

Comment Id	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
11273	0				The concept of rebound effect is particularly important when assessing the potential mitigation impact of a strategy. It is indeed mentioned around 20 times. However, as far as I am aware, it is not defined in the Chapter. Since it is one of the overarching concepts of this Chapter, I	Rebound effects are indeed important, and relevant for all kind of options, not only demand-side options. Indeed demand-side measures are often complementary to supply side technology oriented options to avoid high rebound	Adrien Plomteux	UCL (University College London)	United Kingdom of Great Britain and
17663	0	0	0	0	First of all congratulations for this chapter. I deeply appreciate the presence of this (new) full chapter. I consider it as crucial. However, it faced an extremely ambitious challenge due to the breadth and diversity of references, concepts and analytical frameworks it has to address. The title of the chapter is revealing: it combines the concept of "social aspects of mitigation", which is a more or less disciplinary approach with the concepts of demand and services which are more analytical. We can therefore anticipate that the contours of the chapter will be vague and its content heterogeneous. It seems to me that the structure of this chapter reveals some difficulties encountered by the authors in articulating them (knowing that it is a collective exercise that has to take into account many (probably contradictory) comments from the FOD). There is no optimal solution and it is therefore probably necessary to keep an imperfect solution. Nevertheless, I believe that the structure finally proposed in this SOD is hardly satisfactory and could be improved. As a result, some of my comments below are proposals for changes that could improve it.	Noted, and thanks for the feedback. This is a first attempt to include	Thomas Le Gallic	CNRS - CIRED	France
17665	0	1	0	0	I believe that the presentation, clarity and convincing nature of this chapter is crucial to ensure that it is well received and that demand-side options will receive more consideration. One of the keys to improving this in this chapter, in my view, would be to change the headings (at different levels). The current ones often consist of a juxtaposition of terms linked by a comma, the conjunction "and" or the word "relationship". This gives them a limited meaning, and does not shed enough light on the content, on the reason why this sub-section has been written or is important. This is a general comment, and I make some suggestions below.	Noted. Changes inserted in revised version .	Thomas Le Gallic	CNRS - CIRED	France
20847	0				Please consider providing a definition of the term "behaviour". The report could also provide more detail on the diversity of approaches (sociology, economics, psychology, anthropology, etc.) and tools to move towards a change in practices.	The diversity of approaches and concepts are addressed in the social science primer. We refrain from addressing these issues in all their complexity in the chapter as we focus on assessment, not textbook issues.	Government of France	Ministère de la Transition	France
20849	0				The importance that the document gives to "nudges" is not clear. The summary indicates that it allows for "small to medium significant contributions" of GHG emissions (p. 8), but without changing lifestyles (p. 7). The lack of impact on lifestyles is not recalled in 5.4.	That is a good point. We clarify the importance of more structural changes in 5.4 and 5.5 (emphasizing the importance also of infrastructures for lifestyle changes).	Government of France	Ministère de la Transition écologique et	France
20851	0				It is suggested that the report include mentions of advertising, especially regarding social norms, consumption behaviours. There is also a lack of consideration of the growing role of social media. How can trends that encourage consumption and high emissions be countered, how can new techniques to mobilise and influence be used successfully including in new movements?	Noted. Already there in section 5.4.2 5.4.3 based on available literature	Government of France	Ministère de la Transition écologique et	France
20853	0				It is an important input of this IPCC Report to have taken account of the demand side and to explore it with the social sciences tools. But its strong links with the supply side, and the responsibility of the supply side to shape the demand are too much overlooked. There is little mention of the contribution of businesses to the increase in greenhouse gases and how business practices could help change social demand. Many proposals cannot be supported without structural changes in the economy and geopolitics.	Accepted. Section 5.4 is clear about the fact that interplay of socio-cultural factors, infrastructure and technology do shape the behavioural responses and in that dynamics policy has an important role to play. Fig 5.14 and 5.7 represent these aspects. Also 5.4.3 is revised now to reflect on business and corporate drivers.	Government of France	Ministère de la Transition écologique et solidaire	France
20855	0				While the Supplementary Material (SM) emphasises and documents the systemic dimension of change (p. 172, line 45 ff.), this position is weakened in the body of chapter 5 and is almost absent from the ES. The chapter remains constrained by the dominance of an economicist approach (with some exceptions, as in the introduction to section 5.4, pp.58-59).	The systemic perspective is important and recognized. Focus in ES is on insights that are policy relevant. ES is revised to reflect on these aspects better and now role of choice architects are shown with better assessment based on the available literature in revised draft with summary findings in Tables 5.3 a and 5.3 b	Government of France	Ministère de la Transition écologique et	France
20857	0				Please consider putting less of an emphasis on GDP as the major indicator of development (Jany-Catrice and Gadrey, 2006; Méda, 2008; Sen Stiglitz, Fitoussi, 2009; Jany-Catrice, Méda, 2013; Coyle; 2014; Jany-Catrice, Méda, 2015; Jany-Catrice, Méda, 2016; Schmeltzer, 2016; Laurent, 2017; Jackson, 2017; Cassiers, Maréchal, Méda, 2018). This is especially true when the references cited (such as Jackson 2009) evoke the need for a shift in civilisation (including culture, education - so briefly mentioned p.62 l.6-9 - and spirituality in the broad sense - inner transformation far beyond the role of religions exposed in a very conventional way p.69 l. 20-25). The negative effects of a GDP growth target on climate could also be further emphasized.	The chapter understands that wellbeing evaluation is an important dimension to allow a complementary view on climate policies, especially on the demand side. This view is well represented in the revised chapter draft both in section 5.2 and 5.4.	Government of France	Ministère de la Transition écologique et solidaire	France
28341	0	0	0	0	A general comment on this chapter – it reads like a thinly veiled advertisement for demand-side actions with very few critical insights, and pays little attention to the social science of what is known about 'social aspects of mitigation', which this chapter is also supposed to look at. Much more needs to be done on the critical side of low demand scenarios – they pose enormous risks to society, politics and ethics that go completely unacknowledged in the present form of the chapter. See Bellamy & Geden (2019) for a critique https://www.nature.com/articles/s41561-019-0475-7	Reject. The provided reference alleges that demand-side scenarios are at least equally troubling as CDR-based scenarios without assessment of consequences. But SR1.5 and SRCL already demonstrate that supply side and BECCS scenarios have much higher problematic side effects. The labelling of "social engineering" is inadequate in the sense as it presupposes that existing policies and measures would be absent from "social engineering". But the opposite is true in that large-scale consumption is "engineered" to the detriment of other dimensions of wellbeing. To properly evaluate effects and side-effects of demand-side measures, 55,000 manuscripts were scanned to extract wellbeing effects of demand-side measures, presented in the table in 5.3.	Rob Bellamy	University of Manchester	United Kingdom of Great Britain and Northern Ireland)
31053	0				Military contributions to greenhouse gas emissions are missing from Chapter 5. The values in society that promote nationalism also promote military emissions.	Rejected. No references suggested to show how this is linked to demand side mitigation options.	Daniel Helman	College of Micronesia-FSM	Micronesia, Federated States of
31115	0				Consider adding a special section to Chapter 5, highlighting the particular duty that the developed world owes to the developing world due to resource extraction during colonization, and how this duty might form a basis for their funding the global energy transition.	Rejected. Outside the purview of this chapter.	Daniel Helman	College of Micronesia-FSM	Micronesia, Federated States of
52093	0	0			Demand side solutions bring in a new entry point to solution space for climate change, however, the claim that it makes supply side technologies (e.g., BECCS) irrelevant, and to avoid all in all negative emission technologies, the claim is exaggerated as the report must incorporate as many options, alternatives, and possible solutions for decision makers. The language of the chapter should focus on brining in a new factor to contribute to the solution space rather than replacing existing possible tools.	Accepted. Text adjusted.	Government of Saudi Arabia	Sustainability Advisor to the Minister Ministry of Petroleum and	Saudi Arabia
52107	0				The chapter claims that demand-side strategies can reduce up to 80% of emissions across all sectors with high confidence. This is extremely optimistic as it involves changing human behaviour which is very difficult and complicated. In addition, demand side mitigation strategies include costs of incentives, education, promotion, strategy development which are not included in the analysis.	partially accepted. This chapter estimates potentials and not costs. Any suggestion about literature could have helped. The potential is not only from behavioural change. The change is interaction of infrastructure and technology induced as well which is shown in Figure 5.7. Literature assessment shows preferences are malleable.	Government of Saudi Arabia	Sustainability Advisor to the Minister Ministry of Petroleum and	Saudi Arabia
71473	0				Chapter 5 general comment. Dedicating a detailed chapter to behaviour and demand-side is welcome and the chapter is well-written. However, more attention should be paid to discussing the barriers to the uptake of some of these options. The chapter seems to demand social/psychological 'reform' as a condition to unleashing some of the potential reductions (without also unleashing rebound effects). Yet it is well-established (for example through MAC curves) that substantial mitigation options that are low cost (or even cost saving) can go unrealised. Section 5.3.3 argues that in the case of IAMs, under exploitation of demand-side options is a shortcoming of the models. This may be so, but on the other hand simply assuming that demand-side options (esp those driven by 'free' behavioural changes on the part of consumers) will be taken up is in a sense assuming that the barriers take care of themselves.	Partially accepted. This chapter estimates potentials of various demand side mitigation options. Barriers and roles of various social actors are discussed in section 5.4-5.6	Philippe Tulkens	European Union (EU) - DG Research & Innovation	Belgium
84079	0				The chapter is a very valuable addition to the report, and it might be very influential in emphasizing the importance of Avoid and Shift options and social aspects of mitigation. However, the descriptions of recommendations are not specific enough, and one could expect the details being included in sectoral chapters (e.g. Chapter 10 on transportation). Unfortunately this is not the case, at least in Chapter 10. I hope it can be resolved, for instance by engaging Chapter 5 authors in writing other chapters, as this could be a missed opportunity in influencing mitigation policy.	Agreed. ASI is not the explicit overarching framing theme for the AR6 report. So it has been adopted by various chapters as suitable for them.	Michał Czepkiewicz	University of Iceland	Poland

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84081	0	0			To complement the sometimes somewhat conceptual emphasis of the chapter, it may be useful to check new book with analysis of how combinations of economic and behavioural incentives arising from the metropolitan ETS schemes in Tokyo and Saitama led to substantial emission savings across multiple sectors: Arimura, T. H., and S. Matsumoto, 2021: Carbon Pricing in Japan. SpringerLink, Tokyo.	Agreed. This result is already coming out in 5.4.1 too. We use the reference to further support this insight in 5.4.1.	Michael Grubb	UCL - Institute of Sustainable Resources	United Kingdom (of Great Britain and Northern Ireland)
84091	0				The word Domain appears frequently in this chapter, but its use not always clear, or consistent - despite one indication up front. Domain is indeed a word used in various ways in different contexts in relation to transitions, the book "Planetary Economics: energy, climate and the three domains of sustainable development") uses it to describe different domains of human decision-making (specifically: individual or localised behavioural diversity; economic optimising; (iii) strategic & transformational processes in technologies, systems and society. The material covered in Chapter 5 illuminates hugely issues in "First Domain" (individual & localised) behavioural choices of small actors, as well to an important degree, large-scale "Third Domain" social process of systemic change - and its charts well their interdependencies, which find really helpful. In this chapter the word Domain is being used differently, which of course is fine in principle - but actually it seems to be used to mean different things in different places. Try doing a search on the word, you'll see what I mean ..	Accepted. We tried to avoid confusion by harmonising the concept and now it focuses on three domains : socio-cultural, infrastructure and technologies .	Michael Grubb	UCL - Institute of Sustainable Resources	United Kingdom (of Great Britain and Northern Ireland)
84093	0				The Avoid-Shift-Improve is very useful as a categorisation of service/demand-side options. But in general the language in this section may be hard for some readers to follow, and it risks being hard to get at the real substance behind the concepts. It is certainly very different from some of the language, and more empirical content. Might be worth testing some of the language against people not deeply into this kind of social science, and asking the "so what" question on what might a decision-maker take from it?	Noted. However we do not Reject the ASI framework. We use the ASI framework to show how to think going beyond incremental changes and have been used with clarification fo the terms quite substantially through the chapter so we do keep the concepts with more clarificatory notes.	Michael Grubb	UCL - Institute of Sustainable Resources	United Kingdom (of Great Britain and Northern Ireland)
84095	0				I hope the authors have a chance to comment on Chapter 1, in particular section 1.6 on the Four Analytic Frameworks. Significant parts of Chapter 5 would seem to relate particularly to the Third and Fourth Frameworks, and the exact position of behaviour and psychology between its role in (iii) transition dynamics (consumers, innovators, cultural), and (iv) the psychology of distance, perception / communication and politics of climate change is something I'd like to get sharper. Also, we struggled on where exactly to fit ASI - it is more a way of classifying (and potentially prioritising) options, rather than an Analytic framework in itself.	Noted. We for the purpose of harmonisation in SPM context we use the terms Socio-cultural, infrastructure and technology and resolve the connection between ASI and these three concepts/domains within the chapter.	Michael Grubb	UCL - Institute of Sustainable Resources	United Kingdom (of Great Britain and Northern Ireland)
3087	1		89		This chapter could be revised to better streamline a central focus upon key issues. It also warrants closer attention to the contents and approaches of other chapters in this report. In its current form, it is noticeably less well integrated into the report as a whole. Overall, the Primer is well written and tends to make key points more clearly than the same learning points are made in the main chapter. The main chapter warrants substantive revisions to more clearly articulate new knowledge, and to establish explicit links between lessons from the past and their positive contributions to the present and future.	Accepted. We revised the main chapter where messages were unclear, and/or language from the Primer more appropriate.	Beth Edmondson	Federation University	Australia
3149	1	1			This chapter marks a big improvement from the First Draft	Many thanks.	Ian Gough	CASE, LSE	United Kingdom (of Great Britain and Northern Ireland)
5319	1	1	250	35	After reading the whole chapter, I have the strong feeling that there is a confusion in the mind of the author between renewables and low carbon energies. Several times, I thought I was reading a paper issued by a green party or association, promoting Renewables, at any price, omitting some major information not in favor of wind or solar. Sincerely, I believe that IPCC must not enter into this kind of discussion and polemic. What is important is the low context in carbon. The other considerations have not their place in this report.	Rejected. We follow established assessments on cost trajectories and potentials from different kind of low-carbon energy. Important from Ch5 perspective: modular technologies, like PV, have a strong adoption point of view, in contrast with large-scale supply technologies, that are less relevant from an adoption point of view (in contrast to deployment).	Michel SIMON	Retraité/ Pdt d'association	France
15951	1	1	91	45	Having read the entire chapter, I got the impression that the quality is not at the same level in all parts. It seems not all authors have really engaged in cross-commenting and drafting of parts not allocated to them. I think that one important step towards improving (the already very good!) draft would be to motivate the whole writing team to engage in critically reading, commenting on, and in to a certain extent also drafting parts not allocated to them within the workflow. I know that writing these chapters is very demanding, and in my experience the workload is usually reduced by allocating responsibility for different parts to individual authors or groups within the team, but for this to real shine, you also need an effort to raise cross-fertilization and work on texts that reflect the entire expertise of the team in all parts.	Thanks. Good suggestion. Tried our best in the revised draft.	Helmut Haberl	University of Natural Resources and Life Sciences, Vienna	Austria
18155	1	1	250	1	COMMENT ON WHOLE CHAPTER: The benefits of demand side interventions are abundantly clear from the summary of the report however what appears missing in substantial quantity is the 'how' of changing these demand side preferences, a more thorough exploration of this would assist sovereign stakeholders in actively implementing this category of intervention. E.g. what are the most efficacious methods judicial policy makers have at their disposal to influence demand side forces to achieve more sustainable outcomes? Is it education from a young age? ensuring that products with a deleterious impact on the environment have this info displayed on their packaging - much like in the cigarette industry? Influencing the decision architecture (Nudge economics)	Accepted. Thanks for this comments. 5.4 assesses insights on the "how", including nudges and visual communication. These tools - on their own - are effective but only to limited degree. Both economic instruments and infrastructure provisions work in synergy with choice architectures and other behavioral instruments. We more clearly work this out in the ES.	Government of United Kingdom (of Great Britain and Northern Ireland)	Department for Business, Energy & Industrial Strategy	United Kingdom (of Great Britain and Northern Ireland)
20859	1				Please consider making explicit what the authors mean by the notion of well-being, with an attention to collective well-being as well (for example in health, education and social ties). Indicators could also be referred to.	Accepted. We introduce a sentence already in 5.1 explaining this.	Government of France	Ministère de la Transition	France
48111	1	1	100	1	This chapter seems to be missing and should discuss the great demand reduction that occurs automatically due to electrification and providing that electricity with clean, renewable energy. Specifically, the paper Jacobson, M.Z., M.A. Delucchi, M.A. Cameron, S.J. Coughlin, C. Hay, I.P. Manogaran, Y. Shu, and A.-K. von Krauland, Impacts of Green New Deal energy plans on grid stability, costs, jobs, health, and climate in 143 countries, One Earth, 1, 449-463, doi:10.1016/j.oneear.2019.12.003, 2019 finds that such a transition decreases end-used demand 57% due to 5 reasons: the efficiency of electric transportation over internal combustion; the efficiency of heat pumps over fossil heaters; the efficiency of electrified industry; eliminating mining of fossil fuels and uranium; and small end-use energy efficiency improvements beyond BAU.	Accepted. We now make the importance of electrification explicit in 5.3.	Mark Jacobson	Stanford University	United States of America
9893	2	16	2	21		There is no comment documented	Government of Indonesia	Ministry of Environment and	Indonesia
20861	2				Because the rebound effect is mentioned several times, it could be of interest to further develop the analysis on the existing options to overcome it.	Noted. We are following the assessment of the existing literature and no new analysis is done here.	Government of France	Ministère de la Transition	France
20863	3				Along with the demand-side that is well developed in this chapter, one could stress the importance of analysing the supply-side options of mitigation as well.	Reject. Outside the purview of the chapter	Government of France	Ministère de la Transition	France
76517	3	41	3	48	For a finding to be classified as 'high confidence', there needs to be a substantial body of literature that supports the finding. The finding here references to section 5.3.1.2 in which a single study is cited. This study is innovative and one of a kind. I cannot see how the stated confidence level is justified. Claiming such high confidence levels also undermines the funding of more research in this area. The authors should reconsider their confidence statements also for some of the other claims.	Page number mentioned in wrong as page has no text except for table of content. We assume it is page 4 and line numbers are fine. So our responses relate to page 4 line 41-48. 5.3.1.2 cites several key references. The main quantitative results are based on the most recent systematic review comprising a highly comprehensive set of underlying studies in agreement with state-of-the-art systematic review standards.	Edgar Hertwich	Norwegian University of Science and Technology	Norway
3171	4	1			Notwithstanding these criticisms, the Executive Summary is strong.	Noted with thanks	Ian Gough	CASE, LSE	United Kingdom (of Great Britain and Northern Ireland)
6103	4	20	4	27	less meat intensive diets might lead to underestimated land-use change especially when more primary lands are used for food plantation	noted. The impact is evaluated considering the supply chain and impacts are shown Figure 5.7 n revised draft of the chapter.	Liwah Wong	EIT Climate KIC, EIT RawMaterials	Germany

