues and their significance in the report.</i>	We have brought some of this in, eg. in context of lock-in reference, but acknowlege maybe should still review further in final draft	Debra Roberts	EThekwini Municipality	South Africa
33847	11				Figure 1.2: The percentages of global CO2 do not add up to 100%, so what do these numbers mean? (38, 86, 14, 0.5)	Taken into account. Figure 1.2 has been replaced with Figure 1.3 a and 1.3 b in line with AR5.	Debra Roberts	EThekwini Municipality	South Africa
33849	17	0			Figure 1.4. it would be interesting to see this schematic drawn to scale (where the y axis reflects the reality mentioned in an earlier section, that per capita emissions is 11 p.p. in developed and <.5 p.p in the poorest countries. If the approximate relationship between income and emissions is known, this should be shown in this figure. - It is not clear what the "+" and "-" in front of Adaptation and Mitigation means, until you read the text. Replace with 'more' and 'less', and add 'both' to the middle category. - the SDG icons currently just look like unnecessary decoration. If particular SDGs are important in different parts of the graph, then the SDG names should be large enough to read, and then this should be explained in the caption. - the red and brown line are too similar in colour. - Do the black arrows mean resource transfer? Explain in caption. Partnership should have an arrow that points both ways because high income countries can also benefit from knowledge and people from low income countries.	Figure edited.	Debra Roberts	EThekwini Municipality	South Africa
33851	43	2	0	0	The Figure is almost impossible to understand. Is the black background intentional? Is it hiding any text?	There was an unfortunate technical error in conversion to PDF, however the Figure has been substnially reworked	Debra Roberts	EThekwini Municipality	South Africa
33897	3	25	3	32	This cannot be discussed in isolation from the notion of equity and justice. Please consider how this can be incorporated into the paragraph.	Valid point. However comment no longer applies as this part of the Executive Summary has been completely revamped.	Debra Roberts	EThekwini Municipality	South Africa
33917	6	33	6	33	'consumption footprint' - :: em-dash is necessary instead of a hyphen	Reworded, "consumption -footprint" has been dropped. Thank you.	Dmitry Kovalevsky	Climate Service Center Germany (GERICS), Helmholtz-Zentrum Geesthacht	Germany
33919	7	7	7	7	40 Gt CO2 :: or 40 Gt CO2eq ?	Its c. 40GtCO2 closer to 50GtCO2eq rephrased for long vs short term GHGs, refer to X-cutting box	Dmitry Kovalevsky	Climate Service Center Germany (GERICS), Helmholtz-Zentrum Geesthacht	Germany
33921	7	34	7	34	(IPCC 2018a, 2019c,b) :: or (IPCC 2018a, 2019a,b) ? – correct reference?	Corrected	Dmitry Kovalevsky	Climate Service Center Germany (GERICS), Helmholtz-Zentrum Geesthacht	Germany

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
33923	8	32	8	32	report :: Report ? – capital ‘R’?	Changed to "Special Report on Climate Change and Land" (SRCCL)	Dmitry Kovalevsky	Climate Service Center Germany (GERICS), Helmholtz-Zentrum Geesthacht	Germany
33925	8	32	8	32	change :: Change ? - capital ‘C’?	Changed to "Special Report on Climate Change and Land" (SRCCL)	Dmitry Kovalevsky	Climate Service Center Germany (GERICS), Helmholtz-Zentrum Geesthacht	Germany
33927	9	3	9	3	The atmosphere is a global public good. :: Climate change problem is not limited to atmospheric phenomena only; should other components of climate and environmental system be probably mentioned here as well?	Increased concentrations of GHGs in the atmosphere (which is a part of the global commons) is the root cause of the problem.	Dmitry Kovalevsky	Climate Service Center Germany (GERICS), Helmholtz-Zentrum Geesthacht	Germany
33929	9	12	9	12	tools – :: em-dash is necessary instead of a hyphen	Done	Dmitry Kovalevsky	Climate Service Center Germany (GERICS), Helmholtz-Zentrum Geesthacht	Germany
33931	10	26	10	26	The IPCC 1.5C report :: apparently, inconsistency with abbreviation provided on page 1-6, line 18: ‘hereafter SR1.5, 2018’	Addressed	Dmitry Kovalevsky	Climate Service Center Germany (GERICS), Helmholtz-Zentrum Geesthacht	Germany
33933	11	28	11	28	Making an additional statement on how accounting of other GHG emissions, in addition to CO2, would change the distribution shown in Figure 1.2 would be very instructive.	Taken into account. Figure 1.2 has now been replaced with Figure 1.3 a and 1.3 b covering the whole GHG emissions with the same format of SPM1 AR5	Dmitry Kovalevsky	Climate Service Center Germany (GERICS), Helmholtz-Zentrum Geesthacht	Germany
33935	12	44	12	44	Unnecessary quotation mark?	Accepted - added a sentence	Dmitry Kovalevsky	Climate Service Center Germany (GERICS), Helmholtz-Zentrum Geesthacht	Germany
33937	14	27	14	29	Phrase on lines 27-29 is not completely clear and apparently needs editing.	Edited	Dmitry Kovalevsky	Climate Service Center Germany (GERICS), Helmholtz-Zentrum Geesthacht	Germany
33939	14	43	14	43	Is comma necessary?	Edited.	Dmitry Kovalevsky	Climate Service Center Germany (GERICS), Helmholtz-Zentrum Geesthacht	Germany
33941	15	11	15	11	(2015). :: (2015)). ? Extra bracket necessary?	Edited.	Dmitry Kovalevsky	Climate Service Center Germany (GERICS), Helmholtz-Zentrum Geesthacht	Germany
33943	16	24	16	27	Phrase on lines 24-27 is not completely clear and apparently needs editing.	Edited.	Dmitry Kovalevsky	Climate Service Center Germany (GERICS), Helmholtz-Zentrum Geesthacht	Germany
33945	17	14	17	14	The vertical axis in Figure 1.4 is not completely clear: should not either ‘emissions’ or ‘concentrations’ be retained, but not both?	Figures has been revised	Dmitry Kovalevsky	Climate Service Center Germany (GERICS), Helmholtz-Zentrum Geesthacht	Germany

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
33947	17	19	17	19	1.5 stabilization :: 1.5C stabilization – ‘C’ necessary	Edited.	Dmitry Kovalevsky	Climate Service Center Germany (GERICS), Helmholtz-Zentrum Geesthacht	Germany
33949	18	1	18	1	pollution :: population ? – should be ‘population’ instead?	Text edited.	Dmitry Kovalevsky	Climate Service Center Germany (GERICS), Helmholtz-Zentrum Geesthacht	Germany
33951	18	5	18	5	economic, :: is comma after ‘economic’ necessary?	edited	Dmitry Kovalevsky	Climate Service Center Germany (GERICS), Helmholtz-Zentrum Geesthacht	Germany
33953	18	18	18	21	...which considers the effects of merely the capital and the labour... :: exogenous technological progress is also included in some versions of the Solow-Swan model	Noted	Dmitry Kovalevsky	Climate Service Center Germany (GERICS), Helmholtz-Zentrum Geesthacht	Germany
33955	18	21	18	22	References repetition on lines 21-22.	Edited.	Dmitry Kovalevsky	Climate Service Center Germany (GERICS), Helmholtz-Zentrum Geesthacht	Germany
33957	18	44	18	44	Reference repetition (‘Figure 1.5’).	Figure and reference have been removed.	Dmitry Kovalevsky	Climate Service Center Germany (GERICS), Helmholtz-Zentrum Geesthacht	Germany
33959	20	12	20	12	City transformation services. :: italic font necessary?	In the revised text, we have removed the sub-headings and integrated the sub-sections together.	Dmitry Kovalevsky	Climate Service Center Germany (GERICS), Helmholtz-Zentrum Geesthacht	Germany
33961	20	14	20	14	Glaeser :: year missing in the reference?	Reference fixed	Dmitry Kovalevsky	Climate Service Center Germany (GERICS), Helmholtz-Zentrum Geesthacht	Germany
33963	20	23	20	23	resource :: resources ?	Accepted - text revised	Dmitry Kovalevsky	Climate Service Center Germany (GERICS), Helmholtz-Zentrum Geesthacht	Germany
33965	21	35	21	35	CO2 :: ‘2’ should be a subscript.	Accepted	Dmitry Kovalevsky	Climate Service Center Germany (GERICS), Helmholtz-Zentrum Geesthacht	Germany
33967	22	38	22	42	Repetition of a fragment on lines 38-42.	Duplicated text deleted	Dmitry Kovalevsky	Climate Service Center Germany (GERICS), Helmholtz-Zentrum Geesthacht	Germany
33969	22	43	22	43	International :: why in italic ?	Text convert to normal font	Dmitry Kovalevsky	Climate Service Center Germany (GERICS), Helmholtz-Zentrum Geesthacht	Germany

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
33971	22	47	22	47	2016); :: 2016; - unnecessary bracket?	Bracket fixed	Dmitry Kovalevsky	Climate Service Center Germany (GERICS), Helmholtz-Zentrum Geesthacht	Germany
33973	23	10	23	10	section 2 :: reference unclear - section 1.2 ?	Accepted	Dmitry Kovalevsky	Climate Service Center Germany (GERICS), Helmholtz-Zentrum Geesthacht	Germany
33975	23	37	23	37	ZOD :: abbreviation unclear	Accepted - this refers to the zero order draft. The reference will be updated.	Dmitry Kovalevsky	Climate Service Center Germany (GERICS), Helmholtz-Zentrum Geesthacht	Germany
33977	23	39	23	39	(Crabtree et al. 2015) :: (Crabtree et al. 2015)) ? – extra bracket necessary?	Accepted	Dmitry Kovalevsky	Climate Service Center Germany (GERICS), Helmholtz-Zentrum Geesthacht	Germany
33979	23	45	23	45	(see figure 7.7). :: (see figure 7.7)). ? - – extra bracket necessary?	Accepted	Dmitry Kovalevsky	Climate Service Center Germany (GERICS), Helmholtz-Zentrum Geesthacht	Germany
33981	24	18	24	18	(about 30 MtCO2 yr-1) :: brackets unnecessary?	Rejected - we think this makes the reading easier	Dmitry Kovalevsky	Climate Service Center Germany (GERICS), Helmholtz-Zentrum Geesthacht	Germany
33983	24		24	31	Phrase on lines 28-31 is not completely clear and apparently needs editing.	Accepted - that statement has been removed.	Dmitry Kovalevsky	Climate Service Center Germany (GERICS), Helmholtz-Zentrum Geesthacht	Germany
33985	25	2	25	2	system :: systems ?	Accepted - changed as recommended	Dmitry Kovalevsky	Climate Service Center Germany (GERICS), Helmholtz-Zentrum Geesthacht	Germany
33987	25	7	25	7	blades. :: blades). – bracket necessary	Accepted	Dmitry Kovalevsky	Climate Service Center Germany (GERICS), Helmholtz-Zentrum Geesthacht	Germany
33989	26	18	26	18	Making :: “Making – quotation mark necessary	Accepted.	Dmitry Kovalevsky	Climate Service Center Germany (GERICS), Helmholtz-Zentrum Geesthacht	Germany
33991	26	22	26	24	Phrase on lines 22-24 is not completely clear: why estimates ‘by mid-century’ and ‘in 2016-2050’ are different, is not the time interval the same?	Accepted. These numerical estimates have been removed. Chapter 15 addresses this in much more detail and the reader will be referred to the proper section in SOD Ch 15.	Dmitry Kovalevsky	Climate Service Center Germany (GERICS), Helmholtz-Zentrum Geesthacht	Germany
33993	26	33	26	33	Latina America :: Latin America	Accepted. Text deleted.	Dmitry Kovalevsky	Climate Service Center Germany (GERICS), Helmholtz-Zentrum Geesthacht	Germany

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
33995	26	34	26	34	capacity meet :: capacity and meet ?	Accepted. Text deleted.	Dmitry Kovalevsky	Climate Service Center Germany (GERICS), Helmholtz-Zentrum Geesthacht	Germany
33997	29	12	29	12	State-owned Enterprises :: State-Owned Enterprises ? – capital 'O'?	Capital O. Noted thank you	Dmitry Kovalevsky	Climate Service Center Germany (GERICS), Helmholtz-Zentrum Geesthacht	Germany
33999	30	4	30	4	section 1.3. :: section 1.3 ? – full stop unnecessary?	Accepted	Dmitry Kovalevsky	Climate Service Center Germany (GERICS), Helmholtz-Zentrum Geesthacht	Germany
34001	30	35	30	35	comprises :: comprise ?	Noted, text revised	Dmitry Kovalevsky	Climate Service Center Germany (GERICS), Helmholtz-Zentrum Geesthacht	Germany
34003	30	37	30	37	become :: becomes ?	Noted, text revised	Dmitry Kovalevsky	Climate Service Center Germany (GERICS), Helmholtz-Zentrum Geesthacht	Germany
34005	32	13	32	13	section 5.2 :: is reference full?	I don't understand this comment?	Dmitry Kovalevsky	Climate Service Center Germany (GERICS), Helmholtz-Zentrum Geesthacht	Germany
34007	32	22	32	22	section 5.4 :: is reference full?	Done.	Dmitry Kovalevsky	Climate Service Center Germany (GERICS), Helmholtz-Zentrum Geesthacht	Germany
34009	32	37	32	37	The important :: The importance ?	Typo has been addressed.	Dmitry Kovalevsky	Climate Service Center Germany (GERICS), Helmholtz-Zentrum Geesthacht	Germany
34011	32	45	32	45	climates action :: climate action ?	Typo has been addressed.	Dmitry Kovalevsky	Climate Service Center Germany (GERICS), Helmholtz-Zentrum Geesthacht	Germany
34013	33	12	33	12	to and reduce :: to reduce ?	Accepted, text revised.	Dmitry Kovalevsky	Climate Service Center Germany (GERICS), Helmholtz-Zentrum Geesthacht	Germany
34015	33	28	33	28	scientist say :: scientists say	Accepted, text revised.	Dmitry Kovalevsky	Climate Service Center Germany (GERICS), Helmholtz-Zentrum Geesthacht	Germany
34017	33	28	33	28	necessary avoid :: necessary to avoid	Accepted, text revised.	Dmitry Kovalevsky	Climate Service Center Germany (GERICS), Helmholtz-Zentrum Geesthacht	Germany

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
34019	33	34	33	34	work best :: works best	Rejected. Energy Charter Treaty does not belong to international climate governance.	Dmitry Kovalevsky	Climate Service Center Germany (GERICS), Helmholtz-Zentrum Geesthacht	Germany
34021	33	40	33	44	Phrase on lines 40-44 is not completely clear and apparently needs editing.	Noted.	Dmitry Kovalevsky	Climate Service Center Germany (GERICS), Helmholtz-Zentrum Geesthacht	Germany
34023	34	14	34	14	Fujimori, et al. :: Fujimori et al. ? – comma unnecessary?	Text has been revised	Dmitry Kovalevsky	Climate Service Center Germany (GERICS), Helmholtz-Zentrum Geesthacht	Germany
34025	35	25	35	25	emissions :: concentrations ?	We have now change this phrase following a suggestion from another referee, therefore change no longer needed	Dmitry Kovalevsky	Climate Service Center Germany (GERICS), Helmholtz-Zentrum Geesthacht	Germany
34027	35	28	35	28	emissions :: concentrations ?	Done	Dmitry Kovalevsky	Climate Service Center Germany (GERICS), Helmholtz-Zentrum Geesthacht	Germany
34029	35	35	35	35	lead :: leads	Done	Dmitry Kovalevsky	Climate Service Center Germany (GERICS), Helmholtz-Zentrum Geesthacht	Germany
34031	35	38	35	39	future climate change futures :: repetition ('future')	Done	Dmitry Kovalevsky	Climate Service Center Germany (GERICS), Helmholtz-Zentrum Geesthacht	Germany
34033	36	9	36	9	(IPCC 2018a)four :: (IPCC 2018a) four – space necessary	Noted, thank you	Dmitry Kovalevsky	Climate Service Center Germany (GERICS), Helmholtz-Zentrum Geesthacht	Germany
34035	36	10	36	10	Unnecessary 'the' at the end of the line?	Noted, thank you	Dmitry Kovalevsky	Climate Service Center Germany (GERICS), Helmholtz-Zentrum Geesthacht	Germany
34037	37	28	37	28	reactions - :: em-dash is necessary instead of a hyphen	Done	Dmitry Kovalevsky	Climate Service Center Germany (GERICS), Helmholtz-Zentrum Geesthacht	Germany
34039	37	42	37	42	eg.(Pezzey :: eg. (Pezzey – space necessary	Done	Dmitry Kovalevsky	Climate Service Center Germany (GERICS), Helmholtz-Zentrum Geesthacht	Germany
34041	38	9	38	9	ecognises :: recognises	Thanks, done	Dmitry Kovalevsky	Climate Service Center Germany (GERICS), Helmholtz-Zentrum Geesthacht	Germany

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
34043	38	37	38	37	section 4 :: is reference full?	Is now	Dmitry Kovalevsky	Climate Service Center Germany (GERICS), Helmholtz-Zentrum Geesthacht	Germany
34045	40	7	40	7	Davenport 2009. :: Davenport 2009, - should be a comma instead of a full stop	OK	Dmitry Kovalevsky	Climate Service Center Germany (GERICS), Helmholtz-Zentrum Geesthacht	Germany
34047	40	38	40	38	Patterson et. al :: Patterson et al – full stop unnecessary?	OK	Dmitry Kovalevsky	Climate Service Center Germany (GERICS), Helmholtz-Zentrum Geesthacht	Germany
34049	40	43	40	45	Phrase on lines 43-45 is not completely clear and apparently needs editing.	Thanks, done	Dmitry Kovalevsky	Climate Service Center Germany (GERICS), Helmholtz-Zentrum Geesthacht	Germany
34051	15	45	15	45	(SDGS) :: (SDGs) – small second 's'	Corrected	Dmitry Kovalevsky	Climate Service Center Germany (GERICS), Helmholtz-Zentrum Geesthacht	Germany
34059	3	41	3	41	It should be "fairness" and not "faireness"	Exec Sum completely redrafted	Kirsten Jenkins	University of Edinburgh	United Kingdom (of Great Britain and Northern Ireland)
34061					The chapter makes early reference to issues of "justice" and "equity", which I agree are totally central not only in the context of the Sustainable Development Goals but much further beyond them. However, in linking issues of "justice" and "equity" to energy concerns in particular, the authors seem to limit the scope of their evaluation to the Just Transition. Whilst this is undoubtedly extremely pertinent, it also does not pay due attention to a much wider set of concerns not encapsulated by labour-based transitions away from fossil fuels. This includes the justice issues of grid access, gender-imbalance, affordability and fuel poverty, and vulnerability to energy accidents to name but a few concerns. <i>These issues absolutely should be considered and would be better acknowledged with reference to much more holistic energy justice scholarship.</i> This is not a call to cite my own work by any means, but to recognise a much wider set of challenges and social winners and losers throughout transitions processes particularly as without doing so, the chapter appears to unjustly prejudice a particular social group of concern. The writing of Benjamin Sovacool may particularly help broaden this perspective.	This is a valid point but the use of just transition here goes beyond just energy and covers the whole range of sectors and issues that proponents argue are relevant in navigating societal transformation in the face of climate change in a fair way.	Kirsten Jenkins	University of Edinburgh	United Kingdom (of Great Britain and Northern Ireland)



Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
34063	40	14	40	16	Here the authors give mention to the importance of "distributional injustices" in the context of intergenerational issues. This certainly references a key ethical framework, however, it misses the opportunity to also reflect on the imperatives of "procedural justice" and "justice as recognition" (also known as recognition justice), which have a similarly imperative role. Jenkins et al. (2016) argue that a three-tenet approach of distributional justice, justice as recognition and procedural justice, exists in order to evaluate (a) where injustices emerge, (b) which affected sections of society are ignored, and (c) which processes exist for their remediation in order to (i) reveal, and (ii) reduce such injustices ( <a href="https://www.sciencedirect.com/science/article/pii/S2214629615300669">https://www.sciencedirect.com/science/article/pii/S2214629615300669</a> ). Whether you cite this paper or refer to some of the much older literature around environmental and climate justice, including the work of Schlosberg, Fraser and Young, I suspect this wider framing of justice tenets would prove invaluable in conceptualising the issues of concern.	The importance of procedural fairness is made in the section and other areas in the chapter	Kirsten Jenkins	University of Edinburgh	United Kingdom (of Great Britain and Northern Ireland)
34355	8	4	8	6	Please add the other key CDR solutions in the sentence, so it would give: e.g. Bioenergy with Carbon Capture and Storage (BECCS), Direct Air Capture (DAC) with carbon storage(DACCS) or carbon utilisation (DACCU), and removals in the Agriculture, Forestry and Other Land Use (AFOLU))	This sentence has been deleted.	Célia Sapart	Université Libre de Bruxelles et Co2 Value Europe	Belgium
34357	13	20	13	20	Please add the following sentence "For sectors where electrification is not possible non-fossil fuels, such as green hydrogen, CO2-based fuels (or e-fuels) (e.g. synthetic methane, methanol, ...) are important alternatives. CO2-based fuels represent drop-in solutions as no major changes of infrastructure are necessary for their use. (Artz et al., 2019: Sustainable Conversion of Carbon Dioxide: An Integrated Review of Catalysis and Life Cycle, Assessment, Chem. Rev., 118, 2, 434-504/CCES, 2019: Carbon Utilization – A vital and effective pathway for decarbonization, Center for Climate and Energy Solution/ CONCAWE, 2019: A look into the role of e-fuels in the transport system in Europe (2030–2050) (literature review), CONCAWE)	Accepted. Paraphrased text added.	Célia Sapart	Université Libre de Bruxelles et Co2 Value Europe	Belgium
34359	24	22	24	22	Please add the following sentence at the end of the paragraph: The fast growing principle of carbon capture and utilisation also offers key alternatives, e.g. in producing CO2-based synthetic fuels such as e-methane and methanol. CCU technologies aim to replace fossil resources and thus to support a transformation towards renewables and extend it to industries outside the energy sector such as transport and materials (e.g. Klankermayer and Leitner, Science, 350, 629-630, 2015). CCU could therefore stimulate the energy transition by enabling energy storage through power-to-X approaches and contribute to a circular economy by converting waste emissions into resources (REFERENCES:1)IEAGHG, 2019a: Putting CO2 to Use – Creating value from emissions, International Energy Agency, 2) CCES, 2019: Carbon Utilization – A vital and effective pathway for decarbonization, Center for Climate and Energy Solutions 3) Bruhn et al., Environmental Science & Policy 60 (2016) 38–43.)	Rejected - We agree that CCU has seen development over the last few years, but this technology still emits CO2 into the atmosphere when for instance the synthetic fuel is burned. This paragraph is about CCS, and we do not go into all technologies here.	Célia Sapart	Université Libre de Bruxelles et Co2 Value Europe	Belgium
34491	3	6	3	6	I recommend identifying GHG for those who are unfamiliar with the acronym.	Noted	Danny Tayara	Seattle University / Ulysses VR	United States of America
34493	3	17	3	17	I recommend avoiding use of a complex equation in the executive summary, which may be too detailed and inaccessible for those seeking a simple summary.	Good suggestion. This part of ES has been edited and the comment is not longer relevant.	Danny Tayara	Seattle University / Ulysses VR	United States of America

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
34495	3	2	5	18	<i>In general for the summary section, the language is highly academic. Consider that those who need to comprehend this information are not necessarily the most academic, and it may be useful to rephrase things like "broadened assessment frameworks" into something closer to layman's terms.</i>	The ES has been revamped. We hope the revised version meets the reviewers expectation.	Danny Tayara	Seattle University / Ulysses VR	United States of America
34497	3	46	3	46	Who are these people? I would like to see the report specify who. Otherwise it will be difficult to hold "these people" accountable. Additionally, I feel that this sentence is slightly misplaced, as there is already plenty of cost to governmental inaction.	The comment is valid but no longer applicable as the text has been edited following a total revamp of the Executive Summary.	Danny Tayara	Seattle University / Ulysses VR	United States of America
34633	13	1	13	4	This paragraph should be framed in terms of the money fossil industries spend in advertising their activities and also mention the 'green washing' concept compared with the monetary resources invested in Climate Change awareness and measures of action. As Höhne et al. 2020 ( <a href="https://www.nature.com/articles/d41586-020-00571-x">https://www.nature.com/articles/d41586-020-00571-x</a> ) states, regarding the current emissions gap (UNEP, SR15, 2019) governments, private sector and communities need to enter into crisis mode, which means exponentially increase the public awareness of the challenge and decisive actions against fossil industry advertising and stop funding fossil fuels.	Rejected. The lobbying of fossil industry is mentioned in 1.4.5.	Jordi Solé-Ollé	Spanish National Research Council (CSIC)	Spain
34635	14	8	14	8	Instead of acronym SPP should be SSP	Corrected	Jordi Solé-Ollé	Spanish National Research Council (CSIC)	Spain
34637	10	22	10	31	Other bibliography suggests investments of 4% of GDP (Jacobson MZ, Delucchi MA (2011) Providing all global energy with wind, water, and solar power, part I: technologies, energy resources, quantities and areas of infrastructure, and materials. Energy Policy 39:1154–1169, Bardi, U., Sgouridis, S. In Support of a Physics-Based Energy Transition Planning: Sowing Our Future Energy Needs. Biophys Econ Resour Qual 2, 14 (2017). <a href="https://doi.org/10.1007/s41247-017-0031-2">https://doi.org/10.1007/s41247-017-0031-2</a> )	There are many extensive studies on GDOP and investment needs in AR6 (notably Chapters 3 and 15), this wasn't really the place to elaborate	Jordi Solé-Ollé	Spanish National Research Council (CSIC)	Spain
34639	20	6	20	9	Nexus projections and climate change and suggestions to changes needed to avoid further environmental degradation are analysed by Van Vuuren, D.P., Bijn, D.L., Bogaart, P. et al. Integrated scenarios to support analysis of the food–energy–water nexus. Nat Sustain 2, 1132–1141 (2019). <a href="https://doi.org/10.1038/s41893-019-0418-8">https://doi.org/10.1038/s41893-019-0418-8</a>	Accepted - reference added	Jordi Solé-Ollé	Spanish National Research Council (CSIC)	Spain
34641	21	18	21	18	Van Vuuren et al. 2019 not only suggest this integration but also they propose a methodology following the relationships and fluxes derived from shankey diagrams, which is very useful for other analysis in the same line.	Noted, thank you. Although, this reference is not included in line 18 of page 21.	Jordi Solé-Ollé	Spanish National Research Council (CSIC)	Spain
34643	26	17	26	27	Although there is an estimation of the overall cost of emissions reduction well below 2C for the Paris Agreement, recent outputs on simulations on climate models projections warn about 2C target is too high, and the need to move this target down to 1.5C, which is aligned also with the emission report gap (UNEP, emissions gap report, 2019). With such requirements these estimations should be put in the low range of necessary financing and evaluating that currently the efforts should be four times the ones we require one decade ago (Höhne et al. Nature 579, 25-28 (2020) doi: <a href="https://doi.org/10.1038/d41586-020-00571-x">10.1038/d41586-020-00571-x</a> )	Accepted. These numerical estimates have been removed. Chapter 15 addresses this in much more detail and the reader will be referred to the proper section in SOD Ch 15.	Jordi Solé-Ollé	Spanish National Research Council (CSIC)	Spain

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
34645	30	24	30	26	This is closely linked with the ethics and how is perceived the economy role. There is a recent debate on the notion of Anthropocentrism as a main cause of commodification of nature. This view applies to the main stream economics and also to the Ecological economics (Washington and Maloney, Ecological Economics 169 (2020) 106478 <a href="https://doi.org/10.1016/j.ecolecon.2019.106478">https://doi.org/10.1016/j.ecolecon.2019.106478</a> )	Rejected - We do not find this directly relevant to the discussion in the text.	Jordi Solé-Ollé	Spanish National Research Council (CSIC)	Spain
34647	35	1	36	44	It is important to mention the further analysis (based on SSPs) of the climate impacts considering the energy transition (Neofytou H., Karakosta C., Gómez N.C. (2019) Impact Assessment of Climate and Energy Policy Scenarios: A Multi-criteria Approach. In: Doukas H., Flamos A., Lieu J. (eds) Understanding Risks and Uncertainties in Energy and Climate Policy. Springer, Cham) or the narratives considering the nexus impacts (Renner A & Giampietro M 2020, 'Socio-technical discourses of European electricity decarbonization: Contesting narrative credibility and legitimacy with quantitative story-telling', Energy Research & Social Science, vol. 59, article 101279. DOI: 10.1016/j.erss.2019.101279)	We are now including some of these analyses	Jordi Solé-Ollé	Spanish National Research Council (CSIC)	Spain
34733	15	39	15	39	"won" to be corrected to read as "own"	Corrected.	Rabiz Foda	Hydro One Networks Inc.	Canada
34735	34	37	47	18	Please include a narrative on the principles of "Governance" and "Conflicts of Interests" that will be applied in the application of the transformation activities for the subject matter. This implies involvement of several stakeholders such as governments, municipalities, local bodies, regulatory bodies, educational institutions, private corporations etc .	Partially taken up in the final subsection, and our section on governance	Rabiz Foda	Hydro One Networks Inc.	Canada
34773	1	29	3	30	We suggest to include a specific reference of the national strategies or plan and the climate action could read like: ""This context of a growing gap between the agreed Aims, the national action and overall actual commitments, suggests a...""	Accepted	Yomayra Martino	GreEnergy Dominicana	Dominican Republic
34775	1	19	29	19	No multidimensional poverty (instead of no poverty) that includes other vulnerabilities beyond the economic poverty	Exec Summary completely redrafted	Yomayra Martino	GreEnergy Dominicana	Dominican Republic
34777	17	17	20	18	We suggest to include the challenge to regulate the tragedy of the commons (atmosphere as a common good) versus the the economics of innovation and transformation for deep decarbonisation and low carbon development referred in line 17-18. You could consider the approach of certain religious movement and documents as the Encyclical Letter "Laudato Si"	This tension is captured in the text. Text is edited.	Yomayra Martino	GreEnergy Dominicana	Dominican Republic
34779	10	12	10	21	SDG12 on ensuring sustainable consumption and production patterns is missing. Very important is to note that SDG 12c aims to rationalize inefficient fossil fuel subsidies with the following text:12.c Rationalize inefficient fossil-fuel subsidies that encourage wasteful consumption by removing market distortions, in accordance with national circumstances, including by restructuring taxation and phasing out those harmful subsidies, where they exist, to reflect their environmental impacts, taking fully into account the specific needs and conditions of developing countries and minimizing the possible adverse impacts on their development in a manner that protects the poor and the affected communities	We had several suggestions for additional SDGs that should be mentioned, but struggle with an overly long list. May reconsider phrasing and cross-refer to the final outcome of Chapter 17 mapping of climate mitigation against other SDGs	Patricia Iturregui	Universidad Científica del Sur	Peru

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
34781	31	1	31	2	high carbon economic structures are connected to fossil fuel subsidies and is important to mention it. According to IEA-OECD (2019) Update on recent progress in reform of inefficient fossil-fuel subsidies that encourage wasteful consumption. See <a href="https://www.oecd.org/fossil-fuels/publication/OECD-IEA-G20-Fossil-Fuel-Subsidies-Reform-Update-2019.pdf">https://www.oecd.org/fossil-fuels/publication/OECD-IEA-G20-Fossil-Fuel-Subsidies-Reform-Update-2019.pdf</a> , there was a increasing support for fossil fuels in 2017, accounting for USD 340 billion in 76 economies only. Although coal plants in European union countries will not have public support by 2025, oil and gas are still receiving in many countries benefit from government incentives in several countries, mainly through tax provisions that provide preferential treatment for cost recovery. These policies are counterproductive to domestic efforts to mitigate global ghg emissions. Air pollution is also enhance by these subsidies increasing publica health hazards and environmental problems such as acid rain, due to the emission of sulphur dixodes, nitrogen oxides and particular matter. Moreover, fossil fuel subsidies burden fiscal budgets significantly. Before reform, INdonesian subsidies meant 30% of government spending while Middle East and Northern Africa averaged 20% (see page 3 of J Skovgaard and H van Asselt (2019) The politics of fossil fuel subsidies and their reform: implications for climate change mitigation)	accepted, text revised.	Patricia Iturregui	Universidad Científica del Sur	Peru
34783	80	5	80	7	please include: Skovgaard J and van Asselt H (2019) The politics of fossil fuel subsidies and their reform: Implications for climate change mitigation WIREs Climate Change 2019;e581 <a href="https://doi.org/10.1002/wcc.581">https://doi.org/10.1002/wcc.581</a>	The paper cited in the text is actually Skovgaard, J., S. S. Ferrari, and Å. Knaggård, 2019: Mapping and clustering the adoption of carbon pricing policies: what polities price carbon and why? Clim. Policy, 19, 1173–1185, <a href="https://doi.org/10.1080/14693062.2019.1641460">https://doi.org/10.1080/14693062.2019.1641460</a> . It is listed in the references.	Patricia Iturregui	Universidad Científica del Sur	Peru
34785	80	7	80	9	please include: Skovgaard J and van Asselt H (2018) The politics of fossil fuel subsidies and their reform Cambridge University Press <a href="http://dx.doi.org/10.1017/9781108241946">http://dx.doi.org/10.1017/9781108241946</a>	The paper cited in the text is actually Skovgaard, J., S. S. Ferrari, and Å. Knaggård, 2019: Mapping and clustering the adoption of carbon pricing policies: what polities price carbon and why? Clim. Policy, 19, 1173–1185, <a href="https://doi.org/10.1080/14693062.2019.1641460">https://doi.org/10.1080/14693062.2019.1641460</a> . It is listed in the references.	Patricia Iturregui	Universidad Científica del Sur	Peru
34791	13	3	13	45	These sentences requires editorial review. The full stops should be removed and if possible, colon could be used. In addition, the phrases explained are not necessary as is already in exeructive summary and few sentences in the introduction. It is logical to leave it the way it is	Accepted.	Onema Adojoh	Missouri University of Science and Technology, Rolla, USA	United States of America
34793	25		33		There is need to have a graphical plots to the relationship between Finance and investment; Political economy; Equity and justice; Social innovation and behaviour change; Legal framework and institutions; and Policy drivers International cooperation	Rejected - we do not find this essential.	Onema Adojoh	Missouri University of Science and Technology, Rolla, USA	United States of America
34943	1		50		References in brackets in the text do not appear to follow either the alphabetical or date/year convention eg. P. 1-29 line 2-3(Newell and Paterson 1998; Breetz et al. 2018; Jones and Levy 2009; Geels 2014).	Thank you, but this is determined by the reference style automatically in Mendeley, which was chosen by the TSU. Chapter 1 Cannot chose to change it.	Linda Hancock	Centre of Excellence on Electromaterials Science Deakin University	Australia
34945	6	34	6	36	In relation to "Per-capita GHG emissions between countries even at similar stages of economic development (GDP per capita) vary by a factor of three, and by more than two on consumption basis (ie. taking account of trade) (Chapter 2)." Wouldn't the taking account of trade) apply to factor of three and a factor of two apply to consumption?	The standard approach - territorial emissions - is constricted with 'consumption-based' which makes the role of trade <i>explicit</i> . Countries which seem lower thereby increase, and those that seme high because they produce for export reduce, narrowing the gap.	Linda Hancock	Centre of Excellence on Electromaterials Science Deakin University	Australia