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8359	4	28	4	32	What about supply side implications of that? Does this need a different, post growth economy? Confidence in getting there?	Outside the purview of this chapter. Underlying chapter figure 5.7 shows how the numbers are reached and mitigation potential of demand and supply side are also shown.	Pichler Florian	Energie-Control Austria für die Regulierung der Elektrizitäts- und Erdgaswirtschaft	Austria
9699	4	10	4	13	Yes, this avoids the risks associated with CDR but creates a further risk of changing human behavior	Considered. Human behavior is changed massively all the time, for example by social networks and media. It would be important to have deliberation that decides on the choice architectures available. We now make this point explicitly in 5.4 more clearly with table based on assessment of a large body of literature.	Mustafa Babiker	Saudi Aramco	Saudi Arabia
9701	4	20	4	27	There is an opportunity cost as well as welfare cost associated with changing life style that is not accounted for in the mitigation costs in this statement.	Section 5.2 presents evidence based large scale assessment on the welfare effects of demand-side options.	Mustafa Babiker	Saudi Aramco	Saudi Arabia
11441	4	14	4	14	The figures "50-80%" do not tally with the caption of Figure 5.7 (40-80%), Please check and revise as appropriate.	Thanks for pointing out. Revised and harmonised.	SAI MING LEE	Hong Kong	China
15889	4	10	4	13	Hugely important message, should play a big role in the SPM	Noted with Thanks.	Helmut Haberl	University of Natural Resources and Life	Austria
15891	4	14	4	15	Reference of quoted % reductions unclear. Emissions of a specific year, or of projected emissions?	Please refer to figure 5.7. Period covered is until 2050.	Helmut Haberl	University of Natural Resources and Life	Austria
15893	4	23	4	23	Other animal products are not generally better than meat in terms of their GHG emissions per calorie. There are also some plant-based foods with very high GHG emissions per calorie	Reject. The assessment is based on existing literature. There is no literature suggested in support of the claim	Helmut Haberl	University of Natural Resources and Life	Austria
15895	4	35	4	36	The reason why avoiding flying is portrayed here as having a smaller potential is that there is fewer people who can afford to fly regularly, than people driving cars. For people who fly a lot, reduced flying often offers much higher reduction potentials. In other words, it would be important to phrase this in a manner avoiding confusion between global potentials (higher for cars because private cars emit more than planes, as they are more widespread) and individual options for reducing emissions (in case of high-income groups often much higher when avoiding flying, as the emissions associated with air-travel are higher than those of car use, because more km are travelled by plane)	Noted. Executive summary is for providing the key messages and details are also in the underlying sections.	Helmut Haberl	University of Natural Resources and Life Sciences, Vienna	Austria
15897	4	28	4	32	Superimportant message, should play a big role in SPM. Shouldn't that also be framed in the "cobenefit" language?	Noted with thanks. This statement is about emission reduction alone.	Helmut Haberl	University of Natural Resources and Life	Austria
15899	4	37	4	37	Dairy is an animal-based protein source, so the wording doesn't seem to make sense... - perhaps useful to point out the different levels of GHG per calorie of different animal products? I guess you could specify ranges of a couple of important products such as beef, pork, poultry meat, milk and eggs	Noted. Changed. To save on space we do not extend it further.	Helmut Haberl	University of Natural Resources and Life Sciences, Vienna	Austria
18157	4	14	4	19	When referring to 'Avoid, Shift, Improve' strategies in the text, suggest using italics or inverted commas to distinguish the type of strategy from the rest of the sentence. E.g. 'Avoid potential is largest...' may read better as 'Avoid potential is largest...'	Thanks. Done	Government of United Kingdom (of Great Britain and Northern Ireland)	Department for Business, Energy & Industrial Strategy	United Kingdom (of Great Britain and Northern Ireland)
18159	4	14	4	15	These lines refer to a "50-80%" potential reduction but Figure 5.7, p.37 line 20 suggests "40-80%". Please amend as appropriate to correct and ensure consistency when the figures are referred to throughout the chapters.	Corrected and harmonised	Government of United Kingdom (of Great Britain and Northern Ireland)	Department for Business, Energy & Industrial Strategy	United Kingdom (of Great Britain and Northern Ireland)
19577	4	11	4	13	Delete "Demand side 5.2.5.3". Reason: This chapter (5) does not assess carbon dioxide removal and therefore should not include a characterization of potential "planetary risks" purportedly associated with it.	Accepted. Changed the text	Matthias Honegger	Utrecht University, Perspectives climate research, IASS-Potsdam	Germany
20679	4	15	4	16	Please consider organising the list of changes by order of importance: for example, infrastructural, socio-behavioral and technological changes	Reject. It is not the same potential across sectors/systems per domain. So we followed domains and it gives comparability per domain across sectors.	Government of France	Ministère de la Transition	France
20681	4	16	4	19	Is it necessary to simplify in this way opportunities/sectors? "Avoid" potential is also significant in building through innovation, saving energy consumption (positive energy buildings, for example); transportation research opens to new technologies in improving existing solutions for low energy consumption and low emission. Food-related impacts are also dependant on agriculture and the food industry. These examples appear a little bit restrictive.	Noted. Examples help. These examples are the ones only with highest potential specifically mentioned. In executive summary we wanted some examples to cite.	Government of France	Ministère de la Transition écologique et solidaire	France
20683	4	26	4	26	Please define ASI	Noted. Done in Section 5.1.	Government of France	Ministère de la Transition	France
20845	4	37	4	37	"In the building sector": it should be mentioned that switching from concrete to bio sourced materials is an important way to reduced GHG emissions, at all steps of the building process	Reject. These are supply side solutions.	Government of France	Ministère de la Transition	France
24873	4	11	4	13	The statement that "Demand side mitigation avoids planetary risks associated with other mitigation strategies, and in particular carbon dioxide removal" seems very black and white. A more accurate description would be that demand side mitigation can help avoid a temperature overshoot, not CDR per se. There is plenty of literature on potential negative as well as potential positive synergies between the application of CDR and SDGs. Whether a synergy is positive or negative is very context specific, inter alia dependent on type of CDR, location and scale, and sociotechnical integration. Sweeping statements of the kind made on p. 4 line 13, on CDR, is unhelpful. I would suggest changing from "carbon dioxide removal" to "temperature overshoot". See for example: Fridahl, M., Hansson, A. and Haikola, S. (2020). Towards indicators for a Negative Emissions Climate Stabilisation Index: Problems and Prospects. Climate 8(6): 75; Geden, O. and Löschel, A. (2017). Define limits for temperature overshoot targets. Nature Geoscience 10(12): 881–882.	Accepted. Changed the text.	Mathias Fridahl	Linköping University	Sweden
28343	4	11	4	13	Section I, page 5-4, from line 11: assumed "planetary risks" are based on the quite ridiculous illustrative scales of mitigation and CDR included in IAMs and do not reflect reality – anything done at those scales would pose such risks – including demand-side management. The risks posed by the low demand side changes are omitted from the analysis and must be included. To quote Bellamy & Geden (2019) https://www.nature.com/articles/s41561-019-0475-7 "In place of what has been called geoeengineering we can find ideas that amount to social engineering — more agreeably labelled lifestyle changes — and are equally troubling. Such social engineering scenarios are welcomed in some quarters, such as the non-governmental organization umbrella group Climate Action Network, but could raise enormous social, political and ethical challenges from rapid and unprecedented intrusions into citizens' everyday lives. These include, but are not limited to: the regulation of what people eat (less meat), how much time they spend in the shower (reduced), how many children they have (fewer), and how much they can travel (less)."	Accepted. Changed the text. Self-chosen lifestyle changes avoid the conundrum suggested by the reviewer.	Rob Bellamy	University of Manchester	United Kingdom (of Great Britain and Northern Ireland)
28663	4	14	4	19	I don't understand why technological changes, like EVs for example, are considered as part of a "demand-side" strategy. This seems to me to blur the specific categorization of this chapter around demand.	seems to be wrong pages/line numbers.	MATHIEU SAUJOT	IDDR	France
30683	4	17	4	19	It would be better to explain it comprehensively.	Here only examples are cited but the figure 5.7 explains comprehensively the various actions and examples.	Government of Japan	Climate Change Division - Ministry of	Japan
30685	4	26	4	26	It would be better to add an explanation of "ASI", which is first mentioned in the chapter (or summary), so that the reader can understand easily.	Accepted. Done in revised draft in 5.1	Government of Japan	Climate Change Division - Ministry of	Japan

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31281	4	20	4	39	A good new chapter overall. Repetition in these paragraphs - so combine. Exec Summary is over 5 pages so needs shortening -as does the whole chapter. Much of the chapter is on transport, food and buildings. Has there been sufficient discussion between authors of the chapter sections covering similar topics to avoid overlap and hence also shorten the report? It doesn't seem so to me. There is also the Cross-sector chapter 12 that, inter alia, covers food in detail in 12.4 - so again there is much repetition here with section 5.3 that can be covered in one chapter or another. I realise it is more difficult for chapters to interact remotely, and no doubt some attempts to communicate and reduce duplication have been made. But there remains many opportunities to reduce chapter lengths by cross-referencing rather than repeating.	Thanks . Noted. Discussions among authors across sections and chapters have helped substantially to avoid repetitions and achieve consistency.	Ralph Sims	Massey University	New Zealand
31283	4	37			Delete "and dairy" which is a form of animal protein.	Accepted.	Ralph Sims	Massey University	New Zealand
31285	4	10			Stating demand side mitigation has been "largely overlooked" is simply not true. Hundreds of IEA reports, UN reports, FAO reports on energy smart food etc etc - together with numerous government policies, measures and establishment of agencies have been reporting on demand side opportunities for decades. Indeed even AR3's SPM stated there were "hundreds of technologies" available then. Much of this chapter is written as though it is full of new ideas whereas there is little new from a technology perspective that hasn't been well covered in earlier IPCC reports. The new material that brings a greater focus on social and behavioural changes should be kept but much of the other sections should be shortened - including using cross references as in the comment above.	Thanks for pointing out. Revised text.	Ralph Sims	Massey University	New Zealand
50057	4	14	4	15	"can" has a bit subjective, positive connotation. How about "has a technical emissions reduction potential?" 50-80% number doesn't come with any indication of difficulty (P6, L44-45 discusses the hurdles demand-side options face), and I guess this corresponds to a technical potential. Anyway, clarification is desirable.	Accepted. Changed.	Masahiro Sugiyama	University of Tokyo	Japan
50059	4	37	4	37	"building sector" should be "buildings sector"	Accepted. Changed.	Masahiro Sugiyama	University of Tokyo	Japan
55481	4	5	4	6	Briefly define "services" here so that the reader is informed from the start of the chapter.	Accepted. Added services to enhance wellbeing.	Government of United States of State	U.S. Department of State	United States of America
55483	4	14	4	15	Define ASI acronym here. Also note the typo in "Avoid-Shift-Improve".	Accepted, Done.	Government of United States of State	U.S. Department of State	United States of America
61533	4	26	4	26	Add the explanations on "ASI." An explanation of the ASI, which is being described for the first time, is needed so that the reader can understand.	Accepted, Done.	Takashi Homma	Research Institute of Innovative	Japan
61535	4	17	4	19	More explanations are needed. Fig 5.7 is the result of a single study, and I wonder if it is appropriate to emphasize this based on a single example of analysis in the Executive Summary. Also, 5.3.1.2 in this paper does not discuss the same thing (it is only mentioned in the Caption in Fig 5.7).	Reject. It is not one study. All numbers are based on multiple studies and is an assessment of literature. These are in supplementary materials now and also consistently developed with other chapters as well.	Takashi Homma	Research Institute of Innovative Technology for the	Japan
66803	4	1	9	18	This chapter contains very important messages, but they get obscured in this very lengthy ES. It is at least 1/3 too long at 4+ IPCC pages. Please consider tightening around fewer higher level messages, broadly tracking the various sub-sections, which are useful.	Accepted. Reduced length substantially.	Navroz Dubash	Centre for Policy Research	India
71475	4	1	9	18	Messages on the so far largely overlooked but very significant potential for emission reductions from demand for services and related socio-cultural aspects are clearly written in the Executive Summary. It is a new and emerging, fast growing area of research, where significant knowledge gaps persist. Knowledge about rebound effects from interactions between transformative mega-trends such as digitalisation, sharing and circular economy is still uncertain. A significant increase in peer-reviewed articles and new model results provide a solid basis to indicate, the potential for emission reductions from low-demand scenarios is significant.	Noted. Changed the text and there is a section on knowledge gap.	Philippe Tulkens	European Union (EU) - DG Research & Innovation	Belgium
72503	4	1	9	18	No doubt there is large theoretical potential for mitigation through demand-side management. But this chapter, especially the Exec Sum, seems to ignore the realities of how the majority of the global population/business world/governments operate, for example illustrated here: https://www.climatechangenews.com/2021/03/10/hall-shame-9-countries-missing-chance-green-recovery/ works. (a point also noted on p15). This paper also highlights challenges: Wiedmann et al 2020 Wiedmann, Thomas, et al. "Scientists' warning on affluence." Nature communications 11.1 (2020): 1-10. The main text generally presents a more balanced, nuanced view than comes across in the Exec Sum.	Accepted. Executive summary revised. Shortened and messages have been sharpened highlighting nuances .	Annette Cowie	New South Wales Department of Primary Industries/University of New England	Australia
72505	4	12	4	13	"Planetary risks associated with other mitigation strategies, in particular CDR", are not discussed in 5.2 or 5.3. This statement implies that all CDR is risky, ignoring that there are options that offer synergistic outcomes for climate, people and ecosystems, such as soil carbon management. See chapters 7 and 12. Refer to the relevant sections of these chapters to point the reader to a balanced discussion of the pros and cons of CDR options.	Accepted. Revised text.	Annette Cowie	New South Wales Department of Primary Industries/University	Australia
75039	4	11	4	13	I consider the statement "Demand side mitigation..." too narrow or even misleading, taking into account the (sustainable) development challenges faces by large parts of the world, i.e. with respect to required food provision/energy etc. Accordingly, you could well argue that demand side mitigation is essential but could involve trade-offs with progress against other SDGs than SDG13. I think that is sufficient to have as opening statement that "demand-side mitigation..." is an overlooked option, as the first statement rightly states. A statement regarding the risks in comparison to other mitigation options would require a more detailed statement with respect to trade-offs. Furthermore, including CDR into mitigation portfolios allows also for lower planetary risks by achieving more ambitious net reduction targets.	Noted. Changed the text.	Wilfried Rickels	Kiel Institute for the World Economy	Germany
75041	4	25	4	26	The statement needs be more precise. While lifestyle changes most likely allow for achieving reduction targets at lower cost, I doubt that there is scientific consensus if you turn to economic cost (i.e. accounting for loss in consumer surplus).	Accepted. Deleted.	Wilfried Rickels	Kiel Institute for the World Economy	Germany
75043	4	28	4	28	Low demand scenarios => Global low demand scenarios (otherwise you have international carbon leakage)	Accepted. Changed.	Wilfried Rickels	Kiel Institute for the World Economy	Germany
76519	4	11			I think you mean the 'sharing economy'. Unfortunately, the most prominent companies that classify themselves as 'sharing economy' are not really such - Uber and AirBNB are a taxi and travel company, only a small part of their business is real sharing. Where real sharing happens, it is harder to dismiss it as contributing to mitigation.	No reference to page/line.	Edgar Hertwich	Norwegian University of Science and Technology	Norway
76521	4	29			The cited section 5.3.3.1 lists two references that quantify the 'potential reduction in GHG from reduced food waste'. Here, the authors claim that we can say with 'very high confidence' that avoiding food waste reduced GHG emissions substantially. Really? I think it is a fair conjecture, but to claim that science has established a causal link between food waste and GHG emissions is not correct. It is by no means certain that less food would be produced if there was less food waste, maybe we would just eat more meat or refined foods. I have not seen any question that has investigated this issue. I believe that an adjustment of agricultural policy would also be required at the same time as reducing food waste. A more substantial body of literature showing causal connection would be required to keep this confidence statement. I would also encourage the authors to think about introducing caveats or explaining if other things need to happen at the same time, such as a revision of supply-side agricultural policies.	Noted. Accepted. Revised draft changed substantially and essence of the comment appropriately addressed by adding nuances. Line Number is wrongly mentohed.	Edgar Hertwich	Norwegian University of Science and Technology	Norway
76523	4	35			... among people who will still get adequate nutrition. There are still hundreds of millions in the world who are undernourished or malnourished and who would benefit from eating more meat or dairy products. Please limit this statement to those populations who over-consume meat and dairy products. See https://www.who.int/news-room/q-a-detail/malnutrition "Many families cannot afford or access enough nutritious foods like fresh fruit and vegetables, legumes, meat, and milk".	Noted. Sentence deleted. Revised draft changed substantially.	Edgar Hertwich	Norwegian University of Science and Technology	Norway
80567	4	38	4	38	Reducing overcooling behaviour would also reduce GHG emissions.	Accepted. Added over cooling.	Olga Savchuk	Instituto Superior	Portugal

Comment Id	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
81227	4	11	4	13	This sentence strikes me as insufficiently based on an assessment of the literature. Enhanced demand-side actions reduce the pressure to achieve supply-side reductions, but I can see nothing inherent in demand-side actions that "in particular" increases or decreases demand for CDR as compared to demand for supply-side options to reduce gross emissions. As a result, it's not just planetary risks that are reduced through increased demand-side mitigation, but all risks associated with stringent supply-side mitigation (whether it's CDR or gross supply side options). Whether enhanced demand-side mitigation reduces pressure on CDR or pressure on other mitigation options depends on the total risks and costs of those options. As this chapter doesn't do an assessment of those risks and costs it should refrain from making an implicit judgement here - but link to other chapters that provide relevant information (or cross-reference those chapters that may help form a picture).	Accepted. Changed the sentence.	Andy Reisinger	Ministry for the Environment	New Zealand
83051	4	11	4	13	The sentence "Demand side mitigation avoids planetary risks associated with other mitigation strategies, and in particular carbon dioxide removal (high confidence). (5.2, 5.3)" seems to be only loosely linked to the underlying chapter, which is problematic especially for the first bolded paragraph in the Executive Summary. The concept of "planetary risks" is not really being taken up, and there's not much on carbon dioxide removal (the concern there seems to be on certain methods like BECCS, at certain deployment rates). If you intend this to be a part of the the opening ES statement, then you need to expand on this in the chapter	Accepted. Changed the sentence.	Geden Oliver	German Institute for International and Security Affairs	Germany
83063	4	28	4	29	To avoid the common misunderstanding (even within the AR6 author team) that the term "negative emissions technologies" covers all carbon dioxide removal options, maybe you should indicate that you don't talk about ecosystem-based CDR options here, like afforestation (which is still substantial in Grubler et al. 2018, and which is not really part of the minimization effort in van Vuuren et al. 2018). The briefest option would be "negative emissions technologies like BECCS", or "technological carbon dioxide removal (options)"	Accepted. Deleted. Essence is captured in first headline statement and presented with changed language.	Geden Oliver	German Institute for International and Security Affairs	Germany
85367	4	16	4	16	This statement needs a rationale and a reference, and is more of a political statement rather than a technical. Avoiding specific modes of travel and long-haul flights requires the substitution by transportation modes with less CO2 emissions, otherwise the problem would not be solved, as the demand would surely remain.	Noted. Changed.	Neil Dickson	ICAO	Canada
85765	4	18	4	19	Suggest change to design "options".	Noted. Changed.	Government of Australia	Department of Industry, Science,	Australia
86779	4	36	4	37	Considering previous comments, and taking into consideration that no all livestock production systems shall be transformed as they already convey mitigation benefits, we suggest the following editorial changes (added language in capital letters and deleted wording between parenthesis/brackets): "In the food sector, (any) CERTAIN shifts (away from) ON animal protein and dairy PRODUCTION realises mitigation benefits".	Noted. Sentence deleted.	Government of Argentina	Ministry of Environment and Sustainable development of	Argentina
3013	5	39	5	39	Recognition should be given to the presences of many different service provisioning systems - and their potentially distinctive roles/influences upon climate change mitigation.	Noted. Sentence deleted.	Beth Edmondson	Federation University	Australia
5285	5	41	5	41	Replace Renewables by low carbon	Reject. Literature reviewed mention of renewables.	Michel SIMON	Retraité/ Pdt	France
12187	5	20	5	22	The mention that "Nuclear power is economically viable in some circumstances" is not correct, since nuclear power, especially LTO has the lowest levelized cost of electricity of all energy sources. The report on "Projected Costs of Electricity Generation 2020" recently published by the International Energy Agency and OECD Nuclear Energy Agency, proved that generation costs from new nuclear power are competitive compared with other low-carbon options, particularly when the system costs of higher shares of intermittent generation are included. As the report mentions, electricity produced from nuclear long-term operation (LTO) is highly competitive and remains not only the least cost option for low-carbon generation - when compared to building new power plants - but for all power generation across the board. The mention "in some circumstances" should be removed.	Seems to be wrong pages/line numbers.	Lavinia Rizea	SN Nuclearelectrica SA	Romania
15901	5	1	5	5	The unit should be EJ/yr, these are flows not stocks	Revised draft changed substantially and sentence deleted.	Helmut Haberl	University of Natural Resources and Life	Austria
15903	5	1	5	5	Does digitalisation always reduce energy use? I guess this very much depends on the specific form of digitalisation, right? Perhaps be more specific?	Reject. The sentence says dematerialization through digitalisation a specific case and not a general statement.	Helmut Haberl	University of Natural Resources and Life	Austria
15905	5	11	5	19	I agree that rebound is a very important problem. However, not all "rebound" effects are bad. In situations where people are poor, raising efficiency may help reduce poverty and unavailability of crucial services to satisfy basic human needs. In that case, raising efficiency may not reduce energy reduce, but can still dampen the increase associated with alleviating poverty. Perhaps such considerations can be brought in here as well?	Noted. We tried to summarise the assessment from available literature. More new publications added.	Helmut Haberl	University of Natural Resources and Life Sciences, Vienna	Austria
20685	5	1	5	1	Please further explain "by...system"	Accepted.	Government of France	Ministère de la Transition	France
20687	5	2	5	2	Giving example of service delivery systems in buildings would be appreciated.	No longer valid. Point deleted in revised version.	Government of France	Ministère de la Transition	France
20689	5	5	5	5	Digitization can lead to a sharp increase in greenhouse gases + It's not just electric vehicles: walking and cycling are also ways to improve sustainable mobility.	No longer valid. Point deleted in revised version.	Government of France	Ministère de la Transition	France
20691	5	17	5	18	Please explain the role of data collection in this context	Deleted the word.	Government of France	Ministère de la Transition	France
20693	5	39	5	40	The chapter refers strongly to non stabilized notion such as wellbeing, welfare, quality of life, life satisfaction etc. The notion of well-being seems the most frequent one, but its content is not, however, made explicit. On the one hand, no definition is given of it, and on the other hand, it is often reduced to the subjective perception of well-being, even though the standards to which individuals refer to assess their well-being are different in different countries and social categories. Moreover, the literature does not converge on the implicit idea that the sum of individual well-being will produce a social or common wellbeing. It would be necessary to refer, on the one hand, to objective measures of well-being, for example in health, education, social ties (life expectancy, socialized coverage of health expenditure, social health...) but to refer also to indicators reflecting collective dimensions of well-being, which would make it possible to break with the implicit we have stressed upon.	Noted. space constraint does not allow more additional explanation. Section 5.2 discusses in details.	Government of France	Ministère de la Transition écologique et solidaire	France
20695	5	41	5	41	"and/or" are presented as equal options but they have quite different effects. "Or" drives only to a net reduction of energy consumption. Including the energy used upstream to produce windmills, solar panels etc. the gain should be way lower than in the "And" scenario	Deleted.	Government of France	Ministère de la Transition écologique et	France
29855	5	20	5	29	Please consider to explain the benefits of circular economy in the executive summary, by e.g. adding this text either to this para or insert an additional stand-alone para: The transition to a more circular economy means that the value of products, materials and resources is maintained in the economy for as long as possible, the generation of waste minimised and the demand for primary materials reduced. Industrial processes such as production of goods in steel, cement, plastic, paper and aluminium can reduce GHG emissions when reuse and recycling contribute to reduction in primary input. We have made a similar suggestion for the first paragraph of the "Circular economy" section on page 56-57. We believe findings about circular economy such as this would improve the SPM.	Noted. Text revised and points combined to respect other comments as well.	Government of Norway	Norwegian Environment Agency	Norway
30687	5	9	5	9	It would be better to explain "employment analysis" more.	The Sentences deleted	Government of Japan	Climate Change Division - Ministry of	Japan
31331	5	11	5	19	Wonderful to see these arguments on Circular and Sharing Economy so clearly stated. Great work.	Thanks. Two paragraphs on circular economy merged due to space constraint.	Jacob HALCOMB	UNEP Affiliate	France
50061	5	30	5	31	"possible" is broad and is subject to different interpretations. How about "technical potential?"	Accepted. Changed	Masahiro Sugiyama	University of Tokyo	Japan

Comment Id	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
50063	5	32	5	32	I have a feeling that the "feasibility" is used differently than in Chapter 3.	Noted. Sentence deleted.	Masahiro Sugiyama	University of Tokyo	Japan
55485	5	1	9		There should be a discussion on the links between social inequity, environmental/climate insecurity, and conflict, especially given the increasing focus on security implications of climate change.	Noted. Sentence deleted.	Government of United States of	U.S. Department of State	United States of America
55487	5	6	5	6	"Prosumer" is not defined until much later. Suggest defining it here or using another word or phrase.	Reject. Like consumer and producer prosumer is also becoming common word both in among scientific and policy community so keep the term as it implies particular businessbodies associated with technologies. Executive summary does not allow much space to include further detailed explanation as we are supposed to reduce the length anyway.	Government of United States of America	U.S. Department of State	United States of America
61539	5	9	5	9	Please correct unclear expressions. More explanations on "employment analysis" are needed.	Noted. Deleted.	Takashi Homma	Research Institute of Innovative	Japan
79917	5	16	5	16	on first reading the phrasing "...omitting long-haul aviation.." I thought to mean 'avoid potential is largest *except* for long-haul aviation' - which I don't think it does. Best to avoid ambiguity.	Comment and page numbers do not match .	Stuart Capstick	Cardiff University	United Kingdom (of Great Britain and
79919	5	1	9	18	Terminology is fraught in this area; terms like 'lifestyle', 'behaviour' and 'individual' action seem to be used interchangeably. There will be substantial push-back to the effect that responsibility shouldn't be placed only on individuals' behaviour - which is true and I'm sure the chapter authors aren't suggesting, as stressed in places in the chapter. Nonetheless, these terms are rather triggering these days because of a reactance against individual responsabilisation. I'm not sure what better terms may be (and perhaps there aren't any) - perhaps refer to 'households' or 'citizens' where possible? A glossary or explanatory note might help to pre-empt this in any case.	Noted. Glossary terms and Social science primer explains the terms and concepts	Stuart Capstick	Cardiff University	United Kingdom (of Great Britain and Northern Ireland)
82231	5	32	5	32	In relation to WGIIICh3, I am not fully certain whether the use of the word 'feasibility' is justified here based on what appears to be just the LED scenario. Perhaps 'potential' could be better for this sentence.	Accepted. Sentence deleted.	Jarmo Kikstra	IIASA	Austria
82233	5	44	6	2	Research currently in review shows the material requirements for DLS under very modest technological improvements (https://doi.org/10.13140/RG.2.2.26909.23528). This global assessment based in the current status of decent living shows that global energy needs are still low also without high technological efficiency improvements. However, service provisions system efficiency improvements are still paramount. I would advise rephrasing this paragraph to make the use of efficiency less ambiguous.	Reject. The paragraph is about per capita energy requirement.	Jarmo Kikstra	IIASA	Austria
82619	5	41	5	41	Suggest changing "A reduction in primary energy use and/or shift to renewable energy," to "A reduction in primary energy use and/or shift to non-polluting energy sources."	Paragraph deleted.	Jonathan Cobb	World Nuclear Association	United Kingdom (of Great Britain and
82621	5	6	5	10	There are important instances where the stated text is not true. Some of the fastest deployments of low carbon energy technology were the nuclear build programmes of France and Sweden. These helped to almost entirely decarbonise electricity within a 20 year period. This expansion created a large number of jobs both during construction and in the operations period that followed. A description of nuclear employment impacts and how to measure them can be found in the joint IAEA OECD NEA report 'Measuring Employment Generated by the Nuclear Power Sector' (https://www.oecd-nea.org/jcms/pl_14912) The results indicate that direct employment during site preparation and construction of a single unit 1 000 megawatt-electric advanced light water reactor at any point in time for 10 years is approximately 1 200 professional and construction staff, or about 12 000 labour years. For 50 years of operation, approximately 600 administrative, operation and maintenance, and permanently contracted staff are employed annually, or about 30 000 labour years. For up to 10 years of decommissioning, about 500 people are employed annually, or around 5 000 labour years. Finally, over an approximate period of 40 years, close to 80 employees are managing nuclear waste, totalling around 3 000 labour years. A total of about 50 000 direct labour-years per gigawatt. Direct expenditures on these employees and equipment generate approximately the same number of indirect employment, or about 50 000 labour years; and direct and indirect expenditures generate about the same number of induced employment, or 100 000 labour years. Total employment in the nuclear power sector of a given national economy is therefore roughly 200 000 labour years over the life cycle of a gigawatt of nuclear generating capacity.	Noted. Partially changed based on other comments as well.	Jonathan Cobb	World Nuclear Association	United Kingdom (of Great Britain and Northern Ireland)
82623	5	30	5	36	This is a very optimistic position to take towards reducing overall energy demand in the future and to assert medium confidence about. The most recent IEA World Energy Outlook expects primary energy demand to grow in every scenario – even taking into account the affect of the Covid pandemic and lockdowns shows expected growth in every scenario as the developing world industrializes and increases quality of life for its people (see https://www.iea.org/reports/world-energy-outlook-2020#executive-summary) It seems the mainstream consensus position of the wider energy community is that providing wellbeing for all will almost certainly lead to an increase in energy demand in the future. While it may be true that some of the IPCC's scenarios diverge from this it seems that this consensus should be mentioned	Noted. Paragraph revised.	Jonathan Cobb	World Nuclear Association	United Kingdom (of Great Britain and Northern Ireland)
4203	6	26	6	28	This sentence might be read to suggest that decision making that does follow the (which? BTW) rational choice model does not require non-economic incentives - but that not mean that these non-economic incentives may not be preferable (or equally suitable) for political, cultural or moral reasons.	Noted. Sentence deleted.	Marcel Wissenburg	Radboud University Nijmegen	Netherlands
8361	6	35	6	40	Inert social structures may exacerbate rapid change significantly.	Rejected. Any suggested literature could have helped.	Pichler Florian	Energie-Control Austria für die Regulierung der Elektrizitäts- und Erdgaswirtschaft	Austria
15907	6	3	6	7	This text meanders between different ways of framing human wellbeing, the hedonistic (pleasure-seeking) "happiness" terminology and the more "eudaemonic" (flourishing) wellbeing language. Of course these summaries are not intended to appeal primarily to researchers, rather to practitioners and policy-makers, the question is still whether this can be phrased in a manner that does not both sides of the debate within one statement	Agree. We present a extremely short summary to maintain the required page limits. Discussions are in the chapter.	Helmut Haberl	University of Natural Resources and Life Sciences, Vienna	Austria
15909	6	13	6	13	DLS may not be a self-evident acronym	Full form is already in earlier paragraph.	Helmut Haberl	University of Natural Resources and Life	Austria
18161	6	30	6	34	This part refers to measures that can be choice and agency 'preserving' - there are also choice and agency 'enhancing' measures too - I wondered if this been considered in relation to this statement, and if this needs to be reflected also?	paragraph deleted.	Government of United Kingdom (of Great Britain and Northern Ireland)	Department for Business, Energy & Industrial Strategy	United Kingdom (of Great Britain and Northern Ireland)
20697	6	1	6	1	With time base missing, this GJ cap-1 measurement unit does not make sense: original data in Oswald et al. are measured in GJ yr-1 cap-1	Noted. Corrected	Government of France	Ministère de la Transition	France

Comment Id	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
20699	6	13	6	13	Please add "and safe" in "require better access to low emission energy sources"; because the issue is not only emissions but also health regarding existing energy sources.	Accepted. Added.	Government of France	Ministère de la Transition	France
20701	6	16	6	17	Please note that there is a wrong measurement unit with time base missing: Oswald et al's data are in GJ yr-1 cap-1.	duplicate comment	Government of France	Ministère de la Transition	France
20703	6	18	6	22	This view could be counterbalanced by the view that individuals with LOW socio-economic status, and already low GHG emissions, are role models of frugal, yet decent and sustainable lifestyles. Here, as in most of the report, the solutions advocated seem to come first from advanced countries: the low-input, low-GHG emission solutions already in place in less advanced countries remain ignored and do not seem to be able to inspire societies and policymakers of developed countries.	Reject. No literature suggested.	Government of France	Ministère de la Transition écologique et solidaire	France
20705	6	19	6	22	The idea that social dynamics can be triggered through imitation per se is highly disputable and, to a large extent, outdated. Indeed, throughout the chapter (see also section 5.4), processes of imitation ("role models", "cascading effects", "the power of role models like celebrities", "perceptions of behaviours common in others", "trending norms", "behavioural contagion", "copycat", "ideas and behaviours often spread like infectious disease", "what we do influences others", etc.) are instrumental for transformations at the individual level. Two critiques are of special importance here. First, such "behavioural" changes cannot be decoupled from economic and cultural dimensions - a lower "socio-economic status" may durably distract individuals from adopting behaviours which ultimately lead to emissions reductions. Secondly, the belief that social dynamics are processes of imitation of so-called "role models" imply social norms are subject to external pressures rather than internalization or incorporation. These mechanisms have been confirmed by major works in social sciences (and especially sociology and anthropology) since the late 19th century (from Max Weber to Pierre Bourdieu, to name two major sociologists). More generally, it questions how the authors of the chapter conceive what "social" means. Indeed, it resembles an economic understanding of the notion, where "social" and "collective" are synonymous, and relations to others are reduced to the mere spreading of information (Ego starts behaving in a certain way, and therefore informs Alter of such a change, which encourages him/her to behave in the same way). As a result, while nudges may be efficient in transforming behaviours, a real efficiency (ie. persistent or durable) implies individuals incorporate the new social norms, for example through education, social movements.	Reject. The chapter makes an assessment of the literature and is not adding any new research.	Government of France	Ministère de la Transition écologique et solidaire	France
20707	6	26	6	27	It would be useful to give examples here	Paragraph deleted.	Government of France	Ministère de la Transition	France
27665	6	22	6	22	Delete "and by lobbying for a stringent climate policies"	Reject. The chapter makes an assessment of the literature and is not adding any new research.	Eleni Kaditi	Organization of the Petroleum Exporting	Austria
27667	6	33	6	34	Delete "such as automatic enrolment in "green energy" provision via wind or solar."	Paragraph deleted.	Eleni Kaditi	Organization of the Petroleum Exporting	Austria
28665	6	3	6	7	I understand the point (proposing another concept than demand), but the sentence could be clearer in this perspective. Maybe you could clarify what is "a way of considering".	Accepted. Changed .	MATHIEU SAUJOT	IDDR	France
63609	6	41	6	45	Odd that the paragraph explains capacity but not motivation.	Noted . Now added.	Government of Canada	Environment and Climate Change	Canada
72507	6	8	6	8	This statement overstates the significance of feasible demand-side measures and is not substantiated by the material presented in the cited sections.	Accepted. Changed .	Annette Cowie	New South Wales Department of Primary	Australia
72509	6	18	6	22	This statement is out of place in the Exec Sum; not clear how it is relevant to the audience of this report nor how it relates to 5.2.3, which, rather, notes the disproportionately high contribution of the wealthy to global GHG emissions.	Noted. Text revised to reflect the disproportionate share in emission also.	Annette Cowie	New South Wales Department of Primary	Australia
82235	6	8	6	17	The last sentence of this paragraph (70 E) could be a bit less ambiguous. Firstly, it is not entirely clear whether this refers to total or implied annual energy needs (I assume the latter - but it could be confused with energy investment needs/infrastructure expansion). I would suggest making this explicit. Secondly, perhaps it would be worth rethinking the work 'guarantee', as we are likely talking about a minimum energy needs for a basket of material satisfiers. In addition, stating '70 E]' with 'high confidence' on the section might risk giving a false sense of confidence around this exact number.	Accepted. We deleted this sentence, and instead gave an order of magnitude (20-25% of potential of efficiency savings).	Jarmo Kikstra	IIASA	Austria
4209	7	39	7	39	see my remark 10.	Not clear which one	Marcel Wissenburg	Radboud University	Netherlands
8363	7	38	7	40	The good life is certainly possible beyond the current Social-economic arrangements. But can we even imagine this?	This chapter makes assessment to existing literature and do not do any original research nor express opinion.	Pichler Florian	Energie-Control Austria für die Regulierung der Elektrizitäts- und Erdgaswirtschaft	Austria
8365	7	41	7	43	Certainly depends on the social status of these people. Surely, large minorities will not have this effect in the short run, see BLM.	Not clear what BLM means	Pichler Florian	Energie-Control Austria für die Regulierung der Elektrizitäts- und Erdgaswirtschaft	Austria
15373	7	38	7	40	This paragraph is vague and unclear and leaves too many questions unanswered. Why is a change in values important? What are "GHG emission societies"? What "cultural shift"? Either extend it to include more explanation or delete.	Deleted.	Thomas Wiedmann	UNSW Sydney	Australia
15911	7	1	7	1	Perhaps better "Individual behavioral change that is not embedded..."	Accepted. Included.	Helmut Haberl	University of Natural Resources and Life	Austria
15913	7	3	7	8	In my view, it would be useful to phrase these statements in the language of consumption research rooted in practice theory, i.e. viewing people as adopting "practices" (routine activities) in reaction to their sociotechnical "embeddedness", in particular in terms of the infrastructures at their disposal, the organization of their working and family life, etc. This includes psychological mechanisms, but far exceeds them, and also offers options to change conditions that in a manner that seems plausible to foster adoption of more climate-friendly practices. See e.g. Haberl et al. 2021, Ecol Econ, doi.10.1016/j.ecolecon.2021.106949	Noted, changed the sentence to enhance clarity in meaning.	Helmut Haberl	University of Natural Resources and Life Sciences, Vienna	Austria
15915	7	21	7	27	"action by different actors" suggests that it only takes decisions of several actors to behave differently, and transition (or transformation) will ensue. I doubt that, because a transformation to zero-C living entails a complete reorganization of societies in terms of the organization of work processes, of how people dwell and nourish themselves, how they move in space, and so on.	Reject . The statement is backed by large number of literature.Can be seen by following the line of sight.	Helmut Haberl	University of Natural Resources and Life Sciences, Vienna	Austria
17085	7	41	7	43	Sentence not clear	Has been reworded	Giulio Mattioli	TU Dortmund	Germany