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
34947	10	40	10	43	meaning is not clear of the following statement " "changing regulation and technology in a low-carbon transition" is vague and open to interpretation From a macro regulatory perspective, there is growing recognition that substantial financial value may be at risk from changing regulation and technology in a low-carbon transition with potential implications for global financial stability (Chapter 15, 15.6.3).	I think this better addressed in revision, including in section 6?	Linda Hancock	Centre of Excellence on Electromaterials Science Deakin University	Australia
34949	9	25	9	25	after SDGs, Talanoa Declaration discussed last in this section should be mentioned.	Accepted, text revised	Linda Hancock	Centre of Excellence on Electromaterials Science Deakin University	Australia
34951	11	13	11	16	Sentence beginning "Initiatives launched for meeting the goals of the Paris Agreement include..." should be relocated earlier under Paris Agreement or relevance to Talanoa spelt out	Accepted - text revised	Linda Hancock	Centre of Excellence on Electromaterials Science Deakin University	Australia
34953	11	25	11	26	"higher energy productivity" should be "higher energy production efficiency"	Rejected - No, this refers to energy efficiency and the decoupling. We made a change in the text.	Linda Hancock	Centre of Excellence on Electromaterials Science Deakin University	Australia
34955	11	32	11	32	line 32 needs to extract key statistics from Figure 1.2	Accepted. Figure 1.2 has been replaced with Figure 1.3.a and 1.3 b with brief extraction of key data.	Linda Hancock	Centre of Excellence on Electromaterials Science Deakin University	Australia
34957	12	5	12	5	"an increase in forest fires in North America and Australia" Not just affecting forests but needs to include damage to commercial and domestic infrastructure and buildings, loss of human life, loss of non-human life and hastened extinction threat to endangered species.	Rejected - we do not go into detail in this short overview. We are referring to the forest fires not the impact on forest only.	Linda Hancock	Centre of Excellence on Electromaterials Science Deakin University	Australia
34959	18		21		The organization of this section needs to be more explicit. Figure 1.5 is distracting as the discussion headers do not follow this diagram. Perhaps construct a new diagram or drop Figure 1.5 and review introduction to better guide the reader. The problem with figure 1 is that the headers that follow do not accord with it which is distracting	Figure and reference have been removed.	Linda Hancock	Centre of Excellence on Electromaterials Science Deakin University	Australia
34961	18		34		The 1.4 header 1.4 Drivers, Systems and Constraints Is not really reflected in the sub sections of 1.4 and there needs to be more explanation of why the headings 1.4.1 to 1.4.10 have been chosen. This section goes for many pages and seems to lack an overall justification and rationale. Why these headings and not others? The length of this section tends to miss the opportunity of a first chapter on key points and framings and some sort of cogent framework. It is hard to maintain momentum.	We have revised the introduction to the section which explains how we see the drivers and constraints. The description of the drivers have also been revised.	Linda Hancock	Centre of Excellence on Electromaterials Science Deakin University	Australia
34963	22	5	22	16	Supply chain discussion needs to mention fossil fuel coal, oil, gas exports in relation to international trade and national consumption v export based emissions [even if discussed in ch 2]Supply chain discussion needs to mention fossil fuel coal, oil, gas exports in relation to international trade and national consumption v export based emissions [even if discussed in ch 2]	Accepted - [Due to strict word limits, we are unable to provide a comprehensive discussion in Chapter 1. ]	Linda Hancock	Centre of Excellence on Electromaterials Science Deakin University	Australia
34965	23	10	23	14	Section 1.4.3 Technology introduction needs to mention what is covered and give some coherence to this section	Rejected - we do not think this is necessary	Linda Hancock	Centre of Excellence on Electromaterials Science Deakin University	Australia
34967	23	15	23	34	Needs to mention artificial intelligence at least briefly	We have included AI in our description of the information technology advances.	Linda Hancock	Centre of Excellence on Electromaterials Science Deakin University	Australia

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
34969	24	4	24	7	Para starting "Innovation is also enabling greater recycling and re-use of energy-intensive materials" needs to be relocated back up to p. 1-22 para lines 1-36-1-45 on clean technologies and could also mention the importance of circular economy to prompting more sustainable materials choices in renewables.	Accepted - we moved this paragraph. We did not mention the circular economy as this is covered by the sentences on recycling.	Linda Hancock	Centre of Excellence on Electromaterials Science Deakin University	Australia
34971	24	9	24	14	Social dimensions could mention take up of solar for commercial and residential eg in Australia influencing positively reductions in fossil fuel reliance	Partly accepted - This refers to p.25 (not 24). We have mentioned solar in the first sentence.	Linda Hancock	Centre of Excellence on Electromaterials Science Deakin University	Australia
34973	34	37	34	45	1.5 Frameworks, Methods and Analytical Tools	Not a comment	Linda Hancock	Centre of Excellence on Electromaterials Science Deakin University	Australia
34975	45	17	45	17	Something missing "Values and visions are especially"? useful	addressed	Linda Hancock	Centre of Excellence on Electromaterials Science Deakin University	Australia
34977	53		54		Comment on FAQs 1-53-54	Thank you.	Linda Hancock	Centre of Excellence on Electromaterials Science Deakin University	Australia
35015	6	29	6	29	Insert the phrase "historical responsibility" after the word "equity"	Not needed for introduction - a politically loaded topic addressed in body of chapter equity discussions	Taghavinejad Ehsan	NIOC	Iran
35017	6	30	6	30	Delete the phrase ", and multi-level governance"	Why?	Taghavinejad Ehsan	NIOC	Iran
35241	41	12	41	18	Repetition of a phrase on lines 12-18.	Duplicated text deleted	Dmitry Kovalevsky	Climate Service Center Germany (GERICS), Helmholtz-Zentrum Geesthacht	Germany
35243	42	22	42	22	2008). :: 2008)). ? – extra bracket necessary?	Accepted	Dmitry Kovalevsky	Climate Service Center Germany (GERICS), Helmholtz-Zentrum Geesthacht	Germany
35245	43	1	43	1	Figure 1.7 is unclear: a legend for categories 1, 2, 3 would be informative.	There was an unfortunate technical error in conversion to PDF, however the Figure has been substantially reworked	Dmitry Kovalevsky	Climate Service Center Germany (GERICS), Helmholtz-Zentrum Geesthacht	Germany
35247	43	1	43	1	Figure 1.7 is unclear: what is on the horizontal and on the vertical axis?	There was an unfortunate technical error in conversion to PDF, however the Figure has been substantially reworked	Dmitry Kovalevsky	Climate Service Center Germany (GERICS), Helmholtz-Zentrum Geesthacht	Germany
35249	44	29	44	30	Providing at least brief definitions of 'Transformational Adaptation 1' and 'Transformational Adaptation 2' would be helpful: while other elements of the list of concepts of social transformation on lines 27-30 could be understood at least intuitively, here a distinction is completely unclear for those who have not read the original paper.	to clarify this is a mitigation report not adaptation; but anyway the key points of the section were extracted to shorten and incorporated in the wider discussion of transition and transformation, and we have avoided use of word 'adaptation' to avoid any risk of confusion	Dmitry Kovalevsky	Climate Service Center Germany (GERICS), Helmholtz-Zentrum Geesthacht	Germany
35251	44	32	44	32	O'brien :: O'Brien – capital 'B'.	Corrected	Dmitry Kovalevsky	Climate Service Center Germany (GERICS), Helmholtz-Zentrum Geesthacht	Germany
35253	44	37	44	37	Notions :: notions – small 'n'.	Corrected	Dmitry Kovalevsky	Climate Service Center Germany (GERICS), Helmholtz-Zentrum Geesthacht	Germany

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
35255	45	17	45	19	Phrase on lines 17-19 is not completely clear and apparently needs editing.	Addressed	Dmitry Kovalevsky	Climate Service Center Germany (GERICS), Helmholtz-Zentrum Geesthacht	Germany
35257	45	21	45	23	Phrase on lines 21-23 is not completely clear and apparently needs editing.	Addressed	Dmitry Kovalevsky	Climate Service Center Germany (GERICS), Helmholtz-Zentrum Geesthacht	Germany
35259	45	30	45	30	2015) :: 2015 - bracket unnecessary?	Noted and reflected	Dmitry Kovalevsky	Climate Service Center Germany (GERICS), Helmholtz-Zentrum Geesthacht	Germany
35261	45	47	45	47	'using with' :: either 'using' or 'with', but not both?	Thanks; edited	Dmitry Kovalevsky	Climate Service Center Germany (GERICS), Helmholtz-Zentrum Geesthacht	Germany
35263	47	13	47	13	could a useful :: could be a useful	Thanks, done	Dmitry Kovalevsky	Climate Service Center Germany (GERICS), Helmholtz-Zentrum Geesthacht	Germany
35265	47	44	47	46	Editing the quotation marks in a phrase on lines 44-46 is apparently necessary.	Thank you very much.	Dmitry Kovalevsky	Climate Service Center Germany (GERICS), Helmholtz-Zentrum Geesthacht	Germany
35267	48	14	48	14	a more a more :: repetition	Language has been edited.	Dmitry Kovalevsky	Climate Service Center Germany (GERICS), Helmholtz-Zentrum Geesthacht	Germany
35269	48	16	48	16	section 5 :: is reference full?	Language has been edited.	Dmitry Kovalevsky	Climate Service Center Germany (GERICS), Helmholtz-Zentrum Geesthacht	Germany
35271	48	19	48	19	mainly power :: mainly by power	text has been edited.	Dmitry Kovalevsky	Climate Service Center Germany (GERICS), Helmholtz-Zentrum Geesthacht	Germany
35273	48	42	48	45	Citation request: Please consider adding the following citation at the end of the phrase on lines 42-45 (page 48) - Hasselmann, K., Cremades, R., Filatova, T., Hewitt, R., Jaeger, C., Kovalevsky, D., Voinov, A., Winder, N. (2015): Free-riders to forerunners. Nature Geoscience, 8, 895-898. DOI:10.1038/ngeo2593	Text has been edited.	Dmitry Kovalevsky	Climate Service Center Germany (GERICS), Helmholtz-Zentrum Geesthacht	Germany
35275	49	2	49	2	outcomes :: outcomes. – full stop necessary	Text has been edited.	Dmitry Kovalevsky	Climate Service Center Germany (GERICS), Helmholtz-Zentrum Geesthacht	Germany
35277	49	18	49	18	transformatiion :: transformation – typo ('ii')	Editted.	Dmitry Kovalevsky	Climate Service Center Germany (GERICS), Helmholtz-Zentrum Geesthacht	Germany

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
35279	49	22	49	22	authorities.. :: authorities. – full stop repetition	Edited.	Dmitry Kovalevsky	Climate Service Center Germany (GERICS), Helmholtz-Zentrum Geesthacht	Germany
35281	50	25	50	27	Phrase on lines 25-27 is not completely clear and apparently needs editing.	Text edited.	Dmitry Kovalevsky	Climate Service Center Germany (GERICS), Helmholtz-Zentrum Geesthacht	Germany
35283	50	38	50	38	contributions some :: contributions in some	Thanks	Dmitry Kovalevsky	Climate Service Center Germany (GERICS), Helmholtz-Zentrum Geesthacht	Germany
35285	52	14	52	14	Re- :: to remove ‘Re-’	Accepted, has been removed, thank you.	Dmitry Kovalevsky	Climate Service Center Germany (GERICS), Helmholtz-Zentrum Geesthacht	Germany
35287	52	27	52	27	examines :: examined ?	Accepted, thank you.	Dmitry Kovalevsky	Climate Service Center Germany (GERICS), Helmholtz-Zentrum Geesthacht	Germany
35289	52	41	52	41	Accelerating :: accelerating – small ‘a’	Accepted, thank you.	Dmitry Kovalevsky	Climate Service Center Germany (GERICS), Helmholtz-Zentrum Geesthacht	Germany
35291	53	19	53	19	N2O :: ‘2’ should be a subscript.	Accepted.	Dmitry Kovalevsky	Climate Service Center Germany (GERICS), Helmholtz-Zentrum Geesthacht	Germany
35293	53	37	53	37	‘Carbon Neutrality’ is repeated twice on line 37.	Noted, thank you.	Dmitry Kovalevsky	Climate Service Center Germany (GERICS), Helmholtz-Zentrum Geesthacht	Germany
35295	53	37	54	2	Highlighting the distinction between ‘Climate Neutrality’ and ‘Net-zero Emissions’ in conclusion of two paragraphs on lines 37 (page 53) – 2 (page 54) would be informative: is it about the difference between natural and anthropogenic removals?	Thank you, this FAQ has been entirely rewritten to clarify..	Dmitry Kovalevsky	Climate Service Center Germany (GERICS), Helmholtz-Zentrum Geesthacht	Germany
35695	4	38	5	18	Agree that the meeting the Paris Agreement commitments requires new framing and that the new framing must permit a radical transition of our societies to a zero-carbon economy and lifestyle. To achieve this the new framing should follow a structured approach that has a high chance of success. This means starting with measures that reduce demand for goods and services that lead to carbon emissions. In the energy field, for example, we should start with sufficiency measures that question the demand for goods and services first. Then we should apply the energy efficiency first principle to the processes needed to provide goods and services which will ensure that all energy consumed is consumed at the highest possible level of efficiency. Finally we should ensure that all goods and services delivered in the future use energy that comes from truly renewable sources. <i>So the framing would follow the sequence: Sufficiency - Efficiency - Renewables.</i>	Exec Sum completely redrafted	Adrian Joyce	Catholic University of Louvain-le-Neuve	Belgium



Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
35697	23	15	23	34	This section could be expanded as this issue is one that is gaining in importance on both the technical and political stage. To assist, reference could be made to the issue of potential increased GHG emissions due to digitalisation, see for example: <a href="https://theshiftproject.org/wp-content/uploads/2019/03/Lean-ICT-Report_The-Shift-Project_2019.pdf">https://theshiftproject.org/wp-content/uploads/2019/03/Lean-ICT-Report_The-Shift-Project_2019.pdf</a>	rejected - we do not go into this detail in the text. We refer to chapter 6.	Adrian Joyce	Catholic University of Louvain-le-Neuve	Belgium
35699	33	25	33	33	One example of international cooperation that could be referred to here is the Energy Charter Treaty, which protects vested interests in the fossil fuel industry. Its continued application risks locking developing countries into a carbon future and its provisions are diverting billions of euro away from climate friendly investments. A good reference report on the issue can be accessed at: <a href="https://www.openexp.eu/sites/default/files/publication/files/modernisation_of_the_energy_charter_treaty_a_global_tragedy_at_a_high_cost_for_tax_payers-final.pdf">https://www.openexp.eu/sites/default/files/publication/files/modernisation_of_the_energy_charter_treaty_a_global_tragedy_at_a_high_cost_for_tax_payers-final.pdf</a>	This part was drafted by Chuk.	Adrian Joyce	Catholic University of Louvain-le-Neuve	Belgium
35715	24	9	24	14	Para starting "Innovation is also enabling greater recycling and re-use of energy-intensive materials" needs to be relocated back up to p. 1-22 paragraphs 1-36-1-45 on clean technologies and could also mention the importance of circular economy to prompting more sustainable materials choices in renewables.	Accepted - see comment 34969 above.	Linda Hancock	Centre of Excellence on Electromaterials Science Deakin University	Australia
35717	34	37	34	45	Social dimensions could mention take up of solar for commercial and residential eg in Australia influencing positively reductions in fossil fuel reliance. Up-takers see the economic sense of solar because of high electricity prices as a primary reason.	If reviewer could provide a reference, could aim to mention in final in behavioural section	Linda Hancock	Centre of Excellence on Electromaterials Science Deakin University	Australia
35719	34	37	34	45	Introductory para needs to overview the content of this section to give more coherence. In section 1.5 Frameworks, Methods and Analytical Tools	Accepted: Intro greatly expanded and focused	Linda Hancock	Centre of Excellence on Electromaterials Science Deakin University	Australia
35721	53		54		This reviewer does not see the point of FAQ 5 What is input-output as this implies such a notion is central when in fact it is limited and detracts from the complexities discussed in relation to climate mitigation. FAQs could include What are just climate transitions?	Thank you, the Technical Supporting Unit has suggested to delete FAQ 1.5 and the chapter has accepted the suggestion.	Linda Hancock	Centre of Excellence on Electromaterials Science Deakin University	Australia
35723	1		55		Overall this chapter could be sharper and with better framework and more definitive discussion with some editing down. There is a lot of 'on the one hand this, and on the other hand that', citing a lot of studies, which detracts from giving clearer direction on what concepts and frameworks will actually facilitate mitigation analysis and action. Some of it is repetitive or discusses similar headers in different places eg finance issues	Noted. The chapter has been significantly reworked. The structure has been changed to enhance the coherence and flow of the argument. The sections have been more rigorously edited to reduce repetitions and redundancies.	Linda Hancock	Centre of Excellence on Electromaterials Science Deakin University	Australia
35729	53	22	53	25	It should be explained that the statement refers to CO2-equivalents	Accepted.	Frank Kaspar	Deutscher Wetterdienst	Germany

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
35825	3	33	3	35	<p>Indeed, <i>climate change (SDG #13) cannot be isolated from other major social, economic and environmental concerns around the world today (see the 17 SDGs)</i>. Establishing a universal and rational scale of priorities among the 17 SDGs is a very difficult task, especially when taking into account the legitimate aspirations for a better life in the emerging countries (SDG #1) that make up the majority of the world. Many international development economics experts believe, for example, that access to energy (SDG #7) should be at the centre of the 17 SDGs. Others take a more systemic view (taking into account the world's population growth and rapid urbanization) and propose strategies based on the "nexus" of access to energy - access to water (SDG #6) - access to food (SDG #2).</p> <p>Climate change is real and worrying - it has always existed and no matter what mankind does, it will always exist for reasons related to the physics of the solar-terrestrial system. Climate vulnerability, in particular, is a reality in developing countries - it manifests itself in many areas (such as health, extreme weather, habitat loss and economic stress). The production of CO2 in the atmosphere due to anthropogenic activities is also real and worrying as it has been demonstrated by authoritative sources such as André BERGER, world expert, Professor Emeritus of Climatology at UCLouvain, Belgium- it is steadily increasing over time and plays a fundamental role in global warming, particularly through water vapour feedbacks.</p> <p>Here is a recent summary of anthropogenic CO2 emissions (2008–2017), taken from André Berger – « CLIMAT, PASSÉ, PRÉSENT ET FUTUR - Les données scientifiques du changement climatique », Georges Lemaître Center for Earth and Climate Research (Formerly Institute of Astronomy and Geophysics George Lemaître) (Louvain-la-Neuve, Belgium), cours sur « Les</p>	The point that climate change cannot be isolated from other major social, economic and environmental concerns is a valid and a core theme in the chapter. Hence the chapter offers extensive discussion of the synergies and trade-offs between climate action and the other SDGs.	Georges VAN GOETHEM	Royal Academy of Overseas Sciences of Belgium (ARSOM - KAOW)	Belgium

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
35831	4	19	4	24	<p>Speaking of energy transition, let us recall what the millenary history of these technologies teaches us about the highly inertial nature of energy infrastructures : the diffusion of energy technologies takes time. As Vaclav Smil puts it so well: "Dreams of a near-term transformation are illusory. The needed massive overhaul will take time and commitment "</p> <p>In the history of humankind indeed, there have been many energy transitions: from solar heat and domestic fire to the use of water and wind in suitable mills for essentially mechanical applications; then from the exploitation of fossil fuels (coal, oil and gas) to nuclear fission for essentially thermodynamic and electrical applications. Each time, it has taken decades or even centuries for these energy innovations to reach technological maturity and be widely accepted by users. Moreover, during successive transitions, these energy technologies have never suppressed each other - on the contrary, over the centuries, they have been superimposed on each other.</p> <p>Today, the solution proposed by some for the massive use of so-called renewable energies (such as sun and wind) is a kind of step backwards from a historical point of view, even if sophisticated technologies are used (for mainly electrical applications). In the case of sun and wind driven solutions, for applications in a world of increasing (mainly urban) population and industrial growth, energy storage technologies (e.g. electric batteries or hydrogen for fuel cells) must also be developed on a massive scale to offset the very penalizing impact of intermittency and non-dispatchability. We must also pay close attention to the massive use of so-called rare earths in these technologies based on sophisticated electronics. Recycling and recovery of raw materials (e.g. in composite materials) are also a major</p>	We agree that energy transition takes time. We also agree that the energy transition alone is not the solution. The assessment reflects these points.	Georges VAN GOETHEM	Royal Academy of Overseas Sciences of Belgium (ARSOM - KAOW)	Belgium

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
35833	15	11	15	16	<p>Green economy - uncertainty about Europe's carbon neutrality targets by 2050</p> <p>Coordination is necessary between European countries that intend to gradually close certain dispatchable power generation capacities (in particular, nuclear fission). Relying on electricity interconnections to import from other countries is no longer enough if 7/24/365 security of supply and low cost (not to mention low carbon emissions) have to be ensured. Consultation of the 15 European electricity network operators is required regarding the evolution of the energy mix.</p> <p>The only low-carbon dispatchable energy today is based on nuclear and hydraulic power. Replacing nuclear power with another dispatchable energy source - which is essential to ensure a country's electricity supply and subsequently human welfare - means increasing CO2 emissions. Replacing oil and coal with gas can reduce CO2 emissions, but will not remove them as it is required by the EU policy on carbon neutrality by 2050.</p> <p>The European Union, in its long-term strategic vision ("EU's Green Deal", COM 2019-640, 11.12.2019, Brussels) has the ambition to achieve "a prosperous, modern, competitive and climate-neutral economy by 2050". And it confirmed that nuclear energy, together with renewables, "constitutes the backbone of a carbon-free European energy system", with a share of nuclear energy of around 15% of the European electricity mix, i.e. a relatively stable installed capacity of 110 GWe. The key question however is : does it make sense to have subsequently 85% of renewables in the European electricity mix? (consisting principally of intermittent wind and sun energies, as hydro is quite limited in most EU countries) In particular,</p>	Point is noted but outside the remit of the chapter/authors.	Georges VAN GOETHEM	Royal Academy of Overseas Sciences of Belgium (ARSOM - KAOW)	Belgium

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
35835	24	9	24	15	<p>Steady supply of baseload electricity : nuclear and hydraulic power</p> <p>Actually there is no doubt : already now, Generation III reactors are ready for large scale deployment (e.g. commercial operation of EPR and AP-1000 in China as well as VVER-1200 in Russia) and hence for sure in the years 2025-2065.</p> <p>Access to secure sufficient energy for all is needed to drive economic growth as it is stated in SDG no 7. Working to mitigate the effects of climate change (SDG no 13) is another important constraint, to be balanced with other important SDGs. It is clear that renewable intermittent sources of energy such as wind and solar power will continue to play an important role in the future. At the same time, steady supply of baseload electricity must be ensured : therefore, use of nuclear and hydraulic power - two (reliable, predictable and dispatchable) low-carbon technologies for generating electricity - will need to increase. Nuclear fission is especially suitable for meeting large-scale, continuous electricity demand where reliability and predictability are vital – hence ideally matched to increasing urbanisation worldwide.</p> <p>Increasing role for nuclear power as an environmentally benign way of producing reliable electricity on a large scale</p> <p>It should be noted that in 2019, a total of 30 countries generated nuclear power. In 2019, nuclear power provided over 10% of the world's electricity, and 18% of electricity in OECD countries. Based on data reported to the IAEA, a total of 450 nuclear power reactors were in operation worldwide (mostly Generation II), totalling about 400 GW(e) in net installed capacity,</p>	Comment noted. No change made.	Georges VAN GOETHEM	Royal Academy of Overseas Sciences of Belgium (ARSOM - KAOW)	Belgium
36171	6	5			how you define a safe climate system?	Amended	Youba Sokona	South Centre	Switzerland
36173	8	13			Isn't Solar Radiation Modification? As in the recent SRs	This has been corrected.	Youba Sokona	South Centre	Switzerland
36175	9	4			How the problem can be solved? It seems to me that adequate responses are needed to cope with the impacts. We cannot solve the problem	removed this sentence; a brief reference to the 'public good' framing in the Econ Frameworks section	Youba Sokona	South Centre	Switzerland
36177	9	18			It is not only about decarbonization (this is largely the case of industrialized and emerging economies) but also avoiding options with carbon	Oops I think we failed to clarify this - will review in final	Youba Sokona	South Centre	Switzerland
36179	13	39			what is the safe limit? Do we have any idea? Is it the goals indicated in the Paris Agreement?	Language has been edited.	Youba Sokona	South Centre	Switzerland
36181	13	32			This section discussed sustainable development and climate change without bringing in development. The three are interlinked and need to be discussed together. Sustainable development is required to make development more sustainable and the reality does not start with sustainable development but with development with various degrees of sustainability.	Good suggestion. However, the section incorporates a discussion on development. It is noted that large scale development is an aspiration for many in the low and middle income countries but also implicated as a cause of climate change.	Youba Sokona	South Centre	Switzerland

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
36183	14	18			Could you please define what "the context of sustainable development" means? Here again the whole notion of development is absent or ignored	The section contains reference references to development. The section has suggested that 'mitigation in the context of development' implies that "climate mitigation at local, national and global level cannot be effectively achieved by a narrow focus on 'climate-specific' sectors, actors and policies; but rather through a much broader attention to the mix of development choices and the resulting development paths and trajectories"	Youba Sokona	South Centre	Switzerland
36185	14	20	14	22	Here again development is ignored. Making development more sustainable requires sensitive to equity as well as climate change and more other aspects of sustainability	We think that development has not been ignored. It is noted in the section that the concept sustainability to some degree is an attempt to moderate the neagtive impact of development.	Youba Sokona	South Centre	Switzerland
36187	16	17			Here agan development is missing	Text has been revised	Youba Sokona	South Centre	Switzerland
36189	17	16			This graph is about the interlinks between development, sustainable development, and climate change. It is not only about sustainable development and climate change. The LDCs have very litle emissions and face huge impacts of climate due partly to their level of development, while maily their responses focused on adaptation they also have an opportunity to avoid emissions by investing in low or zero carbon options in their development agenda that could be more sustainable in considering the SDGs. In the contrary the Industrialize countries in responding to climate need to decarbonize while adapting to the adverse impacts and fosing on more relevant SDGs. A wide range of countries are in between those tw categories.	Figure edited.	Youba Sokona	South Centre	Switzerland
36191	18	11			Here you make the distinction between development and sustainable development in a very narrow aspect (wellbeing). Need more elaboration	Unfortunately, the number of words allocated to this topic in this chapter preclude detailed elaboration of many key features such as the one you point to.	Youba Sokona	South Centre	Switzerland
36193	18	12	12		This is a very partial and Western view of wellbeing	Text revised.	Youba Sokona	South Centre	Switzerland
36195	18	28			Please define what such context is	Text has been revised	Youba Sokona	South Centre	Switzerland
36197	20	23			Oil, gaz, coal, hydro, winde etc. are sources of eergy and not "forms" of energy	Noted. In the revised text, we have removed the sub-headings and integrated the sub-sections together.	Youba Sokona	South Centre	Switzerland
36199	27	19			we are just now in 2020 and you cannot say that target has not been met yet	SO FAR jas not been met which is the result of the assessment of ch 15 which we are simply repeating and providing the line of sight link to the relevant section in ch 15.	Youba Sokona	South Centre	Switzerland
36201	29	43			If this is the case why CDM projects were almost absent in the LDCs?	Noted - the sentence is deleted	Youba Sokona	South Centre	Switzerland
36203	30	14	16		could you please elaborate?	Noted - This comment belongs to section 1.4.7. This sentence has been revised according to comments there.	Youba Sokona	South Centre	Switzerland
36205	31	7			What democratization of climate ploitics? At which levels? What are the implications?	The statement indicates that the implication is for more fairness and more effective participation of citizens in decision making at the national level.	Youba Sokona	South Centre	Switzerland
36207					There seems to be a contradiction indicating that transformation and transition are different (true) and using both interchangeable in the document	Have tried to be consistent, with the definition in opening section 1.6.5	Youba Sokona	South Centre	Switzerland
36209	50	33			what have changed fundamentally between 2014 and 2020?	Governance, technology, many more countries starting to reduce .. Hopefully addressed	Youba Sokona	South Centre	Switzerland
36211	50	38			which technologies and for what purposes?	conclusions not the plae to elaborate	Youba Sokona	South Centre	Switzerland
36213	50	44	45		Are you sure that this is not also the case of Developing Countries? Why this is specific to Developed Countries?	We believe this statemnt is balanced. The emphasis is on "mainly"..	Youba Sokona	South Centre	Switzerland

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
36215	51	8			You indicated that they are interchangeable. Very little development has been given to transition while a huge amount of literature exist in particular on energy transition	We have now given plenty of attention on the concept of transition. Thank you.	Youba Sokona	South Centre	Switzerland
36647	11	32	11	33	The depiction of % emissions and population are to be made clear for each category.	Accepted. The revised figures give clearer depiction.	NARESH KUMAR SOORA	Indian Agricultural Research Institute	India
36649	19		19		Fig 1.5 caption needs to be explicit	This figure has been removed from the revised version.	NARESH KUMAR SOORA	Indian Agricultural Research Institute	India
36651	43	0	43	0	Fig 1.7 may be modified and caption needs to be explicit	An unfortunate technical error, but Figure now changed	NARESH KUMAR SOORA	Indian Agricultural Research Institute	India
37019					The figures are nicely done .	Thank you -we have developed further	Joyashree Roy	Asian Institute of Technology, Thailand. Jadavpur University, India	Thailand
37021	17	14	17	16	Extremely helpful figure to convey multiple messages. Only problem I am seeing is would peak in per capita emission at \$7000 be compatible with carbon budget.... One way to get around may be to take out income numbers on the horizontal axis and label the countries as least developed, developing and developed. instead of bringing in income categorisation which is there in the text anyway. Another point is confusing why we need two curves , may be to show corridor but what is confusing is what the brown curve is showing compared to red ? Not clear . needs more clarification.	Figure has been revised.	Joyashree Roy	Asian Institute of Technology, Thailand. Jadavpur University, India	Thailand
37023	18	41	18	41	Unintended by product' is incorrect because it is very much a decision made by users of the fuel variety. The technology of removal is known and choice can be made but are not being made for several reasons (rational, bounded rationality does not matter) But qualifying it as unintended is grossly wrong and shifts the burden of internalising externality (be it for consumer /producer ) in the air and is in contradiction with Common but differentiated responsibility principle as well.	accepted. The word "unintended" has been removed.	Joyashree Roy	Asian Institute of Technology, Thailand. Jadavpur University, India	Thailand
37025	41	6	41	8	statement is redundant if not substantiated by so what is the message?	Edited	Joyashree Roy	Asian Institute of Technology, Thailand. Jadavpur University, India	Thailand
37027	51		51		Fig 1.8 . Cha 4 is about development pathway, Chapter 5 is about human needs and somewhat different than traditional sector chapters, so was wondering showing them distinctively might be interesting as they are new additions in AR6 compared to AR5 and earlier reports	Noted, thank you. The figure has been revised according to the combination of different comments.	Joyashree Roy	Asian Institute of Technology, Thailand. Jadavpur University, India	Thailand
37065	9	3			Revise word choice in the sentence "the atmosphere is a public good." "Climate" seems a more suitable word.	reworded	Diego Silva Herran	National Institute for Environmental Studies	Japan
37067	9	22	11	16	Include brief description of UN Sendai Agreement (similar to the description of other international agreements). Also, mention the Talanoa dialogue in the introductory paragraph.	Noted. Already existing in page 10, first paragraph.	Diego Silva Herran	National Institute for Environmental Studies	Japan
37069	11				Fig 1.2. percentage numbers in the top part don't match with lower numbers for "upper-middle income". Also, specify the corresponding year and coverage emissions (CO2 from FFI only, or also LUC, non-CO2 GHGs?) of the data presented in the figure.	Taken into account. Figure 1.2 has been replaced with Figure 1.3 a and 1.3 b in line with AR5.	Diego Silva Herran	National Institute for Environmental Studies	Japan

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
37071	14	23	15	43	There is little (if no any) reference to the concept of sustainable development in terms of the balance between the resources/services provided by natural systems and the fulfillment of human needs. It may be worth mentioning the concept of "planetary boundaries" as one example of portraying climate change into the greater picture of sustainable development. Also, there is no mention of the "freedom" as one of the elements of "human needs" (as proposed by economist and Nobel prize winner Sen).	The natural aspect is implied in the environmental dimension of sustainability.	Diego Silva Herran	National Institute for Environmental Studies	Japan
37073	14	27	14	30	Unclear sentence (maybe missing keyword or bad word choice). "integration and balancing" of what : aspects, elements, concepts, goals?	Text edited.	Diego Silva Herran	National Institute for Environmental Studies	Japan
37075	18	41	21	20	Flow and logic behind this section's structure is unclear. It seems an original and new framework proposed in the chapter (given the lack of references supporting it) to explain the drivers and climate change and its linkages with several societal elements (sectors?). Better to clarify the logic in the introductory paragraph. For instance, it's unclear if "drivers" refers to drivers of GHG emissions or of environmental change; it's unclear what "outputs" refers to (impacts?). The use of "sectors" is somehow confusing if put in the economic context, in particular the inclusion of "urbanization" and "economy" along with sectors referenced across the report (energy, industry, LU, etc).	Accepted.	Diego Silva Herran	National Institute for Environmental Studies	Japan
37097	0				<i>Characterisation of Paris Agreement Long-term temperature goal needs to be consistent with the Paris Agreement. Throughout this chapter there's a very serious lack of consistency, both with the PA and between chapters and chapter sections. Some instances are marked in this chapter's comments, some in other chapters, but the authors themselves need to fix this throughout.</i>	Accepted. We refer to TSU/DMS on Paris Agreement	Michiel Schaeffer	Climate Analytics	Netherlands
37099	0				The chapter lacks clear flow. All over the place, with many overlapping sections. Could be improved, for easy reading. AR5 was better presented	Noted and we have attempted to address it. Our concern is that AR5 was more of an essay than an introductory chapter that sought to flag key literatures and issues linked through to rest of report	Michiel Schaeffer	Climate Analytics	Netherlands
37101	3	3	1	5	please quote the Paris Agreement long-term temperature goal correctly. It refers to a 1.5°C limit, and this is essential in the UNFCCC political economy.	Accepted, text revised	Michiel Schaeffer	Climate Analytics	Netherlands
37103	3	18	1	18	There is only ONE Paris Agreement Long-term temperature goal, it is not "1.5 or well below". please correct. See <a href="https://climateanalytics.org/publications/2019/insights-from-the-ipcc-special-report-on-15c-for-the-preparation-of-long-term-strategies/">https://climateanalytics.org/publications/2019/insights-from-the-ipcc-special-report-on-15c-for-the-preparation-of-long-term-strategies/</a> for background and <a href="https://climateanalytics.org/publications/2018/the-eu-long-term-strategy-to-reduce-ghg-emissions-in-light-of-the-paris-agreement-and-the-ipcc-sr15/">https://climateanalytics.org/publications/2018/the-eu-long-term-strategy-to-reduce-ghg-emissions-in-light-of-the-paris-agreement-and-the-ipcc-sr15/</a>	Accepted, text revised	Michiel Schaeffer	Climate Analytics	Netherlands
37105	7	5	7	6	refer to 1.5°C limit (not target)	Reworded. The range 1.5-2 is declared Aim of Paris agreement	Michiel Schaeffer	Climate Analytics	Netherlands
37107	7	37	7	43	wrong characterisation of PA LTTG: this needs to be consistent with the characterisation of PA consistent pathways in IPCC SR SPM. see <a href="https://climateanalytics.org/publications/2019/insights-from-the-ipcc-special-report-on-15c-for-the-preparation-of-long-term-strategies/">https://climateanalytics.org/publications/2019/insights-from-the-ipcc-special-report-on-15c-for-the-preparation-of-long-term-strategies/</a>	This is not a characterisation of Paris Agreement Long-Term Temperature Goals (PA LTTG). It is merely a statement of the findings of SR1.5	Michiel Schaeffer	Climate Analytics	Netherlands



Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
37109	8	1	8	6	wrong characterisation of PA consistent pathways: only no or low overshoot pathways with limited use of CDR (based on limits identified by IPCC in SR) are PA consistent. SEe <a href="https://climateanalytics.org/publications/2019/insights-from-the-ipcc-special-report-on-15c-for-the-preparation-of-long-term-strategies/">https://climateanalytics.org/publications/2019/insights-from-the-ipcc-special-report-on-15c-for-the-preparation-of-long-term-strategies/</a> and <a href="https://climateanalytics.org/publications/2018/the-eu-long-term-strategy-to-reduce-ghg-emissions-in-light-of-the-paris-agreement-and-the-ipcc-sr15/">https://climateanalytics.org/publications/2018/the-eu-long-term-strategy-to-reduce-ghg-emissions-in-light-of-the-paris-agreement-and-the-ipcc-sr15/</a>	This sentence has been deleted.	Michiel Schaeffer	Climate Analytics	Netherlands
37111	8	12	8	15	Not appropriate to use CDR and SRM interchangeably. Very different biogeophysical mechanisms, policy interventions and governance implications. Refer to WGI for the 1st dimension. Be clear about these very fundamental differences	Not being used interchangeably. It says 'negative emissions' and/or SRM.	Michiel Schaeffer	Climate Analytics	Netherlands
37113	8	34	8	38	PA also refers to early peaking and rapid reductions thereafter - this is as important as the net zero and should also be referred to here.	There is no mention of PA in these lines.	Michiel Schaeffer	Climate Analytics	Netherlands
37115	10	2	1	3	always refer to PA LTTG as ONE: There is only one Long-term temperature goal in the Paris Agreement. See comments above	accepted, text revised	Michiel Schaeffer	Climate Analytics	Netherlands
37117	12	1	12	1	Add "by Region" diagram, from same source "Our World in Data, 2019" - . would give a picture of context provided in pg 11, lines 28-32	Taken into account. Figure 1.2 has been replaced with Figure 1.3 a and 1.3 b in line with AR5.	Michiel Schaeffer	Climate Analytics	Netherlands
37119	16	19	16	22	The statement could be better substantiated, in particular based on IPCC SR1.5	Edited.	Michiel Schaeffer	Climate Analytics	Netherlands
37121	16	31	16	31	another example of wrong characterisation of the PA LTTG throughout the chapter. This is blatantly wrong. The PA LTTG is to keep warming "well below 2°C and pursue efforts to limit it to 1.5°C". This formulation is wrong and suggests the authors have no understanding of the processes that led to the Paris Agreement and the associated literature	Edited	Michiel Schaeffer	Climate Analytics	Netherlands
37123	17	18	17	27	simplistic and not substantiated statement about priorities for adaptation or mitigation	Revised.	Michiel Schaeffer	Climate Analytics	Netherlands
37125	18	4	18	4	I do not see how Figure 1.4 communicates this statement about clustering of SDGs.	Figure edited.	Michiel Schaeffer	Climate Analytics	Netherlands
37127	19	15	18	16	too simplistic statement: We have a lot of evidence that even when zero carbon resrouces are actually becoming competitive and are plentiful, still fossil fuels prevail, and this is largely because of vested interests and political economy, which is missising in the list.	This statement has been removed.	Michiel Schaeffer	Climate Analytics	Netherlands
37129	19	18	19	20	Refer more specifically to political economy and influence of vested interests.	As part of edits made to the overall section, the line that this comment refers to has been removed. However, we include a separate section on Political Economy in the SOD	Michiel Schaeffer	Climate Analytics	Netherlands
37131	21	21			this section on trade, consumption, and leakage is a strange amalgamation of partial concepts without any systematic storyline or logic.	Rejected. No clear suggestion for improving the text	Michiel Schaeffer	Climate Analytics	Netherlands
37133	23	5	23	7	strange short statement of mitigation potential of oceans, without any explanation. What is exactly meant by ocean renewables and how would they be the biggest of five potenatial areas of contribution to closing emissions gap, when there is evidence that it is phasing out fossil fuels and upscaling of solar and wind energy uptake which is the largest potential to close the 2030 emissions gap. The emissions gap would need to be introduced properly too in this chapter.	The reference to ocean renewables has been removed as it does not fit with consumption and trade	Michiel Schaeffer	Climate Analytics	Netherlands

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
37135	23	9			section lacks systematic storyline and has too anecdotal character. It lacks providing a summary of the evidence based on bottom up studies for mitigation potential through a range of technologies, and fast innovation happening not only with RE (Wind and solar) and batteries, but also electrolyzers, green hydrogen.	Accepted - the section is totally rewritten.	Michiel Schaeffer	Climate Analytics	Netherlands
37137	23	35			section on clean technologies including batteries should be renamed into Renewable energy and battery technologies and is very weak. It should emphasise the fact that renewable energy and storage is now the cheapest option in many geographies. There is strong evidence for the key role that batteries play to provide grid services, the statement that it "may help manage variability" is much too weak. The linkage of electricity and transport is not just "emerging", and it refers to old literature, it completely misses out on recent developments on electrolyzers and hydrogen (see Hydrogen Council report).	Partly accepted - we changed the heading of this subsection. Rephrased some of the sentences, deleted an old reference and added a new. We did not include the developmenmts in electrolyses and hydrogen here as we do not find it very relevant.	Michiel Schaeffer	Climate Analytics	Netherlands
37139	24	16	24	22	mischaracterisation of "need for CCS" - referring to IEA SDS, this is based on assumptions in the scenario, and does not imply this is a real need for CCS. Also the lack of consistency of IEA SDS with PA needs to be addressed.	Rejected - We find the SDS a natural scenario for comparisons. It identifies a pathway consistent with key energy-related sustainable development goals for emissions, access and air quality. Also Sustainable Development Goals is important for this AR, which makes SDS relevant for the comparisons. See also reply to comment 1234 below.	Michiel Schaeffer	Climate Analytics	Netherlands
37141	24	17	24	17	1. Consider adding Important perspective on operating CCS plants, which is that many of these are linked to EOR - check Gough, C., Mander, S. Beyond Social Acceptability: Applying Lessons from CCS Social Science to Support Deployment of BECCS. Curr Sustainable Renewable Energy, 2019. 2. Also, it would be useful for the IPCC to present real feasibility of geological storage and capacity estimates of sequestration reservoirs - not only technology and cost feasibility	1. Accepted - we added social acceptance as a reason for concern. 2. Rejected - we do not go into such details in this introduction chapter.	Michiel Schaeffer	Climate Analytics	Netherlands
37143	26	28	26	28	Expand by indicating that although many financial institutions have adopted policies to never fund fossil fuels, support for fossil fuel is rising (OECD, 2019)	Accepted. Sentence expanded and reference added.	Michiel Schaeffer	Climate Analytics	Netherlands
37145	33	37	33	44	characterisation of PA lacks reference to key top down elements: LTTG and pathway goal; ratcheting up mechanism, review of collective efforts with science input	Noted. Chapter 14 will talk indepth about PA.	Michiel Schaeffer	Climate Analytics	Netherlands
37147	51	11	51	11	Important to mention that national context and circumstances are important in making the action succeed	Agreed but not sure the extremey short conclusions are the place to elaborate	Michiel Schaeffer	Climate Analytics	Netherlands
37761					Who is the target audience for this report?	Primarily, government experts but also wider academic communy	Kouadio Sekedoua	Université Gustave Eiffel	France
37883	47	21	48	6	The Special reports, and specifically, Governance in 7.7. the Land and Climate report covered governance and this chapter should build on this work. Although multi level and policentric governance is important, the role of the states can't be discounted. See chapter 7 of Land and Climate and the reference and explanation of hybrid governance that emphasizes the role of the state in the last section on governance.	We do not understand multi-level governance as discounting the role of the state. It emphasizes the role of governance at local, state (national) and international level.	margot Hurlbert	University of Regina	Canada
37885	48	46	49	2	In the Land and Climate report institutional barriers are identified in the barriers section (7.5.9). This paragraph has no references and should reference the Land and climate report and literature since this 2019 report.	Text has been edited. The chapter references the land report and discusses institutional barrier.	margot Hurlbert	University of Regina	Canada

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
37887	50	24	50	30	This paragraph needs work. 'it may to engage' is poor grammar. The paragraph should be consistent with the definition of governance in the glossary. The questions aren't appropriate to governance but are broader than governance.	Text has been revised.	margot Hurlbert	University of Regina	Canada
37889	50	33	50	33	"the world has changed hugely' is poor grammar	Accept	margot Hurlbert	University of Regina	Canada
37913	4	1	4	1	Suggest including the word "adequately" -- (when environmental damage is not adequately priced).	Exec Sum completely redrafted	Patricia Perkins	York University	Canada
37915	5	1	5	12	Climate change itself is fundamentally unjust, and there are interactions between causes, effects, and transition policies with regard to these injustices. Including mention of these ethical dilemmas would reinforce the points on complexity and need for new forms of governance.	the revised ES makes the point that fairness is an important consideration in addressing climate change.	Patricia Perkins	York University	Canada
37917	5	11	5	13	Chapter 5 also focuses on the positive feedbacks among equity, well-being for all, and mitigation in facilitating effective governance for post-fossil energy transition.	This positive feedback is highlighted in the revised ES.	Patricia Perkins	York University	Canada
37919	15	26	15	29	The word "inequities" would be better than 'inequality' here, to acknowledge that it's not a level playing field but a better-than-level field that is needed to redress the compounding inequities of poverty, discrimination, gender, racialization and other social injustices that can simultaneously be addressed through well-designed climate policies.	Edited.	Patricia Perkins	York University	Canada
37921	18	8	18	8	"inequities" is better here than "inequality", to convey that even in Annex I countries inequities are multidimensional.	edited	Patricia Perkins	York University	Canada
37923	22	34	22	34	"inequity" is a stronger statement of the problem.	Noted	Patricia Perkins	York University	Canada
37925	29	20	29	20	Gender "inequity" is much more accurate.	Accepted - We have added a sentence and a reference on gender inequality.	Patricia Perkins	York University	Canada
37927	42	5	42	11	It would be more accurate to say "exacerbating inequities among communities and countries" and "... address the deeper inequities within societies" -- the authors cited here use "inequities".	Accepted	Patricia Perkins	York University	Canada
37929	18	14	18	27	Chapter 5 uses very similar language (p. 8, lines 42-line 50) so either here or there, this should be modified.	Edited.	Patricia Perkins	York University	Canada

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
38135	4	43	5	12	The Paris Agreement means the world must become carbon neutral by mid-century. Achieving a such ambitious but mandatory target to keep the planet a livable place means a drastic demand reduction of goods and services will be required. Therefore, there is a need for a forth framework to be included in the Framing chapter. A such framework would be based on sufficiency measures (which avoid the demand) , efficiency (which reduce the energy consumption of good and services) and decarbonisation (which use RE sources for the production of the goods needed). A such framework would be close to the one developed in Chapter 5 (Avoid, Shift and Improve). However, as mentioned in Chapter 9 improve (which is based on efficiency) should come before shift (which is based on the use of RE. In fact, it does not make any sense to use RE for running inefficient systems). Furthermore, a such framework has been already proposed by a French NGO named Negawatt which is active since 2003 in France and the French 2015 energy transition law is based on this framework. More information on this framework is available at: <a href="https://negawatt.org/en">https://negawatt.org/en</a> . A such framework is the only way to avoid the lock-in-effect and to limit (if not completely avoid) teh rebound effect. It is als the only way to ensure individuals will change their behaviors by offering them alternative infrastructures and solutions	The chapter as well as several other chapters refelct the importance of the Paris Agreement in tackling climate change.	Yamina Saheb	OpenExp, Ecole des Mines de Paris	France
38137	23	15	23	26	Here reference should also be made to increase GHG emissions due to digitalisation, see for example: <a href="https://theshiftproject.org/wp-content/uploads/2019/03/Lean-ICT-Report_The-Shift-Project_2019.pdf">https://theshiftproject.org/wp-content/uploads/2019/03/Lean-ICT-Report_The-Shift-Project_2019.pdf</a>	Rejected - we do not go into this detail in the text. We refer to chapter 6.	Yamina Saheb	OpenExp, Ecole des Mines de Paris	France
38139	30	13	30	19	Here reference should be made to the role infrastructure plays in the behavior of individual, for example, if you don't have biking lines, you will not bike.	Accepted	Yamina Saheb	OpenExp, Ecole des Mines de Paris	France
38141	32	41	34	35	Here reference should be to international cooperation which leads to locking the developing world in carbon. A good illustration of this is teh Energy Charter Treaty which protects foreign investments in fossil fuels through the threat of costly private arbitration. EU development funds have been used and are still used to facilitate the accession of developing countries to this Treaty. see: <a href="https://www.openexp.eu/sites/default/files/publication/files/modernisation_of_the_energy_charter_treaty_a_global_tragedy_at_a_high_cost_for_tax_payers-final.pdf">https://www.openexp.eu/sites/default/files/publication/files/modernisation_of_the_energy_charter_treaty_a_global_tragedy_at_a_high_cost_for_tax_payers-final.pdf</a>	This is a valid example. However we believe the section makes the point that international co-opertaion can either drive or constrain climate action clearly. There are many other several "positive" and "negative" examples that could be cited.	Yamina Saheb	OpenExp, Ecole des Mines de Paris	France
38143	37	7	37	7	It's good to mention here Chapter 5. However, it would be much better from climate action perspective to include the framework proposed by this chapter (with the correction mentioned in comment 1) in the lust of frameworks considered in Chapter 1.	Mentioned, but 'Avoid, Shift, Improve ..' is more a policy ordering than an analytic framework as such	Yamina Saheb	OpenExp, Ecole des Mines de Paris	France
38145	46	6	46	20	Infrastructure is missing in this list while it's contribution to climate mitigation is very high	Good point. We concluded that infrastructure sits most naturally with technology and made this explicit	Yamina Saheb	OpenExp, Ecole des Mines de Paris	France
38345	20	23	20	25	Repeated comment from previous expert review that was not addressed: You don't need to say "fossil fuels" because you then list them. Also, use consistent terms with other chapters, like "natural gas" instead of just "gas". Should you be using the term biomass?	Accepted - text revised	Lynn Price	Lawrence Berkeley National Laboratory	United States of America
38347	29	42	29	43	Please provide a reference for this statement: "The cheap mitigation options are often found in poor countries."	Accepted - we have deleted this sentence	Lynn Price	Lawrence Berkeley National Laboratory	United States of America
38753	3		3		Why use quotes for the first aim of the Paris Agreement, and not for all three aims in Article 2?	Noted. Because WG III focus is mitigation.	Julian Reyes	Personal Capacity	United States of America

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
38755	7	6	7	6	Other chapters in the WG reports and the actual Paris Agreement do not refer to temperature targets. If temperature is being referred to, please use goals.	Technically, "Aims", reworded	Julian Reyes	Personal Capacity	United States of America
38757	7	17	7	18	This is policy prescriptive by assuming the contents of the report will only help the aims of one particular, but important global agreement. There should be mentions of other policies, if this is meant to be policy-neutral yet policy-relevant.	We wrestled with the question of how to much to shape the Chapter around the Paris Agreement. We have sought to address the tensions in our section on Drivers, but broadly concluded the bulk of the chapter should continue to be framed substantially in relation to various dimensions of the Paris agreement particularly given its almost global participation (and those same governments are the prime recipients for the IPCC reports), but also without assuming adequate implementation, and emphasising that the goals also need to be set in context of competing priorities for governments, including for example around SDGs.	Julian Reyes	Personal Capacity	United States of America
38759	26	17	26	17	Re-word "targets of the Paris Agreements" – the word "target" is not used in Article 2.	Accepted	Julian Reyes	Personal Capacity	United States of America
38761	38	13	38	13	Please be more specific (and fix grammar) on the "emissions Aim of in Paris Agreement". Is this referring to emission reduction targets in Article 4? Or, is this referring to part (b) of Article 2? If referencing the Paris Agreement temperature goals, then say so.	Clarified	Julian Reyes	Personal Capacity	United States of America
38763	42	1	42	1	But isn't impact a function of both exposure and sensitivity, with the former including underlying biophysical and socio-economic factors which may increase the vulnerability of a certain area?	Noted - see what is written in section 1.5.6 on impacts.	Julian Reyes	Personal Capacity	United States of America
39101	2	34	2	34	<i>Suggest that the figure 1.8, in 1.9 Roadmap to the Report, be placed earlier, as Organization of the report, for example at page 6, before/integrated with the passage starting at line 31, where the paragraph begins with the text "As mapped out in this report..."</i>	Agreed, done	Zelina Ibrahim	Universiti Putra Malaysia	Malaysia
39103	4	41	5	12	"five 'Illustrative pathways'" and "three analytic frameworks" are mentioned; and the 3 frameworks are described but <i>there is no mention of the illustrative pathways. There should be some short mention of the illustrative pathways and their concept.</i>	the illustrative pathways were not available at the time and they play a somewhat different role, now presented in section 1.3	Zelina Ibrahim	Universiti Putra Malaysia	Malaysia
39105	6	31	6	31	Figure 1.8 is better placed here before the text "As mapped out in this report..."; and before discussion of the findings of the different chapters of this whole report. This will allow the reader to understand the flow of discussion of findings.	Accepted - figure moved	Zelina Ibrahim	Universiti Putra Malaysia	Malaysia
39107	7	1	7	2	Where will Figure 1.1 be referenced in the text? There is no mention of Illustrative Emmissions Pathways in section 1.1. The first mention of emission pathways (not Illustrative Emission Pathways) is in section 1.2.1. This figure would seem more relevent for section 1.2. Please ensure correct flow, and introduction, of concepts in the revision.	Figures on this restructured	Zelina Ibrahim	Universiti Putra Malaysia	Malaysia

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
39109	8	36	8	43	<p>The sentence "It is crucial however to devise these responses by keeping into the pictures all potential trade-offs and synergies" is very important and relevant for international policies on financing and investment (as summarised in subsection 1.4.4 on page 25) for climate change mitigation and adaptation, especially for developing countries. This report should consider the possible options available, for example for each of the four main consumption (/end-use) drivers of AFOLU, buildings, transport and industry; as listed in the approved outline "Sector specific barriers, policies, financing, and enabling conditions"</p> <p>I make this comment without reading the relevant chapters and only viewing the chapter table of contents; Chapters 7 AFOLU (no subsection heading on financing and investment), 9 Buildings (9.9.4 and 9.9.5 includes financing discussions), 10 Transport (no section heading on financing and investment), or 11 Industry (11.6 does include topics related to financing and investment). It may be that the topics are discussed within other subsection headings, however, I think it is important to highlight them as a distinct subsection topic consistently among chapters 6 to 11.</p>	Noted. Thanks for these observations. Sector specific comments may be directed to the relevant chapters.	Zelina Ibrahim	Universiti Putra Malaysia	Malaysia
39113	13	25	13	31	At line 28, section 1.4 is introduced. However, the immediate section following is 1.3, thus I find this a bit jarring, and suggest some rewrite to indicate the logical sequence by presenting the linkage between subsections 1.3 and 1.4.	Rejected	Zelina Ibrahim	Universiti Putra Malaysia	Malaysia
39115	17	14	17	16	Source of figure should be given.	Figure has been revised.	Zelina Ibrahim	Universiti Putra Malaysia	Malaysia
39117	18	44	19	20	<p>This section refers to the figure 1.5, however, the text in the figure and text in the paragraph are not directly consistent. For example, the aggregate "drivers" are also referred to as a set of "forces"; this is not too bad. It is more difficult to understand what the drivers/forces are as the list in the figure of Policy, Resources, Technology, Economic, Activity, Human desires, culture, institutions, are separated in the figure, but in the bullet point descriptions it is not clear which of these 5 are being described. Also, it is clear how the sectors and the final round disks (outputs?) are defined or linked. For example, desire for Goods and Services (an output) is described as a driver in the first bullet point.</p> <p>Perhaps some rethinking of the figure would need to be done to show the complex interactions described in the bullet points.</p>	Figure and reference have been removed.	Zelina Ibrahim	Universiti Putra Malaysia	Malaysia
39119	20	6	21	20	<p>The hierarchy of description of services is not clear here. In line 8, we have a list of 4 sectors and climate. In lines 9 to 11, a list of examples of services is given. This is followed by description of different services. It would be useful to have the descriptions of services listed from most important to least; or are all of the same level?</p> <p>However, I am uncertain of the intent here as there is a use of italics in four of the paragraphs as separate inline headings, but not for City transformation services (not previously listed as a sector or service, but as a role) or in the description of the climate-land-energy-water nexus at page 21, line 11. Is this intentional? or is the nexus not considered as a service provision? I observe that water services is not described separately but within the nexus.</p>	<p>This section has been rewritten to be clearer that the list of energy services is purely illustrative.</p> <p>City services is now retitled Urbanization. It is now at the same level as energy services.</p>	Zelina Ibrahim	Universiti Putra Malaysia	Malaysia
39121	30	5	30	6	Section 1.4.5 does not discuss "transfers from rich to poor countries"	Accepted - should refer to the section on "Finance and investment".	Zelina Ibrahim	Universiti Putra Malaysia	Malaysia
39123	51	13	51	13	It would have been useful to have some information on the expected topics to be covered here.	Noted, thank you.	Zelina Ibrahim	Universiti Putra Malaysia	Malaysia

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
39125	51	14	51	18	Suggest that the figure 1.8, in 1.9 Roadmap to the Report, be placed earlier, as Organization of the report, for example at page 6, before/integrated with the passage starting at line 31, where the paragraph begins with the text "As mapped out in this report..."	Accepted. Thank you, the figure has been relocated.	Zelina Ibrahim	Universiti Putra Malaysia	Malaysia
39127	51	14	51	17	In the figure, for Sectors, instead of the text Chapters 5-12, there should be some text descriptor	Noted, thank you. The figure has been revised according to the combination of different comments.	Zelina Ibrahim	Universiti Putra Malaysia	Malaysia
39129	51	14	51	17	I observe that this figure is likely inspired by Figure 1.6 in SR1.5, however that report has fewer chapters which allows for a simple cake diagram to be used. I think this report would benefit from a figure which provides more detail on the scope of the 17 different chapters, which may require a different figure format to be used. Perhaps something like a flow chart with chapters 5 to 12, 13 & 14, and 15 & 16, placed in parallel/concurrent?	Noted, thank you. The figure has been revised according to the combination of different comments.	Zelina Ibrahim	Universiti Putra Malaysia	Malaysia
39145					Several inline references have been entered with authors' names only, without the year of publication. This should be avoided as it may result in confusion if an author group has more than one article listed in the chapter reference list.	These should now be fixed	Zelina Ibrahim	Universiti Putra Malaysia	Malaysia
39147	16	19	16	19	"As illustrated by Figure 1.3 above" would be more correct than "As Indicated in Figure 1.3 above".	Figure has been revised.	Bertrand Hespel	University of Namur	Belgium
39149	40	11	40	20	The paragraph is not clear enough to understand what the three "tempest" are.	Text edited.	Bertrand Hespel	University of Namur	Belgium
39151	40	45	40	45	It would be wise to clarify the meaning of the word "self-transcendence".	Edited	Bertrand Hespel	University of Namur	Belgium
39153	41	15	41	18	Duplicate to remove : from "(Jolly et al. 2015)" to "co-operation on climate change".	Duplicated text deleted	Bertrand Hespel	University of Namur	Belgium
39155	43	1	43	1	As such this figure is incomprehensible.	There was an unfortunate technical error in conversion to PDF, however the Figure has been substnially reworked	Bertrand Hespel	University of Namur	Belgium
39157	51	15	51	16	The figure 1.8 does not show the "three main parts" mentioned in the previous line.	Accepted. Thank you, we have revised the text and the figure.	Bertrand Hespel	University of Namur	Belgium
39539	14	8	14	8	SPPs should be SSP	Corrected	Shunsuke Kawagishi	Mitsubishi Research Institute	Japan
39555	4	14	4	18	Potential pathways must also include as a new dimension multi-level governance. It is a heavy constrain to achieve climate change goals and interconnect with socio-cultural and institutional ones.	The role of (new forms of) multi-level governance is highlighted in the revised ES	Marylin Bejarano Castillo	National Water Comission of Mexico	Mexico
39557	7	22	7	22	Increasing emphasis on climate mitigation could reduce searching and innovation ways looking for actions that can mitigate and adapt to climate change at the same time. These actions are relevant to the land-use change sector and, importantly, island countries that faced adverse effects of climate changes now.	Noted	Marylin Bejarano Castillo	National Water Comission of Mexico	Mexico
39559	8	32	8	34	It could be essential to include the effect of fertilizer use on atmospheric fertilization, turning Carbon and Nitrogen cycle at a global scale, such as a relevant example of both synergies and trade-offs between climate change and land (nexus). It could be determinant to sensibilize to the community and make policy decisions about that hide and a less knowledge factor. Nutrient cycle is a process that is required to have healthy fuctioning to achieve climate change goals.	Noted	Marylin Bejarano Castillo	National Water Comission of Mexico	Mexico
39561	19	32	19	32	There is a "They interact" repeated.	Accepted - text revised	Marylin Bejarano Castillo	National Water Comission of Mexico	Mexico

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
39563	26	17	26	19	In the same way, in which DSO compliance can contribute to climate change mitigation and adaptation goals, SDG investment should design itself to lever up advances to the climate change agenda. This multi-sectorial approach could achieve more efficiency in the use of economic resources.	Rejected. This section is specifically addressing framing of climate finance. Page limits keep us from addressing broader finance issues.	Marylin Bejarano Castillo	National Water Comission of Mexico	Mexico
39565	39	22	39	29	Intuitive thinking and rule based-responses also are conditioned by economic status at personal, community and society levels.	A reference would be useful	Marylin Bejarano Castillo	National Water Comission of Mexico	Mexico
39889	8	13	8	13	Solar Radiation Modification was introduced as a term instead of Solar Radiation Management in SR1.5; the same term should be used consistently throughout AR6!	Changed	Axel Michaelowa	University of Zurich	Switzerland
39891	53	37	53	42	Carbon Neutrality is not the same as Climate Neutrality. Other climate forcers than greenhouse gases (e.g. cirrus cloudss, black carbon... )need to be taken into account in the definition of Climate Neutrality. The IPCC should be very careful with its definition given that many jurisdictions are using the terms Carbon and Climate Neutrality interchangeably without being aware of their conceptual difference.	Accepted, thank you.	Axel Michaelowa	University of Zurich	Switzerland
40103	3	30	3	30	The word "Aims" would be "aims"	Exec Sum completely redrafted	Neeraj Pandey	National Institute of Industrial Engineering (NITIE), Mumbai	India
40113	3	40	3	43	"The wide variation in the contribution to, and capability to respond to climate change calls for the need for attention to equity, justice, and faireness within and between countries in conceptualizing the relationship between sustainable development and climate change as well as for specificity in analyzing the drivers and forces that constraint action across time and scale." This statements is one of the key statements in order to remedy a concrete solution that is acceptable to many a stakeholders. In this regard, science must tally with its evidence, solution measures and the financing mechanisms. Prioritizing and under lining these equations (through diverse analytic frameworks developed in AR6) here briefly is of paramount imporatance. Currently this statement does not address of solutions or clear doubts within the science (internally consistent tools for probing possible futures both quantitatively and qualitatively) of the sixth assessment report.	Thank you for agreeing with the equity and fairness statement. The statement has been edited in the new Executive summary although references are still made to the importance of equity, justice and fairness. The ES also points to the role of a range of factors and analytical frameworks in driving ambitious action on climate.	Ramesh Soysa	Biomass Group & World Bank	Sri Lanka
40115	4	4	4	4	Systematic risks that climate change poses - it would be important to quantify (in economic value) and ellaborate these risks here. Linking climate change into financial systems needs further enabling environment and strengthening.	The complete revamping of the ES has made this otherwise valid comment somewhat redundant.	Ramesh Soysa	Biomass Group & World Bank	Sri Lanka
40117	4	15	4	18	"AR6 brings to bear frameworks for assessing trade-offs and synergies of climate mitigation in the context of sustainable development, including equity concerns, and evaluation of the multi-level dynamics involved in accelerating just transitions across a growing number of sectors." The key areas of AR6 is the introduction of an effective broadened assessment framework. The multi-level dynamics evaluating trade offs, synergies, equity concerns needs to be prioritised and summarised here.	The revised ES provides a summary of the key analytical frameworks	Ramesh Soysa	Biomass Group & World Bank	Sri Lanka
40119	50	38			"A technology revolution is clearly under way, making significant contributions some countries but as yet its global impact is limited." making singnificant contributions in some countries. "in" is missing	thanks	Ramesh Soysa	Biomass Group & World Bank	Sri Lanka
41107	3	1	5	18	<i>The format and style of ES need to be coordinated with rest of report.</i>	Comment is valid. We hope the revised ES meets the reviewers expectation.	Jan Fuglestedt	CICERO	Norway



Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
41109	3	3	3	4	The wording "against many odds" is a bit too sloppy for such a broader issue in the opening sentence. I suggest rewording or deleting; not needed.	Accepted, changed	Jan Fuglestedt	CICERO	Norway
41111	3	28	3	28	What is meant by "much lower" ?	Comment no longer applies as this part of the Executive Summary has been completely revamped.	Jan Fuglestedt	CICERO	Norway
41113	3	28	3	28	"all nations" is a very strong statement. Add some nuances?	Comment no longer applies as this part of the Executive Summary has been completely revamped.	Jan Fuglestedt	CICERO	Norway
41115	5	12	5	12	The expression "just transition" is understood differently across readers. I think this needs some explanation.	Just transition is defined in the bibliography.	Jan Fuglestedt	CICERO	Norway
41117	5	12	5	12	The expression "super-wicked" needs some explanation if to be used in ES	The text has been revised	Jan Fuglestedt	CICERO	Norway
41119	0				<i>I strongly suggest to look to WGI and WGII and see if there could be possibilities for writing the opening chapters in a way that can complement each other; similar structure, consistency in use of concepts, level of detail, relation to following chapters and how much of the findings in these chapters that can be used in ch1. In WGI, ch1 uses material from the later chapters in a way that is not conflicting with the more detailed presentations there, but it rather gives a new way of seeing the bigger picture. One mechanism for coordination with WGII and WGI could be to involve authors from these reports as CAs in WGIII Ch1.</i>	We have taken on Rob Lempert, CLA from WGII Chapter 1, as a Contributing Author and asked him to review our Oct 8 draft in light of this comment	Jan Fuglestedt	CICERO	Norway
41121	6	10	6	11	I think it is strange to say that the PA clarified implications of the UNFCCC to avoid DAI. There are many issues in the PA that need further clarification and interpretation. Check consistency with chapter 14.	Reword	Jan Fuglestedt	CICERO	Norway
41123	7	2	7	2	A figure here can be useful - if presented in a way that gives added perspective to the presentatoin in Ch3.	Wasn't clear what figure was in mind? We have however sought to include a clear one on trends, simplified from Ch.2	Jan Fuglestedt	CICERO	Norway
41125	7	6	7	7	In addition to refs to Millar et al and Leach et al., I suggest a reference to SR1.5	Accepted, reference added, thank you.	Jan Fuglestedt	CICERO	Norway
41127	7	26	7	32	As indicated, this para needs update. When you do so, please coordinate with authors in the xWG team - from WGI and WGIII Ch3.	This as a factual statement from AR5 that does not need to be updated.	Jan Fuglestedt	CICERO	Norway
41129	7	43	7	43	You may also refer to ch3 in this report, in addition to referring to SR1.5.	This sentence has been deleted.	Jan Fuglestedt	CICERO	Norway
41131	8	16	8	23	I think you can update with new numbers from this WGI report.	It is unlikely WG1 will have this information. Can try to update with more recent numbers from relevant chapter(s) in AR6 WG3 report. It should be noted, however, the title of this section is "Previous ARs and SRs Key Findings."	Jan Fuglestedt	CICERO	Norway
41133	0				<i>Often the authors refer to AR5 or SR1.5, but it would strengthen the report if ch1 can build on results form the following chapters in the WGIII report. I think this can be done without conflicting with their presentations (which will be deeper and more detailed).</i>	WE did this explicitly with WG1 input, and somewhat with Rob Lempert as CA from WGII	Jan Fuglestedt	CICERO	Norway
41135	8	24	8	25	This sounds obvious, but also somewhat policy prescriptive in the way it is formulated. I suggest you try to find a different wording.	Sentence has been rephrased.	Jan Fuglestedt	CICERO	Norway
41137	9	3	9	4	The point made here is not well connected to the rest of the text.	Text has been modified and expanded.	Jan Fuglestedt	CICERO	Norway
41139	9	28	9	29	It seems very odd to give this statement here ("hailed as..."). There may be other statements in the literature, and this is not balanced and not an assessment. Please check consistency with chapter 14.	Accepted, text revised	Jan Fuglestedt	CICERO	Norway
41141	9	38	9	39	I think it is sufficient to refer to ch14, instead of adding one reference here.	Noted	Jan Fuglestedt	CICERO	Norway