Comment Id	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
20709	7	29	7	29	Cultural change is intricately combined with representations and cognitive frameworks: there is a need to (pursue the) change (in) our representations of the world and the place of humans in nature so as to reintegrate societies and humans into nature (Descola, 2005; Méda, 2013; EEA, 2021); changes in our cognitive frameworks and disciplines, particularly the place of economic reasoning (Dedeurwaerdere, 2014; Méda, 2013); changes in reference indicators and relativization of GDP as major indicator (Jany-Catrice and Gadrey, 2006; Méda, 2008; Sen, Stiglitz, Fitoussi, 2009; Jany-Catrice, Méda, 2013; Jany-Catrice, Méda, 2015; Cassiers, Maréchal, Méda, 2018; Laurent, 2017; Jackson, 2017; Coyle; 2014; Schmeltzer, 2016). This is all the more regrettable since many of the references cited (such as Jackson 2009) evoke the need for a shift in civilisation (including culture, education - so briefly mentioned p.62 l.6-9 - and spirituality in the broad sense - inner transformation far beyond the role of religions exposed in a very conventional way p.69 l. 20-25). To support the issue of systemic change, see for example Cassiers 2014, Raworth 2017, Jackson 2017 (updated and more extended than Jackson 2009), Cassiers, Maréchal & Méda 2018. References: Cassiers, I. (ed.), 2014: Redefining Prosperity, Routledge, Studies in Ecological Economics. Cassiers, Maréchal, Méda, (eds.) 2018: Post-growth Economics and Society. Exploring the path of a Social and Ecological Transition, Routledge, Studies in Ecological Economics ; Coyle, D., 2014: GDP: A Brief but Affectionate History - How GDP came to rule our lives—and why it needs to change, Princeton University Press ; Dedeurwaerdere, T., 2014: Sustainability Science for Strong Sustainability. Edward Elgar ; Descola, P. (2005). Par-delà nature et culture (Vol. 1). Paris: Gallimard. ; European Environment Agency, 2021: Growth without economic growth, 11 janvier, https://www.eea.europa.eu/themes/sustainability-transitions/drivers-of-change/growth-without-economic-growth ; Jackson, 2017 (2nd ed.); Prosperity without Growth. Foundations for the Economy of Tomorrow ; Jany-Catrice, F. and J. Gadrey, 2006, New indicators of well being and development, Palgrave McMillan/ No Pili (Italian) / Os novos indicadores de riqueza (Portugise) / ; Jany-Catrice, F. and D. Méda, 2015: « The key methodological issues of the "new wealth indicators", in Nature and the wealth of the Nations, Revue du CGDD, http://temis.documentation.developpement-durable.gouv.fr/docs/Temis/0083/Temis-0083488/22322_ENG.pdf ; Jany-Catrice, F. and D. Méda, 2013: Well-Being and Wealth of the Nations: How are They to be defined ? Review of Political Economy, 25:3, 444-460 ; Laurent, E., 2017, Measuring tomorrow. Accounting for Well-Being, Resilience, and Sustainability in the Twenty-First Century, Princeton University Press. ; Méda, D., 2013: La mystique de la croissance, Flammarion ; Méda, D., 2008: Au-delà du PIB. Pour une autre mesure de la richesse, Flammarion ; Méda, D., 2018: Work and Employment in a post-growth Era, in Cassiers, I., K. Maréchal, and D. Méda, (eds.) 2018: Post-growth Economics and Society. Exploring the path of a Social and Ecological Transition, Routledge, Studies in Ecological Economics ; Raworth, K., 2017: Doughnut Economics: Seven Ways to Think Like a 21st Century Economist. Random House Libri. ; Schmeltzer, M., 2016: The Hegemony of growth, Cambridge university Press. ; Stiglitz, J., A. Sen, and J-P Fitoussi, 2009: Report by the Commission on the Measurement of Economic Performance and Social Progress.	Reject. This particular sentence tries to bring out the role of professionals in various fields of operation. Theoretical discourse and implications are there in the underlying chapter and the supplementary material.	Government of France	Ministère de la Transition écologique et solidaire	France
20711	7	14	7	15	This point, which is crucial for systemic change, should be further developed and clarified, even in ES.	Noted but space limitation does not allow us to do so.	Government of France	Ministère de la Transition	France
20713	7	27	7	27	... but not only in technologies, also in behaviour: bottom-up socio-cultural forces also catalysed behavioural changes, such as flight-shame or SUV-shame.	Noted. Sentence revised.	Government of France	Ministère de la Transition	France
20715	7	31	7	32	Among intermediaries, employers can also play an essential role in sustaining and facilitating change in mobility practices (offering an alternative service to the private car, financial support for alternative modes of transport, organization of car-sharing systems).	This paragraph is about middle actors.	Government of France	Ministère de la Transition	France
20717	7	33	7	37	The development does not correspond to the title in bold. Lines 21-24 on page 70 deserve to be included here.	Accepted. The paragraph has been reworked. A short version of the smetences on p.70 is included.	Government of France	Ministère de la Transition	France
20719	7	38	7	40	This formulation is too general: there are all kinds of service provisioning systems, but clearly not all of them are equivalent in their climate impact. Could the authors provide further details, and perhaps examples? References: References: Cassiers, I. (ed.), 2014: Redefining Prosperity, Routledge, Studies in Ecological Economics. Cassiers, Maréchal, Méda, (eds.) 2018: Post-growth Economics and Society. Exploring the path of a Social and Ecological Transition, Routledge, Studies in Ecological Economics Coyle, D., 2014: GDP: A Brief but Affectionate History - How GDP came to rule our lives—and why it needs to change, Princeton University Press Dedeurwaerdere, T., 2014: Sustainability Science for Strong Sustainability. Edward Elgar Descola, P. (2005). Par-delà nature et culture (Vol. 1). Paris: Gallimard. European Environment Agency, 2021: Growth without economic growth, 11 janvier, https://www.eea.europa.eu/themes/sustainability-transitions/drivers-of-change/growth-without-economic-growth Jackson, 2017 (2nd ed.); Prosperity without Growth. Foundations for the Economy of Tomorrow Jany-Catrice, F. and J. Gadrey, 2006, New indicators of well being and development, Palgrave McMillan/ No Pili (Italian) / Os novos indicadores de riqueza (Portugise) /	Deleted. Part of it merged with another relevant message.	Government of France	Ministère de la Transition écologique et solidaire	France

Comment Id	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
20721	7	41	7	42	Two fields of literature, scarcely mentioned in the chapter itself, should be further exploited: 1. Numerous works on Ecological and social transition movements which are already at work (those, as transition towns - p.69 l.15 - being insufficiently mentioned). One should not hesitate to get out of the straitjacket of publications in scientific journals alone to take the measure of the movement's creativity. See among others Hopkins 2008,2013,2020, Collectif FORTES 2020. 2. Current research on Indicators beyond GDP and on critique of growth and advocacy for post-growth (insufficiently covered by section 5.2.1., p.15, l.31-44, and p. 89, l.40-44, although dealt with in SScP p.178) and their potential contribution to systemic change, including coordinated action by governments and business. See for instance Méda, 2008 ; Gadrey & Jany-Catrice, 2006; Stiglitz, Sen & Fitoussi 2009, Cassiers and Thiry 2009, Thiry 2015, Malay 2021; Cassiers, Maréchal, Méda, 2018). The negative effect on the climate of a GDP growth target (mentioned in the SScP) should be further emphasised in the chapter and in the ES (The Shift Project). Even the European Environment Agency (EEA), grounded on scientific works has warned in different reports (2019, 2020) that "Europe will not achieve its sustainability vision of 'living well within the limits of the planet' by continuing to promote economic growth and seeking to manage the environmental and social impacts." Same with the green growth paradigm with which the economists feel at ease, but which is regarded as a paradigm not compatible with the 1,5° target (Hickel, Khalis, 2020). References: Hopkins, R., 2008: The Transition Handbook: From Oil Dependency to Local Resilience, Chelsea Green Publishing ; 2013: The Power of Just Doing Stuff: How Local Action Can Change the World, Green Books. ; 2020: From What Is to What If. Unleashing the power of imagination to create the future we want. Chelsea Green publishing. ; Collectif FORTES, 2020 : Manuel de la Grande transition. Former pour transformer, Les liens qui libèrent. ; Méda, D., 2008: Au-delà du PIB. Pour une autre mesure de la richesse, Flammarion ; Jany-Catrice, F. and J. Gadrey, 2006, New indicators of well being and development, Palgrave McMillan/ No Pill! (Italian) / Os novos indicadores de riqueza (Portugise) / ; Stiglitz, J., A. Sen, and J-P Fitoussi, 2009: Report by the Commission on the Measurement of Economic Performance and Social Progress. ; Cassiers and Thiry 2009, Au-delà du PIB : réconcilier ce qui compte et ce que l'on compte, Regards économiques, 75, https://www.regards-economiques.be/index.php?option=com_reco&view=article&cid=86 ; Thiry, G., 2015: Beyond GDP: Conceptual grounds of quantification. The case of the Index of Economic Well-Being (IEWB). Social Indicators Research, 121 (2) 313-344. ; Malay, O., 2021: How to Articulate Beyond GDP and Businesses' Social and Environmental Indicators? Social Indicators Research, https://doi.org/10.1007/s11205-020-02583-6 ; Cassiers, Maréchal, Méda, (eds.) 2018: Post-growth Economics and Society. Exploring the path of a Social and Ecological Transition, Routledge, Studies in Ecological Economics European Environment Agency, 2021: Growth without economic growth, 11 janvier, https://www.eea.europa.eu/themes/sustainability-transitions/drivers-of-change/growth-without-economic-growth Hickel, J., and G. Kallis, 2019: Is Green Growth Possible?, New Political Economy, https://static1.squarespace.com/static/59bc0e610abd04bd1e067ccc/t/5cbdc638b208f1c56f785a7/1555940922601/Hickel+and+Kallis+	Noted. Revised.	Government of France	Ministère de la Transition écologique et solidaire	France
27669	7	34	7	35	Delete "Lobby activism, protecting rent extracting business models, prevent political action."	Rejected. Reported are the findings of the literature. Wording is however changed to "sometimes delay" to clarify that this is sometimes not always happening.	Eleni Kaditi	Organization of the Petroleum Exporting	Austria
51321	7	19	7	19	After the end of the Line 19, could be added: In fact, energy transition should help to understand the dynamics of sustainable development and vice versa if policymakers (TOSI, 2015) understood and heard the voice of the population and their demands and petitions. REFERENCE: TOSI, A.; PERROT, R. Innovation dynamics of the Wind energy industry in South Africa and Brasil: technological and institutional locks. Innovation and Development, v. 5, p. 263-278, 2015.	We added this reference and content to 5.4.2. However due to space constrains (the ES was already far too long) we don't include it here.	Government of Brazil	Ministry of Foreign Affairs of Brazil	Brazil
63611	7	4	7	4	suggest providing examples of behavioral nudges here to improve clarity for general public.	Due to space constraints we deleted this paragraph.	Government of Canada	Environment and Climate Change	Canada
72511	7	28	7	32	While it is true that the professionals mentioned here can play a role in supporting diffusion of technologies, this seems to overstate their capacity; they are largely constrained by economic realities. Inappropriate point to highlight in the Exec Sum; corporate drivers would be a more important point to raise here.	We are reflecting the literature here, which highlights the role of professionals.	Annette Cowie	New South Wales Department of Primary	Australia
79921	7	1	7	2	The line "Behavioural change, not embedded in structural and cultural change, is insufficient for climate change mitigation" is problematic. I think what is meant is insufficient for substantial or necessary "levels" of mitigation - which is perfectly defensible. Behavioural change, even on its own, can help reduce emissions - notwithstanding that for this to be at levels needed it won't at all be enough without wider changes.	Accepted. Headline statement rephrased, and adaptad phrasing put as last sentence.	Stuart Capstick	Cardiff University	United Kingdom (of Great Britain and Northern Ireland)
79923	7	10	7	11	It reads rather oddly, the idea that "Narratives enable people to imagine and share climate futures that are characterised by avoid or shift possibilities". Clearly the IPCC is going with ASI, but in relation to social movements (next sentence) these are likely - especially good and effective ones - not to come from this arbitrary (if useful) way of categorising action. Surely the value of imagining better social and climate futures, is that these envisage a better world all-round, not just ways to do Avoid or Shift in the service of climate mitigation? [This likewise seems at odds with the comment on p. 67 that "Narratives have been used by indigenous communities to imagine climate futures divergent from top-down narratives" - top-down narratives like ASI?]	Accepted. This sentence is deleted.	Stuart Capstick	Cardiff University	United Kingdom (of Great Britain and Northern Ireland)
79925	7	7	7	8	Some key psychological factors mentioned here - odd that perhaps the most important of them all - values - is missing, especially as this is picked up later on in the same page.	Accepted. Values added.	Stuart Capstick	Cardiff University	United Kingdom (of Great Britain and Northern Ireland)
80569	7	39	7	39	Instead of the phrase 'good life', it is suggested 'good / high quality of life'	Accepted.	Olga Savchuk	Instituto Superior	Portugal
82237	7	21	7	21	One could consider making this statement more specific.	Accepted. We deleted the headline statement and put the 2nd sentence instead as headline statement.	Jarmo Kikstra	IIASA	Austria
82239	7	38	7	40	In itself, the bold statement to me seems entirely generic. I assume it should be directly related to climate mitigation in the main statement itself. In addition, the full paragraph seems to me like it has not been written out in full.	Deleted and content accommodated in subsequent paragraph.	Jarmo Kikstra	IIASA	Austria
3015	8	21	8	30	It would be worth recognising the differences of behaviour changes arising from immediate and direct threats as distinct from less immediate and/or less direct. Also worth articulating how steps might be taken to achieve similar levels of change acceptance for less direct, less immediate and more enduring threats.	Due to space constraints we can't answer this here, but took it up in the COVID box.	Beth Edmondson	Federation University	Australia
4205	8	27	8	30	Apart from the fact that I'm not convinced box 5.1 justifies or supports this claim, it would be fair to note the backlash from covid (and covid restrictions) as well: massive civil disobedience, resistance, riots, non-compliance.	Accepted. Last sentence deleted.	Marcel Wissenburg	Radboud University Nijmegen	Netherlands
8367	8	21	8	30	Not lasting as was shown in rebounding behaviours (second and third waves amplified due to unwillingness to lockdown harder again in many countries). Also reductions in emissions quickly recovered to „normal levels" before the pandemic	Accepted. Last sentence deleted.	Pichler Florian	Energie-Control Austria für die Regulierung der Elektrizitäts- und Erdgaswirtschaft	Austria
15917	8	11	8	11	This sentence does not work grammatically. Also I guess the main point is that C pricing needs to be perceived as being fair and targeted. What "fair" is, is probably a very contentious debate...	Accepted. Sentence rephrased.	Helmut Haberl	University of Natural Resources and Life	Austria
15919	8	31	8	37	An alternative viewpoint is that the practices a person has adopted as making up the routines of daily life ("practices") have a big influence on this person's values, so this may well be a hen-egg problem.	Semi-acknowledged. Some literature supporting this. Structures are however good interventions to start with and the literature also supports that preference change with new infrastructure settings.	Helmut Haberl	University of Natural Resources and Life	Austria
18163	8	38	8	42	Without greater specificity this message seems to contrast somewhat with the earlier point (P. 7 - Line 4) that behavioural nudges fail to motivate harder lifestyle choices. Does this specific statement about small to medium contributions refer to the easier lifestyle choices? i.e. could the authors please clarify this statement further? The message that seems to come through from the chapter is that nudges alone are not enough, but this statement muddies that message somewhat.	Accepted. We reorganized the order of these paragraphs (putting the "meta-analysis" one now first. A difference is that choice architectures are effective, but that the weight is not on individual behavioral change (precisely because choice architectures are needed).	Government of United Kingdom (of Great Britain and Northern Ireland)	Department for Business, Energy & Industrial Strategy	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
18165	8	29	8	29	Here it would be worth clarifying if the effect of covid-19 changes were on beliefs about outcome/response efficacy, self-efficacy, collective or political efficacy.	Due to space constraints we deleted this sentence.	Government of United Kingdom (of Great Britain and Northern Ireland)	Department for Business, Energy & Industrial Strategy	United Kingdom (of Great Britain and Northern Ireland)
20723	8	6	8	6	The sentence is unclear: what does it mean "status is COMMUNICATING by relative wealth"? The use of the present participle is disturbing. Is it to say that status is BASED on relative wealth?	Accepted. Reworded.	Government of France	Ministère de la Transition	France
20725	8	19	8	20	These benefits are mainly expected in the INITIAL phase of change. As indicated in the first sentence of this paragraph, in systems growing up, due to economic and institutional scaling, rigidity appears which makes the system less amenable to change and innovation. This dynamics of change is modeled by Holling & Gunderson's theory of adaptive cycle and panarchy. Ref: Holling, C.S., Gunderson, L.H., Ludwig, D. 2002. In quest of a theory of adaptive change. In: Gunderson, L.H., Holling, C.S. (eds.). Panarchy: understanding transformations in human and natural systems. Washington (DC), USA: Island Press, 3–22.	That is correct, but not in contrast to the wording of this paragraph. Considered in 5.5.	Government of France	Ministère de la Transition écologique et solidaire	France
20727	8	21	8	22	COVID-19 confinement is an example of rapid change in social behaviour but not necessarily a model which could be useful for changing behaviour in climate matters. The perception of risk is easy to figure out by public in COVID-19 but less clear in climate matters.	Accepted. The COVID paragraph substantially shortened.	Government of France	Ministère de la Transition écologique et	France
20729	8	24	8	25	page 8, lines 24-25. This statement "To achieve acceptability, collective social change towards less resource intensive lifestyles require a social mandate building on deliberative processes", which is correct in itself, should not be found under the title "covid 19" because the pandemic has precisely undermined any deliberative procedure	Accepted. Delineated now with "however".	Government of France	Ministère de la Transition écologique et	France
20731	8	30	8	30	page 8 line 30: However, are the transformations acquired during the covid crisis perennial or adopted as exceptional thoughts? The emerging protests against government measures, after almost a year of pandemic, show the complexity of changes imposed for an extended period.	Accepted. Good question. We substantially shortened this paragraph to speculative less on this matter.	Government of France	Ministère de la Transition écologique et	France
20733	8	36	8	37	page 8, lines 36-37. For a better understanding of the systemic nature of the change required, much more space should be given to this type of sentence ("Changing in consumption choices consistently require structural changes and political action that enable taking low-carbon choices"), which is too marginalised.	Accepted. We changed the order of the statements to highlight this important result.	Government of France	Ministère de la Transition écologique et	France
20735	8	39	8	40	chapter 5, in executive summary, page 8, lines 39-40, saying "it works better in tandem" is not sufficiently specific, is it quantitatively significant ?	Accepted. Reworded to clarify the synergetically observed effects.	Government of France	Ministère de la Transition	France
20737	8	41	8	41	chapter 5, in executive summary, page 8, line 41, the affirmation that it "can accelerate" is very weak, it also can't...	Accepted. Now reworded.	Government of France	Ministère de la Transition	France
27671	8	11	8	13	Delete "Carbon pricing works best if implemented as targeted and fair (high confidence). A carbon levy earmarked for green infrastructures or saliently returned to tax payers corresponding to widely accepted notions of fairness increases political acceptability of carbon pricing. (5.6, Box 5.10)"	Rejected.	Eleni Kaditi	Organization of the Petroleum Exporting Countries, OPEC	Austria
55489	8	21	8	30	The behavioral changes seen during COVID-19 pandemic may not be sustainable. There should be some discussion on potential for changes or rebound drawing from social sciences.	Accepted. See COVID-box in Ch5 and in TS (not discussed in this ES).	Government of United States of	U.S. Department of State	United States of America
75045	8	43	9	8	The paragraph is inconsistent and not backed by the scientific literature on growth, development, and innovation. The paragraph calls for regulation and public policy and uses then as example the energy savings by modern smartphones, the latter being like an almost perfect example for a bottom-up market based innovation process.	Accepted. Paragraph deleted.	Wilfried Rickels	Kiel Institute for the World Economy	Germany
82243	8	21	8	30	While this assessment in itself seems correct to me, perhaps it would be worthwhile to add 'temporarily' here or in Box 5.1 explicitly, as the long-term durability of these insights might not be straightforward.	Accepted.	Jarmo Kikstra	IIASA	Austria
15921	9	2	9	4	Important point, but please remove exactoid numbers (5 W, 449 W), these are at least 20% uncertain	Accepted.	Helmut Haberl	University of Natural Resources and Life	Austria
20739	9	2	9	2	chapter 5, in executive summary, page 9, line 2, the environmental impact of an electronic device is mainly generated during the upstream phase of construction, nothing is said about this and about the short life of these devices. the consumption of energy at the end user level is clearly not sufficient, and nothins is said about the energy consumption of data centers when reading videos or music files	Accepted. Removed here.	Government of France	Ministère de la Transition écologique et solidaire	France
50065	9	2	9	4	Why not round the 5 watts and 449 watts numbers? The precision is not high, I guess.	Accepted. It is removed.	Masahiro Sugiyama	University of Tokyo	Japan
63613	9	15	9	15	Complementary is not the only indicator of successful policy mixes. Other indicators include comprehensiveness, coherence, consistency, balance, sequence, etc. This was explained on page 34, lines 8&9 of the summary for policy makers chapter. Stating that complementarity is the only condition of an optimal policy mix is inconsistent with page 34 of the summary. Alternatively, line 15 could be changed to "policies that operate complementary to each other is one characteristic of an optimal policy mix"	Accepted. Wording changed accordingly.	Government of Canada	Environment and Climate Change Canada	Canada
8369	10	30	10	37	There are at least 2 things here to consider. Are services less emission intense than,say, manufacturing service industry (the answer is probably yes). But do services get more or less emission intense over time? Third, how much does outsourcing (exporting) manufacturing but importing manufactured goods only disguise such trends of decoupling in most developed economies?	The perspective of consumption vs territorial emissions is treated in Ch2. Service sectors typically include transport sector, which becomes with economic development increasingly dominant in terms of share of CO2 (See Ch8, AR5). Here we take a more encompassing perspective of services asking how a high resolution on services that people need for decent living enables a novel identification of mitigation solutions. The question of decoupling is treated in 5.2.1, not in 5.1.	Pichler Florian	Energie-Control Austria für die Regulierung der Elektrizitäts- und Erdgaswirtschaft	Austria
18167	10	35	10	37	Could the authors include some examples of widening the public participation in climate change policies? such as citizen's assemblies, use of social surveys and public forums for discussions and involvement in shaping policy.	Accepted. Included in 5.2.3 in the paragraph on participatory governance.	Government of United Kingdom (of Great Britain and Northern Ireland)	Department for Business, Energy & Industrial Strategy	United Kingdom (of Great Britain and Northern Ireland)
20743	10	35	10	35	Concerning "well-designed demand for services scenarios are consistent with ... sustainable human development (Arrow et al. 2013; Dasgupta and Dasgupta 2017), add to the references Jany-Catrice, Gadrey, 2006. Jany-Catrice, F. and J. Gadrey, 2006, New indicators of well being and development, Palgrave McMillan/ No Pill (Italian) / Os novos indicadores de riqueza (Portugise) / Jany-Catrice and Gadrey's book very early on (2006) reviews all human development indicators and shows the links between well-being, growth, and service development by analyzing how the various available indicators hold these issues together.	A large number of references added	Government of France	Ministère de la Transition écologique et solidaire	France
24939	10	2	11	43	These introductory pages seem more like a summary of the main conclusions instead of motivating the chapter. As there already is an executive summary, I would avoid having too many conclusions here.	Thanks. Noted and respected when editing (also for saving space)	Snorre Kverndokk	Frisch Centre	Norway
31333	10	9			chapter uses both "wellbeing" and "well-being"	All changed to well-being in agreement with correct usage.	Jacob HALCOMB	UNEP Affiliate	France
55491	10	15	10	15	The last citation should be Jorgenson et al. (2018). This should be changed in the reference list too.	Accepted.	Government of United States of	U.S. Department of State	United States of America
55493	10	17	10	23	Define "services" more directly here so that scope of the chapter is clear to the reader from the start. It would be helpful to explain the difference and relationships between services, physical / primary resources, technology, and goods.	Accepted. Definition added.	Government of United States of	U.S. Department of State	United States of America
60231	10	2	10	2	Delete the word "full" to read "features a chapter"	Accepted.	Government of United Republic of	Tanzania Meteorological	United Republic of Tanzania