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
41143	9	44	9	45	Again strange to write "hailed", and in addition there seems to be something wrong with language in this sentence	Accepted, text revised	Jan Fuglestedt	CICERO	Norway
41145	12	3	12	4	The first sentence here does not sound policy neutral and needs rewording.	Accepted	Jan Fuglestedt	CICERO	Norway
41147	12	3	12	7	As stated, yes, this needs coordination with WGI and WGII authors. Please get in touch with TSUs or Bureau members for help on this.	Noted. Communication with WGs 1 & 2 ongoing.	Jan Fuglestedt	CICERO	Norway
41149	12	40	12	40	Mentioning the yellow vest movement seems a bit narrow. I suggest adding 1 or 2 other examples, or leave out	Accepted. Exsmple of South Africa has been adeed	Jan Fuglestedt	CICERO	Norway
41151	16	15	16	18	Fig 1.3 looks potentially interesting. But it needs more explanation , and probably also visual improvement. (And you don't need to give chapter authors as source)	Edited.	Jan Fuglestedt	CICERO	Norway
41153	17	16	17	16	Fg 1.4 The legend on the vertical axis is strange. GHG emission per capita is OK, but not "(concentration)". I suggest deleting that.	Figure has been revised.	Jan Fuglestedt	CICERO	Norway
41155	19	5	19	5	The use of the word "simply" seems odd. I suggest delete	agree. word "simply" has been deleted.	Jan Fuglestedt	CICERO	Norway
41157	34	38	34	38	About unprecedented in scope and scale: Probably a reasonable thing to say, but the way it is written here is not working well. I suggest adding a bit more why - even if it seems obvious to you. Or delete.	Accepted, expanded	Jan Fuglestedt	CICERO	Norway
41159	35	18	35	18	you may consider changing "events" to the slightly more general "factors"	Done	Jan Fuglestedt	CICERO	Norway
41161	35	20	35	20	Add "possible" before "future" ?	Done	Jan Fuglestedt	CICERO	Norway
41163	35	47	35	47	I dont think "metrics" is the right word here. This is usually applied for other things than what you talk about here.	we now use elements	Jan Fuglestedt	CICERO	Norway
41165	36	3	36	3	Check consistent use of "reference scenario" (vs "baseline scenario") across chapters of the report	Generic, discuss	Jan Fuglestedt	CICERO	Norway
41167	36	9	36	9	Instead of "developed" I would say chosen or highlighted in the SPM. They were not developed by IPCC. And chapter 2 based its assessment on a large number of scenarios. This is not clear from the current text.	Noted, thank you	Jan Fuglestedt	CICERO	Norway
41169	36	19	36	19	You could also mention that scenarios are a key part of the communication of the IPCC findings. (But not sure if you think it fits in here.)	Added statement on communication role of scenarios	Jan Fuglestedt	CICERO	Norway
41171	36	32	36	32	"Deep uncertainty" is a concept used in another AR6 report; e.g. SROCC. Please check for consistency	Generic, discuss	Jan Fuglestedt	CICERO	Norway
41173	35	1	36	44	Nice section, but it would be very useful if it also gives an overview of scenarios across chapters in WGIII. See what was done in WGI Chapter 1, as well as in WGI TS. This could also be discussed in the xWG team on scenarios.	We changed text to provide overview of scenarios in line with WGI	Jan Fuglestedt	CICERO	Norway
41175	50	33	50	33	You could add which year the AR5 was finalized (2014).	Accepted	Jan Fuglestedt	CICERO	Norway
41177	50	38	50	38	Can you say so nuanced that a technological revolution is underway? What qualifies for calling technological development a revolution? As written now it sounds very optimistic.	Our judgement is that in particular the transition in technology for accessing the worlds biggest renewable energy resource, from being extraordinarily expensive, to "the cheapest electricity in history" (IEA) - at least, in many areas as cheap as fossil fuels - in particular, does amount to a revolutionary change though accept we havent explicitly defined this. Slightly reworded.	Jan Fuglestedt	CICERO	Norway
41179	53	20	53	20	Re "contribute only a few per cent": In terms of what?	A few per cent of total GHG emissions, as stated in the beginning of the phrase.	Jan Fuglestedt	CICERO	Norway

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
41181	53	26	54	2	I think FAQ 1.3 needs improvement. I suggest starting with Art 4 of the PA instead of starting with one of the many concepts used (often undefined) in the literature. Rogelj et al (ERL) gives a good overview of various concepts used before the PA; and a ref should be given to this paper. The PA introduced "balance between anthropogenic emissions by sources and removals by sinks of greenhouse gases", which could be a reference point here. In addition to "balance" many other concepts are used in climate policy today (carbon neutrality, climate neutrality, net zero CO2 etc), and the box could help clarifying these.	Accepted, thank you.	Jan Fuglestedt	CICERO	Norway
41183	53	26	54	2	A relevant paper for FAQ 1.3 could be Fuglestedt et al., 2018 which discussed interpretation of the PA balance: Fuglestedt J, Rogelj J, Millar RJ, Allen M, Boucher O, Cain M, Forster PM, Kriegl E, Shindell D. 2018 Implications of possible interpretations of 'greenhouse gas balance' in the Paris Agreement. Phil. Trans. R. Soc. A 376: 20160445. <a href="http://dx.doi.org/10.1098/rsta.2016.0445">http://dx.doi.org/10.1098/rsta.2016.0445</a>	Noted, thank you.	Jan Fuglestedt	CICERO	Norway
41185	53	32	53	36	Some important points are made here, but I miss a point about domestic GHG balance and how this need to add up to global GHG balance. The Paris Agreement text is not explicit about whether the balance between sources and sinks is mandated at a global or national level but from a climate system perspective, the global level is what is needed. See discussion in Fuglestedt et al., 2018, Implications of possible interpretations of 'greenhouse gas balance' in the Paris Agreement. Phil. Trans. R. Soc. A 376: 20160445. <a href="http://dx.doi.org/10.1098/rsta.2016.0445">http://dx.doi.org/10.1098/rsta.2016.0445</a>	Noted, thank you, the FAQ has been rewritten.	Jan Fuglestedt	CICERO	Norway
41951	20	17	20	19	Replace sentence with "...when URBAN PLANNING and their systems of innovation and transformation are turned ... creating ENERGY EFFICIENT AND/OR renewable energy SYNERGIES INTEGRATED IN CITY LAYOUT, and regenerating ..." . This modification would explicitly include other solutions apart of renewables (e.g. district heating) and also stress the need of interleaving any solution in the planning of urban areas	Accepted - text revised. In the revised text, we have removed the sub-headings and integrated the sub-sections together.	Francisco Javier Hurtado Albir	European Patent Office	Germany
41953	23	15			In the section dedicated to "information technology" and for the sake of completeness, reference should be made to the high consumption and environmental impact of ICT equipment manufacturing and disposal, which is very frequently overlooked. The "dark side" of ICT has been already referred in lines 30 to 35 of this page. Perhaps the modification which I am proposing should go in this paragraph. An overall picture will be then provided with regard to the negative impact of ICT	Accepted - we have added more on this.	Francisco Javier Hurtado Albir	European Patent Office	Germany
41955	34	35	0	0	Add at the end of the sentence "which are instrumental for the "downgrading" of high-level agreements to more concrete, particular and day-to-day level."	Sorry couldn't see what this referred to and the meaning actually unclear to me	Francisco Javier Hurtado Albir	European Patent Office	Germany
42199	3				this is a general comment - this FOD is considerably better than the ZOD. <i>What I would like is that this chapter sets out the key issues that derive from the other chapters as well as set out a pathway of the following chapters through the report. At the moment, chapter 1 does not yet do this.</i> For example, I have just reviewed Chapter 5 and it sets out a pretty good argument for why mitigation would be much easier / cheaper etc if the demand side (including energy efficiency) was targeted. <i>It seems to me a very big issue is how do we globally change the way we do things - and moving from supply to demand is a very good example of that. I think that chapter 1 should be dealing with those big issues of how we have to move away from BAU ways of thinking.</i>	We hope this is now better addressed, including with the Report Structure figure brought up front and the development of new section 1.3.	Catherine Mitchell	University of Exeter	United Kingdom (of Great Britain and Northern Ireland)

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
42201	19	20			a plea for policy and governance - policy is actually just one dimension of governance so having policy without all the other stuff (institutions, decision-making processes, rules / regulations) is leaving out a huge part of one driver....	As part of edits made to the overall section, the paragraph that this comment refers to has been removed.	Catherine Mitchell	University of Exeter	United Kingdom (of Great Britain and Northern Ireland)
42203	25	15	25	35	this is very technology heavy ? What are you trying to say ? Social dimensions (25, 8) minimal	Accepted - the paragraph is rewritten.	Catherine Mitchell	University of Exeter	United Kingdom (of Great Britain and Northern Ireland)
42205	31	42			Governance drivers, including policy....	Amended	Catherine Mitchell	University of Exeter	United Kingdom (of Great Britain and Northern Ireland)
42207	42	34	45	30	maybe add O'Brien 2018 to this section - as another way of thinking about transformation. Social transformation seems to trail off.	Accepted; full reference not supplied will try to identify	Catherine Mitchell	University of Exeter	United Kingdom (of Great Britain and Northern Ireland)
42209	49	24			are we really still talking about governance experiments. In the MLP - yes, niches build to something else. But are you really suggesting governance experiments in this final section are teh way forward - i would have thought we are way past that in global north countries? This may be so in the global south. I dont know that literature. In general, though we ahve to accelerate change - which enables acceleration adn SD. i thought that was the point of you having the MLP , Grubb's stuff and O'briens stuff in the previous section. MLP falls down on the need to accelerate and rapid innovation. on page 17 you have figure 1.4. This shows the differences from low income countries / mid to high income etc/ developed. Somehow this chapter 1 has got to get across that we have to have SD and that means different emission trajectories for different countries. BUT developing countries have to cut their emissions. I dont think this figure 1.4 is right yet - the curves are still wrong but i think this could become an iconic figure if you draw it yourselves from scratch. For the developed countries section we are not saying lets have niches and experiment in general we are saying we have to cut emissions rapidly and we ahve to do things in a new way not in a BAU way. I think your arguments through the chapter ahve not yet got the differences of different country development paths across.	The litrature reviewed does not bear out this assertion. The litrature show that governance experiments are very active in both developed and developing countries. The section does NOT suggest that experiments are that way to go - but rather simply that experiments are going on actively in various parts of the world. Actors such as cities, governments and businesses are testing, adjusting, (experimentaing with) various tools for governing climate change including various forms of taxes, subsidies, "green" bonds, blended climate fiannce, etc.	Catherine Mitchell	University of Exeter	United Kingdom (of Great Britain and Northern Ireland)
42535	15	39			Developed countries may, for their OWN part tend to emphasise the concept	Edited	Celine Bak	IISD	Canada
42537	16	25	16	27	Sentence needs revision.	Edited.	Celine Bak	IISD	Canada
42539	18	14	18	18	Sentence needs revision.	edited	Celine Bak	IISD	Canada
42541	18	44			Figure 1.5Figure - figure is repeated	Figure has been removed in the revised version	Celine Bak	IISD	Canada
42543	19	17	19	18	"Existing energy institutions have been largely shaped around fossil fuels." This idea should stand alone as its own sentence and if possible, there should be reference to peer reviewed literature on governance of these institutions. For example, the International Energy Agency has received correspondance from its members to develop a scenario that reflects the full ambition of the Paris Agreement, that this scenario be central to the World Energy Outlook and that the scenario extend to 2050 and beyond with full visibilty of assumptions regarding negative emissions. Notwithstanding these requests from members of its governing board, the IEA has not done this.	As part of edits made to the overall section, this sentence has been removed.	Celine Bak	IISD	Canada
42545	20	24			fuels, oil, gas, coal, peat uranium) = missing comma	Noted. In the revised text, we have removed the sub-headings and integrated the sub-sections together.	Celine Bak	IISD	Canada
42547	21	38			competitiveness in an open global economy = check font of y in economy	This sentence has now been deleted	Celine Bak	IISD	Canada

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
42549	22	44			(though GHG impact of former is increased by indirect effects). - unpack this sentence. Also "the" is missing before "former"	Fixed in the revised version	Celine Bak	IISD	Canada
42551	23	4			tourism (with air travel included) is responsible for about 8% of global emissions (Lenzen et al. 2018). - Include figures on projected growth of aviation, particularly in Asia.	This comment belongs to 1.4.2. This sentence has been removed as part of general editing undertaken in this section.	Celine Bak	IISD	Canada
42553	27	27			Sentence missing "is" Developing country shortfall more acute driven by debt burden of governments.	Accepted. Corrected.	Celine Bak	IISD	Canada
42555	29	40			and also between countries relatively similar = should be "relatively similar countries"	Accepted	Celine Bak	IISD	Canada
42557	30	14			individual and collective behaviors . = move period	Noted thank you.	Celine Bak	IISD	Canada
42559	30	35			Institutions comprises of formal and informal rules that shape action within = Institutions comprise formal and informal	We significantly updated this section, and have changed the wording accordingly.	Celine Bak	IISD	Canada
42561	30	37			Understood in these terms, it become obvious that = It becomes obvious	Accepted, text revised.	Celine Bak	IISD	Canada
42563	31	3			Some suggest that societal transformation towards low carbon future requires new = insert "a" before "low"	Typo has been addressed.	Celine Bak	IISD	Canada
42565	32	37			The important of policy at multiple levels does not lessen the importance of international policy, for = replace "important" with "importance" and delete "for"	Text revised	Celine Bak	IISD	Canada
42567	32	39			at international levels remain fewer and governance weaker... replace "fewer" with "few", replace "weaker" with "weak"	Text revised	Celine Bak	IISD	Canada
42569	32	42			is often mentioned as one of important = change to "as an important"	Accepted, text revised.	Celine Bak	IISD	Canada
42571	33	5			these creates strong incentives = replace "creates" with "create"	Edited	Celine Bak	IISD	Canada
42573	33	11	33	12	check punctuation: One of the roles of international institution set up to address ozone layer depletion was the promotion of trust between emitters which was needed to and reduce the threat of free-riding	Accepted, text revised.	Celine Bak	IISD	Canada
42575	33	23			and addressing climate = change "addressing" to "address"	Edited	Celine Bak	IISD	Canada
42577	33	31			power leverage over one = change "power" to "gain"	Done.	Celine Bak	IISD	Canada
42579	33	34			Scholars suggest that international collaboration work = change "work" to "works"	Edited.	Celine Bak	IISD	Canada
42581	35	9	35	12	Check sentence - verbs seem to be missing	Thank you we rephrased to make the statement clearer	Celine Bak	IISD	Canada
42583	34	5	0	0	Because the CO2 carrying capacity of the atmosphere and of the ocean are such first order resources to mitigate climate change, could they be included as a "for instances" of "alternative resource"... I raise this because the scope and scale of negative emissions in many climate scenarios is so infrequently discussed. See sentence: alternative policies, alternative resource availability, and alternative socio-economic drivers.	Sorry but I found it unclear what this referred to - perhaps misplaces - but we do have now a bit more ref to CDR	Celine Bak	IISD	Canada
42585	35	44	35	45	only bin existing and future scenarios but to build entirely new scenarios = change "bin" to "categorize" and use a simpler "and" rather than "but" structure	Done	Celine Bak	IISD	Canada
42587	36	6	0	0	limit values for the 3 RCPs (2.6, 4.5, and 6.0 W/m2)", " = add comma also this whole section would benefit from a diagram	Noted, thank you	Celine Bak	IISD	Canada
42589	36	39	0	0	suggest consistent use of financial risks = "transition" rather than "transactional"	Noted, thank you	Celine Bak	IISD	Canada
42591	38	9	0	0	Social choice theory (Arrow et al. 2011) recognises = "r" missing in "recognises"	Thanks, done	Celine Bak	IISD	Canada

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
42593	39	38	39	39	Close quotation marks... "Behavioral research, however, suggests a more complex, less idealized, view. People 39 procrastinate; attention wanders. Peripheral factors subconsciously influence perceptions and decisions.	OK	Celine Bak	IISD	Canada
42595	41	12	0	0	Hackman (2016) has suggested that the individual states = add possessive to "states' "	OK	Celine Bak	IISD	Canada
42597	41	41	0	0	highlight three asymmetries relevant for climate change = only two asymmetries are listed in the paragraph	Accepted - the paragraphs are merged.	Celine Bak	IISD	Canada
42599	43	29	0	0	at the respective levels. = correct "levels"	OK	Celine Bak	IISD	Canada
42601	44	37	0	0	Notions of social = remove capital on "notions" for consistency	Corrected	Celine Bak	IISD	Canada
42603	45	22	0	0	scholarship on social transformation has to Humanities, = missing word?	Thanks; edited	Celine Bak	IISD	Canada
42605	45	47	0	0	be reached using with various policy instruments (reference to policy chapter) = delete either "using" or "with"	Para deleted	Celine Bak	IISD	Canada
42607	48	12			purist of wellbeing = change "purist" to "pursuit"	Text has been edited.	Celine Bak	IISD	Canada
42609	48	19			governance is driven mainly power relations = missing "by" before "power"	Text has been revised.	Celine Bak	IISD	Canada
42659	24	18	24	19	As the IEA's Sustainable Development Scenario is not central to the WEO, strongly suggest that references be made to required CCS figures for the New Policy Scenario (WEO 2018) or Stated Policy Scenario (WEO 2019)	Rejected - We do not agree that the SDS is not central to the IEA WEO. The Stated Policies Scenario (SPS), explores the implications of announced targets as well as existing energy policies, while the SDS identifies a pathway consistent with key energy-related sustainable development goals for emissions, access and air quality. In the SPS, the CO2 emissions increase up to 2040, which is not in line with the Paris agreement. Also Sustainable Development Goals is important for this AR, which makes SDS relevant for the comparisons.	Celine Bak	IISD	Canada
42661	39	14	0	0	realistic damage functions.' - even in an introductory chapter, this begs a more expansive explanation. It hints at a relationship to GDP.	Noted - refer to box in Ch.3	Celine Bak	IISD	Canada
42663	48	18			Could the writer include a list of factors at the start of the section... Power dynamics, quality and role of institutions, ideas etc..	Text has been revised.	Celine Bak	IISD	Canada
42665	50	25			Ultimately, it may to engage wide publics and their = it may "be wise" to engage?	Sorted	Celine Bak	IISD	Canada
42815	19	12	19	14	This sentence misses the crucial question of "where" goods and services are produced and delivered and puts an incorrect focus on "technology". Suggest "Much of this Assessment describes how changes in what, where and how humans deliver the goods and services they desire (based on preferences and pricing) can provide these and meet sustainability goals, without concurrent net greenhouse gas emissions.	This sentence has been removed in the revised version	Mark MAJOR	Partnership on Sustainable Low Carbon Transport	Spain
42817	19	17	19	17	Many policies (e.g. transport) and trade are based on fossil fuels (not just "energy". Suggest "Existing trade, transport and energy policies and institutions..."	As part of edits made to the overall section, this sentence has been removed.	Mark MAJOR	Partnership on Sustainable Low Carbon Transport	Spain
42819	20	12	20	14	This introduction underplays the contribution of the exchange of goods to urban life. Urban logistics generates 50% of road freight vehicle kilometer travelled (ITF, (2017). ITF Transport Outlook 2017. OECD Publishing, Paris. <a href="https://doi.org/10.1787/9789282108000-en">https://doi.org/10.1787/9789282108000-en</a> ) Suggest: "Cities throughout history have been the place where people and goods come together and create new solutions to problems because of agglomeration economies, workplace diversity and opportunities for creative solutions based on face-to-face contact and exchange".	In the revised text, we have removed the sub-headings and integrated the sub-sections together.	Mark MAJOR	Partnership on Sustainable Low Carbon Transport	Spain

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
42821	22	8	22	13	Should mention that international aviation and international maritime emissions are accounted separately and so are neither attributed to territorial or consumption based approaches - which leads to a lack of integrated understanding and policy attention.	Accepted - text revised [Emissions from International aviation and shipping are only considered in production-based accounting approaches, and not territorial and consumption-based approaches (Figure 2.8)]	Mark MAJOR	Partnership on Sustainable Low Carbon Transport	Spain
42823	22	45	22	47	"They are not explicitly covered by the Paris Agreement" This phrasing is very misleading as it implies that somehow international aviation and maritime are treated differently to other sectors when in fact few sectors are explicitly mentioned in the Paris Agreement (buildings, transport, land use ALL NOT MENTIONED) but the PA clearly covers all anthropogenic emissions.	Accepted - [We have edited the text as follows: As the Paris agreement primarily deals with NDCs, emissions from international aviation and shipping are not covered in the agreement (see Chapter 10)]	Mark MAJOR	Partnership on Sustainable Low Carbon Transport	Spain
42825	22	44	22	44	"increased" gives insufficient emphasis "(though GHG impact of former is increased by indirect effects)" IPCC AR 4 estimated 2-4 times the impact of the CO2 emissions alone. Suggest: (though the climate impact of the former is estimated to be 2 - 4 time higher due to indirect effects)	Accepted - text revised	Mark MAJOR	Partnership on Sustainable Low Carbon Transport	Spain
42917	3	25	3	32	This paragraph should start with the sentence 'For all nations, the gap between action and commitment remains wide' rather than first asserting the diversity in national trends. I believe beginning with unity is important in framing the respons throughout the report. In addition, urgency is a critical rhetorical tool which is most effective when establishing the call to action before describing the challenges faced across the globe, especially so early in the report. Thus, I believe the paragraph should begin with the 'for all nations' sentence. In the same vein, the rhetorical dichotomy of developed vs. poorer countries is not only a blunt categorization, but is inconsistent and unclear throughout the report. In this early instance, the two groups are categorized as 'developed countries' and 'poorer countries.' I think the initial framework of the report should lay out the UN country classifications and reference examples of countries referenced as often as possible. Eg. 'major developed economies such as USA and Japan' or 'economies in transisiton such as Armenia and ukraine' or 'develpoing economies such as Kenya or Colombia' and vary examples.	Treated more broadly, a call to acknowledge urgency. Need to clarify between commitment, and longterm ambition ? Could start with global urgency / gap before moving into differentiation in various ways (beyond crude rhetorical dichotomy)	Emily Clark	Goldsmiths	United Kingdom (of Great Britain and Northern Ireland)
42919	3	40	3	43	<i>When framing the shared responsibility but varying capability to respond to climate change, acknowledgement of degrees of responsibility should be emphasized. Without acknowledgment of the vast historical injustices and rapid economic growth beginning with imperialism through slavery and modern corporate power structures which have exacerbated climate change, responsibility is universalized. In universalizing responsibility, the call to action is undermined and the resulting strategic responses are severely dehistoricized and thus suffer from distorted framing.</i>	This is a valid comment. The ES has been revamped. However, it still contains references to the current and historical relationship between GHG emissions and industrialization. It recognises the differences in capabilities and the importance of fairness in making global climate action effective. That said, we hope the reviewer will also acknowledge that the literature offers divergent views on the extent to which emphasis on historical reponsibility is necessary and helpful for framing global action on climate change.	Emily Clark	Goldsmiths	United Kingdom (of Great Britain and Northern Ireland)
42921	4	3	4	6	I found the statement 'there is little progress on incorporating environmental norms in the trade system' incredibly frustrating. There is an ongoing reliance on 'norms' rather than strict regulations. More truthfully, "governments have failed to enhance environmental regulations in the trade system due to difficulty passing regulation faced with resistance from stakeholders in the trade sector who would lose money.' The following sentence, 'much finance continues to flow into carbon-intensive investments, often supported by governments' should cite examples. Urgent call to action supported by generalized claims, equating consumer behavior with the role of financial systems.	The complete revamping of the ES has made this otherwise valid comment somewhat redundant.	Emily Clark	Goldsmiths	United Kingdom (of Great Britain and Northern Ireland)

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
42923	4	42	4	45	Economic frameworks must also expand beyond short-termism and acknowledge historical trends in global economic growth which have exponentially hastened climate change. De-westernize and historicize to allow for true innovation outside of democratic capitalist model.	Valid point. We hope the revised text meets the expectation of the reviewer.	Emily Clark	Goldsmiths	United Kingdom (of Great Britain and Northern Ireland)
42925	18	41	18	43	The beginning of this section frames greenhouse gas emissions using the universalizing 'anthropogenic' qualifier, hence distributing responsibility equally despite clear acknowledgement of the differences in emissions based on income demonstrated in Figure 1.2 earlier in the chapter. Similarly, the language identifying the direct source of emissions as 'human needs and desires' 'human culture and institutions' 'the physical world in which WE live.' This universalizing language excludes alternate ways of living/organizing that are crucial to 'accelerate action with unprecedented scale of transition' and to have a 'more dynamic consideration of intertwined challenges concerning the transformation of key GHG emitting systems' as the report lays out and to perhaps outline national goals that in fact are sufficient to meet the stated objective to limit warming to 1.5 degrees.	The opening statement has been modified to be simpler and has removed the word, "unintended".	Emily Clark	Goldsmiths	United Kingdom (of Great Britain and Northern Ireland)
42927	20	37	20	48	Land use should acknowledge the historical management of landscapes to acquired through violent and disenfranchising means. It should also make reference to the substantive literature on the sociopolitical history of land grabbing from indigenous cultures who hadcohabitated and sustained ecosystems for thousands of years as well as the extensive ecosystem disruption by big agriculture and fisheries that has sterilized land and ocean and fed the vicious circle of warming for the sake of profit rather than production of goods and services necessary to sustain life.	While this is an important subject, this short section does not have the word allocation to allow this level of detail.	Emily Clark	Goldsmiths	United Kingdom (of Great Britain and Northern Ireland)
42929	40	11	40	20	Intergenerational should include past generations with regard to accountability and responsibility. When blaming human existence fails to address the nuances of climate change but rather creates an intangible existential crime, the deflection distorts the resulting action. Adrian Lahoud's Floating Bodies could be useful to cite as theoretical underpinning to a wider spatiotemporal framing here.	The importance of historical aspects of responsibility and distribution is recognised in the section.	Emily Clark	Goldsmiths	United Kingdom (of Great Britain and Northern Ireland)
42931	40	35	40	40	Instead of framing this as either or, it should necessitate the inclusion of 'alternative perspectives' deemed fundamental to meet the task at hand - in the analysis and formation of policy, technology, and finance. Not disentangling economic utilitarianism's unsustainable consumption and resulting emissions (via resource extraction, use, and waste) but instead presenting ethical frameworks as separate and apart literally from 'governance' reveals the underlying biases at play which view these as external but potentially useful or inevitable perspectives to be considered. In considering these alternate frameworks in such a decontextualised and marginalised way, while nevertheless considering them, serves to sublimate them and undermine their inclusion.	We agree that all the frameworks overlap. However each of the framework has its own priority and offers a distinctive lens for analysing and understanding climate policy.	Emily Clark	Goldsmiths	United Kingdom (of Great Britain and Northern Ireland)



Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
42933	40	41	41	36	Hannis, Kasperbauer, Jolly, Herrick, and Howell and Allen studies seem to find pretty low hanging fruit. I'm a bit confused about whether this is supposed to inform a societal change just by saying that states privilege economic growth to climate resilience and think short-termly. Framing issues of the climate through virtuous ethics and values and moral imperatives is religious in tone, emphasis on morality has never worked throughout human history and would require agreed upon moralities. Instead define justice and make the long term case for NON CATASTROPHE looking at the science. The transitions must not rely on the benevolence and morality of policymakers and stakeholders in industry but rather should be designed through a climate justice prism which acknowledges historical injustices and structures which have led to climate crises, inequality, and the exponential growth of these outcomes.	The section has assessed relevant literature and the object was not to make any judgement or prescription.	Emily Clark	Goldsmiths	United Kingdom (of Great Britain and Northern Ireland)
42935	42	33	42	42	In a 2017 article, Francoise Verges articulates a useful objection to the "illusion of an organic and undifferentiated humanity" (Verges) at the basis of the Anthropocene narrative; challenging the singularity of the human change agent as dehistoricized and universalized and thus prohibitive of the crucial analysis and understanding necessary to address the climate catastrophe. Verges' apt critique of the term Anthropocene is in dialogue with Dipesh Chakrabarty's "The Climate of History: Four Theses" which crucially puts postcolonial and environmental studies in conversation but in Verges' opinion, still calls for expanding the discourse of climate change beyond the limited historical context of the present. Verges supports the argument of a new narrative framework by citing Jason Moore's argument that the Anthropocene narrative and its central universal human agent, "does not challenge the naturalized inequalities, alienation, and violence inscribed in modernity's strategic relations of power and production" (Moore). Furthermore, the discourse doesn't acknowledge the racialized history of world ecology shaped largely by slavery and colonialism. Thus, Verges proposes a new epoch term, 'Racial Capitalocene4,' which raises crucial questions about the discourse around climate change that can be elucidating of problematic assumptions and concordant proposals following the framing of the transition. While identifying the most vulnerable populations and anticipating drastically disproportionate affects, the report fails to acknowledge the colonial violence and 'other'ing inherent in and carried out through the causes and effects of global warming. As a discursive framework, the 'Racial Capitalocene' advocates for "decolonization of knowledge production and institutions and a denationalization of knowledge."4 By attempting to decolonize the climate change discourse, the 'Racial Capitalocene' framework calls for recognition of colonialism's lasting impact and debilitating legacy which not only	The Anthropocene is a clear scientific term adopted by the relevant international academic bodies to describe the impact of human beings at a planetary level. Mitigating climate change also requires global efforts. This comment appears to be a more ideological stance within far wider academic debate. Unclear how useful contribution to mitigation would emerge from politicising debate in terms of race, capitalism and colonialism.	Emily Clark	Goldsmiths	United Kingdom (of Great Britain and Northern Ireland)
42937	43	13	43	15	Reliance on market mechanisms supplemented by a non-existent and idealized 'inclusive governance' undermines the focus on sustainability and reveals the limits of the Anthropocene westernized development discourse in establishing pathways necessary for the drastic change required by the studies.	The literature assessed indicated the utility and limits of different frameworks and approaches for tackling climate change including market mechanisms. It also indicated the progress and challenges related to making climate governance more inclusive. We agree there is need for more ambition and in some cases drastic measures to tackle the challenge and this is reflected in several places in the text based on the literature reviewed.	Emily Clark	Goldsmiths	United Kingdom (of Great Britain and Northern Ireland)

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
42939	44	16	44	19	the purportedly inclusive pathways rely upon the goodwill and commonsense and 'judgement' of 'strategic planners' to determine what is possible, what is desirable in the shift to a 'new system.' This framing excludes new ways of thinking by assuming those in power of governance will make decisions based on a just transition, which has no precedent. Historically, what shifts every few decades are being referenced here?	The literature reviewed does not bear out this assertion. The literature show that governance experiments are very active in both developed and developing countries; that those with power are making decisions to enable just transition in some jurisdiction even though much more ambition is required to tackle the climate challenge.	Emily Clark	Goldsmiths	United Kingdom (of Great Britain and Northern Ireland)
42941	19	15	19	22	Related to Figure 1.5 but also to the text: It is difficult to follow that "Resources" is conceptualized as a driver. This is not clear and not fully convincing.	The figure has been removed.	Sigrid Kusch-Brandt	University of Padua	Germany
42959	12	30	12	39	In next revision of the paragraph "Civil society pressures for stronger action" for SOD-Draft, I suggest to read the paragraph "Three Icons of 2019: Greta Thunberg, Holy Father Francis, Ursula von der Leyen" in my "The history could repeat itself: hydrogen-oxygen fuel cell is the 'game changer'" [published in "4th AIEE Energy Symposium Conference Proceedings" Rome, Italy, 2019, available at < <a href="http://www.aieeconference2019rome.eu/documents/AIEE_Symposium_Proceedings_4.pdf">http://www.aieeconference2019rome.eu/documents/AIEE_Symposium_Proceedings_4.pdf</a> >].	Noted - thanks for the suggestion. However, we need a peer reviewed journal article or book to make a reference.	MARIO VALENTINO ROMERI	Independent consultant	Italy
43365	8	13	8	13	Solar Radiation Modification was introduced as a term instead of Solar Radiation Management in SR1.5; the same term should be used consistently in AR6!	Changed	Matthias Honegger	Perspectives Climate Research gGmbH	Germany
43367	52	24	52	33	Solar Radiation Modification was introduced as a term instead of Solar Radiation Management in SR1.5; the same term should be used consistently in AR6!	Noted, thank you.	Matthias Honegger	Perspectives Climate Research gGmbH	Germany
43369	53	27	53	31	Incomplete definition: "This balance is achieved by offsetting emissions with carbon removals either through natural carbon sinks with long retention times, through carbon capture and storage (CCS) technology or through production of long-lived carbon based products which will be permanently stored at their respective end-of-life (e.g. by utilisation in BECCS power plants)."	Accepted, thank you.	Matthias Honegger	Perspectives Climate Research gGmbH	Germany
43371	53	37	53	42	Carbon Neutrality is not synonymous with Climate Neutrality! There are other climate forcers aside from greenhouse gases, which are to be included in the definition of Climate Neutrality (insofar that this designates a halt to human effects on the climate system)! Defining Climate Neutrality as equivalent to Carbon Neutrality would mean that in a climate neutral state, humans would likely still be altering global average temperatures. While many political entities are using these terms interchangeably it would be a severe mistake for the IPCC to not fully follow the sense of the term with great clarity.	Accepted, thank you.	Matthias Honegger	Perspectives Climate Research gGmbH	Germany
43573	3	25			Evidence points ...	Exec Sum completely redrafted	Jacqueline Peel	University of Melbourne	Australia
43707	39	21	0	0	Great section. Consider linking to 5.4 where behavioral frameworks and their relevance for identification of solutions are investigated in detail. Also point explicitly to nudges.	OK	Felix Creutzig	MCC Berlin	Germany
43709	1	1			good framing of the overall report. For the SOD, it would be good if Ch1 could also work out <i>novel dynamics and insights that have emerged since AR5, such as the rapid decline in costs of PV, divestments, demand-side transitions, and sector-coupling.</i>	We have sought to address these better though demand-side could maybe still be improved	Felix Creutzig	MCC Berlin	Germany