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71477	10	2	11	43	The concepts 'demand', 'services' and 'social aspects' of mitigation come across as fragmented in the introduction. An up-front explanation, how the concepts relate through demand for services (such as for well-being) depending on social aspects (geographically and culturally differentiated) to provide solutions for climate mitigation is not provided. The reader has to read 2½ pages, i.e. the entire introduction to understand, how the concepts relate.	Accepted, joint definition added.	Philippe Tulkens	European Union (EU) - DG Research & Innovation	Belgium
82245	10	25	10	28	A recent study provides a step beyond the cited studies here by expanding Rao et al. 2019b to the global level, and relating scenarios to currently observed decent living provisioning (thus going beyond Millward-Hopkins 2020 for this statement).	Accepted.	Jarmo Kikstra	IASA	Austria
5287	11	3	11	3	Replace Renewables by low carbon	As this is an illustrative example, the specification in terms of renewables is acceptable.	Michel SIMON	Retraité/ Pdt	France
8371	11	5	11	5	Better to delete „wasteful“, it applies to energy consumption overall.	Accepted. Now specified and explained using the world "unnecessary".	Pichler Florian	Energie-Control Austria für die Regulierung der Elektrizitäts- und Erdgaswirtschaft	Austria
10601	11	41	11	43	This place is as good as any other to submit comments about population control. 1) - the population is a major driver of GHG emissions. That anybody could contest this statement is not likely. In addition to being common sense, it is supported by several sentences in the present WG3 SOD; see e.g. chapter 2, page 53, lines 28-30. 2) - Is it possible to act upon this driver? The answer is yes. This has been demonstrated recently by Vollnet et al (2020, doi.org/10.1016/S0140-6736(20)30677-2); earlier, Abel et al (2016, doi.org/10.1073/pnas.1611386113) write: "the analysis presented here (...) quantitatively illustrates the view that demography is not destiny and that policies can make a decisive difference. In particular, advances in female education and reproductive health can contribute greatly to reducing world population growth." This paper is included in the list of references to chapter 3 of the present WG3 SOD.	Accepted. Reference to the key message referenced by reviewer now in box 5.3.	Philippe Waldteufel	CNRS	France
10603	11	41	11	43	CONTINUED 3) - It follows from 1) and 2) that establishing policies mentioned by these two articles contribute to mitigate drivers of climate change. Actually, the SOD does support this view when writing (chapter 2, page 106, lines 6-9): "The main gap in knowledge therefore is how these persistent and powerful drivers that increased emissions can be mitigated by demand management, alternative economic models, population control and rapid technological transition". 4) – Given the structure of WG3 SOD, mitigation involving demography certainly belongs to the field (solutions on the demand side) covered by chapter 5. Specifically, the relevant section might be 5.4.2 but some rearrangement may be appropriate. Note that policies proposed by Abel, Vollset and their colleagues fully correspond to target 5.6 of SDG 5. Therefore they help to strengthen sustainable development.	The point is very helpful. Abel et al 2016 takes a sustainability perspective, not a climate change mitigation perspective. Hence, the precise relevance is not clear. We however mention now the importance of female education for population growth in 5.4.1 in the education section.	Philippe Waldteufel	CNRS	France
15923	11	9	11	10	In my view it would be good to link that to the debate on "practices" as routinized behaviors (e.g. Haberl et al. 2021, Ecol Econ 10.1016/j.ecolecon.2021.106949). This is a more useful conceptualization than that of "individual choice" or even "rational choice", for reasons very well explained here: Hausknot 2014, Env Politics, 10.1080/09644016.2013.874138 as well as Hausknot and Haas, 2019, Sustainability, doi 10.3390/su11020506	Accepted. We introduced a very short additional framing paragraph in 5.1 --> "Social practice theory emphasizes that material stocks and social relations are key in forming and maintaining habits. This chapter reflects this insights by assessing the role of infrastructures and social norms in GHG emission intensive or low-carbon lifestyles (5.4). "	Helmut Haberl	University of Natural Resources and Life Sciences, Vienna	Austria
17667	11	45	12	24	The sub-section "5.1.1 Demand-side solutions and planetary health" anticipates and sums up key messages that are described further in 5.2 & 5.3.3. I find this redundant (even if these are important messages that are available in SPM) and suggest to remove it.	Accepted. 5.1.1 deleted. A shorter version, more as motivation, introduced in text above.	Thomas Le Gallic	CNRS - CIRED	France
18169	11	28	11	30	I think more should be made of the "Decent living standards compatible with the 2 degree window" point as it was absent in the executive summary but fundamentally this is the key question of the climate change quandry. How much are we willing to accept in the way of reduced material living standards now in the immediate to short term in order to orchestrate long term viability? The fact that some research is showing that a desirable set of living standards for the global populace is achievable within the 2 degree warming window is a cause for celebration and should be the driving impetus for swift and radical transitions into sustainable societies.	Accepted. Text slightly modified to better highlight living standards can be achieved while simultaneously reducing emissions.	Government of United Kingdom (of Great Britain and Northern Ireland)	Department for Business, Energy & Industrial Strategy	United Kingdom (of Great Britain and Northern Ireland)
20745	11	24	11	24	Two important additions to be made to this paragraph : 1) It is important to define this notion, and to specify the different dimensions to which it refers : nutritional, shelter, living condition, clothing, health care, education, mobility ; 2) It is important to clarify the differences with other poverty indicators such as the multidimensional poverty index and why DLS is more relevant. One can refer to : Rao, N.D. Min, J. (2017) Decent living standards : material prerequisites for basic human wellbeing, Social Indicators Research, 1-20	Accepted. Both issues worked in.	Government of France	Ministère de la Transition écologique et solidaire	France
24875	11	46	12	3	The statement that demand-side solutions "make negative emission technologies, such as Bio-Energy with Carbon Capture and Storage (BECCS) irrelevant (Grubler et al. 2018) or at least less relevant (Van Vuuren et al. 2018)" appears as misleading. Negative emission technologies can still be very relevant even if the climate benefit of such interventions are disregarded. Many NETs can have substantial positive impact on SDGs. See for example Hansson, A., Haikola, S., Fridahl, M., Yanda, P., Mabhuve, E. and Pauline, N. (2020). Biochar as multi-purpose sustainable technology: Experiences from projects in Tanzania. Environment, Development and Sustainability. Biochar applied to the often acid and carbon depleted tropical soils may contribute positively both to mitigating climate change and to improve food security, reduce vulnerability and contribute to preserve forests. Re- and afforestation is another example that, if done well, can have multiple positive impacts on SDGs.	Rejected. While specific NETs may be positive the IPCC special report on land pointed to high risks related to land use intensive NETs.	Mathias Fridahl	Linköping University	Sweden
24877	11	46	12	3	Also related to the statement that demand-side solutions "make negative emission technologies, such as Bio-Energy with Carbon Capture and Storage (BECCS) irrelevant (Grubler et al. 2018) or at least less relevant (Van Vuuren et al. 2018)". Demand-side solutions may reduce the need for CDR on global scale. This is not the same as to say that it makes NETs, such as BECCS, irrelevant. NETs may have a specific function in global technology-cost optimized mitigation scenarios compatible with different global temperature targets. However, it may fulfill other functions in relation to supranational, national and sub-national climate and development targets. Different climate policy objectives and processes plan for NETs in multiple different ways, only loosely associated with traits in various global climate mitigation scenarios constructed by IAMs. BECCS in Sweden is one example. Demand-side policy is very promising for reducing emissions in Sweden too, but even if combined with supply-side mitigating, it will not be enough to fulfill the Swedish 2045 target. And Sweden aspires to become net-negative after 2045, regardless if this is needed to meet global goals or not. Similar other examples exist too. See for example two recent articles in a special issue in Frontiers in Climate: Schenuit, F., Colvin, R., Fridahl, M., McMullin, B., Reisinger, A., Sanchez, D. L., Smith, S. M., Torvanger, A., Wreford, A. and Geden, O. (2021). Carbon Dioxide Removal Policy in the Making: Assessing Developments in 9 OECD Cases. Frontiers in Climate 3(7); Fridahl, M., Bellamy, R., Hansson, A. and Haikola, S. (2020). Mapping Multi-Level Policy Incentives for Bioenergy With Carbon Capture and Storage in Sweden. Frontiers in Climate 2(25).	Accepted. We qualify now with "possibly" before "irrelevant" to clarify that there are other perspectives.	Mathias Fridahl	Linköping University	Sweden
28345	11	46	12	15	Section 5.1.1, page 5-11, from line 46: it is simply incorrect to say that BECCS or NETs can be made irrelevant owing to the fact there will always be difficult to abate or impossible to abate emissions from sectors such as aviation, shipping, concrete production etc.	There are different views on this. It's correct that some sectors are harder to abate than others. But hydrogen and synfuels are working options even for industry, aviation etc. However, we note that there is disagreement on this phrasing and qualify "irrelevant" with plausible. We also add: "(still requiring ecosystem based carbon dioxide removal). "	Rob Bellamy	University of Manchester	United Kingdom (of Great Britain and Northern Ireland)
50067	11	47	11	47	CDR, instead of negative emissions technologies?	Both wordings are accepted. So we stay with NETs.	Masahiro Sugiyama	University of Tokyo	Japan
64161	11	26	11	26	"that provides"	Thanks. We split up the sentence into two parts to make it more readable.	Federica Cappelli	Roma Tre University	Italy

Comment Id	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
64163	11	46	12	6	D'Alisa and Kallis (2016) distinguish between "hard interventions" (e.g. large-scale structural engineering interventions, like dams, canals, etc) and "soft interventions" (e.g. structural ecological interventions aimed at restablising natural functions of the physical environment as well as non-structural interventions at the institutional level, hence being part of demand-side solutions). According to the authors, harder interventions are usually preferred by public institutions over softer interventions because of the huge amounts of capital they help circulate, but are rarely more effective and are often source of risk-transfer and increased vulnerability of the areas concerned. [D'Alisa, G., & Kallis, G. (2016). A political ecology of maladaptation: Insights from a Gramscian theory of the State. <i>Global Environmental Change</i> , 38, 230-242.]	Accepted. One sentence added here. "Arguably, demand-side interventions often operate institutionally or in terms of restoring natural functioning, and have so far been politically sidelined due to a maladapted political system."	Federica Cappelli	Roma Tre University	Italy
82247	11	27	11	33	It would be worthwhile to highlight particular regionally diverse challenges here right from the start, meaning for instance mentioning improving ways of living (or increasing energy services) in sub-saharan africa and/or south africa as particular challenge rather than leaving this implicit with a focus on the global north's avoid and shift (see e.g. https://doi.org/10.13140/RG.2.2.26909.23528 for more on this challenge)	We shortened this part (also removing the avoid(shift part). The focus on SSA is warranted but taken up in 5.2 and 5.3 not here.	Jarmo Kikstra	IASA	Austria
83053	11	47	12	1	To avoid the common misunderstanding (even within the AR6 author team) that a term like "negative emissions technologies" covers all carbon dioxide removal options, you should indicate that you (obviously) don't talk about ecosystem-based CDR options here, like afforestation (which is still substantial in Grubler et al. 2018, and which is not really part of the minimization effort in van Vuuren et al. 2018)	Accepted. We added: "(still requiring ecosystem based carbon dioxide removal)."	Geden Oliver	German Institute for International and Security Affairs	Germany
83055	11	46	12	1	Not demand-side solutions as such make BECCS et al. irrelevant/less relevant but some level of deployment and prioritization (and probably correct to say something like "in modelling studies" since if there's hardly any BECCS in the real world, it's impossible to prove that a focus on a certain class of measures will reduce BECCS deployment - or maybe it would work with "(projected) demand for BECCS (deployment)")	Accepted. "in modelling studies" added.	Geden Oliver	German Institute for International and Security Affairs	Germany
3017	12	26	13	23	Valuable inclusion in chapter.	Thanks.	Beth Edmondson	Federation	Australia
8373	12	13	12	15	LED has huge implications for the underlying economic regimes. Historically, lower energy demand has always been associated with crisis in a growth (and profit) oriented (capitalist) economic system. LED would thus crucially challenge the survival of current economic organisation.	Noted. Literature on this is weak so there is no substantial conclusion that we can cite.	Pichler Florian	Energie-Control Austria für die Regulierung der Elektrizitäts- und Erdgaswirtschaft	Austria
15925	12	1	12	1	Perhaps better to use a less derogative formulation than "irrelevant" - e.g. would not require or similar?	Irrelevant is now qualified.	Helmut Haberl	University of Natural Resources and Life	Austria
17669	12	25	13	16	The sub-section "5.1.2 Bibliometric foundation of demand-side climate change mitigation" provides very general lessons based on a specific methodological approach. It seems to me that it should be presented as a box.	Accepted.	Thomas Le Gallic	CNRS - CIRE	France
20747	12	31	12	33	add following references: Vaden, T., Lähde, V., Majava, A., Järvenvivo, P., Toivanen, P., Hakala, E., Eronen J.T, (2020) ; Hickel, J., and G. Kallis, 2019. These authors provide new support for the idea that green growth is a myth and that rather than believing in the technological mirage, we need to engage in sober practices.	Noted. We don't cite that paper here because this is a short methodological note.	Government of France	Ministère de la Transition écologique et	France
24941	12	30	12	33	You refer to quantitative or qualitative date relevant to the chapter found in the systematic review of the literature. But this seems a bit narrow as not only empirical studies are relevant for this chapter, and not only empirical literature are referred in the chapter either.	Accepted. Concepts etc are included too. Marked in text.	Snorre Kverndokk	Frisch Centre	Norway
36999	12	7			This paragraph discusses demand-side solutions to climate mitigation. In support of this discussion, Fouquet (2018) shows that, while consumption of energy services generates benefits to consumers, there is large variation in the net benefits of consumption. For instance, in relation to travel, while around one thousand kilometres travelled per year by an individual generate very large net benefits, the marginal kilometres (e.g., in the UK, the 12,000th kilometre) travelled do not generate much benefit and could be curtailed at little loss of wellbeing to the individual. Fouquet, R. (2018). 'Consumer surplus from energy transitions.' <i>The Energy Journal</i> 39(3) 167-88.	Accepted. Context specificity of benefits is mentioned in many parts of the chapter.	Roger Fouquet	LSE	United Kingdom (of Great Britain and Northern Ireland)
52133	12	16	12	24	Figure 5.1 is very hard to read, and the explainer text is very cumbersome. Fix.	Accept. Clarity and explanation added.	Government of Saudi Arabia	Sustainability Advisor to the Minister Ministry of	Saudi Arabia
71479	12	11	12	24	The IPCC SR1.5 (2018) identifies the LED scenario based on demand-side solutions to achieve a 1.5 degree pathway with less decarbonisation effort and no use of BECCS technologies. However, the scenario comes with a high uncertainty. The sources of this uncertainty are not explained, which seems important to understand the robustness and viability of this very attractive mitigation scenario. Hence, more research and knowledge in this area would be useful.	Section deleted and text moved up. This statement mentions the source of information and specifically says oone scenario analyses demand side solution. Knowledge gap #3 discusses gaps in knowledge on scenarion modelling of services.	Philippe Tulkens	European Union (EU) - DG Research & Innovation	Belgium
83057	12	13	12	15	Why is the only argument now that BECCS is a technology with high uncertainty? While the argument itself is correct, it does not really fit into a "planetary health" frame (as indicated by the title of subsection 5.1.1)	Accepted. Section deleted. Text moved up under 5.1.	Geden Oliver	German Institute for International and Security Affairs	Germany
83059	12	16	12	24	This is indeed a stark difference, but I wonder whether an AR6 chapter should base a figure on SR1.5 scenarios. You should probably use use numbers from the AR6 database	Here argumnet is around role of demand side measures and reference to 1.5 report and figure is in that context.	Geden Oliver	German Institute for International and Security Affairs	Germany
83061	12	16	12	24	The AR6 WG1 numbers on the remaining carbon budget will change, so you should use their final number when published. But the enormous uncertainties in the WG1 carbon budget calculations and the many substantial changes in the WG1 methodology (between SR1.5 and AR6) might warrant to avoid using the number at all	Here argumnet is around role of demand side measures and reference to 1.5 report and figure is in the context.	Geden Oliver	German Institute for International and Security Affairs	Germany
31287	13	11			I cannot comprehend this figure. What are the "60-dimensional topic scores" for example? Not defined in glossary or described here. The paper has not been accepted so cannot be referred to yet. The analysis of 100,000 papers may be more of an interesting academic exercise than anything of direct relevance to mitigation and behavioural change? Suggest delete it. But now, having reached Fig 5.8 I guess these 60 "dimensions" are really the 60 "demand-side options" shown here. So still think figure should be deleted as adds little but if it stays, then suggest you use this "demand-side option" term to replace "dimensions" in all places in the text for clarity and also add a note saying the 60 options are listed in Fig 5.8 - even if you cannot read them!	Paper is published and in the revised version reference is added	Ralph Sims	Massey University	New Zealand
5289	14	46	14	46	Replace Renewables by low carbon	Accepted	Michel SIMON	Retraité/ Pdt	France
8375	14	8	14	12	True, but the differences are not listed here at all and thus the danger persist to overestimate the applicability of all COVID-19 learnings to climate change mitigation. Importantly, the timelines are essentially different. While COVID-19 is imminent and requires immediate action, climate change is slow and distant, not affecting current policy makers (and thus not decisive in their political success).	Rejected. Given the space constraint the main messages are already included. Also, AR6 report will have a Box on COVID 19. 1.5 report and AR6 WG 1 report approved now shows that climate change is no longer a distnt problem. It is clear through public communication also that world is living in a 1 Degree warmer world.	Pichler Florian	Energie-Control Austria für die Regulierung der Elektrizitäts- und Erdgaswirtschaft	Austria
8377	14	36	14	40	Governments have been willing for large-scale interventions in the past, especially in the case of local catastrophes. Yet, since climate change has been on the horizon for roughly 40 years or even longer, there is little evidence that governments have been willing to equally intervene in the economy for this reason. Why should this change in the near future because of COVID-19?	The littrature expects some of these to stay which can be consistent with climate benefit delivering actions. and that is what is summarised in the box. Climate impacts are now no longer considered as distnat future events	Pichler Florian	Energie-Control Austria für die Regulierung der Elektrizitäts- und Erdgaswirtschaft	Austria