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
43803	20	41	20	42	health of species has specific meaning (illness) as well as being used generally - rather ecosystem functioning	Thank you for the comment, and the reference. This sentence has been replaced as a result of general editing undertaken in this section	Hans Poertner and Elvira Poloczanska	Alfred-Wegener-Institut	Germany
43805	20	43	20	43	use managed ecosystems rather than commercial to be consistent with WGII	Accepted, thank you. We now write "managed"	Hans Poertner and Elvira Poloczanska	Alfred-Wegener-Institut	Germany
43807	20	44	20	44	expanded forests isnt clear, do you mean through afforestation and reforestation	This sentence has been replaced as a result of general editing undertaken in this section	Hans Poertner and Elvira Poloczanska	Alfred-Wegener-Institut	Germany
43809	21	1	21	3	IPBES uses the framework of natures contributions to people, the categories given are MEA , acknowledge IPBES framework here	Thank you. This mention has been removed due to word constraints, and general editing of the section. In the revised text, we have removed the sub-headings and integrated the sub-sections together.	Hans Poertner and Elvira Poloczanska	Alfred-Wegener-Institut	Germany
43823	20	39	20	40	Human land use utilises ecosystem services - this sentence needs reformulation	Thank you for the comment, and the reference. This sentence has been replaced as a result of general editing undertaken in this section	Hans Poertner and Elvira Poloczanska	Alfred-Wegener-Institut	Germany
43825	20	42	20	42	The choice of Thomson et al for evidence for this statement seems odd given it focuses on one ecosystem. There are papers that show a signal in biodiversity across taxonomic groups and regions - see SR15 Chp 3. Also link to WGII Chps 2 and 3	Thank you for the comment, and the reference. This sentence has been replaced as a result of general editing undertaken in this section	Hans Poertner and Elvira Poloczanska	Alfred-Wegener-Institut	Germany
43827	20	44	20	45	This statement needs further information, how will increased carbon storage increase ecosystem services? Why the concern over monocultures? See WGII Chp 2 and box under development (will be cross WG or WGII cross chapter) on forests and mitigation	This sentence has been replaced as a result of general editing undertaken in this section	Hans Poertner and Elvira Poloczanska	Alfred-Wegener-Institut	Germany
43829	21	4	21	8	why call pollinators out - recognising this is a serious issue? What is the link to climate change? See WGII Chp 2	Explicit link to pollinators has been removed in the revised version owing to constraints in word limits, and we now provide a broad perspective.	Hans Poertner and Elvira Poloczanska	Alfred-Wegener-Institut	Germany
43831	21	9	21	10	nature based solutions for what? To tackle climate change? Phrase this as bringing co-benefits for consistency with SR15, SRCL and SROCC	Accepted, we now write "can offer co-benefits for tackling climate change and for enhancing..."	Hans Poertner and Elvira Poloczanska	Alfred-Wegener-Institut	Germany
43833	23	5	23	7	This paragraph on ocean renewables appears lost here, could this be a subsection of its own? SROCC did not address the potential of ocean renewables in any great detail, as the report was a collaboration between WGI and WGII, so WGIII could address this policy-relevant shortfall	The reference to ocean renewables has been removed as it does not fit with consumption and trade	Hans Poertner and Elvira Poloczanska	Alfred-Wegener-Institut	Germany
43835	45	10	45	13	shouldnt geological storage be under geophysical? Here the role of ecosystem in carbon sequestration and storage should be highlighted	Couldn't locate sorry	Hans Poertner and Elvira Poloczanska	Alfred-Wegener-Institut	Germany

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
43875					In this report the treatment of climate futures is very schematic without considering risk of impacts and associated global mean temperature thresholds for the transition to high risk (e.g. in burning ember diagrams). A key question by WGIII also is how much mitigation is needed for adaptation to be successful. Both questions (avoidance of transitions to high risk and enabling successful adaptation) could be guiding principles in discussions of various mitigation futures.	we have tried to strengthen discussion of scenarios, risks, science and impacts within a new section 3	Hans Poertner and Elvira Poloczanska	Alfred-Wegener-Institut	Germany
43879	8	20		23	Authors should add in brackets the components of the carbon price. The concept of social cost of carbon could be referred to here.	This text has been removed.	Hans Poertner and Elvira Poloczanska	Alfred-Wegener-Institut	Germany
43881	11	3		16	Introductory text should also refer back to how the climate targets of the Paris agreement evolved in terms of avoided impacts at below 2 if not 1.5°C and the tradeoffs if these targets are violated due to conflicting or constraining concepts or considerations. A ranking of priorities would be needed and the WGIII report together with the WGII report should provide clear criteria for guiding that ranking.	Noted - Paris Agreement is described in section 1.2.2.	Hans Poertner and Elvira Poloczanska	Alfred-Wegener-Institut	Germany
43883	11	17			a very valuable section, a range of optional policy conclusions to be discussed.	Noted	Hans Poertner and Elvira Poloczanska	Alfred-Wegener-Institut	Germany
43885	13	10		31	technologies discussed should be more comprehensive. Completely missing synthetic and biofuels which are already used e.g. by some airlines. CO2 recycling technologies and their cost should be added.	synthetic and biofuels are touched on, and much more extensively later in the report	Hans Poertner and Elvira Poloczanska	Alfred-Wegener-Institut	Germany
43887	14	23			The ingredients of the relevant concepts and how they connect should be illustrated in a conceptual figure.	Nice suggestion. We have not implemented this because that would be controversial since different communities understand the relationship differently. However the diagrams offered below provides some indication of the relationship of some of the key concepts	Hans Poertner and Elvira Poloczanska	Alfred-Wegener-Institut	Germany
43889	15	46	16	1	Missing the consideration in UNFCCC Article 2 that ecosystems should be allowed to adapt naturally a request which clearly conflicts with current findings of IPBES. Again, these considerations and the related risk thresholds identified in AR5 and the AR6 Special reports would allow setting the guardrails for mitigation efforts.	This is implied in the environment dimension of sustainability.	Hans Poertner and Elvira Poloczanska	Alfred-Wegener-Institut	Germany
43891	16	19		22	This text does not provide any imagination what the difference might be between development pathways that "narrowly focus on climate mitigation and economic growth and "development paths that maximise the synergy between climate mitigation and broader sustainable development".	Figure has been revised	Hans Poertner and Elvira Poloczanska	Alfred-Wegener-Institut	Germany
43893	17	14		17	Figure 1.4. seems to assume a sustainable net per capita emission rate which is not backed by text or caption or previous assessments?	Figure edited.	Hans Poertner and Elvira Poloczanska	Alfred-Wegener-Institut	Germany
43895	18	39			Drivers, systems and constraints need definition before going into detail. Refer to Figure 1.5 early. In the figure, missing the consideration of impacts and risk thresholds in that context.	Figure has been removed in the revised version	Hans Poertner and Elvira Poloczanska	Alfred-Wegener-Institut	Germany

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
43897	22	5			Ocean renewables should be detailed.	The reference to ocean renewables has been removed as it does not fit with consumption and trade	Hans Poertner and Elvira Poloczanska	Alfred-Wegener-Institut	Germany
43899	21	43	22	5	Again it is puzzling that synthetic fuels and CO2 recycling are missing from this text.	Rejected. Synthetic fuels and CO2 recycling is not relevant in this section.	Hans Poertner and Elvira Poloczanska	Alfred-Wegener-Institut	Germany
43901					The writing in the FOD is overly vague. <i>Quantitative information needs to be included to the extent possible. Headings need to be more specific, e.g. two technology sections, how are they different?</i>	Yes but also note this is a framing chapter - much of the quantitative data is in the specific chapters as appropriate. We have sought to minimise overlap between sections & their titles	Hans Poertner and Elvira Poloczanska	Alfred-Wegener-Institut	Germany
43903	23	9			technologies discussed should be more comprehensive. Completely missing synthetic and biofuels which are already used e.g. by some airlines. CO2 recycling technologies and their cost should be added.	Accepted - we have added some sentences on this.	Hans Poertner and Elvira Poloczanska	Alfred-Wegener-Institut	Germany
43905					Chapter 1 should summarize the impacts on natural and human systems, known to happen under climate change, with reference to WGII. It seems insufficient to just mention the economic impacts on page 25 onward.	we have tried to strengthen discussion of scenarios, risks, science and impacts within a new section 3 and aim to do this further in the final draft when final WG-II should be available (and with our contributing author from WGII)	Hans Poertner and Elvira Poloczanska	Alfred-Wegener-Institut	Germany
43907	26	35		37	Adaptation finance should be balanced with WGII assessment.	Accepted. Text removed and will be part of cross-WG box in ch3 and text in ch 15.	Hans Poertner and Elvira Poloczanska	Alfred-Wegener-Institut	Germany
43909	44	0	0	0	Difference between transition and transformation needs to be clearly explained.	Now in first sentence of this section	Hans Poertner and Elvira Poloczanska	Alfred-Wegener-Institut	Germany
43911					<i>Many concepts discussed in this chapter equally apply in the context of adaptation. It would be worthwhile to formulate more specifically for the context of mitigation and relate to the treatment of adaptation related issues in AR6 WGII report.</i>	We included a Contributing Author from WG-II, Chapter 1 and will keep this under review as both working groups finalise	Hans Poertner and Elvira Poloczanska	Alfred-Wegener-Institut	Germany
43993	3	28	3	32	It's worth mentioning directly the disconnect between commitments in the NDCs and the ability of countries to follow through (i.e. there's a huge disconnect between the commitments in the NDCs and the actual impact of actions undertaken under them).	Comment no longer applies here as this part of the Executive Summary has been completely revamped. However the role of differential capabilities and other factors such as political economy in explaining the gap between ambition and action are covered in relevant part of the chapter.	Tegan Blaine	Blue Cairn Climate Consulting	United States of America
43995	7	38			Please use the convention "1.5-2 degrees" (easier to grasp without pausing in reading), rather than writing "2-1.5 degrees".	Done	Tegan Blaine	Blue Cairn Climate Consulting	United States of America
43997	8	10	8	11	Again, it is important to recognize that goals are different than actions, and with goals that are far more ambitious than actual follow-through, it's going to be important to point out that we are even further from achieving what we need to achieve.	Noted. Sentence has been rephrased to state NDCs will not meet objectives of the Paris Agreement.	Tegan Blaine	Blue Cairn Climate Consulting	United States of America
43999	13	5	13	9	Along with transnational alliances, I think it is important to point out that many of these are developing at the sub-national level, not just the national level. Increased political action at the subnational level may lead in speed to what happens at the national level and could (as in the U.S., where some states are larger than many countries) have measurable global impact.	Rejected -this should already be clear from the text	Tegan Blaine	Blue Cairn Climate Consulting	United States of America

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
44001	18	11	18	27	I greatly appreciate the inclusion of this paragraph discussing the weaknesses around the current GDP measures and the alternatives being developed. It's an important conversation given more weight for being included in the report, along with the whole conversation about alignment between climate change actions and SDGs.	Thank you.	Tegan Blaine	Blue Cairn Climate Consulting	United States of America
44003	19				It seems to me that Institutions should be separated into its own group distinct from human desires/culture. In addition, I would appreciate "Policy" becoming "Policy and Regulation", since regulation is such a critical part of policy to move issues forward.	This figure has been removed from the revised version.	Tegan Blaine	Blue Cairn Climate Consulting	United States of America
44005	20	12	20	36	These paragraphs are so poorly written that it's not possible to easily understand the main points without rereading multiple times.	We have revised the paragraphs in the SOD. In the revised text, we have removed the sub-headings and integrated the sub-sections together.	Tegan Blaine	Blue Cairn Climate Consulting	United States of America
44007	21	22	21	31	"trade opening" as a phrase is hard to make sense of. I'm assuming it's shorthand for "trade expansion and the opening of new countries to international trade", but it might be important to explain that rather than use a term which is not common in public literature.	Taken into account. The text has been substantially shortened leaving more detailed discussion to Chapter 2.4.5	Tegan Blaine	Blue Cairn Climate Consulting	United States of America
44009	26	35	26	37	Reference to Adaptation finance needs do not make sense in the middle of this paragraph.	Accepted. Text deleted.	Tegan Blaine	Blue Cairn Climate Consulting	United States of America
44011	27	34	27	36	I am not sure that it is necessary to call out developing countries for hindering negotiation efforts in this area; it sounds like opinion rather than reflecting research accurately.	Accepted. Text deleted.	Tegan Blaine	Blue Cairn Climate Consulting	United States of America
44013	31	11	31	15	Paragraph does not seem directly related to what is before or after; it seems completely out of place.	The paragraph has been restructured. We hope this is clearer.	Tegan Blaine	Blue Cairn Climate Consulting	United States of America
44015	35	1	36	44	I had a hard time understanding the point of this review, since it was very focused on earlier scenarios and only the end dealt with new types of scenario planning. It could be very helpful to develop a chart that illustrates the differences and the areas of overlap in different scenario development processes (e.g. how do those scenarios laid out in the 1.5 report compare to the scenarios laid out in AR5 and in the SSP process, for example).	We now provide a detailed set of information about illustrative pathways and how they compare to previous reports	Tegan Blaine	Blue Cairn Climate Consulting	United States of America
44017	40	10	40	20	There is a referrence to three major points. The first two are in italics, but the third point appears to be missing (or is embedded in the 2nd -- it's unclear).	Text edited.	Tegan Blaine	Blue Cairn Climate Consulting	United States of America
44019	40	31	40	40	is there any evidence or history of societal values shifting rapidly to respond to a crisis on the order of climate change? What can we learn from those situations? Or is this an area that has no research or historical thinking whatsoever?	The section provides ideas of how to overcome lock-in and inertia.	Tegan Blaine	Blue Cairn Climate Consulting	United States of America
44021	41	41	42	5	Three asymmetries are mentioned, but only two are listed in the first paragraph; the third is eventually mentioned in the next paragraph. It makes it very difficult to follow the argument if they are split up like this.	Accepted - the paragraphs are merged.	Tegan Blaine	Blue Cairn Climate Consulting	United States of America
44023	43	0	0	0	I cannot make any sense of Figure 1.7. It either needs significantly more explanation or deletion if it does not add to the text.	There was an unfortunate technical error in conversion to PDF, however the Figure has been substnially reworked	Tegan Blaine	Blue Cairn Climate Consulting	United States of America
44025	50	16	50	23	Especially when the discussions around governance turn towards shifting perceptions, it seems that it would be useful to delve into the research on behavior change and how public perceptions shift at an individual level and social level together and separately. This could be an important area where an additional discipline could add value to the thinking on social transformation that is summarized in this report.	Useful. We have given more attention to behaviour change in the chapter if not so much in this section. Thank you.	Tegan Blaine	Blue Cairn Climate Consulting	United States of America
44081	9	44			delete the "a" before "entered".	accepted, text revised	Mohammad Fahmy Ramadan	Head of Civil & Architecture Branch, MTC, Cairo, Egypt	Egypt

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
44083	12	4			add "off" before "high"	Rejected. Rewritten sentence is grammatically correct.	Mohammad Fahmy Ramadan	Head of Civil & Architecture Branch, MTC, Cairo, Egypt	Egypt
44085	13	11			add "times" after "5-10".	Actually I think "A factor of 5-10..." is the norm?	Mohammad Fahmy Ramadan	Head of Civil & Architecture Branch, MTC, Cairo, Egypt	Egypt
44087					Figures resolution have to be enhanced.	Many changed and hopefully improved	Mohammad Fahmy Ramadan	Head of Civil & Architecture Branch, MTC, Cairo, Egypt	Egypt
44097	19				Fig. 1.5 this draft version of the figure is not consistent with the sections in several chapters of the report, which address drivers/factors/determinants more thoroughly.	This figure has been removed from the revised version.	Ulli Weisz	University of Natural Resources and Life Sciences Vienna, Institute of Social Ecology	Austria
44175	16	24	16	27	Probably double use of "timelines" in line 26 & 27 within one sentence.	Edited	Roland Lifka	Synto GmbH	Austria
44177	18	44	18	44	Double entry - "Figure 1.5Figure 1.5".	Figure and reference have been removed.	Roland Lifka	Synto GmbH	Austria
44465	9	24	9	24	It should read Sendai Framework for Disaster Risk Reduction 2015-2030, and does not deal with disaster risk management, since this is a more constrained policy, and a managerialist approach	Accepted, text revised	Urbano Fra Paleo	University of Extremadura	Spain
44491	1	1	54	25	<i>Instead of talking about "aims" when it comes to the Paris Agreement it might be better to go with the terms more commonly used, like "goals" or "objectives", sometimes also "targets". Probably best to check with ch14</i>	noted	Oliver Geden	German Institute for International and Security Affairs	Germany
44493	6	12	6	12	Is the use of "net zero emissions" deliberately ambiguous (encompassing both CO2 and GHG)? If not, you better should say either "net zero CO2 emissions" (referring to the geophysical requirement) or "net zero GHG emissions" (referring to the PA Art 4 mitigation target)	Introduction does not need this level of precision, which is addressed in section 1.3 / X-chapter box	Oliver Geden	German Institute for International and Security Affairs	Germany
44495	7	6	7	7	You probably shouldn't refer to two single studies here (Millar & Leach) but to SR1.5 or the new WGI budgets (SOD).	Accepted, reference added, thank you.	Oliver Geden	German Institute for International and Security Affairs	Germany
44497	7	10	7	10	Since most of the (speculative) removal methods focus on CO2 it's better to go with "CO2" instead of "GHG"	Think our wording on this is now fine, but note the Paris Agreement does specify "... GHGs"	Oliver Geden	German Institute for International and Security Affairs	Germany
44505	8	12	8	15	If you are not talking exclusively about "net negative emissions" here it's probably better to say "carbon dioxide removal". If in fact you are, then better add the "net". SRM is not discussed in ch12 but in ch14 (an earlier outline had it in 12)	The word 'net' has been added.	Oliver Geden	German Institute for International and Security Affairs	Germany
44507	24	16	24	16	I guess you are talking about "deployment" here, not "development", or maybe both?	Accepted	Oliver Geden	German Institute for International and Security Affairs	Germany
44509	30	45	31	2	This short paragraph should probably be extended to discuss or highlight some issues around "institutional capacity" to steer transitions at the speed necessary to reach global/national targets, e.g. the electoral market orientation of politicians (see <a href="https://journals.sagepub.com/doi/10.1177/0038026117731658">https://journals.sagepub.com/doi/10.1177/0038026117731658</a> ), the status quo orientation of senior public officials (see <a href="https://onlinelibrary.wiley.com/doi/abs/10.1002/wcc.305">https://onlinelibrary.wiley.com/doi/abs/10.1002/wcc.305</a> ), path dependencies created by 'instrument constituencies' (see <a href="https://onlinelibrary.wiley.com/doi/abs/10.1111/gove.12179">https://onlinelibrary.wiley.com/doi/abs/10.1111/gove.12179</a> ), or the benefits (for politicians) of deliberate inconsistencies between talk, decisions and actions in climate policy (see <a href="https://onlinelibrary.wiley.com/doi/abs/10.1002/wcc.305">https://onlinelibrary.wiley.com/doi/abs/10.1002/wcc.305</a> )	The role of institutional capacity in shaping response to climate change is reflected in the section and many other parts of the chapter.	Oliver Geden	German Institute for International and Security Affairs	Germany

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
44511	31	25	31	32	Maybe also mention the flip side of this, namely strategies of blaming and shaming where legal accountability is weak, see <a href="https://www.tandfonline.com/doi/full/10.1080/14693062.2017.1331904">https://www.tandfonline.com/doi/full/10.1080/14693062.2017.1331904</a>	Noted	Oliver Geden	German Institute for International and Security Affairs	Germany
44513	33	25	33	33	Maybe worthwhile to highlight the origin of the "organized hypocrisy" approach (see <a href="https://books.google.de/books/about/The_organization_of_hypocrisy.html?id=4E25AAAAIAAJ&amp;redir_esc=y">https://books.google.de/books/about/The_organization_of_hypocrisy.html?id=4E25AAAAIAAJ&amp;redir_esc=y</a> ), or one of the few climate policy applications of this approach (see <a href="https://onlinelibrary.wiley.com/doi/abs/10.1002/wcc.427">https://onlinelibrary.wiley.com/doi/abs/10.1002/wcc.427</a> )	Accepted, text revised.	Oliver Geden	German Institute for International and Security Affairs	Germany
44515	52	24	52	24	"carbon dioxide removal" instead of GHG removal	Accepted, thank you.	Oliver Geden	German Institute for International and Security Affairs	Germany
44517	52	24	52	24	SRM not covered in ch12 but ch14	Accepted, thank you.	Oliver Geden	German Institute for International and Security Affairs	Germany
44519	53	26	54	2	FAQ 1.3 requires a complete overhaul, more clearly distinguishing between 'carbon neutrality' (net zero CO2), 'greenhouse gas neutrality' (net zero GHGs) and maybe even 'climate neutrality' (technically including all forcings, but in policymaking often used as a synonym for net zero GHGs). Depending on how central the "net zero" concept should be for WGIII, this could be moved to the beginning of ch1, either as a section or a box	Noted, thank you. However, Chapter 1 does not see room for a section or box to define the concept.	Oliver Geden	German Institute for International and Security Affairs	Germany
44521	15	45	18	37	It's probably worthwhile to include considerations on equity in the context of very tight remaining global carbon budgets (see, for the Pre-Paris constellation <a href="https://iopscience.iop.org/article/10.1088/1748-9326/10/10/105004">https://iopscience.iop.org/article/10.1088/1748-9326/10/10/105004</a> ). In the context of the growing importance of net negative pathways one might think that this simply means that industrialized countries have to go net negative first, creating space for emerging economies and developing countries (see <a href="https://link.springer.com/article/10.1007/s10584-019-02368-y">https://link.springer.com/article/10.1007/s10584-019-02368-y</a> ). But neither are industrialized countries talking about this, nor is this well reflected in IAMs, which often deploy CDR in regions with the highest afforestation and biomass potential, like Latin America (see <a href="https://www.nature.com/articles/nclimate3369">https://www.nature.com/articles/nclimate3369</a> ). There is a little bit of a discussion in ch 3.6.1.2, which hopefully will be expanded	Suggestion adapted.	Oliver Geden	German Institute for International and Security Affairs	Germany
44749	24	9	24	9	"Generation III light nuclear fission reactors" replace with "Generation III light water nuclear fission reactors"	Accepted	Daniel Westlén	Liberal party Swedish parliament	Sweden
44793	24	13	24	15	While the reference by Manan et al. (2015) gives a good view of the challenges to consider for a country considering nuclear power, in this particular case Malaysia, I suggest the inclusion of the following report that gives a more comprehensive view of the cost drivers and also discusses how to handle them. Ref: K. Gogan et al, 2018: The ETI Nuclear Cost Drivers Project: Summary Report. Energy Technologies Institute, <a href="http://energyforhumanity.org/resources/reports-en/eti-nuclear-cost-drivers-study/">http://energyforhumanity.org/resources/reports-en/eti-nuclear-cost-drivers-study/</a> .	The existing peer-reviewed publication is adequate to support the point.	Daniel Westlén	Liberal party Swedish parliament	Sweden



Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
44903	4	13	4	14	Reference also needs to be made to the scale of the biodiversity crisis and its implications for ecosystem integrity and stability; long term carbon storage; and risk of premature release of ecosystem carbon stocks to the atmosphere. The condition (or integrity) of ecosystems is underpinned by biodiversity and there is an alarming tendency to overlook the functional role of biodiversity in ecosystem integrity and stability.'The IPBES 2019 Global Assessment presents an ominous picture for the foundations of Life and the ecosystem services, including carbon sequestration and relatively stable carbon storage, that we rely on. It's clear that the biodiversity crisis must be treated as seriously as the climate crisis for the future of humanity and that synergistic climate and biodiversity action in land, forests and other ecosystems must be encouraged going forward	The revised ES references the growing risk of climate change and links to WGII which is devoted to the impact of climate change. Other aspects of the chapter also highlights concern for biodiversity loss.	Virginia Young	Australian Rainforest Conservation Society, Griffith University, CAN Ecosystems	Australia
44905	8	24	8	37	Comments apply to sections dealing with SDG's.: Climate Change, Biodiversity loss and sustainable development "are interwoven along multiple and complex lines of relationship'. Failure to reverse the current dangerous trajectory on biodiversity loss, fragmentation of, damage to and conversion of, natural ecosystems will increase the risk of premature release of ecosystem carbon stocks to the atmosphere and make the climate mitigation and sustainable development challenges ever more difficult. Each crisis amplifies the other and neither can now be successfully tackled in isolation. (for an explanation of the functional role of biodiversity in the provision of ecosystem services see the Millenium Ecosystem Assessment Report of 2005)	Noted	Virginia Young	Australian Rainforest Conservation Society, Griffith University, CAN Ecosystems	Australia
44907	14	24	14	44	This section on Sustainable Development could benefit from referring back to the Millenium Ecosystem Report 2005, in particular the section on Ecosystems and Human Well-being. At that time it was clear humanity could not continue to trade off increases in provisioning services at the expense of other ecosystem services and that "if trends in ecosystem services were projected to the middle of the 21st century, there was a high likelihood that widespread constraints on human well being would result". Fifteen years on IPBES has concluded that the "health of ecosystems is deteriorating more rapidly than ever". So any discussion of synergies and trade offs must understand that we little if any room left to continue to trade off biodiversity and ecosystem integrity for short term development needs. New pathways to climate resilient development based on protecting and restoring natural and agricultural ecosystems must be found.	The idea of interdependence between human and natural systems, tension, trade offs, planetary boundaries and balancing have all be incorporated in the section.	Virginia Young	Australian Rainforest Conservation Society, Griffith University, CAN Ecosystems	Australia
44909	15	46	18	37	The limits to trade offs needs some discussion in this section. Understanding hard limits and the inertia in ecological systems make it hard to predict at what point irreversible change will occur - although there are now many global examples of ecosystem collapse when exploitation, pollution, fragmentation and other threats exceed regenerative capacity.	Suggestion adapted.	Virginia Young	Australian Rainforest Conservation Society, Griffith University, CAN Ecosystems	Australia

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
44911	20	37	20	48	<p>The condition of ecosystems matters for their vulnerability to all threats including climate change. This section is therefore potentially seriously misleading. Vulnerability to climate change depends on many factors but in almost all cases ecosystems underpinned by biodiversity in natural patterns of distribution and abundance are more resistant and resilient to threats and far better able to adapt to changing conditions than modified natural systems which are in turn less vulnerable to threats, including climate change, than monoculture crops, including tree plantations. For example, the science is very clear that primary tropical and cool temperate forests (and indeed many other primary forest ecosystems) are resistant to pests, disease, drought and fire. Fragmentation by roads and even light logging creates edge effects that extend up to 2kms into a primary forest, resulting in drying and vulnerability to drought and fire. (Giardina et al 2018, Siegert et al 2001, Hlodsworth and Uhl, 1997, Cochrane et al 1999, Bush et al 2004, Briant et al 2010, Taylor et al 2014, Price and Bradstock 2012, Thompson et al 2007, Mackey and Cadman 2017,). There is considerable evidence that the 2019 fires in Brazil did not penetrate unfragmented primary forest (Griffith University Research, yet to be published). While analysis is incomplete, the 2019/2020 fires in Australia show some resistance by 'old growth' forests to fire including protection of refugial rainforests that were surrounded by old forests undisturbed by modern industrial logging. The science is also very clear that mono culture crops including tree crops are far more vulnerable to pests, disease, drought and fire than natural systems all of which are and will be, exacerbated by climate change (FAO 2010). These differences in vulnerability based on ecosystem integrity (or condition) should not be confused with range contraction or expansion based on changing temperature. It is worth remembering that many ecosystems and particularly those with ancient lineages have survived</p>	<p>We do not have the space to cover this detail in land use. However, Chapter 7 has more space and is a potential place for this material.</p>	Virginia Young	Australian Rainforest Conservation Society, Griffith University, CAN Ecosystems	Australia

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
44913	21	1	21	20	The Millenium Ecosystem Report 2005 explains the "inescapable link between ecosystem condition and human well being" and the "special role of biodiversity in supplying ecosystem services." " In some cases biodiversity can be treated as an ecosystem service ....in other respects it is a necessary condition underpinning the long term provision of other services such as food and clean fresh water" (and stable carbon storage). "Variation among genes, populations and species and the variety of structure, function and composition of ecosystems are necessary to maintain an acceptable and resilient level of ecosystem services in the long term"... "For ecosytem functions such as productivity and nutrient cycling, the level, constancy of services over time, and resilience to shocks all decline over the long term if biodiversity declines." "...Regulatory services generally need higher levels of biodiversity than provisioning services." .."Changes in species composition can alter ecosystem processes even if the number of species present remains unchanged or increases. Thus conserving the composition of (biological) communities rather than simply maximising species numbers is more likely to maintain higher levels of ecosystem services...there is evidencefrom terrestrial and aquatic systems that a rich regional species pool is needed to maintain ecosystem stability in the face of a changing environment in the long term" ... "the integrity of the interactions between species is critical for the long term preservation of human food production on land and in the sea."(Millenium Ecosystem Report 2005): ..	Thank you. This mention has been removed due to word constraints, and general editing of the section. In the revised text, we have removed the sub-headings and integrated the sub-sections together.	Virginia Young	Australian Rainforest Conservation Society, Griffith University, CAN Ecosystems	Australia
44915	46	25	46	28	Given the scale of the biodiversity crisis and its interaction with the climate crisis we need strong pointers to the need to pursue climate resilient developent pathways that are positive for biodiversity and people and in particular ensure synergistic climate and biodiversity action in land, forests and other ecosystems.	We think this is well captured by having an environmental dimension to the criteria?	Virginia Young	Australian Rainforest Conservation Society, Griffith University, CAN Ecosystems	Australia
44917	49	44	50	30	The gaps and some inconsistencies between the Rio Conventions need to be addressed. The UN Secretary General has called for synergstic climate and biodiversity action through Nature Based Solutions to both crises; and dialogue has started between the IPCC and IPBES that could be strenghtehened to provide guidance on synergistic climate and biodiversity action in land, forests and other ecosystems. Another obvious pathway would be a joint working group on how to operationalise the 'ecosystem provisions of the UNFCCC (article 4.1(d)) and Article 5 of Paris Agreement.	Yes, thank you. However, this is is not the point being made in this section.	Virginia Young	Australian Rainforest Conservation Society, Griffith University, CAN Ecosystems	Australia
44977	3	14	3	15	This statement needs supporting references. Considering the uncertainties in emissions estimates within the short period of two/three years (2014-2016), it seems a bit too strong to talk about a "plateau". The wording used in AR6 WG1 Ch 5 FOD is also short, but clearer: "Since AR5, fossil fuel CO2 emissions and industry followed a period (2014-2016) with little or no growth (largely due to reductions in coal emissions)". In AR6 WG1 Ch5 SOD this statement becomes more elaborate, but too long and detailed for the intended use in here.	This part of the Executive Summary (ES) has been edited followiung the compalte revamping of the ES	Sergio Henrique Faria	Basque Centre for Climate Change (BC3)	Spain
44979	8	24	8	37	This paragraph is very good.	Noted, thanks.	Sergio Henrique Faria	Basque Centre for Climate Change (BC3)	Spain

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
44983	14	17	14	22	This paragraph is very good.	Thank you.	Sergio Henrique Faria	Basque Centre for Climate Change (BC3)	Spain
45025	8	2	8	3	Please clarify that this is for CO2 only, not for all GHGs	This sentence has been deleted.	Andy Reisinger	NZAGRC	New Zealand
45027	9	37	9	38	To avoid confusion with the statement about net zero on page 8, please clarify that here this refers to all GHGs (not just CO2 as the statement on page 8)	Noted	Andy Reisinger	NZAGRC	New Zealand
45029	53	26	54	2	FAQ 1.3 is not as clear as it should be and will potentially add to the confusion around the different terms. Please use this FAQ to differentiate between net-zero CO2 and net-zero all GHG emissions and explain how these two differ (in terms of timing but also their effect on climate). Cross-reference the cross-chapter box on GHG metrics in chapter 2 (currently box 2.2). Also please clearly distinguish climate neutrality from net zero emissions, as these terms have very different implications if short-lived gases like methane are involved. To start with, climate neutrality is not clearly defined (and is not in the current glossary). Rather than defining this term ad-hoc, I think this FAQ could help by clarifying that climate neutrality is a rather ambiguous term (and it ignores any warming due to historical emissions, the potential and need for net negative emissions to reduce warming, or in the case of short-lived GHG, it ignores the fact that climate neutrality (in the sense of 'not causing any additional warming' is rather unambitious, in contrast to the same concept being applied to CO2). Hence this FAQ should clarify that net-zero emissions targets are less ambiguous and more relevant for policy than claims/targets of 'climate neutrality'.	Noted, thank you.	Andy Reisinger	NZAGRC	New Zealand
45129	52	12	52	14	Referral to Chapter 8 may also indicate that this chapter for the first time places an emphasis on “urban systems.” This is also particularly relevant to the context of Chapter 1 that provides the framing as well as the concluding chapter of the WGIII contribution to AR6 that focuses on the need for “synergies across sectors and policy coherence across scales,” which can be pursued and exploited with holistic system approaches. One definition of “urban transformation” that may be useful for this referral is “large-scale changes in system properties and the overall structure of the system in the process of shifting trajectories towards higher levels of sustainability” as given in Elmqvist et al. (2019) in Nature Sustainability < <a href="https://doi.org/10.1038/s41893-019-0250-1">https://doi.org/10.1038/s41893-019-0250-1</a> >. In addition, similar to Figure 1.7 on page 43, several conceptual pathways are also indicated with varying levels of sustainability as the impact.	Accepted, thank you.	Sir Kilis	The Scientific and Technological Research Council of Turkey	Turkey
45171	3	2	5	18	Chapters 6-12 cover different sectors in more detail but the Executive Summary seems to gloss over them. <i>Given that the entire document does not have a separate Executive Summary</i> , the Executive Summary for this chapter becomes very important and should not ignore key information from some chapters.	The ES has been revamped. The new ES makes references to the rest of the chapters. The SPM is the document that is designed to serve as the Executive Summary for the whole report.	Cheah Singfoong	Independent consultant, formerly more than 10 years with the National Renewable Energy Laboratory, USA	United States of America
45405	24	9	24	15	This paragraph refers to GenIII fission reactors, and fusion in the long-term, but no reference to the GenIV fission reactors currently under development. Over 50 copanies in the US, 5 working through licensing, with demonstrations build in China and Russia.	Comment noted. However, the scope of Chapter 1 does not allow for development of the material suggested.	Jessica Lovering	Carnegie Mellon University	United States of America
45517	12	8			In this section, the impacts of unprecedented pandemic diseases ( such as coronavirus covid-19) on macroeconomy should be mentioned.	Accepted. Impact of COVID-19 on macroeconomy is now mentioned.	Zamani Leila	Department of Environment of Iran	Iran