Comment Id	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
17815	14	15			I agree with the box on Covid impacts, but think it is missing something. The additional questions that we need to ask of Covid, responses, and the contribution to CC mitigation relate to how different cultures and governance contexts create different opportunities for (and acceptability of) different interventions. In terms of governance infrastructure, we can see how e.g. the UK relied on supermarkets to deliver food, and struggled to meet demand (particularly to vulnerable people). Further East, and countries like Czechia continue to have a strong local government system - the municipalities are small and retain responsibilities over services and infrastructure - municipal government organised deliveries to people in their areas. This example shows how the different contexts created different needs for how it is possible to respond to the crisis, and what people expected of who. This nuance does appear later in this chapter, but isn't flagged in this box. I think we need to be clear that understanding Covid response for CC mitigation also requires us to understand the different cultural, social, political contexts in order to find interventions that are acceptable and effective. I can't point you to a paper, because the empirical work has not yet been done, but its a gap tht needs filling.	Noted. We tried to summarise the assessment from available literature. More new publications added.	Julia Leventon	Global Change Institute of the Czech Academy of Sciences CzechGlobe	Czech Republic
18171	14	2	15	21	Suggest referring here to the wider literature on the potential of disruptive events to enable systemic changes to energy systems. Some of the literature is referenced here: https://www.sciencedirect.com/science/article/pii/S0967070X20303012	More new publications added	Government of United Kingdom (of Great Britain and Northern Ireland)	Department for Business, Energy & Industrial Strategy	United Kingdom (of Great Britain and Northern Ireland)
19181	14	28	14	28	Sova Cool has to be corrected and written as Sovacool	corrected.	Andrei Belyi	University of Eastern	Finland
19969	14	10	14	12	Van der Voorn et al (2020) have drawn important lessons from the Covid19 pandemic to tackle the water crisis and climate change. See e.g., van der Voorn, T.; van den Berg, C.; Bhattacharya, P.; Quist, J., Never Waste a Crisis: Drawing First Lessons from the COVID-19 Pandemic to Tackle the Water Crisis. ACS ES&T Water 2020. https://doi.org/10.1021/acsestwater.0c00041	Rejected. Outside the scope of this chapter.	Tom van der Voorn	Institute of Environmental Systems Research	Netherlands
19977	14	10	14	12	An important lesson drawn by Bivins et al (2020) is the need to upscale efforts in Wastewater-Based Epidemiology in a Global Collaborative to Maximize Contributions in the Fight Against COVID-19 see e.g., Bivins, A.; North, D.; Ahmad, A.; Ahmed, W.; Alm, E.; Been, F.; Bhattacharya, P.; Bijlsma, L.; Boehm, A. B.; Brown, J.; Buttiglieri, G.; Calabro, V.; Carducci, A.; Castiglioni, S.; Cetecioglu Guro, Z.; Chakraborty, S.; Costa, F.; Curcio, S.; de los Reyes, F. L.; Delgado Vela, J.; Farkas, K.; Fernandez-Casi, X.; Gerba, C.; Gerrity, D.; Girones, R.; Gonzalez, R.; Haramoto, E.; Harris, A.; Holden, P. A.; Islam, M. T.; Jones, D. L.; Kasprzyk-Hordern, B.; Kitajima, M.; Kotlarz, N.; Kumar, M.; Kuroda, K.; La Rosa, G.; Malpei, F.; Mautus, M.; McLellan, S. L.; Medema, G.; Meschke, J. S.; Mueller, J.; Newton, R. J.; Nilsson, D.; Noble, R. T.; van Nuijs, A.; Peccia, J.; Perkins, T. A.; Pickering, A. J.; Rose, J.; Sanchez, G.; Smith, A.; Stadler, L.; Stauber, C.; Thomas, K.; van der Voorn, T.; Wigginton, K.; Zhu, K.; Bibby, K. Wastewater-Based Epidemiology: Global Collaborative to Maximize Contributions in the Fight Against COVID-19. Environ. Sci. Technol. 2020, 54 (13), 7754–7757, DOI: 10.1021/acs.est.0c02388	Rejected. Outside the scope of this chapter.	Tom van der Voorn	Institute of Environmental Systems Research	Netherlands
20749	14	39	14	40	Regarding "governments' revealed willingness to make large-scale interventions in the economy also reflect sudden shifts due to COVID-19 with various service provision and climate implications, some likely to be lasting (Aldaco et al. 2020; Bilal et al. 2020; Norouzi et al. 2020; Prideaux et al. 2020; Sovacool et al. 2020a; Hepburn et al. 2020)", please add reference: Boyer 2020. Robert Boyer, Les capitalismes à l'épreuve de la pandémie, La Découverte, 2020	Accepted.	Government of France	Ministère de la Transition écologique et solidaire	France
55495	14	14	14	17	It should also be noted that there are varying behaviors across populations (e.g., science denial, resistance to mask wearing) which point to different beliefs, values, and social norms that parallel opinions and behaviors about climate change.	Noted. Discussed more in section 5.4	Government of United States of	U.S. Department of State	United States of America
74149	14	2	15	21	Recommendation of article to include in this section: Sharma, S., Zhang, M., Anshika, Gao, J., Zhang, H., & Kota, S. H. (2020). Effect of restricted emissions during COVID-19 on air quality in India. Science of The Total Environment, 728, 138878. https://doi.org/10.1016/j.scitotenv.2020.138878	Rejected due to space constraints.	Mayuri Utturkar	University of Delaware, USA	United States of America
79927	14	2	14	47	It would be very helpful to acknowledge - it would only take a few words - that at their peaks, lockdown emissions reductions were around 30% for many (especially EU) countries. The 7% figure is often used to argue that behaviour change is rather futile, because despite so much disruption, this was the extent of the effect. However, 7% is averaged over the year 2020 and a range of circumstances, and masks far larger drops at times. Le Quee et al include material on this in the supplemental information, and have also I believe released further data on this linked to their original paper.	Accepted.	Stuart Capstick	Cardiff University	United Kingdom (of Great Britain and Northern Ireland)
80571	14	2	15	21	The report should also highlight the dangers of mistrust of authority figures (governmental and/or scientific) that may impair the effectiveness of the policies and polarize the society. References: https://doi.org/10.1038/s41562-020-0884-z ; https://doi.org/10.1177/0963721420969364	Accepted.	Olga Savchuk	Instituto Superior Tecnico	Portugal
82241	14	22	14	26	It could be considered to add newer (IEA 2021 statement, newer GCP publications), and additional independent estimates here (e.g. under revision https://doi.org/10.21203/rs.3.rs-155224/v120751).	Accepted.	Jarmo Kikstra	IASA	Austria
85369	14	22	14	22	Please, include "travelling", to provide a clear message on the impact on the associated modes of travel.	This comment is unclear. It should be evident that aviation and car transport belong to travel. Hence, we don't add "travelling" here.	Neil Dickson	ICAO	Canada
3011	15	1	61	28	Diversities of contexts are often invisible throughout and when they are fleetingly considered little attention is paid to their importance for mitigation. There are so many 'coulds' raised throughout this chapter that it becomes quite speculative and appears to lack substantive knowledge at key points. It's also not clear why some 'coulds' or possibilities are mentioned, selected for comment, while others are not. Rewriting to establish a cohesive narrative, clearer logic and basis for discussion would be worthwhile.	Accepted. Thank you for this important point. In rewriting the chapter we have drawn in the most recent literature on policy feasibility in diverse contexts, which is mentioned several times in section 5.1. The use of "could" reflects conclusions in the literature which are further explained in each reference.	Beth Edmondson	Federation University	Australia
12659	15	23	33	20	I found section 5.2 to be very confusing. The concepts of wellbeing and decent living standard (DLS) are introduced but they are not clearly defined (dimensions of wellbeing are shown in Figure 5.6 and metrics are suggested but not specified). How those concepts relate to each other and to conventional metrics such as per capita income is not clear. It is asserted that wellbeing helps achieve the SDGs, but how that happens is not clear. The biggest gap for me is between individual and collective characteristics. I assume that wellbeing, DLS, etc. are individual (perhaps household) characteristics. Are they also collective (national) characteristics and if so how are they measured at the national level? This is important because the sections discusses a number of national characteristics that affect mitigation action – equity, governance, social trust, and national happiness (p. 30, l. 23). Much of the equity literature discussed is based on per capita income so the relationship between that metric and wellbeing and DLS is relevant. All unclear and confusing and that carries over into the SPM.	Accepted. Thank you for this point. We have revised the text about COVID-19 to clarify the relation between social care, health impacts including mental health, and emissions reductions.	Erik Haites	Margaree Consultants Inc.	Canada
15927	15	36	15	36	What does 8000 mean? Each of those reviewed more than 8000 papers, or do you mean collectively. I know that the two last-mentioned reviews alone analyzed >11.000 papers	Accepted-Text revised and the numbers deleted to avoid confusion.	Helmut Haberl	University of Natural Resources and Life	Austria
17673	15		33		I find it very good that the first part of the chapter is devoted to defining such a framework for demand-side mitigation options. The dynamic of drastically increasing greenhouse gas emissions has indeed accompanied a rise in wellbeing, and today it must remain an objective beside that of mitigation (otherwise it would be much easier to drastically reduce our emissions!) However, the titles and the introducing paragraph of this section should allow for a more fundamental justification of the use of equity and wellbeing issues. I added below some words for inspiration (for the introducing paragraph), but I also find that some parts of the SMs.1 are inspiring for this introduction.	Noted	Thomas Le Gallic	CNRS - CIRED	France

Comment Id	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
17675	15		33		A few words for inspiration: "Well-being (here considered in its broadest sense) is a guiding principle in the field of climate change mitigation. Firstly, it motivates the very existence of an interest in mitigation, since one of its main purposes is the preservation of an environment capable of ensuring the present and future needs of human beings (and so their wellbeing). Secondly it is also apparent in the fears expressed in developed countries with regard to transition policies: the possibility of loss of well-being or comfort poses problems of acceptability and forms a political obstacle. [+ It is also the prism through which greenhouse gas emission reduction trajectories and mitigation strategies are assessed (in IAM in particular), with the transitions considered to be preferable being those that allow for the highest levels of well-being in both the South and the North. Finally, at the individual level, the quest for well-being, for a better condition, would guide most of our actions according to the theory of rational choice which underlies many modeling works in the field of climate change mitigation.]"	Accepted. Thank you for the inspiring text provided. A brief paragraph has been added to provide a fundamental justification related to the equity-well-being and mitigation trilogy. This topic has raised among the authors and this text clearly complement the discussion.	Thomas Le Gallic	CNRS - CIRED	France
17677	15		33		Suggestions of new (more meaningful) heading for inspiration: 5.2.1. Measuring wellbeing when considering demand-side mitigation options 5.2.2. Recognising and reducing inequity and unequal access to services 5.2.3. Considering the interaction between well-being, equity, trust and governance when building policies	Noted	Thomas Le Gallic	CNRS - CIRED	France
17695	15	30	16	12	It would be fair to refer in this paragraph to the questions and debates in the scientific community and in societies about the need to pursue GDP growth in developed countries or to consider post-growth development. This subject has often been considered controversial since the 1970s, but the debate is real and the literature supporting it is relatively abundant. It would therefore be unfair not to mention it sufficiently in this synthesis of the literature. The literature on post-growth and degrowth (which in reality cannot be summarised as GDP decline, but is much broader) would be worth mentioning here. Some useful references are available in e.g. : Wiedmann, T., Lenzen, M., Keyßer, L.T., Steinberger, J.K., 2020. Scientists' warning on affluence. Nature Communications 11, 3107. https://doi.org/10.1038/s41467-020-16941-y (already cited in the chapter) European Environment Agency, 2021. Growth without economic growth. Publications Office, LU. Hickel, J., Kallis, G., 2020. Is Green Growth Possible? New Political Economy 25, 469–486. https://doi.org/10.1080/13563467.2019.1598964	Taken into account. Text revised and text added related to the degrowth issue briefly. Thank you for the suggested literature.	Thomas Le Gallic	CNRS - CIRED	France
20751	15	6	15	10	It can also be added that COVID-19 may result in a decrease in well-being. In France, the epidemic situation and the measures taken to control it significantly affect the mental health of the population, particularly in terms of anxiety and depression symptoms. The highest prevalences are observed among 18-24 year olds, students, inactive people, people reporting a very difficult financial situation, people reporting living in overcrowded housing or those reporting a history of psychological disorders. Source: Sante Publique France, <i>Prodivrep survey</i> , January 2021. The analysis made here is contradictory to the idea that "that human wellbeing and related metrics provide a wider societal perspective which is inclusive and compatible with sustainable development and provide multiple ways to mitigate emissions". COVID-19 policy that it is possible to act quickly, to reduce greenhouse gas emissions, while at the same time reducing well-being.	Accepted. Thank you for this point. The text has been revised.	Government of France	Ministère de la Transition écologique et solidaire	France
20753	15	19	15	21	The elements mentioned on page 8 cannot be found. It is essential to mention : "In many instances, confinement was undesired and increased social inequality. To achieve acceptability, collective social change towards less resource intensive lifestyles require a social mandate building on deliberative processes."	Accepted. The text has been rewritten to relate D-side mitigation options to others.	Government of France	Ministère de la Transition écologique et solidaire	France
20755	15	33	15	34	One field of literature, scarcely mentioned in the chapter itself, should be further exploited : Current research on Indicators beyond GDP and on critique of growth and advocacy for post-growth (insufficiently covered by section 5.2.1., p.15, I.31-44, and p. 89, I.40-44, although dealt with in SSCP p.178) and their potential contribution to systemic change, including coordinated action by governments and business. See for instance Méda, 2008 ; Gadrey & Jany-Catrice, 2006; Stiglitz, Sen & Fitoussi 2009, Cassiers and Thiry 2009, Thiry 2015, Malay 2021; Cassiers, Maréchal, Méda, 2018). The negative effect on the climate of a GDP growth target (mentioned in the SSCP) should be further emphasised in the chapter and in the ES (The Shift Project). Even the European Environment Agency (EEA), grounded on scientific works has warned in different reports (2019, 2020) that "Europe will not achieve its sustainability vision of 'living well within the limits of the planet' by continuing to promote economic growth and seeking to manage the environmental and social impacts." Same with the green growth paradigm with which the economists feel at ease, but which is regarded as a paradigm not compatible with the 1,5° target (Hickel, Khalis, 2020). References: Hopkins, R., 2008. The Transition Handbook: From Oil Dependency to Local Resilience, Chelsea Green Publishing. ----, 2013: The Power of Just Doing Stuff: How Local Action Can Change the World, Green Books. ----, 2020: From What Is to What If. Unleashing the power of imagination to create the future we want. Chelsea Green publishing. Collectif FORTES, 2020 : Manuel de la Grande transition. Former pour transformer, Les liens qui libèrent. Méda, D., 2008: Au-delà du PIB. Pour une autre mesure de la richesse, Flammarion Jany-Catrice, F. and J. Gadrey, 2006, New indicators of well being and development, Palgrave McMillan/ No Pill (Italian) / Os novos indicadores de riqueza (Portuguese) / Stiglitz, J., A. Sen, and J-P Fitoussi, 2009: Report by the Commission on the Measurement of Economic Performance and Social Progress. Cassiers and Thiry 2009, Au-delà du PIB : réconcilier ce qui compte et ce que l'on compte, Regards économiques, 75, https://www.regards-economiques.be/index.php?option=com_reco&view=article&id=86 Thiry, G., 2015: Beyond GDP: Conceptual grounds of quantification. The case of the Index of Economic Well-Being (IEWB). Social Indicators Research, 121 (2) 313-344. Malay, O., 2021: How to Articulate Beyond GDP and Businesses' Social and Environmental Indicators? Social Indicators Research, https://doi.org/10.1007/s11205-020-02583-6 Cassiers, Maréchal, Méda, (eds.) 2018: Post-growth Economics and Society. Exploring the path of a Social and Ecological Transition, Routledge, Studies in Ecological Economics European Environment Agency, 2021: Growth without economic growth, 11 janvier, https://www.eea.europa.eu/themes/sustainability-transitions/drivers-of-change/growth-without-economic-growth	Taken into account-Combined with comment 17695. Thanks for the suggested references.	Government of France	Ministère de la Transition écologique et solidaire	France
24943	15	31	33	19	Section 5.2 is particularly hard to read as it has too many references in the text, much more than in the rest of the chapter. In some places (e.g. p. 30), there are references to every sentence. This should be avoided to improve the accessibility and readability of the section.	Approved. Section 5.2 has been substantially rewritten, shortened, and made more readable. Most of the references have been moved to the Social Sciences	Snorre Kverndokk	Frisch Centre	Norway
24949	15	24	15	29	I think the conclusion that demand-side measures are the single most important generic mitigation option needs some more justification. This was surprising to me and I was not convinced. There is some justification on p. 42 lines 25-42, but it does not compare to supply side measures. Surely, if we close down the supply of coal globally, it will have a huge impact.	Accepted. We have added references for this statement and the text has been rephrased to avoid confusion.	Snorre Kverndokk	Frisch Centre	Norway
55497	15	25	15	27	What are other categories of generic mitigation options? Clarify so that the reader can place demand-side solutions in better context relative to other mitigation options.	Accepted. The text has been rewritten to relate D-side mitigation options to others.	Government of United States of	U.S. Department of State	United States of America
60219	15	24	15	24	The second sentence should be specific on actions/policies. It could sound great by adding "Global, regional, and national actions/policies"	Accepted. Thank you for this point. The text has been revised and the terms 'global, regional and national actions' are now included in the text.	Government of United Republic of	Tanzania Meteorological	United Republic of Tanzania