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
45519	12	30			youth collective actions ( such as lobbying and voting) can influence environmental rules and policies. (ref. GEO for Youth report which will be released on the 8th of April )	Noted - thanks we added more references.	Zamani Leila	Department of Environment of Iran	Iran
45589	3	12	3	14	The first line on this paragraph refers to general GHG rises, but the next line is specific to an energy-related CO2 plateau. Does this mean that all other CO2 sources, and other GHGs have also reached a plateau in 2014-16, and then rose again more slowly, or is this comment specific to CO2? Needs to be clear for exec summary and many will only read this part.	Exec Sum completely redrafted	Geoffrey Saville	Willis Towers Watson	United Kingdom (of Great Britain and Northern Ireland)
45591	3	23	3	24	This line makes it look like analytically we have had continued progress, while policy have had more mixed success. <i>I'd suggest that analytically there are also many challenges to reaching a common language around climate risk and risk reporting which become a baseline upon which evidence-based policy making can be achieved.</i>	Exec Sum completely redrafted	Geoffrey Saville	Willis Towers Watson	United Kingdom (of Great Britain and Northern Ireland)
45593	4	4	4	13	Very true. The finance sector is indeed rapidly mobilising its analytical capabilities around climate change related risks. Regulation is a big driver of this, but public sentiment and scientific advancement have also played a large part in building the foundations for the transformation on the finance sector to encode climate risk into asset valuation and risk assessment techniques. I agree that climate risk is still underpriced and for smart investors can present an opportunity to invest in green companies (or at least those who assess and report on their climate risks through TCFD and other frameworks) while they are relatively cheap. Board level conversations now include climate risk high on the agenda, and this is leading to a proliferation of climate risk consultancies of varying degrees of capabilities but all promising "the solution". Companies with long experience in risk assessment (insurance, reinsurance and brokers) are now stepping up to provide the climate risk metrics that will be needed. These need to be translated across the financial sector and then will inevitably spread to the corporate sectors and governments. Public private partnerships will be essential to bring these techniques to the academic community but also help support public policy around climate change. Perhaps more is needed here, though the main points are covered.	Thank you for the positive and valid comment. The revised ES has reference to the role of multiple actors in driving climate policy, ambition and action.	Geoffrey Saville	Willis Towers Watson	United Kingdom (of Great Britain and Northern Ireland)
45595	4	38	4	42	Scenarios are becoming the main tool for the finance sector to stress test their portfolios of assets, insurance policies, or strategic plans. RCPs have been useful for imagining a future world in transition risk assessments, but their weaknesses in consulting have become clear when looking at sector level, or even company level risk assessments. There are many ways to reach a 4C or 2C (scenarios commonly used). In this situation, many organisations and institutions are putting forward their own scenarios (even the word scenario means different things to different people, depending on their industry and position). The risk industry needs a way to create a common language around future scenarios from an industry specific standpoint. The SSPs go a long way towards this, but companies need a more accessible way to connect the SSPs to their own businesses. I believe the SSP should be the basis of industry scenarios to maintain impartiality.	Valid point. We hope the revised text meets the expectation of the reviewer.	Geoffrey Saville	Willis Towers Watson	United Kingdom (of Great Britain and Northern Ireland)
45597	6	41	6	45	see comment 3. Challenges in analytical advances for private sector also exist, and partnerships with academic expertise is essential for credible steps forward.	Noted, but could not identify comment 3 or need for specific change	Geoffrey Saville	Willis Towers Watson	United Kingdom (of Great Britain and Northern Ireland)

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
45599	6	28	7	28	AFOLU need expanding here as this is the first incidence of the acronym, and not in later uses twice on page 8 and once on page 52	Accepted and amended, thank you.	Geoffrey Saville	Willis Towers Watson	United Kingdom (of Great Britain and Northern Ireland)
45601	8	36	8	37	"...by keeping into the pictures..." doesn't really make sense. Perhaps "...while being mindful of..."	The sentence has been rephrased.	Geoffrey Saville	Willis Towers Watson	United Kingdom (of Great Britain and Northern Ireland)
45603	9	12	9	13	Perhaps add "catastrophe and risk models". For the finance sector to understand climate risk, most actuarial or economic models fall short as they will rely heavily on assumptions about the future. IAMs have major flaws with more specific applications. The answer is a probably a blended approach using economic models, risk models, catastrophe models, IAMs, and based on projections from CMIP6 climate models.	Done	Geoffrey Saville	Willis Towers Watson	United Kingdom (of Great Britain and Northern Ireland)
45605	10	43	11	2	There are also some significant new developments in financial regulations. The Bank of England's regulator, the prudential regulation authority have for the first time in 2019 included climate change as a key part of the general insurance stress tests for insurers, a letter than goes to the CEO for every insurance company. Last year, we also saw a further development in the form on more signincat and detailed exam questions around climate risk from the BoE again, this time in the in the Biennial Exploratory Stress test discussion paper. These are industry leading developments and have created a huge change in attitudes towards climate change in the insurance and banking sectors. While this is UK focussed, other countries are also following this lead in Europe and Australia to my knoweldge. Perhaps a mention of this trend would be encouraging and drive innovation to address the regulatory challenges set to the industry.	I think for an intro chapter we do flag this sufficiently?	Geoffrey Saville	Willis Towers Watson	United Kingdom (of Great Britain and Northern Ireland)
45607	13	5	13	9	Suggest the inclusion the private sector led Coalition for Climate Resilient Investment (CCRI - <a href="https://www.adaptation-undp.org/sites/default/files/uploaded-images/coalition_for_climate_resilient_investment_cas_launch_.pdf">https://www.adaptation-undp.org/sites/default/files/uploaded-images/coalition_for_climate_resilient_investment_cas_launch_.pdf</a> ) aimed at providing financing for climate resilient development of infrastructure. A key component of which will be climate risk modelling from a financial impact perspective. This can also apply to the later chapter on Internation Cooperation (chap 14)	Rejected -finance is already mentioned	Geoffrey Saville	Willis Towers Watson	United Kingdom (of Great Britain and Northern Ireland)
45609	27	1	27	11	See comment 10	Text revised	Geoffrey Saville	Willis Towers Watson	United Kingdom (of Great Britain and Northern Ireland)
45611	28	25	28	26	the "climate (in) action" would be better phrased as "the degree of climate action"	Text has been revised	Geoffrey Saville	Willis Towers Watson	United Kingdom (of Great Britain and Northern Ireland)
45613	29	37	29	38	Impact on fisheries of changes to storminess (as linked to cliamte change) examined here: Sainsbury, N.C., Genner, M.J., Saville, G.R., Pinnegar, J.K., O'Neill, C.K., Simpson, S.D. and Turner, R.A., 2018. Changing storminess and global capture fisheries. Nature Climate Change, 8(8), pp.655-659.	Noted - we do not think we need a reference onthis here.	Geoffrey Saville	Willis Towers Watson	United Kingdom (of Great Britain and Northern Ireland)

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
45615	36	34	36	43	I would suggest one more example here from the financial regulatory organisations. The Prudential Regulation Authority issues its General Insurance Stress Test last year which for the first time included indicative scenarios related to climate change physical risks. The Biennial Exploratory Stress test ( <a href="https://www.bankofengland.co.uk/-/media/boe/files/paper/2019/the-2021-biennial-exploratory-scenario-on-the-financial-risks-from-climate-change.pdf?a=en&amp;hash=73D06B913C73472D0DF21F18DB71C2F454148C80">https://www.bankofengland.co.uk/-/media/boe/files/paper/2019/the-2021-biennial-exploratory-scenario-on-the-financial-risks-from-climate-change.pdf?a=en&amp;hash=73D06B913C73472D0DF21F18DB71C2F454148C80</a> ) has built on these with more complicated use of scenarios based on SSP thinking related to orderly and disorderly transitions in their early, late and no policy action narratives. I think this is relevant to add here.	Add in chapter	Geoffrey Saville	Willis Towers Watson	United Kingdom (of Great Britain and Northern Ireland)
45617	38	9	38	9	"recognise" missing R	Thanks, done	Geoffrey Saville	Willis Towers Watson	United Kingdom (of Great Britain and Northern Ireland)
45619	40	10	40	20	should there be a third 'tempest' in italics? Perhaps the phrase 'inadequate theoretical perspectives' on line 17-18 is intended to be referred to at the beginning of the paragraph?	Thanks, done	Geoffrey Saville	Willis Towers Watson	United Kingdom (of Great Britain and Northern Ireland)
45621	42	22	42	22	Extra parenthesis in citation	Accepted	Geoffrey Saville	Willis Towers Watson	United Kingdom (of Great Britain and Northern Ireland)
45623	52	44	52	44	Missing s on include	Accepted, thank you.	Geoffrey Saville	Willis Towers Watson	United Kingdom (of Great Britain and Northern Ireland)
45795	40	11	40	20	This paragraph could be more succinct, or could combine views from more studies.	Edited.	Sergio Henrique Faria	Basque Centre for Climate Change (BC3)	Spain
45797	41	12	41	18	Repetition of the same statements.	Duplicated text deleted	Sergio Henrique Faria	Basque Centre for Climate Change (BC3)	Spain
45799	43	1	43	1	Fig.1.7: Needless to comment that this figure has serious problems (black background?) and needs redrawing.	There was an unfortunate technical error in conversion to PDF, however the Figure has been substantially reworked	Sergio Henrique Faria	Basque Centre for Climate Change (BC3)	Spain
46129					I think the references must be put in a manner that these should not interrupt the sense of the sentence, so large and so many references (authors and dates), sometimes it occupies up to 2 lines of a paragraph and make difficulties to read and understand, specially if the reader is not an English native. The climate change is so important that these reports must be known as wide as possible, and the reading should be fluent.	We are following the standard IPCC and academic referencing approach, sorry	Sharl Noboa	INOCAR	Ecuador
46167	3	25	3	46	Continual growth (either demographic, or economic) is impossible on a finite planet and will come to an end, whether we anticipate it or not; this should be reflected here.	Valid point. However comment no longer applies as this part of the Executive Summary has been completely revamped.	Jean-Marie FLOWER	Fleur de Carbone SARL	France
46169	4	19	4	19	Some difficult tradeoffs ARE unavoidable because carbon intensity of GDP remain globally stubbornly high (> 200 g eq C per unit of World Domestic Product).	We agree that some trade-offs are unavoidable. The ES has been revised.	Jean-Marie FLOWER	Fleur de Carbone SARL	France
46173	4	25	4	31	Sharper attention to EROIE as well as power density of available primary energy resources should be paid in order to better understand why physics makes declining energy supply much more likely.	Energy Return on energy investment is a more complex topic than it seems, because the data evolve (for both fossil fuels and renewables); it's more of a topic for the Energy Chapter rather than introduction	Jean-Marie FLOWER	Fleur de Carbone SARL	France

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
46205	4	13	4	14	Executive Summary. Reference also needs to be made to the scale of the biodiversity crisis and its implications for ecosystem integrity and stability; long term carbon storage; and risk of premature release of ecosystem carbon stocks to the atmosphere. The condition (or integrity) of ecosystems is underpinned by biodiversity and there is an alarming tendency to overlook the functional role of biodiversity in ecosystem integrity and stability.'The IPBES 2019 Global Assessment presents an ominous picture for the foundations of Life and the ecosystem services, including carbon sequestration and relatively stable carbon storage, that we rely on. It's clear that the biodiversity crisis must be treated as seriously as the climate crisis for the future of humanity and that synergistic climate and biodiversity action in land, forests and other ecosystems must be encouraged going forward	The revised ES references the growing risk of climate change and links to WGII which is devoted to the impact of climate change. Other aspects of the chapter also highlight concern for biodiversity loss.	Virginia Young	Australian Rainforest Conservation Society, Griffith University, CAN Ecosystems	Australia
46207	8	24	8	37	Developments since AR5. Comments apply to sections dealing with SDG's.: Climate Change, Biodiversity loss and sustainable development "are interwoven along multiple and complex lines of relationship'. Failure to reverse the current dangerous trajectory on biodiversity loss, fragmentation of, damage to and conversion of, natural ecosystems will increase the risk of premature release of ecosystem carbon stocks to the atmosphere and make the climate mitigation and sustainable development challenges ever more difficult. Each crisis amplifies the other and neither can now be successfully tackled in isolation. (for an explanation of the functional role of biodiversity in the provision of ecosystem services see the Millennium Ecosystem Assessment Report of 2005)	Same as comment 44905.	Virginia Young	Australian Rainforest Conservation Society, Griffith University, CAN Ecosystems	Australia
46209	13	33	13	46	Sustainable Development and Climate Change Mitigation. See comments below	Thank you. Noted	Virginia Young	Australian Rainforest Conservation Society, Griffith University, CAN Ecosystems	Australia
46211	15	46	18	37	1.3.2 The limits to trade offs needs some discussion in this section. Understanding hard limits and the inertia in ecological systems make it hard to predict at what point irreversible change will occur - although there are now many global examples of ecosystem collapse when exploitation, pollution, fragmentation and other threats exceed regenerative capacity.	This point has been made elsewhere in the chapter.	Virginia Young	Australian Rainforest Conservation Society, Griffith University, CAN Ecosystems	Australia



Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
46213	20	37	20	48	<p>1.4.1 The condition of ecosystems matters for their vulnerability to all threats including climate change. This section is therefore potentially seriously misleading. Vulnerability to climate change depends on many factors but in almost all cases ecosystems underpinned by biodiversity in natural patterns of distribution and abundance are more resistant and resilient to threats and far better able to adapt to changing conditions than modified natural systems which are in turn less vulnerable to threats, including climate change, than monoculture crops, including tree plantations. For example, the science is very clear that primary tropical and cool temperate forests (and indeed many other primary forest ecosystems) are resistant to pests, disease, drought and fire. Fragmentation by roads and even light logging creates edge effects that extend up to 2kms into a primary forest, resulting in drying and vulnerability to drought and fire. (Giardina et al 2018, Siegert et al 2001, Hlodsworth and Uhl, 1997, Cochrane et al 1999, Bush et al 2004, Briant et al 2010, Taylor et al 2014, Price and Bradstock 2012, Thompson et al 2007, Mackey and Cadman 2017,). There is considerable evidence that the 2019 fires in Brazil did not penetrate unfragmented primary forest (Griffith University Research, yet to be published). While analysis is incomplete, the 2019/2020 fires in Australia show some resistance by 'old growth' forests to fire including protection of refugial rainforests that were surrounded by old forests undisturbed by modern industrial logging. The science is also very clear that mono culture crops including tree crops are far more vulnerable to pests, disease, drought and fire than natural systems all of which are and will be, exacerbated by climate change (FAO 2010). These differences in vulnerability based on ecosystem integrity (or condition) should not be confused with range contraction or expansion based on changing temperature. It is worth remembering that many ecosystems and particularly those with ancient</p>	<p>We do not have the space to cover this detail in land use. However, Chapter 7 has more space and is a potential place for this material.</p>	Virginia Young	Australian Rainforest Conservation Society, Griffith University, CAN Ecosystems	Australia

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
46215	21	1	21	20	1.4.1 Drivers, Systems and Constraints. The Millenium Ecosystem Report 2005 explains the "inescapable link between ecosystem condition and human well being" and the "special role of biodiversity in supplying ecosystem services." " In some cases biodiversity can be treated as an ecosystem service ....in other respects it is a necessary condition underpinning the long term provision of other services such as food and clean fresh water" (and stable carbon storage). "Variation among genes, populations and species and the variety of structure, function and composition of ecosystems are necessary to maintain an acceptable and resilient level of ecosystem services in the long term"... "For ecosytem functions such as productivity and nutrient cycling, the level, constancy of services over time, and resilience to shocks all decline over the long term if biodiversity declines." ... "Regulatory services generally need higher levels of biodiversity than provisioning services." .. "Changes in species composition can alter ecosystem processes even if the number of species present remains unchanged or increases. Thus conserving the composition of (biological) communities rather than simply maximising species numbers is more likely to maintain higher levels of ecosystem services...there is evidencefrom terrestrial and aquatic systems that a rich regional species pool is needed to maintain ecosystem stability in the face of a changing environment in the long term" ... "the integrity of the interactions between species is critical for the long term preservation of human food production on land and in the sea."(Millenium Ecosystem Report 2005):. ..	Thank you. This mention has been removed due to word constraints, and general editing of the section. In the revised text, we have removed the sub-headings and integrated the sub-sections together.	Virginia Young	Australian Rainforest Conservation Society, Griffith University, CAN Ecosystems	Australia
46217	46	25	46	28	1.5,5 Frameworks for Assessing Desirability and Feasibility of Decarbonisation pathways. Given the scale of the biodiversity crisis and its interaction with the climate crisis we need strong pointers to the need to pursue climate resilient developent pathways that are positive for biodiversity and people and in particular ensure synergistic climate and biodiversity action in land, forests and other ecosystems.	[Repeated comment]	Virginia Young	Australian Rainforest Conservation Society, Griffith University, CAN Ecosystems	Australia
46219	49	44	50	30	1.6 Multi Level Governance. The gaps and some inconsistencies between the Rio Conventions need to be addressed. The UN Secretary General has called for synergstic climate and biodiversity action through Nature Based Solutions to both crises; and dialogue has started between the IPCC and IPBES that could be strenghtehened to provide guidance on synergistic climate and biodiversity action in land, forests and other ecosystems. Another obvious pathway would be a joint working group on how to operationalise the 'ecosystem provisions of the UNFCCC (article 4.1(d)) and Article 5 of Paris Agreement.	Yes, thank you. However, this is is not the point being made in this section.	Virginia Young	Australian Rainforest Conservation Society, Griffith University, CAN Ecosystems	Australia

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
46429	3	12	1	19	<p>The Introduction improperly frames climate change as apocalyptic, and the international response to climate change as inadequate, noting that "emissions have continued to rise," as though rising emissions might not be a necessary part of poor and developing nations reaching living standards capable of meeting human dignity and flourishing. This is misleading. carbon emissions have been declining in developed nations for more than a decade. In Europe, emissions in 2018 were 23% below 1990 levels. In the U.S., emissions fell 15 percent from 2005 to 2016.</p> <p>The U.S. and Britain have seen their carbon emissions from electricity, specifically, decline by an astonishing 27 percent in the U.S. and 63 percent in the U.K., between 2007 and 2018.</p> <p>Most energy experts believe emissions in developing nations will peak and decline, just as they did in developed nations, once they achieve a similar level of prosperity.</p> <p><i>As a result, global temperatures today appear much more likely to peak at between two to three degrees centigrade over preindustrial levels, not four, where the risks, including from tipping points, are significantly lower. The International Energy Agency (IEA) now forecasts carbon emissions in 2040 to be lower than in almost all of the IPCC scenarios.</i></p>	No references. Disagree on key elements of his assertions (to be evidenced). Refer to Ch.2. Can check IEA refs & data. Link to scenarios we have. 2-3 deg still above Paris goals etc	Michael Shellenberger	Environmental Progress	United States of America
46431	3	25	1	43	<p>It is not simply that developed nations brought down emissions in "past few years." Total emissions from energy in Europe's largest countries, Germany, Britain, and France, peaked in the 1970s. It should make mention of this, and <i>the fact that it occurred for reasons having nothing to do with climate change</i>, and everything to do with energy security, economic growth, de-industrialization, and the switch from coal and petroleum to natural gas and nuclear, all of which contradict the claim made that climate change needs to be the reason for decarbonizations or emissions decline, and perhaps even "the dominant priority," as the text alludes. <i>The notion that there is a "gap" between commitment and action is something that is both highly subjective and yet to be proven, and hardly something appropriate for the introduction.</i> The notion that we should pay attention to "diquity, justice, and fairness" [sic] feels like a throwaway line given the dreary and unsupported claims that the authors have made.</p>	Linked to above, more specific re the attribution or not to past policies	Michael Shellenberger	Environmental Progress	United States of America
46433	4	1	1	13	<p>The assumption here is that "international cooperation" will be more effective than "populism, nationalism" in reducing emissions but the evidence is far from clear. French, Swedish, Japanese, American, and South Korean efforts to build nuclear plants from the 1960s through the 1980s had a major role in decarbonizing energy, with nuclear reaching nearly 18% of global electricity at its peak, and much of the nuclear-build out was motivated by what most scholars consider to be "nationalism" and, in many nations, populism too, though they are different concepts that should be wrestled with analytically rather than used, without substantiation, in the introduction.</p>	The vast amount of literature suggests that some form of international co-operation can help to facilitate effective, fair and durable climate action. The assessment reflects underlying literature. The tone has been adjusted to address the concern about policy prescription noting that international co-operation is one of many other enabling conditions.	Michael Shellenberger	Environmental Progress	United States of America

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
46435	4	25	4	31	<p>The anti-nuclear pro-renewables and efficiency bias of the author is inappropriate, particularly for it to manifest so clearly in the introduction. While renewables in 2018 globally generated 11 percent of total primary energy, 64 percent of it (7 percent of total primary energy) came from hydroelectric dams, which are largely maxed out in developed nations, and which environmentalists oppose construction of in poor and developing ones.</p> <p>Despite the hype, the shares of global primary energy from solar and wind in 2018 was just 3 percent, the share coming from geothermal was 0.1 percent, and tidal was too small to measure.</p>	We discussed review comments arguing both that we were too pro-renewables, and also our comment on nuclear was too pro-nuclear. The data cited in this comment is static, but the key is dynamic - trends in cost and deployment. See for example our Figure on renewables trends (and the SPM Figure), and also in Chapter 2 on fact that renewables have been far exceeding predictions whilst others mostly lag	Michael Shellenberger	Environmental Progress	United States of America
46437	13	10	13	18	<p>This is paragraph engages in unwarranted, credibility-sapping renewable energy boosterism. It makes no mention of any downsides to solar and wind, which are energy dilute and unreliable. Various studies have shown that the cost of integrating unreliable wind energy is high and rises as more wind is added to the system. For example, in Germany, when wind is 20 percent of electricity, its cost to the grid rises 60 percent. And when wind is 40 percent, its cost rises 100 percent.</p> <p>This is because of all the power plants, often natural gas, that must be standing by and ready to fire up the moment wind dies down, the extra power lines that have to be built to remote renewable energy locations, and all of the other extra equipment and personnel required to support fundamentally unreliable and often unpredictable forms of energy.</p>	Rejected - Renewable energy is mostly intermittent energy (not hydro energy). This is just a short overview of developments and not the place to discuss intermittent energy and back up capacity.	Michael Shellenberger	Environmental Progress	United States of America
46439	13	19	13	24	<p>This is paragraph engages in wishful thinking and boosterism regarding batteries. The costs of batteries are declining, but the progress has been gradual, not radical. The switch from nickel-cadmium to lithium-ion batteries during the last several decades has been wonderful. It has allowed for the proliferation of cordless phones, cell phones, laptops, wireless electric appliances, and an array of electric vehicles, small and large. But it has not allowed for the cheap storage of the grid's electricity.</p> <p>Consider Tesla's most famous battery project, a 129 megawatt-hour lithium battery storage center in Australia. It provides enough backup power for 7,500 homes for four hours. But, there are nine million homes in Australia, and 8,760 hours in a year.</p> <p>One of the largest lithium battery storage centers in the world is in Escondido, California. But it can only store enough power for about twenty-four thousand American homes for four hours. There are about 134 million households in the United States.</p> <p>To back up all the homes, businesses, and factories on the U.S. electrical grid for four hours, we would need 15,900 storage centers the size of the one in Escondido at a cost of \$894 billion. Another study by a group of climate and energy scientists found that when taking into account continent-wide weather and seasonal variation, for the United States to be powered by solar and wind, while using batteries to ensure reliable power, the battery storage required would raise the cost to more than \$23 trillion. That number is \$1 trillion higher than U.S. gross domestic product was in 2019.</p>	Rejected - we do not report radical declining of the costs. This is just a short overview of the development.	Michael Shellenberger	Environmental Progress	United States of America

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
46441	13	19	13	24	<p>Even the leading advocates of renewable energy recognize that batteries will not solve the problems created by the daily and seasonal cycles of solar and wind, and they look elsewhere for storage solutions.</p> <p>The most influential proposal for 100 percent renewable energy was created by Stanford professor Mark Jacobson, who points out that most renewable energy proposals only try to replace the third of U.S. energy coming from the electricity grid.</p> <p>Jacobson's proposal for all energy, not just electricity, relied on the conversion of existing hydroelectric dams into giant batteries. The idea is that when the sun shines or the wind blows, vast quantities of surplus power would be used to pump water uphill. The water would be stored as long as necessary, and then released to flow downhill back through turbines to produce electricity when needed.</p> <p>Jacobson's studies and proposals became the basis of the energy plans of many American states, as well as that of Democratic presidential candidate Senator Bernie Sanders.</p> <p>But in 2017, a group of scientists pointed out that Jacobson's proposal rested upon the assumption that we can increase the amount of power from U.S. hydroelectric dams ten-fold when, according to the Department of Energy and all major studies, the real potential is just 1 percent of that. Without all that additional hydropower, Jacobson's 100 percent renewables proposal falls apart.</p> <p>Even though California is a world leader when it comes to renewables, the state hasn't converted its extensive network of dams into batteries. You need the right kind of dams and reservoirs, and even then it's an expensive retrofit. There are also many other uses for the water that accumulates behind dams, namely irrigation and cities. And because the water in California's rivers and reservoirs is scarce and unreliable, the water from</p>	Rejected - this is just a short overview of the developments globally, and a discussion of the situation for the US energy supply does not belong here.	Michael Shellenberger	Environmental Progress	United States of America
46443	20	37	20	48	<p>This paragraph is misleading. The headline number in the IPCC's 2019 report on food, a 70 percent reduction in emissions by 2050, referred only to agricultural emissions, which comprise a fraction of total greenhouse emissions.</p>	Not entirely sure what the problem is as there is no reference to 70 percent reduction in emissions by 2050.	Michael Shellenberger	Environmental Progress	United States of America

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
46445	29	1	29	17	<p>This paragraph is misleading. It exaggerates the role of fossil fuel funded interests in undermining climate legislation. Exxon stopped funding climate denial. Climate activists massively outspend climate skeptics . The two largest U.S. environmental organizations, EDF and NRDC, have a combined annual budget of about \$384 million compared to the mere \$13 million of the two largest climate skeptic groups, Competitive Enterprise Institute and Heartland Institute. That amount of money, \$384 million, is 5 to 10 times more than all of the money Exxon gave to climate skeptical organizations for two decades.</p> <p>It might be objected that there are other organizations that criticize and oppose climate policy, including the Heritage Foundation (\$86 million in revenue), the American Enterprise Institute (\$59 million in revenue), and the Cato Institute (\$31 million in revenue).</p> <p>But those three organizations all accept that humans are changing the climate, even if they oppose many of the proposed ways of dealing with it. The American Enterprise Institute has endorsed both a carbon tax and government research and development for clean energy innovation. And there are many other organizations, including the Nature Conservancy (\$1 billion in revenue, 2018) and Center for American Progress (\$44 million in revenue, 2018) that advocate for renewables and against nuclear energy.</p>	We disagree with this comment. The paragraph is balanced and based on literature.	Michael Shellenberger	Environmental Progress	United States of America
46447	30	20	30	23	<p>This paragraph is misleading when it claims "diets have a major impact on emissions." They don't. One study found that converting to vegetarianism might reduce diet-related personal energy use by 16 percent and greenhouse gas emissions by 20 percent but total personal energy use by just 2 percent, and total greenhouse gas emissions by 4 percent. As such, were IPCC's "most extreme" scenario of global veganism to be realized—in which, by 2050, humans completely cease to consume animal products and all livestock land is reforested—total carbon emissions would decline by just 10 percent.</p> <p>Another study found that if every American reduced her or his meat consumption by one-quarter, greenhouse emissions would be reduced by just 1 percent. If every American became vegetarian, US emissions would drop by just 5 percent.</p> <p>Study after study comes to the same conclusion. One found that, for individuals in developed nations, going vegetarian would reduce emissions by just 4.3 percent, on average. And yet another found that, if every American went vegan, emissions would decline by just 2.6 percent.</p> <p>Plant-based diets, researchers find, are cheaper than those that include meat. As a result, people often end up spending their money on things that use energy, like consumer products. This phenomenon is known as the rebound effect. If consumers respend their saved income on consumer goods, which require energy, the net energy savings would only be .07 percent, and the net carbon reduction just 2 percent.</p> <p>It is for that reason that reducing carbon emissions in energy, not food or use of land more broadly, matters most. And energy includes electricity, transportation, cooking, and heating, nearly 90 percent of which globally are fossil fuels.</p>	Accepted - We have changed the text and have removed "major impact on emissions".	Michael Shellenberger	Environmental Progress	United States of America

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
46449	50	33	50	46	This repeats fallacy that international action is necessary to reducing emissions, which is contradicted by history, see comments 1 - 3 above. There is no substantive basis for the claim that "growing movements in society are starting to affect the politics." This is asserted without substantiation. After a major grassroots movement in Britain with Extinction Rebellion shutting down streets with the support of Greta Thunberg, the Labour Party, which had a climate policy agenda that the authors of this IPCC report no doubt would label "stronger" than the Conservative Party's, lost in its worst defeat since 1935. The paragraph repeats the unsubstantiated and indeed contradicted claim that nationalism is somehow an obstacle for deep decarbonization.	Broadly, the larger and stronger the state, the less its actions will depend on international arrangements - but much of the world is not like that. All the evidence is that poorer and weaker countries depend more on international frameworks and linkages. Even the US sought to make its actions conditional on China ... the literature is very clear about international interdependences as outlined in relevant sections	Michael Shellenberger	Environmental Progress	United States of America
46691	12	33	12	34	Highlighting Laudato Si' as "the most prominent" religious/spiritual voice on climate change is an unjust, Western-centric and Catholic-centric statement that disregards the heroic efforts on this matter performed by many other global religious leaders, most prominently the Dalai Lama. Such leaders have been raising strong voices warning about the impacts and inequalities caused by climate change since long ago (at least since the late 1980s) and about our duties to protect future generations and the natural world since much earlier. Major examples of international inter-religious declarations on environment and climate change are recorded in the reports and annals from the Global Forum of Spiritual and Parliamentary Leaders (1988, 1990, 1992, 1993) and the Millennium World Peace Summit of Spiritual and Parliamentary Leaders (2001). While Pope Francis' encyclical was timely and very important for the catholic world, its main prominence comes from the fact that it marked a decisive and much longed change in the institutional position of the Catholic Church on the issue of climate change, and weakened the foundations of many catholic "climate skeptics". We cannot, however, ignore the global socio-environmental awareness promoted by the lifeworks of the Dalai Lama and other spiritual leaders from diverse religions around the world. Therefore, I support citing Pope Francis' encyclical, but it should be mentioned side-by-side with the efforts made by the Dalai Lama and other spiritual leaders.	Accepted - we changed the sentence	Sergio Henrique Faria	Basque Centre for Climate Change (BC3)	Spain
46693	51	1	51	1	Fig. 1.8: This pie chart is a nice figure, but the equally-sized slices are a bit confusing, since some cover just one chapter and others cover a number of chapters. I believe it would be easier to understand if the slice size were somehow proportional (possibly non-linearly) to the number of chapters included in each slice.	Good suggestion	Sergio Henrique Faria	Basque Centre for Climate Change (BC3)	Spain
46699	4	36	4	37	Please amend the text into: "...which society demands to be possible, in particular when taking co-benefits into account, though achieving...".	Text has been revised.	Mikael Karlsson	KTH Royal Institute of Technology	Sweden
46701	4	44	4	44	Please amend into: "... options, co-benefits and cost-effective delivery of multiple objectives...".	Text has been revised.	Mikael Karlsson	KTH Royal Institute of Technology	Sweden
46703	15	24	15	26	After "... development aspirations...", please add the following referenc: "Mikael Karlsson, Eva Alfreddsson & Nils Westling (2020) Climate policy co-benefits: a review, Climate Policy, DOI: 10.1080/14693062.2020.1724070".	Suggestion of reference noted.	Mikael Karlsson	KTH Royal Institute of Technology	Sweden
46705	15	26	15	26	Please add "diet and health" as another co-benefits in the exemplification.	The list is not intended to be exhaustive.	Mikael Karlsson	KTH Royal Institute of Technology	Sweden

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
46707	15	32	15	32	Please insert the following sentence before "The key...": In order to highlight the various ways that synergies can occur, it has been suggested to label "climate policy co-benefits", i.e. mitigation benefits in addition to avoided climate change, as Type 1, and "climate co-benefits", i.e. climate mitigation resulting from a measure in another policy field, as Type 2, and benefit synergies of policies with multiple objectives as Type 3 (Mikael Karlsson, Eva Alfredsson & Nils Westling (2020) Climate policy co-benefits: a review, Climate Policy, DOI: 10.1080/14693062.2020.1724070).	Suggestion adapted; thank you.	Mikael Karlsson	KTH Royal Institute of Technology	Sweden
46709	37	24	37	25	Please add after "... not impossible.": "A recent major review by Karlsson et al. (2020) also shows that the co-benefits frequently resulting from climate policy seldom are monetized and considered in policy-making, leading to biased decisions and overestimations of costs."	Noted, reference included	Mikael Karlsson	KTH Royal Institute of Technology	Sweden
46711	38	24	38	24	Please add after "...carbon innovation.": Identifying and communicating co-benefits of of climate policy may also offer a way of addressing perceived imbalances regarding distributional effects (Karlsson et al. 2020).	Noted, cited	Mikael Karlsson	KTH Royal Institute of Technology	Sweden
46905	36	19	36	26	This chapter may highlight the need and achievements of sectoral and regional specifications necessary in case study assessments. Just as an example, we have been involved in developing SSPs for the European agricultural sector (eur-agri-ssps.boku.ac.at; Mitter et al. 2019. Journal of Environmental Management 252, 109701; Mitter et al., 2020. Global Environmental Change (under review)). There are several other initiatives, e.g. for the baltic sea region, on the food sector (developed by PIK, Germany, etc. These initiatives typically have a strong stakeholder buy-in, which increases credibility and trust.	Use as example for national modelling	Martin Schönhart	University of Natural Resources and Life Sciences, Vienna	Austria
46921	32	37			typo: replace "The important of policy..." with "The importance of policy..."	Typo has been addressed.	Taran Fæhn	rerserach institute	Norway
46923	32	41	34	35	On Section 1.4.10 "International cooperation", I miss the mentioning and brief discussion of recent years' literature on the feasibility and impacts of supplementing an inefficient, unambitious, and for several participants unbinding, Paris Agreement with a treaty among producers of fossil fuels on regulating . Here are some (in my view among the most central and ranged accordingly) papers: (1) Hoel, M.O. (1994): Efficient Climate Policy in the Presence of Free Riders, Journal of Environmental Economics and Management 27(3): 259–274. <a href="http://dx.doi.org/10.1006/jeem.1994.1038">http://dx.doi.org/10.1006/jeem.1994.1038</a> , (2) P. Erickson, M. Lazarus, G. Piggot, Limiting fossil fuel production as the next big step in climate policy. Nature Climate Change 8, 1037–1043 (2018); (3) Asheim. G. B., T. Fæhn, K. Nyborg, M. Greaker, C. Hagem, B. Harstad, M. O. Hoel, D. Lund, K. E. Rosendahl (2019): The case for a supply-side climate treaty, Science 365(6451):325-327, DOI:10.1126/science.aax5011; (4) Fæhn T., C. Hagem, L. Lindholt, S. Mæland og K.E. Rosendahl (2017). Climate policies in a fossil fuel producing country: demand versus supply side policies, The Energy Journal 38(1),77–102. (5) Harstad, B. (2012). Buy Coal! A Case for Supply-Side Environmental Policy, Journal of Political Economy 120(1), 2012: 77-115; (6) Green, F., & Denniss, R. (2018). Cutting with both arms of the scissors: The economic and political case for restrictive supply-side. SEE ALSO MY COMMENTS 10 AND 11.	The characterisation of the Paris Agreement as presnted here is highly subjective. The role of parallel initatives as supplment to the UNFCCC regime is mentioned in the section.	Taran Fæhn	rerserach institute	Norway



Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
47109	3	18	3	19	Add "net" before "emissions reductions". Climate stability requires that CO2e removals equal or exceed additions. Recognising this essential conceptual distinction, climate stability could theoretically be achieved without emission reductions if carbon dioxide removals achieve large scale. The role of emission reduction is essential for environmental repair and economic efficiency, but its share within the overall task of climate stability has been oversold, as CDR will have to have a bigger net role.	This part of the Executive Summary (ES) has been edited out following a complete revamping of the ES.	Robert Tulip	Australian National University	Australia
47111	4	32	4	37	For Costs of Transition, the key measure of climate response methods should be impact on radiative forcing. Many ways to reduce GHG emissions may have less RF impact than alternative strategies that focus on increasing albedo and removing CO2 from the air. It is a regrettable omission that the AR6 draft has nothing to say about albedo enhancement, despite the numerous effective methods proposed for solar radiation management such as marine cloud brightening and stratospheric aerosol injection.	Text has been revised.	Robert Tulip	Australian National University	Australia
47113	4	38	4	42	The illustrative pathways for analytic frameworks should include a model whereby decarbonisation is replaced by carbon removal.	This is not the purpose of the analytical frames.	Robert Tulip	Australian National University	Australia
47115	5	4	5	4	The assumption that "deep decarbonisation" presents the guiding ethical framework can be challenged by a model with a high carbon economy enabled by high levels of conversion of carbon waste to assets such as food, feed, fish, forests, fuel, fertilizer and fabric (a 7F strategy).	It has not been suggested that deep decarbonization provides a guiding ethical framework for all societies. The text makes several references to the importance of pursuing climate action in the context of sustainable development.	Robert Tulip	Australian National University	Australia
47117	7	5	7	8	The claim that a positive carbon budget can keep warming below 1.5 degrees is false. Rohling, The Climate Question, explains that committed warming from past emissions means this dangerous level of warming would occur with no further emissions, indicating that Negative Emission Technologies at larger scale than total emissions are essential to stop dangerous warming through an overall net reduction in the amount of CO2 in the air and sea. The real carbon budget is negative, and should be defined as the path needed to return the atmosphere to the Holocene maximum of 280 ppm CO2, together with restoration of levels of CO2 equivalents such as methane. Speaking of a remaining carbon budget breeds complacency and misunderstanding of the real climate risks.	Reworded. The range 1.5-2 is declared Aim of Paris agreement	Robert Tulip	Australian National University	Australia
47119	7	15	7	15	Deep decarbonisation may prove to only provide weak support for sustainable development, if it emerges that conversion of CO2 into useful commodities is a better overall climate strategy than decarbonisation. Efforts to focus climate policy solely on deep decarbonisation of the world economy face strong resistance from legacy industries, indicating that failure to explore the alternative of rapid ramp up of carbon dioxide removal will come at high social cost and risk.	Not quite clear of the point. Clearly Carbon Capture and Utilisation would be helpful, but the volumes of practical utilisation seem modest compared to global emissions in add studies of which I am aware? Suggesting deep decarbonisation still needed?	Robert Tulip	Australian National University	Australia
47121	7	33	7	33	The key message should be the need to mitigate CO2 levels, not CO2 emissions. Stable emissions can be compatible with falling CO2 levels if the primary focus is Carbon Dioxide Removal.	"A key message from recent reports is the urgency to mitigate GHG emissions...." is simply re-stating what previous IPCC reports have said.	Robert Tulip	Australian National University	Australia
47123	8	9	8	10	The claims that 2 degree limit can be met without NETS are heavily disputed, eg by Rohling as noted above, and make no scientific sense in view of the obvious impact of committed warming from past emissions.	Noted. This is not being implied in the text.	Robert Tulip	Australian National University	Australia

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
47125	8	9	8	10	The IPCC strategic vision needs to give more prominence to committed warming and accelerating feedbacks as discussed by Steffen et al Trajectories of the Earth System in the Anthropocene. The draft report lacks urgency, clarity and direction in analysis of the climate emergency. The overall approach of analysing climate through the lens of social development indicates a serious complacency about the scale of climate risks.	Noted. Presumably "draft report" refers to FOD of WG3 report.	Robert Tulip	Australian National University	Australia
47127	8	12	8	13	It is outrageous for the IPCC to qualify NETs as expected "subsequently in the future" only after 2030. The primary planetary security imperative is to mobilise urgent R&D investment in NETs immediately. Only false 'moral hazard' reasoning is constraining this urgency. An unfortunate psychology of suppression of discussion of NETs in public and scientific and government discourse creates a false perception that decarbonisation is the primary climate option. In fact, the arithmetic of expected future trajectories indicates that CDR can deliver much more abatement than emission reduction can. As noted in Chapter 12, CDR could potentially deliver hundreds of gigatonnes of CO2 abatement per year, orders of magnitude greater contribution than the likely potential of decarbonisation.	Noted	Robert Tulip	Australian National University	Australia
47129	8	24	8	24	Mitigation is both an end in itself and a means to achieve sustainable development. A stable climate with a regulated atmosphere is essential for sustained prosperity, and to minimise risks of conflict and collapse.	Noted	Robert Tulip	Australian National University	Australia
47131	8	26	8	28	The call to go beyond "a narrow focus on specific mitigation and adaptation options" generates a high political risk, unduly politicising the IPCC and deterring technical engagement and investment from large corporations. Climate is too important to be held hostage to political visions of social justice. "Design of comprehensive equitable strategies" positions the IPCC to support the socialist strategy of the Green New Deal, deflecting focus from climate and antagonising many in the conservative business sector. Climate security requires reaching out to the engineering and investment expertise of industries who are often suspicious of the social agenda of the UN.	This is merely an observation and not a call for action.	Robert Tulip	Australian National University	Australia
47133	9	28	9	29	Self congratulatory language about the Paris Accord is uncalled for. Paris was a triumph of spin over substance, ignoring the central urgent role of carbon dioxide removal and albedo enhancement in stabilising the climate.	Accepted, text revised	Robert Tulip	Australian National University	Australia
47135	10	21	10	21	To say "mitigation must be pursued in the context of sustainable development" creates a high risk that the urgency of climate stability is subordinated to wealth redistribution. The IPCC should adopt a technical focus on least cost abatement of radiative forcing, not a confusing political agenda of using climate to pursue other social agendas.	Rejected. Mitigation in the context of SD is the overarching theme of AR6.	Robert Tulip	Australian National University	Australia
47137	11	21	11	27	Aggregate emissions need to include methane and other GHGs that provide more than a third of anthropogenic radiative forcing according to the NOAA AGGI report. The text wrongly only mentions CO2.	Accepted - We have included a sentence about global GHG emissions.	Robert Tulip	Australian National University	Australia
47139	14	38	14	38	The key role for NETs is reducing GHG levels, not reducing emissions, as asserted. This is an essential conceptual distinction that IPCC should clarify and not blur.	Edited.	Robert Tulip	Australian National University	Australia

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
47141	15	4	15	20	This paragraph on development presents a left wing agenda that fails to respect the dire security emergency posed by climate change. While social development does have to be central to climate policy, holding climate hostage to social objectives as seen in programs such as the Green New Deal has weak prospect of success, and should not be presented as the only path. Such political posturing has to be abandoned in order for the UN to contribute effectively to climate needs. This paragraph reflects a disturbing prioritisation of political over technological methods. There is no prospect of achieving "social justice" without ongoing economic growth, contrary to what the "critics" mentioned here assert.	This comment appears to misread the section. The central point made in the section is that the concept of sustainable development represents an attempt to address the tension between economic growth and the need for climate action. The argument that development is needed to tackle climate change and address social justice is covered in the section but so are opposing arguments.	Robert Tulip	Australian National University	Australia
47143	16	17	16	17	Figure 1.3 is unscientific fantasy. Holding temperature rise to below 1.5C is primarily a function of how fast we move to geoengineering solutions including albedo enhancement and carbon dioxide removal. Putting the SDGs central to climate policy is magical thinking that abdicates the IPCC responsibility to promote sound and feasible climate solutions.	Figure has been revised	Robert Tulip	Australian National University	Australia
47145	16	21	16	22	While the principle of synergy between the SDGs and climate goals is worthy, the high risk is that its adoption as a policy guide will lead to suboptimal investments against the core goal of cutting radiative forcing. The underlying agenda in such talk of synergy appears to be to increase pressure for wealth transfers from rich to poor, illustrating political capture of the IPCC.	Thinking about the synergy and trade off have risks and benefits for both climate mitigation and development as clearly stated in the section.	Robert Tulip	Australian National University	Australia
47147	16	29	16	30	The "pledge-review-ratchet" mechanism of the Paris Accord is a sad farce, a triumph of political spin over scientific analysis. The Madrid Conference showed the prospect of achieving any ratchet is minimal without a shift of focus to immediate technology investment for carbon removal, along the lines promoted by Australia's Technology Road Map for the Climate Solutions Fund.	The point is made that the pledges do not always translate to action.	Robert Tulip	Australian National University	Australia
47149	18	35	18	35	The concept of a "remaining carbon budget" is unscientific. Remaining below 2C requires removal of carbon from the air due to the committed warming from past emissions.	Rejected.	Robert Tulip	Australian National University	Australia
47151	19	15	19	16	The claim that "The challenge of mitigation would largely disappear if fossil fuels were small, or where zero carbon resources are cheap and plentiful" is grossly unscientific and illustrates the politicisation of the IPCC away from its mandate to address climate change. Mitigation means cutting the drivers of climate change. The main driver is the committed warming from past emissions. Cutting new emissions is small by comparison to the need to remove the carbon dioxide previously emitted. The IPCC needs to grapple urgently with this real problem of CDR as the primary strategy to prevent warming, bringing language from Chapter 12 into the Framing as discussed in comments below.	As part of edits made to this section in the revised version, this sentence has been removed.	Robert Tulip	Australian National University	Australia
47153	19	23	19	23	The delusion that Paris goals can be met just by cutting emissions pervades climate thinking. Paris goals will only be met by removal of CO2 at scale, combined with measures to increase planetary albedo. Cutting emissions is likely to be a smaller factor in stabilising the climate than engineering interventions.	As part of edits made to the overall section, the line that this comment refers to has been removed.	Robert Tulip	Australian National University	Australia
47155	20	7	20	7	Assessing nexus trade offs (water-energy etc) should aim to quantify the needed role of negative emission technologies.	Accepted - reference inserted (Fajardy et al. 2018)	Robert Tulip	Australian National University	Australia

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
47157	20	19	20	19	Pleased to see mention of CDR, but there is no good reason why CDR should be presented as primarily something for cities.	Noted. In the revised text, we have removed the sub-headings and integrated the sub-sections together.	Robert Tulip	Australian National University	Australia
47159	20	40	20	40	Climate change is already stressing ecosystems, so this statement that assumes stress is only in the future is wrong.	Agreed, we now write "impacts"	Robert Tulip	Australian National University	Australia
47161	20	46	20	46	Negative Emissions do not "meet deep decarbonization goals". There is a conceptual distinction between cutting emissions (reducing the amount of CO2 added to the air) and negative emissions (removing CO2 already in the air) that IPCC should recognise. It may be theoretically possible to meet climate goals through negative emissions without any decarbonisation of the economy beyond what market forces will support.	Thank you, we have now deleted this reference to deep decarbonisation in the revised version	Robert Tulip	Australian National University	Australia
47163	27	1	27	43	The purpose of the Green Climate Fund, "to help finance the transition to a low-carbon economy", should be changed to "to cut radiative forcing as efficiently as possible". A narrow focus on quantitative effects on climate will help to choose and progress effective projects, including with potential profit for transforming carbon from dangerous CO2 to a range of productive commodities.	Accepted. The text was modified to say "to help finance developing countries' efforts to "reduce their greenhouse gas emissions and enhance their ability to respond to climate change" (GCF website).	Robert Tulip	Australian National University	Australia
47165	28	1	28	21	The focus on "low carbon" reflects the absence of strategic analysis of carbon transformation as a potential investment strategy to fix the climate, enabling an ongoing high carbon economy. For example, large scale ocean based algae production offers potential to transform CO2 into a range of profitable forms - food, feed, fertilizer, fuel, fabric, forests, fish. This '7F strategy' could be a better approach to climate stability than the IPCC focus on decarbonising the economy.	This algae production to provide 7F is also a way to decarbonise the economy since it is producing products we consume today but with a low/negative emission process.	Robert Tulip	Australian National University	ti
47167	28	36	28	40	The problems of "the centrality of fossil energy to economic development over the last two hundred years" are not in fact obvious, in view of the complexity of balancing the opportunities provided by carbon based energy against its real climate impacts. These problems do not simply imply a need to ramp up decarbonisation as fast as possible. For example, net zero emissions simply means that removals equal emissions. This could theoretically be achieved equally by massive ramping up of removals as by massive cuts to emissions. My view is that removals will be a far better strategy, since decarbonising is too slow, small, risky, divisive and costly to be a primary climate strategy. A focus on removals creates a trajectory to power through net zero to the requirement for large net negative removals. The problems of decarbonising are in fact much more complex than the assertion that they are "obvious", turning on the social and economic desirability of proposed strategies as much as on political relations of power and money.	The view that removal will be a better strategy is a valid view that is also reflected in other literature. This has no direct relationship as far as we can see to the point about the centrality of fossil in economic development which to the best of our knowledge is widely made in extant literature.	Robert Tulip	Australian National University	Australia
47169	29	1	29	17	The call for coalitions to oppose fossil fuel companies illustrates the poverty and bias of strategic thinking in the IPCC regarding fundamental policy objectives on feasible methods to reverse warming. An alternative superior strategy is to work in alliance with these industries to develop new technologies for carbon removal and albedo enhancement, a strategy with real potential to stabilise the climate, unlike the failed decarbonisation agenda, which overly politicises climate debate and generates polarisation and deadlock.	The section does not contain a call for coalitions to oppose fossil fuel companies. The section reviews literature that highlights the role of fossil fuel companies in blocking climate action but also notes the role of other political economic factors including opposition (but also support) for climate action by citizens and other industry actors.	Robert Tulip	Australian National University	Australia

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
47171	29	18	30	11	The analysis of the role of equity and justice reflects the failed strategic prism of the entire report. Nowhere yet has this report acknowledged the central truth that research and development of transformative technology should be seen as a central and urgent climate policy objective. By ignoring this important possibility, the report reduces policy to squabbling about distribution of resources within a system heading to inevitable hothouse tipping points. The only thing that can underpin equity is successful achievement of methods to remove CO2 from the air at a scale of about 100 gigatonnes per year. This key goal is only possible through a major immediate research program into frontier uses of the world ocean, which has the area, energy and nutrients needed for carbon conversion on the required scale.	Noted	Robert Tulip	Australian National University	Australia
47173	30	12	30	33	Again, the analysis of behaviour change reflects deeply biased and false assumptions that pervade the report. There is a psychology of suppression of alternative views that give primacy to technology for carbon removal. The IPCC should recognise that its own 'tribal' focus on ramping up decarbonisation represses debate about technology for carbon removal, despite lip service to this as a future possible goal. The chosen example in the report of cutting meat consumption may well be a good medium term objective, but against the urgency of stopping the accelerating feedbacks of warming, changing eating habits is marginal.	Rejected - Research on climate change mitigation tends to focus on supply-side technology solutions. A better understanding of demand-side solutions is missing. This is now mentioned explicitly in the text.	Robert Tulip	Australian National University	Australia
47175	30	34	31	42	The explanation of how institutions constrain policy objectives rightly attributes delay and sluggishness to opposition from vested interests, but then says this indicates need for "intergenerational time horizons". We do not have the luxury of such a relaxed time horizon, given the dire urgency of the climate peril. Practical immediate measures are needed. The IPCC should recognise the need to work within existing power structures and economic systems, looking to cooperate with emitters on investment in new climate repair technology rather than build coalitions to oppose these industries. The IPCC should reflect on the failure of its institutional strategy and change it. The fact as noted that democracy may not be compatible with some climate policies may say more about the lack of wisdom of those proposed climate policies than the shortcomings of democracy.	Noted	Robert Tulip	Australian National University	Australia
47177	31	42	32	39	Placing policy drivers solely in the framework of the goal of a low carbon economy fails to engage with the scale and urgency of climate change. The real policy driver for this report should be how to remove CO2 at the scale of 100 GT per year, so that governments, scientists and industry can collaborate to develop methods able to achieve that goal. The intrinsic problems of the goal of a low carbon economy are that this goal is too small, slow, costly, risky and divisive to inform a climate strategy able to stabilise and repair planetary systems. The 'low carbon' path can at best remove about one third of new emissions, and at worst can see emissions stabilise or increase, according to Climate Action Tracker. By contrast, the carbon removal policy framework offers potential to steadily increase removals to the needed level of much more than emissions, creating a feasible trajectory to return the earth to the Holocene norm of 280 ppm CO2.	We brought in a contributing author (Kate Ricke) to address geoengineering including carbon removal. However we do not find that literature supports the assertion in this comment. There will doubtless be a role for carbon removal but there is little robust evidence of specific technologies that could remove CO2 at the scale indicated or at lower cost than the numerous options for actually avoiding emission in the first place. However, we intend to review also the final version of our Chapter 12 which covers the literature more fully on this matter, and review our wording in final chapter	Robert Tulip	Australian National University	Australia

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
47179	32	41	34	35	International Cooperation - the path dependency of the IPCC assumption that international cooperation between states is the foundation of climate response has created an inadequate lowest common denominator approach. Equity is essential in cooperation, but the focus on equity in this report brings the risk of a lack of focus on adequacy. The absence of support for innovation and the political focus on social equity produces an implicit veto on the required level of R&D of new carbon removal technology. Governments focus on doing what they understand, whereas climate response requires ingenuity to create methods we do not yet understand, involving a primary role for the private sector. International cooperation to freeze the Arctic would be a practical measure to support peace and security, as an essential step to prevent accelerating feedbacks, but this is excluded by the complete absence of discussion of solar radiation management in this report.	We do not think that the report is focused on equity. Others factors including technology have been covered. We disagree that equity and adequacy as opposed. Some literature argue the very opposite - that equity enhances action.	Robert Tulip	Australian National University	Australia
47181	35	1	35	22	Scenarios require more than internal consistency, they require consistency with desired external goals. Exploration of how to stabilise the climate needs a narrative scenario implementing rapid large scale geoengineering research and development, in view of the likely impossibility of rapid emission cuts and their inadequacy even if achieved. A scenario of large scale ocean based algae production aiming to store 100 GT CO2 in a range of productive forms such as biochar, fuel and fabric could be an optimal strategy to consider in a more wide ranging scenario discussion. Such a level of carbon removal may be the minimum to deliver stability in view of earth system fragility and committed warming from past emissions. Unfortunately, it appears the climate science in the IPCC has been captured by social development politics, largely ignoring how a stable climate is a precondition for any social goals.	Several of the discussed scenarios in Chapter 3 imply massive use of negative emissions. Some explore the role of Direct Air Capture and very few explore the role of Solar Radiation Management. We will make sure reference to the latter two types of technologies is made in the chapter (check where and write here)	Robert Tulip	Australian National University	Australia
47183	37	34	37	37	The discussion of potential extreme consequences of climate change should inform the overall strategy much more. But rather than limiting to justification for carbon pricing, the risk analysis should consider the need for geoengineering as a potentially urgent response.	Addressed in 'options and instruments'	Robert Tulip	Australian National University	Australia
47185	38	16	38	17	Carbon pricing may be the best way to cut emissions, but the unasked question here is whether cutting emissions is the best way to cut radiative forcing, which should be the decisive objective. Carbon pricing sends an incentive to remove past emissions, but the real need is more akin to the security agenda that prompted the USA to launch the Manhattan Project to build the atomic bomb in World War Two, requiring leadership decisions rather than economic policy instruments. The next US President should announce a plan to achieve net zero emissions globally by 2030, akin to President Kennedy's 1961 announcement of a plan for the USA to send a man to the moon and bring him safely back before 1970. The new climate moon shot needs a primary focus on carbon dioxide removal rather than decarbonisation.	Rejected (mostly). It seems a poor analogy and no literature offered. Emissions come from vast range of sources and applications, everywhere. The challenge is just as much commercialisation and global diffusion of technologies. We do not touch on CDR, but comment offers no evidence that CDR is likely to be either cheaper or safer	Robert Tulip	Australian National University	Australia

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
47187	38	44	39	16	Path dependence analysis provides a highly valuable lens to assess carbon dioxide removal, as a more dynamic response to radiative forcing than decarbonisation. The blockage of such assessment appears largely due to fallacious moral hazard reasoning regarding how carbon removal undermines incentives to decarbonise. The IPCC has its own path dependence on decarbonisation and state primacy, which means the world is failing to learn the lessons now from needed early stage work on CDR as a vital future major industry. This failure appears in the key cited themes of technology change and realistic damage functions.	Some points on CDR now noted	Robert Tulip	Australian National University	Australia
47189	40	31	40	40	The ethical critique of managerial governance is wrong in principle, even if it provides a legitimate critique of some inadequate approaches. Climate response should be primarily a managerial technical agenda. The underlying major ethical problem of climate change is the existential risk of tipping points to extinction and collapse, which should have an urgency overwhelming all other concerns around social transformation. Subsuming this primary problem beneath so-called "deeper values" displays a dangerous complacency about existential risk on the part of the IPCC. The values promoted by ethical concerns around social equity have a longer time horizon and are less amenable to influence and change than the direct tasks needed to address climate change, which requires a narrow focus on immediate use of technology to cool the planet. The assertion that we need to "challenge the deeper values that underpin societies" to "secure the deep change required to avert dangerous climate change" is simply false, reflecting a dangerous rejection of the centrality of technology. Carbon removal at scale, the decisive task for climate stability, is less about shifting moral values across society than finding ways to stop dangerous warming using new technology. The failure to see that emissions reduction is only a small part of the physical carbon removal task is a key indicator of the complacency around the ethics of climate change response.	The point here is that effective effort to combat climate change requires or implicates value consideration that goes beyond (or sits outside) cost benefit and economic considerations. We do not agree that elevating value as a part of climate change governance implies complacency. In fact some literature suggest the very opposite.	Robert Tulip	Australian National University	Australia
47191	41	8	41	10	Frustration about failure to cut emissions needs to go back to first principles, seeing that opponents of emission cuts can easily see the economic harm of transition to a low carbon world but not the benefits, and will therefore maintain staunch resistance to decarbonisation. A more ethical, effective and conciliatory way to fix the climate would be to accept that accelerating the transition away from fossil fuels is not a feasible climate response, and that instead geoengineering technologies to remove carbon from the air and increase albedo should become the primary focus.	This view is captured in this and other sections of the report in ways that non prescriptive.	Robert Tulip	Australian National University	Australia
47193	41	5	41	5	Preventing free riding is impossible in the time frames required to stop dangerous warming. Therefore other scenarios that accept the inevitability of free riding must be urgently explored, not simply ignored due to specious arguments about moral hazard.	The chapter has examined all the leading frames and scenarios	Robert Tulip	Australian National University	Australia
47195	41	37	41	46	Language about "just transition" prioritises social science over climate science in a way that fails to respect the urgency of physically removing the dangerous excess carbon from the air. The politics of redistribution appears to be using the banner of climate for its separate motives.	Noted	Robert Tulip	Australian National University	Australia

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
47197	42	5	42	7	A focus on equity has high opportunity cost, deflecting attention and investment from the urgent climate priority of investment in new technology R&D. Without a stable climate, equity problems will become immeasurably worse. The focus on social inequality is a dangerous hijack for climate policy.	Noted	Robert Tulip	Australian National University	Australia
47245	52	22	52	24	This statement that "Chapter 12 explores solar radiation management" is untrue. The complete absence of analysis of SRM is a major flaw in the draft report. SRM including stratospheric aerosol injection and marine cloud brightening and arctic ice thickening is essential to slow the accelerating feedbacks of climate change, especially the melting of Arctic ice. This is a primary planetary security priority which should be subject of international cooperation and leadership, especially in view of efforts by governments to open the Arctic for greater economic development. Turning the pole from white to black is a major disruption of the planetary climate stability.	Noted, thank you, Chapter 12 should revise it for the SOD and the phrase should be true.	Robert Tulip	Australian National University	Australia
47401	8	13	8	13	This passage states that less ambitious near-term trends may 'imply...Solar Radiation Management', and refers to coverage in Chapter 12, but Chapter 12 does not contain any content on SRM.	Changed	Kelly Wanser	SilverLining	United States of America
47403	8	16	8	23	Constraining global temperature through solar radiation management is significantly less expensive than other forms of mitigation, particularly on short time-horizons. In the near-term (10-30 years), it may also be significantly less uncertain than other mitigation approaches in reducing heat energy in the climate system (CITE), and thereby reducing impacts and preventing feedbacks, adding to its relative value. This requires adjustment for uncertain side-effect risks and governance challenges, but some contextualized discussion of this is warranted. Lawrence, M.G., Schäfer, S., Muri, H., Scott, V., Oschlies, A., Vaughan, N.E., Boucher, O., Schmidt, H., Haywood, J. and Scheffran, J., 2018. Evaluating climate geoengineering proposals in the context of the Paris Agreement temperature goals. Nature communications, 9(1), pp.1-19. <a href="https://doi.org/10.1038/s41467-018-05938-3">https://doi.org/10.1038/s41467-018-05938-3</a>  MacMartin, D.G., Kravitz, B. and Rasch, P.J., 2015. On solar geoengineering and climate uncertainty. Geophysical Research Letters, 42(17), pp.7156-7161. <a href="https://doi.org/10.1002/2015GL065391">https://doi.org/10.1002/2015GL065391</a>	SRM is not mitigation. This section is titled "Previous ARs and SRs Key Findings" and simply summarises the findings of these reports.	Kelly Wanser	SilverLining	United States of America
47405	13	24	13	24	There have been substantial developments in the Carbon Dioxide Removal and Solar Radiation Management sectors since AR-5 that warrant coverage. Carbon Dioxide Removal has seen substantially increased commercial investment, successful pilots and increased government funding in the United States and elsewhere. Orr, L. (2018) "Carbon Capture, Utilization, and Storage: An Update", SPE Journal, <a href="https://scs.stanford.edu/sites/g/files/sbiybj7741/f/spe-194190-pa_carbon_capture_utilization_and_storage.pdf">https://scs.stanford.edu/sites/g/files/sbiybj7741/f/spe-194190-pa_carbon_capture_utilization_and_storage.pdf</a>  National Academy of Science Engineering and Medicine, Climate Intervention, Carbon Dioxide Removal and Reliable Sequestration (2015), <a href="https://www.nap.edu/catalog/18805/climate-intervention-carbon-dioxide-removal-and-reliable-sequestration">https://www.nap.edu/catalog/18805/climate-intervention-carbon-dioxide-removal-and-reliable-sequestration</a>	Noted - we have removed this subject from this subsection, but a more thorough description of solar radiation management has been moved to subsection 1.5.3.	Kelly Wanser	SilverLining	United States of America



Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
47407	13	24	13	24	<p>Significant developments in solar radiation management since AR-5 include:</p> <ul style="list-style-type: none"> <li>•In 2015, the United States National Academy of Sciences, Engineering And Medicine published an assessment of techniques for directly reducing warming in climate by increasing the reflection of sunlight away from Earth. The study assessed a broad array of proposed solar radiation management techniques. As part of its findings, it recommended research efforts in the United States and identified research in stratospheric aerosol injection and marine cloud brightening as priorities. (National Academies of Science, Engineering and Medicine (2015), Climate Intervention: Reflecting Sunlight to Cool Earth, NASEM, <a href="https://www.nap.edu/catalog/18988/climate-intervention-reflecting-sunlight-to-cool-earth">https://www.nap.edu/catalog/18988/climate-intervention-reflecting-sunlight-to-cool-earth</a>)</li> <li>•In 2015, the Institute for Advanced Sustainability Studies in Potsdam, Germany launched the Solar Radiation Governance Initiative (SRMGI) and DECIMALS (Developing Country Impacts Modelling Analysis for SRM) Fund to support research in solar climate intervention by scientists in developing countries. In the past few years, SRMGI held meetings in London, Berlin, Kenya and elsewhere for dialogue among representatives from developing countries and small island states including Kenya, Bangladesh, Barbados, Dominican Republic and others (“The Decimals Fund”, <a href="http://www.srmgi.org/decimals-fund/">http://www.srmgi.org/decimals-fund/</a>);</li> <li>•In 2017, the Indian Department of Science and Technology research and development program (MRDP) to understand the implications of geoengineering on developing countries like India. (Bala, G., Gupta, A. (2019), “Solar Geoengineering Research in India”, Bulletin of the American Meteorological Society, <a href="https://journals.ametsoc.org/doi/full/10.1175/BAMS-D-18-0122.1">https://journals.ametsoc.org/doi/full/10.1175/BAMS-D-18-0122.1</a>);</li> <li>•In March 2019, NGO SilverLining published a comprehensive report which was widely circulated among policymakers, the diplomatic corps, federal</li> </ul>	<p>The reviewer is correct that much research on geoengineering has occurred since the last assessment report. There is now a small designated section in our chapter written to talk about geoengineering issues. Due to space constraints, it's not possible to give an in-depth treatment of individual research initiatives, so we focus on citing reports that survey the literature that will form a helpful starting point for readers that hope to learn more.</p>	Kelly Wanser	SilverLining	United States of America

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
47409	13	24	13	24	<p>Since AR-5, escalating impacts have increased activity in atmospheric weather modification and localized SRM in attempts to counter them.</p> <ul style="list-style-type: none"> <li>•In 2015, the United Arab Emirates launched The UAE Research Program for Advanced Rainmaking Science, making grants of \$5m per year to researchers from around the world, operating in conjunction with experimental flights and weather stations throughout the UAE ("The UAE Research Program for Advanced Rainmaking Science", <a href="http://www.uaerep.ae/">http://www.uaerep.ae/</a>);</li> <li>•In 2018, China launched a large-scale weather modification program designed to generate 10 billion m3 of additional rainfall in the Tibetan Plateau (Forbes (2018), "China Is Launching Weather-Control Machines Across an Area the Size of Alaska", Forbes, <a href="https://www.forbes.com/sites/trevornace/2018/05/10/china-is-launching-a-massive-weather-control-machine-the-size-of-alaska/#19e9b8286315">https://www.forbes.com/sites/trevornace/2018/05/10/china-is-launching-a-massive-weather-control-machine-the-size-of-alaska/#19e9b8286315</a>);</li> <li>•In 2019, the Australian government provided substantial funding for research in marine cloud brightening to reduce warming of the Great Barrier Reef (NPR (2018), "Australia Investing \$377 Million To Protect Great Barrier Reef", NPR, <a href="https://www.npr.org/sections/thetwo-way/2018/04/30/607037119/australia-investing-377-million-to-protect-great-barrier-reef">https://www.npr.org/sections/thetwo-way/2018/04/30/607037119/australia-investing-377-million-to-protect-great-barrier-reef</a>, Saving the Great Barrier Reef (2019) "Marine Cloud Brightening the Great Barrier Reef", <a href="https://www.savingthegreatbarrierreef.org/">https://www.savingthegreatbarrierreef.org/</a>);</li> <li>•In January 2020, Indonesian authorities launched salt flares into offshore clouds in an attempt to prevent rainfall on land during a period of record flooding (BBC (Jan 2020), "Jakarta Floods: Cloud Seeding Used to Try to Stop Rain", BBC, <a href="https://www.bbc.com/news/world-asia-50981453">https://www.bbc.com/news/world-asia-50981453</a>)</li> </ul>	Noted- we thank you for this list, but this is just a short summary of developments, and we do not go into details here.	Kelly Wanser	SilverLining	United States of America
47411	23	9	25	39	This section is missing any discussion of the development of solar radiation management technologies to "enhance potential for transformative changes, in particular to help deliver climate goals simultaneously with other SDGs." AR5 treated these topics extensively (see, e.g. AR5 WGIII 3.3.7, 6.9), but the treatment in this section is limited to CCS, despite numerous developments and continuing need for understanding potential.	Accepted - we have added a paragraph on geoengineering including solar radiation management.	Kelly Wanser	SilverLining	United States of America

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
47413	37	1	37	39	<p>Economic and behavioral frameworks may warrant expansion to include models that do not require collective action, notably interventions such as CDR or SRM that could be undertaken and scaled disproportionately by smaller numbers of actors. These models are frequently treated as undesirable, or a threat to social justice and equity, but their differential risk characteristics and potential benefits should be considered in the context of market failures and potential insurance models to reduce risk. The interests of more vulnerable countries in insuring against collective failure to reduce severe risks to their communities may warrant consideration of SRM techniques as a means of promoting equity and thorough exploration of their potential to promote safety as a question of social justice.</p> <p>For a discussion of sub-collective action frameworks: Engel, K.H. and Saleska, S.R., 2005. Subglobal regulation of the global commons: The case of climate change. Ecology LQ, 32, p.183. <a href="https://www.jstor.org/stable/24114448?seq=1">https://www.jstor.org/stable/24114448?seq=1</a></p> <p>For a discussion of the value of technological optionality:  G. Heutel, J. Moreno-Cruz, S. Shayegh Journal of Environmental Economics and Management 87 (2018) 24–41, Solar geoengineering, uncertainty, and the price of carbon <a href="https://www.nber.org/papers/w21355.pdf">https://www.nber.org/papers/w21355.pdf</a></p> <p>Yosuke Arino, Keigo Akimoto, Fuminori Sano, Takashi Homma, Junichiro Oda, and Toshimasa Tomoda PNAS May 24, 2016. 113 (21) 5886-5891; <a href="https://doi.org/10.1073/pnas.1520795113">https://doi.org/10.1073/pnas.1520795113</a></p>	Added discussion of SRM CDR	Kelly Wanser	SilverLining	United States of America
47415	38	31	39	20	<p>Lock-in: This section is missing a discussion of dynamic efficiency under conditions of technological uncertainty. See, for example, Cason 2019, which finds investment in R&amp;D is an important factor in dynamic efficiency when the rate of technological progress is stochastic. <a href="https://link.springer.com/article/10.1007/s10640-018-0247-7">https://link.springer.com/article/10.1007/s10640-018-0247-7</a></p>	Thank, a bit more on 'tech push' noted	Kelly Wanser	SilverLining	United States of America
47417	48	38	48	42	<p>This conclusion rests on the explicit, but vulnerable assumption that mitigation burdens will be significant. If, in fact, the mitigation burdens are comparatively light, the provisioning of global goods is highly likely, even without cooperation, (AKA the Free-Driver Problem): Wagner &amp; Weitzman 2015, <a href="https://books.google.com/books?id=omYDwAAQBAJ&amp;lpg=PP9&amp;ots=NqkZuwV-oV&amp;dq=Weitzman%20%5B2015%5D%20calls%20a%20%20E2%80%9Cfree%E2%80%90driver%E2%80%9D%20problem&amp;lr&amp;pg=PA39#v=onepage&amp;q=free%20driver&amp;f=false">https://books.google.com/books?id=omYDwAAQBAJ&amp;lpg=PP9&amp;ots=NqkZuwV-oV&amp;dq=Weitzman%20%5B2015%5D%20calls%20a%20%20E2%80%9Cfree%E2%80%90driver%E2%80%9D%20problem&amp;lr&amp;pg=PA39#v=onepage&amp;q=free%20driver&amp;f=false</a></p>	The conclusion is that purposeful governance at across scales of governance is necessary for globally effective climate mitigation. The assessment is that mitigation efforts implicates burdens and benefits.	Kelly Wanser	SilverLining	United States of America
47419	52	24	52	24	<p>Refers to coverage of environmental as well as governance challenges of solar radiation management in Chapter 12, but the environmental challenges of SRM are not addressed anywhere in the report and Chapter 12 does not contain any content on SRM at all.</p>	Accepted, thank you.	Kelly Wanser	SilverLining	United States of America

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
47453	31	25	31	30	The Paris Agreement is a legal instrument within the meaning of the Vienna Convention on the Law of Treaties and is governed by international law, Some of its provisions are legally binding while others are not. (Bodansky 2016a). For example, the Paris Agreement establishes a legal obligation on Parties to communicate and maintain an NDC and to pursue domestic mitigation measures, but does not require Parties to achieve their NDCs. It also obliges developed country Parties to provide financial assistance to developing countries. The "bindingness" of an agreement in a more general (non-legal) sense also depends on the costs (e.g., loss of reputation) to a state of non-participation, noncompliance or withdrawal ...	Accepted, text revised.	Kelly Wanser	SilverLining	United States of America
47467	3	16	3	19	The firm statement on "incompatibility" would require substantiation. I.e., what level of emissions would be compatible with what target? Also, the statement on "wholly unprecedented" reductions seems pointless, as the mentioned declared contributions are also "wholly unprecedented" and still considered wholly inadequate.	This part of the Executive Summary (ES) has been edited following the complete revamping of the ES	Zoltán Rakonczay	European Commission, Directorate General for Research	Belgium
47469	6	31	6	32	What is the evidence for/interpretation of the slowing trend? Year-on-year increases in CO2 concentrations were 0.5 ppm higher in the 6 years prior to 2020 than the 6 years prior to 2014 (2.56 for 2014-2019 vs 2.08 for 2008-2013). It seems to indicate an increasing trend in emissions, or a decline in the airborne fraction.	We have clarified distinction between slowdown in emissions, but continued rise in concentration	Zoltán Rakonczay	European Commission, Directorate General for Research	Belgium
47471	6	7	6	8	Suggest replacing "before the target is reached" with "before the target becomes unattainable". "Reaching a target" strongly implies success. In this case, avoiding the target figure is the success indicator. Reaching 1.5 degrees means a failure to stay below it, which is what we should strive for.	Accepted, thank you.	Zoltán Rakonczay	European Commission, Directorate General for Research	Belgium
47473	7	5	7	6	Reference to "meeting the 1.5oC target" is odd. If it is a reference to the Paris Agreement, then the target is not to "meet" 1.5 degrees, but to limit the temperature increase to (i.e., below) that level. Also, the Paris Agreement formulates different targets (also including "well below 2 degrees C" and "reaching a balance of anthropogenic emissions and removals". It would be more appropriate to say "limiting temperatures to 1.5 degrees C allows fro additional ..."	Reworded. The range 1.5-2 is declared Aim of Paris agreement	Zoltán Rakonczay	European Commission, Directorate General for Research	Belgium
47475	3	4	3	5	The Paris Agreement is incorrrectly quoted. There is no "towards 1.5" in that text.	Accepted, text revised	Zoltán Rakonczay	European Commission, Directorate General for Research	Belgium
47477	23	15	23	34	The overall emission impact of the IT sector should be pointed out. It is not limited to just "some" IT technologies (as mentioned in the last sentence), neither it is limited to electricity consumption. The whole IT infrastructure puts pressures on resource extraction and depletion (and associated emissions), consumption habits (including on-line shopping, which reduces trips to stores, but increases deliveries, often rapid and by air, as well as web streaming services which use massive amounts of energy) and cooling needs of data infrastructure. The (very real) emission impact of all this should be compared to the listed (and yet largely hypothetical) benefits.	accepted: The thewsis of this section is a need to maximize benefits and minimize tradeoffs.	Zoltán Rakonczay	European Commission, Directorate General for Research	Belgium

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
47479	50	33	50	33	"The world has changed hugely since the IPCC Fifth Assessment." This is not substantiated. Continuity with pre-AR5 seems more striking than any differences. The mentioned "technology revolution" is not specified and unclear: technologies like IT, biotech and renewable energies show further developments along earlier trajectories and look much more evolutionary than revolutionary, in particular in the context of mitigation. No new technology emerged, no unexpected changes happened, and some of the expected ones did not happen. The only new factors mentioned are the SDGs and the Paris Agreement, but they represent continuity with earlier international regimes (the SDGs are not "hugely" different from the MDGs and the PA reiterates the objectives of the 1992 Convention). What may have changed is the public perception of and awareness to the challenges faced. That could and should be highlighted.	The Paris Agreement and SDGs are major developments. Our judgement is that in particular the transition in technology for accessing the worlds biggest renewable energy resource, from being extraordinarily expensive, to "the cheapest electricity in history" (IEA) - at least, in many areas as cheap as fossil fuels - in particular, does amount to a revolutionary change though accept we havent explicitly defined this. Slightly reworded.	Zoltán Rakonczay	European Commission, Directorate General for Research	Belgium
47481	53	2	53	16	The definition of "mitigation" seems unuly limited. Anthropogenic forcing other than GHGs can be important and may act differently. E.g., it is well-established that albedo changes of land-use changes can be substantial compared to the GHG changes of the same LUC and may even cancel the GHG impact. It is unhelpful to suggest that "enhancing the sinks of greenhouse gases" would constitute mitigation if it led to increased radiative forcing, through associated albedo change.	Noted, thank you. We have revised the text, and no longer suggest that "enhancing the sinks of greenhouse gases constitutes mitigation". We do, however, mention greenhouse sinks as one way of removing emissions from the atmosphere, which falls under mitigation.		European Commission, Directorate General for Research	Belgium
47483	20	22	20	36	This section would be best placed to address energy quality and net energy (energy return on energy invested), which are missing from the whole chapter, but have key implications on the shift from current fossil energy sources to renewables (or CCS).	Accepted-text revised (Reference added: Brockway,et al. 2019, Nature Energy).	Zoltán Rakonczay	European Commission, Directorate General for Research	Belgium
47485	0				Entire chapter: The rebound effect should be prominently discussed in the chapter, most notably in the context of energy efficiency (which is emphasized throughout). It is currently only mentioned in 1.4.6. (p30., line 9), but it should be considered across the board and the needs and ways to limit it should be prominently discussed.	Noted in both sections 5 and 6, but the role of other chapters (eg. 5) to discuss in more depth	Zoltán Rakonczay	European Commission, Directorate General for Research	Belgium
47593	1	1	53	20	Nice work! Overall I enjoyed reading this chapter, that gave me a good overview of the main issues that comprise the mitigation literature, clearly enough for a non-expert to understand. As CLA of WG1 Ch1 I will give some general comments from that perspective.	Thankyou!	Maisa Rojas	University of Chile	Chile
47595	1	1	53	20	The overall structure of the chapter, with 9 section is good. <i>However there is almost no reference to the other WGs. As part of the scoping for the AR6, there was a clear mandate to produce a more integrated assessment among the 3 WGs. WG1 in particular ended up with a structure such as to emphasis information useful for adaptation and mitigation.</i> Section 1.6 of WG1 defines 3 dimensions of integrations for the 3 WGs: scenarios, temperature levels and cumulative CO2 emissions. It would be good if these are mentioned in this chapter	We have included a Contributing Author from WG2 for a new risk section, and explicit reference to WG1 science	Maisa Rojas	University of Chile	Chile
47597	1	1	53	20	There are a number of acronyms that are either not defined or not defined when first used: AFOLU, SD, IAMs,BRI, CDM	Noted and addressed	Maisa Rojas	University of Chile	Chile
47599	7	1	12	31	An important development since AR5 is the development of a common (across 3 working groups) risk farming. See cross chapter box 1.3	Addressed explicitly in our new section 1.3	Maisa Rojas	University of Chile	Chile
47601	6	18	6	18	include SRCLL	Added, thank you.	Maisa Rojas	University of Chile	Chile
47603	6	21	6	21	Along with better understanding of the "physical science basis" of climate change	Accepted, thank you.	Maisa Rojas	University of Chile	Chile
47605	12	14	12	21	This list is "cherry picking" impacts. Needs to be more carefully thought	Noted	Maisa Rojas	University of Chile	Chile

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
47607	12	14	12	21	You can cite here: Frame et al, 2019 (ERL): Emissions and emergence: a new index comparing relative contributions to climate change with relative climatic consequences	Accepted. The literature is now cited.	Maisa Rojas	University of Chile	Chile
47609	12	30	12	39	You can cite here : Civil disobedience movements such as School Strike for the Climate are raising public awareness of the climate change emergency. DOI: 10.1111/gcb.14978 global change biology	Accepted	Maisa Rojas	University of Chile	Chile
47611	13	1	32	30	overall sections 1.3 and 1.4 could use more confidence language when new, clearer reference to other chapter when introducing a topic and reference to Special Reports if topics have been addressed there. For example: page 14, para 17-22: is this covered in another chapter? in a SR?	We have tried to improve on cross referencing. Confidence language is reserved for the Exec Summary as per IPCC procedure.	Maisa Rojas	University of Chile	Chile
47613	19	3	19	3	is "desire" the correct term? Needs?	This sentence has been removed in the revised version	Maisa Rojas	University of Chile	Chile
47615	19	21	19	21	Fig 1.5: nice, but could link to other WGs?? See figure 1.23 WG1	The figure has been removed from the revised version	Maisa Rojas	University of Chile	Chile
47617	21	8	21	9	About "nature based solutions", this is a concept widely used in the literature and also in the UNFCCC world....but I was surprised to not seing is in the SRCCL, nor WG1 ....would be good to harminize this concept across the working groups for the SYR	Thanks for your comment, agreed. The comment does not propose any edits, hence text for nature-based solutions has not been modified.	Maisa Rojas	University of Chile	Chile
47619	24	5	24	7	Fig1.6 only shows developed countries! What about Chile for example?	Partly accepted -we use a different figure now.	Maisa Rojas	University of Chile	Chile
47621	24	23	24	33	"...seen little in the way of innovation for decades is agriculture" I think this sentence needs references. What about the SRCCL ?	Accepted - that statement has been removed.	Maisa Rojas	University of Chile	Chile
47623	29	19	29	34	This para could end with a confidence language statement : evidence? Agreement?	Noted	Maisa Rojas	University of Chile	Chile
47625	31	33	31	41	Why not mentioned here that there are a number of countries that have or are in the process of having climate change laws? Don't have the literature at hand now, but there is! Maybe need a contributing author?	Rejected. The assessment report is based on assessing current literature within the timeframe of the report.	Maisa Rojas	University of Chile	Chile
47627	35	1	36	44	There was a cross working group discussion on the usage of the terms storylines and narratives. WG1 is using "scenario storylines". Would be good to be coordinated here, see section 1.4.4 in WG1. Also, the whole section could have a table of figure.	We now have a figure to illustrate pathways	Maisa Rojas	University of Chile	Chile
47629	44	20	44	35	no reference to relevant chapter in SR15	OK	Maisa Rojas	University of Chile	Chile
47631	47	21	47	36	for a southern hemisphere perspective, you could cite : Arriagada et al, 2018: Climate change governance in the Anthropocene: Emergence of Polycentrism in Chile. <a href="https://www.elementascience.org/article/10.1525/elementa.329/">https://www.elementascience.org/article/10.1525/elementa.329/</a>	The suggested citation is helpful. However, the cited literature offer a global not a Western perspective about polycentric climate governance	Maisa Rojas	University of Chile	Chile
47633	51	13	51	13	is degrowth covered somewhere in this report??	Chapter 3 and Chapter 17	Maisa Rojas	University of Chile	Chile
47687	3	12	3	19	Why is the major contribution to the decrease of GES emissions NEVER mentionned : the <i>substitution of CFCs which represented between 15 à 20 % of total anthropogenic GES [GHG?] emissions !!</i> . This is much more than any reduction made under the Kyoto Protl and could contribute to demonstrate that it is possible to act !!	It would help if the reviewer gave a reference, but our understanding is that most of this occurred in the decades to 2010 (or at least driven by prioe agreements) so covered in previous IPCC assessments, rather than a new development?	Jacques de Gerlache	GreenFacts	Belgium
47689	3	33	3	38	The lack of teaching and application of systemic or integrative methodologies to manage complex and irreducible systems and their challenges should be more highlighted as without the adoption of such methodology no real progress will be made to overcome these challenges. A complain is not sufficient here	This comment no longer applies here as the text has been revamped.	Jacques de Gerlache	GreenFacts	Belgium
47691	4	14	4	23	these problems would be more easily covered by such operational integrative approach combining the cahallenges, the stakeholders involved and the constraint . A matrix approach is proposed in the following book with a foreward of a.o. J.P. van Ypersele	The role of (new forms of) multi-level governance is highlighted in the revised ES	Jacques de Gerlache	GreenFacts	Belgium

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
47693	4	14	4	23	<a href="https://www.dunod.com/sciences-techniques/mettre-en-oeuvre-transitions-energetiques-strategie-integrative-et-gestion">https://www.dunod.com/sciences-techniques/mettre-en-oeuvre-transitions-energetiques-strategie-integrative-et-gestion</a>	Thank you for the suggestion	Jacques de Gerlache	GreenFacts	Belgium
47695	4	38	4	42	this goes exactly in the way of suggesting to apply existing and validated integrative methodologies and should be done more explicitly	This is the point made. Thank you.	Jacques de Gerlache	GreenFacts	Belgium
47697	5	13	5	14	would be useful to make, even in the summary some suggestion of the level at which such "new governance" should be developed and adopted as these governance weaknesses extend to far more domain than only the energy transitions	The chapter covers the developments in the new forms of governance.	Jacques de Gerlache	GreenFacts	Belgium
47717					I am looking at the draft from the perspective of an RE or Chapter 1 WGI and former synthesis report author, looking to see if key concepts are consistent across working group and the chapters provide a good handshake. <i>One particularly important concept is the concept of risk. WGI ch1 has a box and a section on it, and in review questions were raised if this is consistent across WGs. I think it would be extremely helpful if the term 'risk' was discussed and its meaning in WGIII in your chapter 1, and possibly linking to WGI and WGII discussed risks as these will be important for costing climate risks on your end (right?) - while WGI probably needs to ensure to mention risk of mitigation in a helpful manner. Risk is a key concept that connects the working groups and it would make the synthesis work much easier if this was streamlined early on (and chapters 1 is probably the place to do it). As such, it would be excellent if some WGIII Chapter 1 people commented on WGI chapter 1 to make sure its consistent as well, as there is a danger of overlap (possibly productive but possibly confusing eg on values which is dealt with very nicely in this chapter. and also the discussion on emissions)</i>	We have included a section on Risk in new section 1.3, led by Contributing Author from WG-II and with explicit reference to the IPCC Risk Guidelines	Gabriele Hegerl	University of Edinburgh	United Kingdom (of Great Britain and Northern Ireland)
47719	3				The executive summary communicates well to a nonspecialist and is engaging and very interesting.	Thank you. The ES has been revamped. We hope the reviewer continues to like it.	Gabriele Hegerl	University of Edinburgh	United Kingdom (of Great Britain and Northern Ireland)
47721					I am a bit surprised extreme climatic events aren't mentioned more as causing key costs of climate change - the recent few years have provided some good examples - it is mentioned as a risk to the financial sector in the ES	We have included a section on Risk in new section 1.3, with more reference to the science and impacts - also extreme events touched on in some of the later discussion	Gabriele Hegerl	University of Edinburgh	United Kingdom (of Great Britain and Northern Ireland)
47723	12				Climate impacts: it would be interesting to bring this out slightly better: what has really maintained interest is the extreme events particularly where impactful (right?) - the recent Australian fires, US fires as you say, and also flooding events in many countries. hence extreme events might deserve a pointer.	Accepted. New phrasing includes reference to extreme events.	Gabriele Hegerl	University of Edinburgh	United Kingdom (of Great Britain and Northern Ireland)
47725	12				It might also be worth mentioning under distribution of impacts that there is some WGI type literature that unprecedented climates emerge first in countries with lower GDP. There is literature on 'emergence' of climate change that shows early emergence in the tropics and low latitudes, where the climate variability is small. Is this a point worth making - it is more WGIII than WGI area but WGI finds this pattern of earlier emergence based on climate physics in low latitudes.	Noted. This element is already included in the draft.	Gabriele Hegerl	University of Edinburgh	United Kingdom (of Great Britain and Northern Ireland)
47727	38	0	0	0	the inertia point is really interesting. Note that there is also substantial inertia in the climate system response with delayed response to concentrations which may contribute to making this problem as wicked as it is? Might be useful to link to as well	Text on inertia expanded	Gabriele Hegerl	University of Edinburgh	United Kingdom (of Great Britain and Northern Ireland)
47729	52				FAQ 1.3: could crosslink to the WGI finding that global warming is proportional to cumulative emissions making a strong case that net zero is needed to reach any threshold temperature	Noted, thank you.	Gabriele Hegerl	University of Edinburgh	United Kingdom (of Great Britain and Northern Ireland)

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
47731	52				FAQs: I am not sure I (as a nonspecialist) is asking what interlinkages are - could you phrase this more like a question a nonspecialist like me might have? Ditto input-output. On the other hand, mitigation and net zero (which might be good in the title?) is good, and the question what causes ghg emissions is excellent.	Thank you, the FAQ has been removed according to the Technical Supporting Unit guidance.	Gabriele Hegerl	University of Edinburgh	United Kingdom (of Great Britain and Northern Ireland)
47733	20	1	20	11	Human systems interact with biological and physical systems.' include a reference to biodiversity in this section given its functional role in ecosystem integrity and the provision of all ecosystem services.	Accepted - reference inserted (Mori et al. 2017)	Virginia Young	Australian Rainforest Conservation Society, Griffith University, CAN Ecosystems	Australia
47737	12	3	12	7	Note that WGI now describes a list of 'climatic impact drivers' that include extreme heat, fires, and ice sheet loss used for examples here as well as many additional factors (drought, flooding, severe storms, ocean acidification, sea ice loss, etc.). I understand that space is tight here and this short paragraph intends to provide examples rather than a comprehensive look, but it would be helpful to note the framework for this that was established in WGI CH12 (see 12.1-12.3, in particular) and continues through WGII. - A fundamental point of emphasis could be that AR6 has additional information about regional changes and the sector-specific hazards that will affect things we care about.	Accepted. Paraphrased text included.	Alex Ruane	NASA Goddard Institute for Space Studies	United States of America
47759	15	31	15	32	Bozovic, R. et al. (2016) 'Blue Green Solutions, A Systems Approach to Sustainable, Resilient and Cost-Efficient Urban Development', p. 52	Suggested reference noted.	Daniel Schertzer	Ecole des Ponts ParisTech,	France
47761	20	1	20	1	Lovejoy, S. and Schertzer, D. (2013) The weather and climate: Emergent laws and multifractal cascades, The Weather and Climate: Emergent Laws and Multifractal Cascades. doi: 10.1017/CBO9781139093811.	This reference has not been included in the revised text, as it is not clear how it fits in.	Daniel Schertzer	Ecole des Ponts ParisTech,	France
47763	34	43	34	43	The need of a holistic approach resulted into the thematic "Urban Geosciences" at AGU and EGU conferences	Noted - but not needed for the brief into themes here	Daniel Schertzer	Ecole des Ponts ParisTech,	France
47923					The style of the chapter executive summary is completely different from the usual IPCC ES style (e.g. no use of calibrated language to express confidence).	Hopefully addressed	Valérie Masson-Delmotte	CEA, IPSL/LSCE	France
47925					The framing of remaining carbon budgets in "number of years" does not reflect the IPCC AR5 WGI nor the SR15 approach, and the issue of reliance on ability to remove greenhouse gases reads as optimistic compared to the remaining uncertainties and challenges linked with the potential, limits, costs, and potential tradeoffs of CDR.	Addressed	Valérie Masson-Delmotte	CEA, IPSL/LSCE	France
47929					Figure 1.2, "our world in data 2019") reports CO2 emissions per person without clarity on methods (national? Whole footprint including trade and international transport?)	We used the standard method of territorial accounting, as detailed also in Chapter 2 and IPCC data descriptions	Valérie Masson-Delmotte	CEA, IPSL/LSCE	France
47931					Figure 1.5 is missing references to biodiversity, disasters and impacts (loss and damage, material and non material), heritage, as well as pressure on land	I believe this referred to the Sectors diagram? Which is now removed	Valérie Masson-Delmotte	CEA, IPSL/LSCE	France
47935					Chapter 1 needs to frame the role of CO2 versus non CO2 (as done in SR15), the importance of separating CO2 (cumulative effects) and non CO2 in terms of mitigation and response time of the climate system, there is also a need to introduce and assess new metrics such as GWP* to better measure the climate effect of various substances (coordination with WGI is needed here)	There is a cross-working box on this, and detailed discussion elsewhere in AR6 - however we will also review for our final draft as some technical issues of comparison were only resolved at a late stage	Valérie Masson-Delmotte	CEA, IPSL/LSCE	France
47937					There is ambiguity in section 1.5.1 between scenarios and pathways, and wording introduced here differs from wording used in SR15 (eg. Illustrative pathways). It reads as if there were only 4 pathways assessed in SR15.	This should be somewhat better addressed not least with inclusion of our section on scenarios and the Illustrative Pathways in new section 1.3	Valérie Masson-Delmotte	CEA, IPSL/LSCE	France



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47939					Coordination is needed across WG on how to introduce scenarios, including the contribution of WGIII on their plausibility, including the most extreme ones (RCP19, RCP85).	This was intended to occur through the IPs process - though unfortunately that only finalised at a very late stage which made it hard for us to make much use of it directly	Valérie Masson-Delmotte	CEA, IPSL/LSCE	France
48105					FAQ1.3 Carbon neutrality : this is very ambiguous as it refers to a balance between emissions and natural sinks, while the SR15 definition of net zero is purely related to human sources and human removals. Is it possible to coordinate across WG to ensure the coherency of approaches to such key concepts within the AR6 IPCC Reports?	There was a cross-WG dialogue on this and we have referred across to Annex A which covers it	Valérie Masson-Delmotte	CEA, IPSL/LSCE	France
48107					I am surprised by the "conclusion" for a framing chapter, and which differs from the ES (which currently is hard to trace to the underlying chapter sections).	We considered this: the Chapter is Introduction as well as Framework, we decided that the Chapter rounds off better with conclusions which flag what seem the broad themes we concluded could usefully echo through the report, in addition to the specific findings in the ES. But this may also be a matter of style with social sciences	Valérie Masson-Delmotte	CEA, IPSL/LSCE	France
48109					<i>For "fat tail risks". WGI is using the framing of "low probability, high impact" events. Is it possible to seek coordination x WG and implement a more coherent approach to facilitate integration?</i>	Yes, we added explicit section on risk and sought to avoid the 'fat tail' language of economics	Valérie Masson-Delmotte	CEA, IPSL/LSCE	France
48221	3	46	3	46	There is a gap between climate ambition and people's willingness to bear additional costs. Rephrase to include: There is a gap between climate ambition and people's (and many communities or local governments') willingness to bear additional costs. Adaptation referred to later in the section, but think it should be front loaded and defined esp. with regard to interaction with emissions--limit to how much we can mitigate at this point.	Exec Sum completely redrafted	Laurie Schoeman	Enterprise Community Partners	United States of America
48223	3	21	2	21	impacts and adaptation (AR6 WGII), the landscape of climate mitigation has evolved substantially since [ <i>the use of the phrase adaptation has grown to incorporate strategies to support adaptive behavior and design--coupled with mitigation leads to the use of the term resilient--important to note</i> ].	It is entirely true that resilience has replaced adaptation in climate literature and policy discourse. Instead both adaptation and resilience remain important and complementary. We have used both resilience and adaptation in the chapter in ways that are consistent with literature.	Laurie Schoeman	Enterprise Community Partners	United States of America
48225	7	24	7	24	Successive IPCC Assessments have increasingly emphasised the importance of climate mitigation and 22 the need to consider the broader context of multiple societal goals, particularly the broader challenges 23 of sustainable development [Need to clarify what specifically is meant by this--is this sustainable development with respect to land use, industry, etc. or specifically which SDG's goals referring to?]	"Sustainable development" is being referred to in a generic sense. The sentence alludes to multiple IPCC assessments, some which predate SDGs.	Laurie Schoeman	Enterprise Community Partners	United States of America
48227	12	3	12	4	Climate impacts. Rising global temperatures and extreme events have helped to maintain the political 3 profile of climate change in many region [What do you mean by "political profile"]	Accepted - the sentence is rewritten	Laurie Schoeman	Enterprise Community Partners	United States of America
48229	12	14	12	14	Distribution and climate impacts. While extreme poverty has fallen in more than half of the world's 14 [Need to mention impact to safe and affordable housing and impacts on housing in areas of extreme poverty as a key determinant and risk from climate change]	Rejected - we do not go into detail in this short overview.	Laurie Schoeman	Enterprise Community Partners	United States of America
48231	13	25	13	25	In conclusion, developments since AR5 have underlined that climate mitigation technology, trade, [K would invoke again some of this technology can be qualified as adaptation--not just mitigation]	Noted	Laurie Schoeman	Enterprise Community Partners	United States of America

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
48233	14	13	14	15	Specifically, the impact of climate 13 change in limiting development is most acutely felt by the world's poorest, who have the smallest 14 carbon footprint, constrained capacity to respond and limited voice in important decision-making circles [Qualify "limiting development"---many resource constrained communities are expanding in the flood plains, and spreading out. Is this referring to economic development because this affects all communities. Additionally, impacts to housing needs to be placed somewhere in framing because that is often the one impact that hurts resource constrained communities the most].	The language has been edited to clarify the meaning.	Laurie Schoeman	Enterprise Community Partners	United States of America
48235	14	27	14	29	Fundamentally, sustainable development 27 implies a close integration and the balancing of economic, social, and environmental (including climate 28 aspects) and into development process and planning. [where did this definition come from? Doesn't seem quite clear a definition] Also considering placing up front in front of entire section to make clear from beginning.	Text edited.	Laurie Schoeman	Enterprise Community Partners	United States of America
48237	1	1	1	1	Who is the audience for the report--I would recommend a bit more framing in the executive summary because it can get a bit windy throughout the report. I think starting on page 19 starting with "Achieving the Paris goals" the framing is quite appropriate for the executive section to frame out more broadly what is being discussed in report.	Exec Sum fundamentally rewritten	Laurie Schoeman	Enterprise Community Partners	United States of America
48239	21	11	21	15	Climate-land-energy-water nexus is of utmost importance to sustainable development. Water plays a 11 central role in the nexus. It is intertwined with energy production, transformation and use. It is critical 12 to human life both directly, and indirectly through agriculture and other land-based human activities. It 13 is also critical to the health of ecosystems and through the provision of ecosystem services that sustain 14 human welfare. [Add shelter somewhere in this section suggestion: It is intertwined with energy production, + shelter, ...	Thank you. This mention has been removed due to word constraints, and general editing of the section. In the revised text, we have removed the sub-headings and integrated the sub-sections together.	Laurie Schoeman	Enterprise Community Partners	United States of America
48241	28	6	28	7	Climate finance flows and access are deeply affected by political uncertainty and lack of credible public 6 commitments.[+and also capital finance flows impacted by the need to establish an ROI-Return on Investment--for investors seeking to invest funds into mitigation and adaptation). Our field needs to identify ROI to attract private capital.	Accepted. This text has been deleted.	Laurie Schoeman	Enterprise Community Partners	United States of America
48243	29	37	29	38	The reason is mainly that these countries are more dependent 37 on primary industries (agriculture, fisheries etc.) than rich countries, and that their infrastructure is also 38 in a poorer condition. Costs of mitigation also differ across countries. [Another worthwhile reason that should be considered recognizing i is lack of political representation at world stage for many of these communities--and political disenfranchisement on the world stage which inhibits interaction with financial networks. For example Puerto Rico and other Caribbean Countries not able to access networks with resource due to affiliation with countries that don't equitable represent needs]	Accepted - we have added a sentence on this.	Laurie Schoeman	Enterprise Community Partners	United States of America

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
	4	32	4	37	These statements should be based on our assessment and not in the introduction.	Accepted	Diana Urge-Vorsatz	WGIII Vice-Chair	
	5	13	5	14	<i>NEED is policy prescriptive. Instead, describe in a what if framework or other ways to highlight why it is better to choose the options you are suggesting.</i>	Accepted	Diana Urge-Vorsatz	WGIII Vice-Chair	
	5	13	5	13	wicked problem is a bit strong in an EXSum. It is not explained here. An ES should be able to stand on its own. Use a different phrase here	Accepted	Diana Urge-Vorsatz	WGIII Vice-Chair	
	6	1	6	12	As the first lines of this huge and crucial report, can we not start out with text weighing more? Even an IPCC report does not need to be dull and boring. <i>Why is this report especially important? Perhaps mention the significant changes that the world has committed to since our landmark SR1.5 (e.g. now 49% of world GDP committed towards climate neutrality)? Or that this might be (among) the last report(s) that can still inform the efforts to reach the climate action before the climate has been committed to warm 1.5C, as per the SR, etc.</i> I think also the major youth movements could be mentioned as a signal that global attention has significantly changed since AR5, and even since SR1.5, and this places unique importance on this report. There could be other ideas, too, but even for a very balanced IPCC report there can be stronger starts that raise the attention of the reader to this report and chapter more.	Accepted, changed	Diana Urge-Vorsatz	WGIII Vice-Chair	
	11	33	11	33	Fig 1-2. Great figure. Can the first billion be further broken down? It would be important to show that the top few % have a very large impact.	Taken into account. Figure 1.2 has been replaced with 1.3 a and b in line with the format of SPM 1 of AR5	Diana Urge-Vorsatz	WGIII Vice-Chair	
	11	17	13	31	This section reviews some crucial recent trends. I am surprised not to see the major shift in political and policy commitments to tackle climate change since AR5, and especially since SR15. While the most recent ones may not yet be in the peer reviewed domain, but the fact that close to half of global GDP is now "covered" by climate neutrality commitments is an important change. Their feasibility, rigor and level of implementation are also important issues, but the fact that the issue has become the center of policy and political attention in the recent years is as an important trend as technology cost developments.	In some material transferred to new section 1.3 we have included recognition of "Net Zero" commitments	Diana Urge-Vorsatz	WGIII Vice-Chair	
	8	13	8	23	<i>Presenting these figures alone in this section, without the benefits of avoiding the risks and damages caused by higher warming levels, is unbalanced and misleading. Summarising the SR on costs also needs to refer to the benefits this costs are designated to be spent for - at least in term of the level of risk reduction.</i>	Accepted A section added on risks linking to WGII	Diana Urge-Vorsatz	WGIII Vice-Chair	
	13	33	13	34	This is a very academic statement - very true but would it not be more important to recognise as the first sentence of this chapter the underlying recognition of this report that you also document above that in most countries of the world today (sustainable) development comes first, but CC is an increasing threat to that development (as you state later)? I agree this is not a question of literature but a value judgment, but is this not a general recognition in IPCC? This has a crucial implication for the entire report and cannot be just assessed from the literature, but is this not a more universal recognition? I leave it for the authors and Co-Chairs to decide, but this first sentence (or perhaps should be second?) is key for the entire report's approach to development.	Amended	Diana Urge-Vorsatz	WGIII Vice-Chair	

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
	16	16	16	18	Fig 1-3. I am not sure if this figure is very useful, or clarifies a lot of new concepts. Perhaps a rethinking is necessary to better connect the various concepts in the chapter...? The lines, esp on the right, are unclear.	Replaced by Fig from SR1.5	Diana Urge-Vorsatz	WGIII Vice-Chair	
	19	1	19	20	this coverage of drivers should rely more on existing literature, it is presently a bit arbitrary. For instance, there is no recognition of the meeting of basic human needs on which there is a nice array of recent literature; then the connection to well-being. It would be better to rely on academic literature than reports. Consider, for example, RAO, Narasimha D.; MIN, Jihoon. Decent living standards: material prerequisites for human wellbeing. Social indicators research, 2018, 138.1: 225-244., or Rao, Narasimha D., Jihoon Min, and Alessio Mastrucci. "Energy requirements for decent living in India, Brazil and South Africa." Nature Energy 4.12 (2019): 1025-1032.	The drivers do draw extensively on literature. The drivers also overlap extensively with the list of enabling factors covered in SR1.5. As we see it, meeting basic needs and decent living standard are important objectives for development policies but not drivers for or constraints against climate policy in the same way as Finance, Policy, and Technology, etc. The link between meeting basic needs /wellbeing and climate policy has been extensively explored in Section 1.4 of this report (section 1.3 in the FOD).	Diana Urge-Vorsatz	WGIII Vice-Chair	
	19	20	19	21	Useful figure for framing the rest of the report. Minor suggestions: 1. to be consistent, instead of urbanisation, name the sector, i.e. cities or urban areas. 2. consider distinguishing between good and bad outcomes: i.e. sust dev and goods and services should not be on par with emissions/pollutants. Consider marking that in a different color and shape.	Figure removed	Diana Urge-Vorsatz	WGIII Vice-Chair	
	23	35	23	35	consider replacing "batteries" by "energy storage" technologies as the latter are broader.	Corrected after 8 Oct submission	Diana Urge-Vorsatz	WGIII Vice-Chair	
	29	18	30	11	Should this subsection not mention also historical responsibility?	Rejected - historical responsibility is mentioned in subsection 1.6.3.2. We try to avoid overlap in the sections.	Diana Urge-Vorsatz	WGIII Vice-Chair	
	34	37	48		<i>This section is very interesting and well written from an academic perspective. However, in a framing chapter of an IPCC Assessment report it would be useful to slightly refocus this to be less as a textbook section and rather linking it much more to the rest of the report as well as to the implications of these framings on approaches to climate solutions. So keep what you have, but instead of discussing how much literature there is on the subject, lay out the key issues - such as in ethics. In fact one would expect that ethics might come up at the start of the whole report as a rationale for the entire climate effort rather than just one of the many relevant theories and assessment frameworks...?</i>	Accepted. Section substantially developed to give more overt and relevant conclusions	Diana Urge-Vorsatz	WGIII Vice-Chair	
	1	1	51	12	<i>Very interesting chapter from an academic perspective. However, it would be good to refocus this as a framing/introductory chapter for an IPCC report and highlight the key rationales for climate action, mitigation, and the rest of the report, and focus less on theory/analytical frameworks. These are less useful for policy- and decision-makers, or at least needs to be better connected to the relevance of climate action, solutions, and the rest of the report. The chapter well identifies key concepts used in the report, and gives a good guide to the rest of the report. Consider shortening or refocusing the theory/analytical frameworks part to make this more relevant to the rest of the report.</i>	We have tried to do this - we have a requirement in govt outline to address "frameworks, methods and tools" and this was strongly highlighted by Jim at outset; but we have worked hard to make the relevance clearer	Diana Urge-Vorsatz	WGIII Vice-Chair	