Comment Id	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
66329	15	19	15	21	Could there be an inclusion between the difference in "green" investment as a result of covid-recovery, and social investment be made to highlight that whilst there is momentum in green recovery, the social aspects are covered/ aren't covered as seriously also in response to the recovery.	Accepted. Thank you for this point. The text on COVID-19 has been revised and clarified.	Alex Osborne-Saponja	Sustainalytics	Canada
66331	15	27	15	28	Accelerating demand side measures is fine, but everyone needs equal access to these for this to work, therefore should the equitable element be noted as well as participation - not everyone can participate.	Accepted. Thank you for this point. This text has been revised to include mention of wide and equitable participation.	Alex Osborne-Saponja	Sustainalytics	Canada
84395	15	14	15	14	O'Callaghan & Murdock (2021) note that "only the 18% of international recovery spending and 2.5% of total announced spending is likely to reduce GHG emissions" p. 15 => https://wedocs.unep.org/bitstream/handle/20.500.11822/35281/AWB88.pdf	Accepted. Thank you for this reference which reinforces the point. Data has been updated.	Paola Villavicencio-Calzadilla	Universitat Rovira i Virgili	Netherlands
3019	16	38	16	38	Citing dated sources is problematic in this setting. Factors influencing preferences and approaches to wellbeing have changed considerably since 1971 and 1989. Also the point being made here concerns how to evaluate present and future policy and present and and future demand-side solutions so recent sources are essential.	Taken into account. References and sentence updated.	Beth Edmondson	Federation University	Australia
5125	16	32	16	32	"previously thought" - could you specify previously (e.g. "as assumed in AR5" or whatever you refer to)	Taken into account. Text revised to clarify the meaning	Lina Hollender	n/a	Germany
8379	16	1	16	1	Given the essential alternative proposed by experts such as Jackson and others on issues of „post-growth“ or „de-growth“, it would only feel appropriate to give these alternative perspectives to current economic conduct more space here and through the first pages of the chapter (and most likely the following pages as well).	Taken into account-Combined with comment 17695.	Pichler Florian	Energie-Control Austria für die Regulierung der Elektrizitäts- und Erdgaswirtschaft	Austria
17087	16	16	16	18	While I appreciate IEA's efforts to bring attention to the SUV issue, their claim that SUVs were the second power sector for contribution to the increase in global CO2 is inaccurate, as it considers SUVs as an entirely separate sector (i.e. as compared to zero emissions), whereas SUVs substitute other types vehicles. If the entire car sector was considered, the increase would be much smaller. I think it is important to report this correctly in the IPCC report, to prevent criticism.	Taken into account. Text deleted due inconsistent data	Giulio Mattioli	TU Dortmund University	Germany
18173	16	8	16	10	'High-income economies realised most reduction in CO2 emissions with energy system decarbonisation, low-income economies with economic efficiency and electrification (Wang et al. 2021).' - I think this is extremely policy relevant and should be in the executive summary	Noted	Government of United Kingdom (of Great Britain and Northern Ireland)	Department for Business, Energy & Industrial Strategy	United Kingdom (of Great Britain and Northern Ireland)
20757	16	1	16	1	Jackson 2017 should be either added or preferred to Jackson 2009, as it is updated and more complete. Jackson, 2017 (2nd ed.); Prosperity without Growth. Foundations for the Economy of Tomorrow	Accepted. Text revised and reference updated and revised.	Government of France	Ministère de la Transition	France
20759	16	24	16	25	Please note that this also applies to car traffic; it is probably due to the drop of oil price after its peak in 2012	Noted	Government of France	Ministère de la Transition	France
37001	16	27	16	29	There is a brief discussion about cooling/air-conditioning. It is far too brief. Given that much of the future rapid rises in income will happen in countries at low latitudes and generally warm average temperatures (and the aggravating force of climate change), the demand for air-conditioning and the associated energy consumption need to be addressed more. For instance, a critical issue is how comfortable people feel with the temperatures they are exposed to and this depends on a number of physical, physiological, behavioural, and psychological factors (Nikolopoulou and Steemers, 2003, Jacobs et al, 2019). Physical factors include air temperature, humidity and wind speed and radiation - as an example trees provide shading, leading to improved thermal comfort in hot conditions, despite minimal differences in air temperature. Furthermore, it is possible that as individuals in hot climates become more used to air conditioning, their thermal thresholds decline, creating huge latent demands for air conditioning and electricity consumption (Singh et al 2018). T Singh, C Siderius, Y Van der Velde (2018) When do Indians feel hot? Internet searches indicate seasonality suppresses adaptation to heat. Environmental research letters 13 (5) 054009. Jacobs, C., Singh, T., Gorti, G., et al. (2019) 'Patterns of outdoor exposure to heat in three South Asian cities.' Science of the Total Environment. Nikolopoulou, M., Steemers, K., 2003. Thermal comfort and psychological adaptation as a guide for designing urban spaces. Energy and Buildings 35, 95–101.	Taken into account- text revised and a brief sentence added due the word limit constraints.	Roger Fouquet	LSE	United Kingdom (of Great Britain and Northern Ireland)
51591	16	16	16	17	"Disproportional expansion in GHG intensive economic activities includes aviation (+28.5% from 2010 to 2020)" This number is inconsistent with the statement of Chapter 10, p. 60 lines 7-8, which says the growth of CO2 emissions of aviation for the period 2010-2018 was about 4% per year, ie 48% in 10 years. Same issue in SPM-7 lines 1-2	Taken into account. Text deleted due inconsistent data	eric lombard	Stay Grounded	France
71481	16	30	17	13	Literature reviewed provides evidence that shifts in individual preferences for services such as smoking, red meat, walking and biking - lifestyle aspirations - can be influenced through awareness campaigns, price changes and policies directed at mitigation incl. infrastructure investments. It is found that such demand side changes in preferences for services are more significant than previously thought. Yet, the mitigation potential is not quantified and comes with high uncertainty. More research into these aspects would be valuable.	Noted	Philippe Tulkens	European Union (EU) - DG Research & Innovation	Belgium
85371	16	16	16	16	Missing a reference to the source of data used.	Taken into account. Text deleted due inconsistent data	Neil Dickson	ICAO	Canada
4207	17	18	17	18	the good life' is equated here with welfare or wellbeing. Apart from utilitarians, few ethicists will agree with this identification. A virtuous or righteous life (i.e., a good life from the point of view of virtue ethicists and deontologists) is almost by definition suboptimal in terms of welfare or wellbeing. By the same token, virtually every religion rejects the equation of a good life with maximizing welfare/wellbeing. I would therefore suggest removing all references to the good life.	Taken into account. Text revised. We rephrase the text.	Marcel Wissenburg	Radboud University Nijmegen	Netherlands
11275	17	23	17	28	The concept of well-being is complex. For the sake of concision, I understand that the Chapter limits itself to presenting two perceptions. However, limiting the concept of subjective well-being to "hedonic" well-being is reductive. Many authors have stressed that it is far from only measuring pleasure. See for example Thin, N. 2012. Social happiness: Theory into policy and practice. Policy Press. For other visions of well-being/happiness, see: Brülde, B. 2007. Happiness theories of the good life. Journal of Happiness Studies 8(1), pp. 15-49.	Noted. However, the intended objective within the chapter is to assess the mitigation potential and consequences for well-being. We agree that there is no single metric of wellbeing, and this pose a challenge. That is why we adopted the DLS approach for practical implication in terms of services which together help meet human needs.	Adrien Plomteux	UCL (University College London)	United Kingdom (of Great Britain and Northern Ireland)
11277	17	31	17	32	I think that it would be worth adding a reference to Manfred Max-Neef's theory of needs after the Doyal and Gough's reference. Max-neef M A, Hopenhayn M and Elizalde A 1991 Human Scale Development Conception, Application and Further Reflections 2nd edn (New York: The Apex Press).	Accepted. Text revised and reference included.	Adrien Plomteux	UCL (University College London)	United Kingdom (of Great Britain and Northern Ireland)
20761	17	17	17	18	Sentence "A number of different wellbeing metrics are valuable in emphasising the constituents of what is needed for a good life in different dimensions". The chapter refers strongly to non stabilized notion such as wellbeing, welfare, quality of life, life satisfaction etc. The notion of well-being seems the most frequent one, but its content is not, however, made explicit. On the one hand, no definition is given of it, and on the other hand, it is often reduced to the subjective perception of well-being, even though the standards to which individuals refer to assess their well-being are different in different countries and social categories. Moreover, the literature does not converge on the implicit idea often contained in the chapter that the sum of individual well-being will produce a social or common wellbeing. It would be necessary to refer, on the one hand, to objective measures of well-being, for example in health, education, social ties (life expectancy, socialized coverage of health expenditure, social health...) but to refer also to indicators reflecting collective dimensions of well-being, which would make it possible to break with the implicit we have stressed upon.	Certainly the term well-being is not explicit and operationalized in objective and subjective terms. The scarcity of indicators and consensus makes this task difficult due to the multiple contexts at the global level. However, the DLS approach uses the basic prerequisites for what a life of dignity means and allows linking this to mitigation measures.	Government of France	Ministère de la Transition écologique et solidaire	France
20763	17	38	17	39	Please explain why	Accepted. Text revised and explanation related to cultural and historical perspectives was added.	Government of France	Ministère de la Transition	France

Comment Id	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
24945	17	40	18	2	The critique of IAMs is quite hard. Especially the sentence on line 41 and 42. I do not think this is in line with the rest of the WGIII report. IAMs are used or referred to in several chapters like 1, 3 and 4 (probably more), and they should be described in a similar way.	Accepted. Text removed from this part.	Snorre Kverndokk	Frisch Centre	Norway
28667	17	48	18	2	You could add that IAM are also not currently adapted to represent the different dimensions of lifestyles and their change along the transition.	Rejected. The text has been removed from this section as chapter 3 is intended to cover this topic.	MATHIEU SAUJOT	IDDRI	France
28673	17	48	18	2	There is a potential contradiction between this assertion and other assertions on the potential of low-demand scenario for mitigation that are underlined in the Executive Summary, based on the "Mapping the opportunity space" section. If IAM are indeed inadequate, how can we evaluate the potential of low demand scenario ? Or said in other words: how can we be sure that this assessment, largely based on IAM, is robust ? This would need more discussion. One way to approach this question is to consider that IAM are useful for identifying and pointing to issues, and the latest works cited in this chapter identifies the issue of lifestyles in low demand scenarios, but they are maybe not able to inform this issue in a policy-relevant way. To support this vision: Waisman, H., et al., 2019. A pathway design framework for national low greenhouse gas emission development strategies. Nature Climate Change 9, 261. https://doi.org/10.1038/s41558-019-0442-8 and Lifestyle changes in mitigation pathways: policy and scientific insights, Saujot, M., Le Gallic, T., Waisman, H. Environmental Research Letters, 2020, 10.1088/1748-9326/abd0a9	Rejected. The text has been removed from this section as chapter 3 is intended to cover this topic.	MATHIEU SAUJOT	IDDRI	France
31233	17	40	18	2	Does the criticism of IAMs better belong to chapter 3? It appears a bit out of place here	Accepted. Text has been removed.	Minal Pathak	WGIII TSU, Ahmedabad	India
52095	17	14			It is externally challenging to develop shared metrics to compare across different countries of what is needed for a good life in different dimensions. This fact is conflicting with the high confidence of most of the proposed demand side measures.	Noted. This is an important GAP mentioned as part of this assessment report.	Government of Saudi Arabia	Sustainability Advisor to the Minister Ministry of	Saudi Arabia
82249	17	40	18	2	While they carry the same name (integrated assessment model), generally it is helpful to separate cost-benefit IAMs that are primarily used for calculating the social cost of carbon and do usually not aim to provide extensive insight about the underlying complex systems, from detailed-process IAMs which are generally applied in the context of transition research. The latter are much used in AR6 (heavily in ch3+ch4), the former only sparsely. The latter generally do not attempt to estimate climate damages. Currently, this paragraph without this distinction is perhaps somewhat confusing and I am not sure what point it makes directly. (referring to the split made in Weyant 2017, https://www.journals.uchicago.edu/doi/10.1093/reep/rew018).	Accepted. Text has been removed.	Jarmo Kikstra	IIASA	Austria
5291	18	20	18	20	Replace Renewables by low carbon	Accepted. Renewables were replaced	Michel SIMON	Retraité/ Pdt	France
5293	18	23	18	23	Replace Renewables by low carbon	Accepted. Renewables were replaced	Michel SIMON	Retraité/ Pdt	France
6027	18	16	18	22	I suggest that this is strengthened. The concept that reduced energy use/GHG emissions lifestyles can lead to enhanced subjective wellbeing is important. See, for example, Druckman, A and Gatersleben, B. (2019). A time-use approach: high subjective wellbeing, low carbon leisure. Journal of Public Mental Health 18(2), pp. 85-93.	Noted. However, the literature is disparate	Angela Druckman	University of Surrey	United Kingdom (of Great Britain and Northern Ireland)
8381	18	16	18	16	„Doing more with less...“ is somewhat overly optimistic in connection with sustainability because it tries to optimize 2 things at once. „Doing the same with less“ or „doing more with the same“ would fit much better the ideas of sustainability. More often than not, you cannot maximise the one thing, while minimising the other.	Accepted. Text revised. Thanks.	Pichler Florian	Energie-Control Austria für die Regulierung der Elektrizitäts- und Erdgaswirtschaft	Austria
8383	18	42	18	49	This deserves significantly more attention here since this inequity in consumption mainly shifts the burden of emission reduction to the most developed countries (As stated in the past). Yet, DLS would then also, somewhat logically imply, a decline of LS in these countries - a hard piece to sell but obvious to many. This should be named and made more explicit.	Noted. Thank you	Pichler Florian	Energie-Control Austria für die Regulierung der Elektrizitäts- und Erdgaswirtschaft	Austria
10605	18	32	18	36	In view of the frequent use of this benchmark, it might be appropriate to provide a short definition of the content of DLS so that the reader does not have to search for the relevant literature. From what I understand, culture is absent from DLS?	Noted. A glossary contains DLS definition. Decent Living Standards framework has been adopted because of the practical implications to assess services for mitigation and wellbeing. Cultural aspects are absent from the DLS framework.	Philippe Waldteufel	CNRS	France
17089	18	49	19	4	Brand Correa et al. (2020) provide a discussion of how the energy and carbon requirements of need satisfaction can escalate over time. REFERENCE: Brand-Correa, L. I., Mattioli, G., Lamb, W. F., & Steinberger, J. K. (2020). Understanding (and tackling) need satisfier escalation. Sustainability: Science, Practice and Policy, 16(1), 309-325.	Taken into account. Reference added/text revised	Giulio Mattioli	TU Dortmund University	Germany
17671	18	4	18	4	"5.2.1.1 Services for wellbeing" - without 5.2.1.2 ...	Accepted. Text revised/corrected	Thomas Le Gallic	CNRS - CIRED	France
20765	18	28	18	28	Land access is also a determinant of mobility. (Litman T and Steele R, 2017, Land use impacts on transport)	Accepted. Land access included.	Government of France	Ministère de la Transition	France
20767	18	45	18	46	Please note that income per consumption unit might be more significant for comparison	Noted	Government of France	Ministère de la Transition	France
52097	18	32			The section builds upon the concept of a Decent Living Standard as a socio-economic benchmark which is very judgemental and subjective for different countries and within countries. Imposing such measures requires curtailing individuals' preferences and this requires incentives and additional costs which are not included in the discussion.	Rejected. DLS has practical implications to assess energy threshold for human wellbeing. Even when the diversity and cultural aspects pose a challenge, DLS can be applied for different dimensions, universal requirements can be translated into country-specific materials and energy needs at different context.	Government of Saudi Arabia	Sustainability Advisor to the Minister Ministry of	Saudi Arabia
82251	18	42	19	4	For a detailed overview of DLS service shortfalls (DLS gaps) across the world, see: https://doi.org/10.13140/RG.2.2.26909.23528	Taken into account. Reference added/text revised	Jarmo Kikstra	IIASA	Austria
82625	18	18	18	22	Suggest changing "a reduction in primary energy use and/or shift to renewable energy, if associated with the maintenance or improvement of services, can not only ensure better environmental quality but also directly enhance well-being" to "a reduction in primary energy use and/or shift to non-polluting energy, if associated with the maintenance or improvement of services, can not only ensure better environmental quality but also directly enhance well-being". The current text excludes nuclear energy which has similar benefits to renewables in terms of environmental benefits and human well being. For environmental benefits see especially Gibon et al 'Health benefits, ecological threats of low-carbon electricity' (https://iopscience.iop.org/article/10.1088/1748-9326/aa6047/meta). For socioeconomic benefits of nuclear see UNECE report the Use of Nuclear Fuel Resources For Sustainable Development (I)	Taken into account. Renewables replaced by low carbon.	Jonathan Cobb	World Nuclear Association	United Kingdom (of Great Britain and Northern Ireland)
3021	19	5	19	6	Graphic B does not seem to add value to this chapter	Noted. This panel has been deleted.	Beth Edmondson	Federation	Australia
3151	19	5			Figure 5.3 is very important but too condensed. The three aspects of heterogeneity - inter-country, intra-country, and both together - deserve separate Figures	Noted. The reduced number of pages does not allow separate figures. However, the figure has been improved for better visualization.	Ian Gough	CASE, LSE	United Kingdom (of Great Britain and Northern Ireland)
10607	19	19		20	same sentence	Accepted. Text revised. Thanks.	Philippe Waldteufel	CNRS	France

Comment Id	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
17091	19	6	19	17	I am very skeptical about the use of pkm as a metric of "service levels" in Figure 5.3. Unlike calories for food, and m2 for housing, pkm is several steps removed from what is actually important for "need satisfaction", i.e. accessibility to services and opportunities. The establishment of this metric could have all sorts of perverse consequences. For example: Americans (need to) travel longer distances in order to access services as compared to people in other world regions, because of high levels of car dependence and urban sprawl. Also note that in panel A mobility is the only item where the DLS threshold is "above" the current global average, and this despite the fact that transport is one of the sectors where activity levels (pkm) and emissions are increasing most rapidly. This is concerning and illustrative of the paradoxical (and potentially perverse) implications of using pkm as the relevant metric here. The consensus in transport and social inclusion research is that we should be aiming at maximising accessibility, not travel levels (and certainly not travelled distance).	Taken into account. We use this as a metric due the data availability but definitely the ideas mentioned by the reviewer has been included as an important note to be taken into account by the readers.	Giulio Mattioli	TU Dortmund University	Germany
20769	19	19	19	20	Isn't there a verb missing in this sentence "The emerging literature with high evidence and high agreement vital dimensions of human wellbeing correlate with consumption"?	Accepted. Text revised. Thanks.	Government of France	Ministère de la Transition	France
55499	19	6	19	24	Authors should contextualize the inequities in energy consumption and access to DLS somewhere in this section and Figure 5.3. While Section 5.3 addresses the Avoid-Shift-Improve framework that is mentioned throughout Chapter 5, this section is devoid of any reference to the implications of these inequities on the mitigation options considered throughout the rest of the chapter. It would be useful to assess how these inequities, which are eloquently detailed in Section 5.2, impact decisionmaking regarding mitigation options for non-OECD countries and for impoverished communities globally.	Noted. Sections 5.4-5.6 includes the implications about inequities.	Government of United States of America	U.S. Department of State	United States of America
64165	19	19	20	15	It may be useful to provide examples of countries that effectively succeeded in achieving both high wellbeing (as measured, for instance, by a high life expectancy) and low carbon emissions per capita. For instance, Lamb et al. (2014) carry on this exercise and show that a few countries (half of them are from Latin America) have managed to place in the so-called Goldemberger's corner (i.e. high life expectancy and low carbon emissions per capita), while no wealthy consuming nation has succeeded. Another example can be found in the WWF 2006 report, where it is shown that Cuba is the only country succeeding to achieve, in 2003, an HDI higher than 0.8 and, at the same time, a globally sustainable ecological footprint per capita. [Lamb, W. F., Steinberger, J. K., Bows-Larkin, A., Peters, G. P., Roberts, J. T., & Wood, F. R. (2014). Transitions in pathways of human development and carbon emissions. Environmental Research Letters, 9(1), 014011. ; WWF (2006). Living Planet Report 2006, WWF International, Switzerland.]	Taken into account. Covered in section 5.6.	Federica Cappelli	Roma Tre University	Italy
71483	19	19	20	15	To understand the concepts and theories behind demand for service mitigation options, the reader is directed to the Supplementary Material titled a "Social Science Primer" which starts at p. 172 and make up another 78 pages, in total 250 pages incl. references. According to the approved outline and mandate for Ch. 5, the length is estimated to be 45 pages. Hence, there is a need to prioritise and shorten the chapter to respect the original mandate and scope of the report.	The social science primer SSP has been approved by the TSU as supplementary material.	Philippe Tulkens	European Union (EU) - DG Research & Innovation	Belgium
82253	19	6	19	17	To increase the robustness of the assessment provided in this figure, especially panel C could be appended with data from https://doi.org/10.13140/RG.2.2.26909.23528 . This would show more clearly that regional differences can depend to some extent on ranging differences in exact estimates, not only in terms of the definitions of the DLS thresholds, but also more strongly in terms energy intensity of delivering these services. For instance, assuming differences in regional diets, taking into account current transport modal shares, different models for heating and cooling demand, and/or varying transport activity levels can lead to different estimates of intraregional differences.	Taken into account. However, at the time of responding this comment the paper mentioned has not been accepted for publication, the text has been revised.	Jarmo Kikstra	IIASA	Austria
82255	19	20	19	22	Could consider adding https://doi.org/10.13140/RG.2.2.26909.23528 if accepted before the literature deadline.	Taken into account. However, at the time of responding this comment the paper mentioned has not been accepted for publication, the text has been revised.	Jarmo Kikstra	IIASA	Austria
82257	19	24	20	15	This is an important section, but perhaps it could be made stronger if quantification could be provided, as a case-in-point. One example is found in the supplementary information of https://doi.org/10.13140/RG.2.2.26909.23528 , which speaks about decreasing energy needs for DLS mobility when replacing a share of private transport with public transport - but as this is only one quite specific example, it could be worthwhile looking a bit further.	Taken into account. However, at the time of responding this comment the paper mentioned has not been accepted for publication, the text has been revised.	Jarmo Kikstra	IIASA	Austria
3153	20	5			Important passage: a mitigation strategy that protects minimum 5 levels of service delivery for DLS, but critically views consumption beyond the point of diminishing 6 returns of needs satisfaction, is able to sustain wellbeing while generating emissions reductions. This needs developing to encompass later the idea of 'ceilings' to luxury consumption in both developed and developing countries.	Noted	Ian Gough	CASE, LSE	United Kingdom (of Great Britain and Northern Ireland)
20771	20	6	20	6	Please further develop this statement	Accepted. Text revised. Thanks.	Government of France	Ministère de la Transition	France
29857	20	3	20	7	Please consider specifying the value/what level the threshold represents. Please also consider breaking up the sentence to increase readability, as it is very long.	Taken into account. Text revised	Government of Norway	Norwegian Environment Agency	Norway
29859	20	23	20	28	This sentence is very long and includes three clauses, while the last part of the sentence refers to "both." Please consider clarifying, and breaking up the text to improve readability.	Accepted. Text revised	Government of Norway	Norwegian Environment Agency	Norway
31235	20	42	20	42	Suggest an alternate word for 'worse'	Accepted. Thanks	Minal Pathak	WGIII TSU, Ahmedabad	India
31289	20	5			I presume the unit is meant to be GJ/capita/year - amend both x axis label and caption if so. Figure poorly produced with income category dots too small to be seen to distinguish colours.	Taken into account. Unit fixed and figure updated to improve visualization.	Ralph Sims	Massey University	New Zealand
63615	20	21	20	22	In some notable academic literature, energy poor/poverty refers to affordability-related challenges, rather than access. (i.e., someone can be energy poor even if there is access, if they cannot afford energy; similarly, wealthy individuals in some regions could have lack of access to energy due to infrastructure constraints). Based on this, an example on energy access should not accompany the term energy poor on lines 21 and 22. Alternatively, the paragraph could better clarify differences between affordability and access, and linkages of these terms to energy poverty. See: Urge-Vorsatz, Diana; et Herrero, Sergio Tirado. 2012. "Building synergies between climate change mitigation and energy poverty alleviation". In Energy Policy. Issue 49. Pages 83-90.	Accepted. Text revised. Thanks.	Government of Canada	Environment and Climate Change Canada	Canada
66333	20	13	14		Whilst more equitable societies provide DLS, do they not also drive emissions based on the factors assessed? Take China's emerging middle class - this has caused increased demand for mobility and communications durables, increasing emissions, not mitigating them, therefore is mitigation more likely? Or would developing economies see an increase, without an already developed demand side shift globally, which is unlikely given the aforementioned reasons for increased emissions i.e. more SUVs, increased non-residential energy use	Rejected. In this section this message is mentioned as an option. The topic rised by the reviewer is discussed in section 5.2.2.3 Variations in consumption-based emissions.	Alex Osborne-Saponja	Sustainalytics	Canada
71485	20	18	21	5	The text should mention somewhere that there are vast differences across the world in carbon intensity of energy. CO2 emissions per capita in the EU are lower than in China for example, as result of both energy efficiency and decarbonisation of energy (as noted in Chapter 2). The latter point is not captured in Figure 5.4.	Taken into account. The message has been included in the text.	Philippe Tulkens	European Union (EU) - DG Research & Innovation	Belgium

Comment Id	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
82259	20	23	20	31	I feel that the assessment could be made a bit stronger here by either (a) providing a more clear assessment of why these ranges are different if mentioned separately, or (b) putting them all as one estimate. If deemed to be a very important finding/assessment of this chapter, and if enough data from the underlying studies is available, it could be very useful to plot these ranges next to each other (and perhaps even provide an 'IPCC assessed range' as has been traditionally one of the main tasks of the IPCC for instance for the equilibrium climate sensitivity and many other climate parameters in WG1 - assessing the literature and providing a confidence statement based on an expert assessment). Also here, if published, a more recent global estimate based in current technologies could be a good addition: https://doi.org/10.13140/RG.2.2.26909.23528 ; Rao et al. India, Brazil and South Africa should be mentioned for the 15-25 estimate; and one should consistently use the correct units)	Taken into account. Text revised. However, the suggested paper has not been published at the time this comment has a response.	Jarmo Kikstra	IIASA	Austria
2441	21	14	21	14	The should be "in this eighteen-year period" (not four-year period).	Accepted. Text revised	Caroline Zimm	International institute for Applied	Austria
2443	21	14	21	14	change 2014 to 2018, delete the spaces after the period.	Accepted. Text revised	Caroline Zimm	International institute for Applied	Austria
2445	21	10	21	10	change "service" to "services"(plural)	Accepted. Text revised	Caroline Zimm	International institute for Applied	Austria
2447	21	13	21	13	change "(mobile phone subscriptions)"to "(households with mobiles)"	Accepted. Text revised	Caroline Zimm	International institute for Applied	Austria
3023	21	1	21	1	Some explanation/discussion should follow Figure 5.4 recognising that links between income and energy use are not as simple as more income = more energy use.	Rejected. Lines above the explanation has been included.	Beth Edmondson	Federation University	Australia
15929	21	13	21	14	2000 to 2014 span a range of more than 4 years, indeed 15 if you count from jan 2000 to dec 2014	Accepted. Text revised and dates updated.	Helmut Haberl	University of Natural Resources and Life	Austria
20773	21	4	21	4	"20-50 GJ cap-1": measurement unit is wrong and does not make sense since time base is missing. Original data in Oswald et al. (2020) are in GJ yr-1 cap-1. Please correct.	Accepted. Unit has been corrected.	Government of France	Ministère de la Transition	France
24947	21	14	21	14	I guess you refer to a 14-year period here and not four?	Accepted. Text revised	Snorre Kverndokk	Frisch Centre	Norway
27673	21	14	21	14	Between 2000 and 2014 it is a fourteen-year period and not a four-year period.	Accepted. Text revised	Eleni Kaditi	Organization of the Petroleum Exporting	Austria
31337	21	14			Should read "in this fourteen-year period" or it should read 2010-2014, not sure which.	Accepted. Text revised	Jacob HALCOMB	UNEP Affiliate	France
66335	21	14	21	14	2000 to 2014 is a fourteen year period not a four year period	Accepted. Text revised	Alex Osborne-Saponja	Sustainability	Canada
82261	21	1	21	1	I really like the idea for this figure, but find that it could be significantly clearer in how the energy required for decent living standards relate to the (final?) energy use per capita from oswald et al. I think it would be reasonable to explain what the 20-50 range means, and that this is a global range, rather than dependent on the country (as DLS energy requirement itself can depend on the country). Adding a DLS energy range would probably be difficult because of data availability and specific national level contexts (though some hints can be coming from data in Kikstra et al. 2021 and/or Millward-Hopkins 2020). Perhaps here also, the figure could benefit from a more clearly defined/assessed DLE range - maybe based on an IPCC assessment that combines multiple sources (or if such an assessment is not done, the most extensive/applicable estimate available)?	Taken into account. Caption has been improved based on the suggestions. DLS range is only used as a reference due data availability as pointed out in the suggested changes by the reviewer.	Jarmo Kikstra	IIASA	Austria
2449	22	1	22	1	add "to" before participate. Should read: "[...] to participate in society."	Accepted. Text revised	Caroline Zimm	International institute for Applied	Austria
2451	22	10	22	10	Multidimensional (one word, delete the dash).	Accepted. Text revised	Caroline Zimm	International institute for Applied	Austria
2453	22	17	22	17	delete line	Accepted. Text revised	Caroline Zimm	International institute for Applied	Austria
2455	22	8	22	8	The figure is based on Zimm 2019, updated with new data. Adapted from Zimm 2019, updated using World Bank, ITU and other data sources (see source sheet)	Accepted. Text revised	Caroline Zimm	International institute for Applied	Austria
18175	22	17	22	18	Please add a title for the x-axis and clarify the titles of the two coverage columns in the table	Accepted. Text revised	Government of United Kingdom (of Great Britain and Northern Ireland)	Department for Business, Energy & Industrial Strategy	United Kingdom (of Great Britain and Northern Ireland)
82263	22	1	22	6	To provide a comprehensive global assessment, that puts the global energy for development in the context of climate mitigation pathways, see Kikstra et al. in review (https://doi.org/10.13140/RG.2.2.26909.23528), especially last paragraph of Results, and Figure 5. Here, in my view an additional note on reduced inequalities required for this challenge would be welcome.	Noted. Thanks for the suggested reference, however, it has not been published.	Jarmo Kikstra	IIASA	Austria
15071	23	34	23	36	The expression is ambiguous. According to the original text, it is easy to understand that China should be responsible for the emissions of such consumer products. The conclusion of the original text points out that Europe and the United States should be responsible for the emissions of their consumer products. Supporting literature : [1]X.D. Wu,,J.L. Guo,,Jing Meng & G.Q. Chen.(2019).Energy use by globalized economy: Total-consumption-based perspective via multi-region input-output accounting. Science of the Total Environment(2019). https://doi.org/10.1016/j.scitotenv.2019.01.108	Accepted. Text revised and rewritten to avoid confusion.	Guoquan HU	National Climate Center of China Meteorological Administration	China
18177	23	26	23	27	The text 'For example, at similar levels of human development, per capita energy demand in the US was 27 63% higher than in Germany (Arto et al. 2016)' could be improved by including some examples of how countries can maintain living standards whilst reducing energy. What exactly is it about their consumption modalities, their technologies in production or social habits which leads to such a discrepancy?	Taken into account. A brief explanation about the challenge to maintain DLS whilst reducing energy has been added.	Government of United Kingdom (of Great Britain and Northern Ireland)	Department for Business, Energy & Industrial Strategy	United Kingdom (of Great Britain and Northern Ireland)
20775	23	47	23	47	is "an order" a mistake meant to be "one order"? This sentence wording is confusing	Accepted. Text revised and rewritten.	Government of France	Ministère de la Transition	France
79745	23	31	23	34	You could see too: Mónica Santillán V., Angel de la Vega N., Jorge Islas S. "Climate change and income inequality: an I-O analysis of the structure and intensity of the GHG emissions in Mexican households", Energy for Sustainable Development, ISSN: 0973-0826, Volume 60, February 2021, pages 15–25. https://doi.org/10.1016/j.esd.2020.11.002 One conclusion of this study is that, in order to be effective and sustainable from a social and economic point of view, the formulation of policy to mitigate GHG must take into account both household income inequality and the diverse quantity and structure of consumption as a function of income level.	Accepted. Reference has been added	Angel DE LA VEGA NAVARRO	UNAM - National Autonomous University of Mexico	Mexico
82265	23	45	23	45	Add source.	Accepted. Text corrected	Jarmo Kikstra	IIASA	Austria
3025	24	33	21	33	Should read 'High income households....'	Accepted. Text revised and corrected.	Beth Edmondson	Federation	Australia
3027	24	40	24	40	New paragraph should commence for 'The food sector dominates in all income groups...'	Accepted. Text in a new paragraph	Beth Edmondson	Federation	Australia
4001	24	9	24	9	A reference to the article on " Environmental impact assessment of household consumption" will be appropriate here, the article is already referenced elsewhere in the report: Ivanova, D., Stadler, K., Steen-Olsen, K., Wood, R., Vita, G., Tukker, A., Hertwich, E.G., 2016. Environmental impact assessment of household consumption. J. Ind. Ecol. 20, 526–536. https://doi.org/10.1111/jiec.12371	Accepted. Reference has been added and text revised.	Diana Ivanova	University of Leeds	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
4003	24	7	25	11	A references that is highly relevant for this section is missing, namely the OXFAM report on "Confronting carbon inequality" (OXFAM, 2020, Confronting carbon inequality.). The OXFAM reference is key as it links to the changes in carbon inequality between 1990 and 2015, highlighting that the emission increases in that period are predominantly associated with the consumption of the top 10% richest, while that of the 50% of the population with the lowest incomes have stayed relatively stable over time. The same study makes a link to the 1.5C carbon budget used up in that period.	Accepted. Thank you for the suggested reference which has been inserted and text updated regarding the consumption-emissions percentages.	Diana Ivanova	University of Leeds	United Kingdom (of Great Britain and Northern Ireland)
4005	24	7	25	11	Another references that is highly relevant for this section that is missing, namely the one by Ivanova, D., Wood, R., 2020. The unequal distribution of household carbon footprints in Europe and its link to sustainability. Glob. Sustain. 3, 1–12. https://doi.org/https://doi.org/10.1017/sus.2020.12 . That study is different in a way that it focuses on the discrepancies by EU emitting (rather than income) groups, outlining the contribution of the EU top 1%, top 10%, etc emitters. It differs from other studies mentioned as it quantifies the share of households living within the 1.5C climate targets across EU countries (only 5% within the EU), where the top 1% emit more than 22 times the target on average. The study also describes the carbon contribution by consumption category among the highest emitters, with a substantial contribution from air and car travel, and quantifies expenditure elasticities across quintiles. Finally the study depicts the carbon distribution across a set of socially desirable outcomes, e.g. depicting a strong variation of income levels at any given level of carbon footprints and highlighting countries with lower carbon intensities per social outcome.	Accepted. Thank you for the suggested reference which has been inserted and text updated.	Diana Ivanova	University of Leeds	United Kingdom (of Great Britain and Northern Ireland)
8385	24	28	24	32	While consumption-based accounting is certainly preferable, the question of producer responsibility (especially of fossil fuel exporting countries) must also be answered. Similar to debates in plastics industries, producers need to be held accountable in one way or the other, too.	Noted. This excerpt has been deleted, since it refers to the previous assertion which also has been deleted.	Pichler Florian	Energie-Control Austria für die Regulierung der Elektrizitäts- und Erdgaswirtschaft	Austria
15073	24	28	24	32	This reference is too old to reflect the recent changes. It is a case for year 2004. I presume that there are many recent international trade studies on such a topic, which can provide very updated information and data.	Noted. This excerpt has been deleted, since it refers to the previous assertion which also has been deleted.	Guoquan HU	National Climate Center of China	China
15931	24	1	24	32	Perhaps this paper could also be relevant here: Otto et al. 2019. Nature Clim Change 9, 82–84. https://doi.org/10.1038/s41558-019-0402-3	Noted	Helmut Haberl	University of Natural Resources and Life	Austria
16321	24	33	24	33	The word 'energy' is used twice in a row.	Accepted. Text revised	Government of Republic of Korea	Korea Meteorological	Republic of Korea
31237	24	5	25	31	This overlaps with the section on inequality and emissions in chapter 2. Some of the text in the first para can perhaps be moved to ch 2 but their assessment of social factors that influence consumption as incomes increase (middle class emulating the lifestyles of the rich, etc) could better fit in chapter 5	Taken into account. We collapse the text to avoid overlap with chapter 2, retaining only important data to support the variation statement in consumption based-emissions as well as social factors that influence consumption.	Minal Pathak	WGIII TSU, Ahmedabad University	India
31291	24	28			Not stated is that imported oil, coal and gas already come under consumption-based accounting. Needs a discussion on why this is compared with food for example.	Noted. This excerpt has been deleted, since it refers to the previous assertion which also has been deleted.	Ralph Sims	Massey University	New Zealand
64167	24	33	24	33	Consume energy or demand energy	Accepted. Text revised and corrected.	Federica Cappelli	Roma Tre University	Italy
71487	24	28	24	28	In context of section 5.2.2.3 it is stated that 'emissions accounting should preferably be consumption-based'. This is a normative statement and it would be controversial in context of negotiations that are now production based at country level. Rather than making a normative statement, it would be useful if the authors can explain, how consumption-based accounting could function to enhance mitigation actions. See also our comment on CBA: Chapter 2 page 41.	Noted. This excerpt has been deleted, since it refers to the previous assertion which also has been deleted.	Philippe Tulkens	European Union (EU) - DG Research & Innovation	Belgium
79747	24	7	24	10	In the article mentioned in the previous comment cell (Monica Santillán V. et al), household energy consumption is related, by income level, to both direct energy (i.e., electricity, gas, gasoline, etc.) and indirect energy (i.e., energy used to produce goods and services), in order to establish a link to GHG emissions.	Taken into account. Reference has been added above.	Angel DE LA VEGA NAVARRO	UNAM - National Autonomous University of Mexico	Mexico
82329	24	6	25	31	Section 5.2.2.3 "Variations in consumption-based emissions" has currently discussed variations between nations and between income groups within nations. For completeness of information, I'd like to suggest to also include results from analysis at city level. This is particularly important given that cities are mentioned in AR6 as one of the most important non-state actors and most emissions leakage associated with trades occur between cities. What's more, analysis at city level shows bigger difference on average between consumption-based emissions and production-based emissions compared to national level analysis, hence strengthening the argument in line 28 on page 24, that emissions accounting should preferably be consumption-based. In addition, in terms of key consumption categories, researches at city level show that apart from energy use, aviation and food which are already mentioned in the SOD, private transport, clothing, housing equipment and communication services are also big sources of consumption-based emissions where variations between nations/income groups are noticeable. For reference, here are some published papers/reports on consumption-based emissions analysis at city level: https://onlinelibrary.wiley.com/doi/abs/10.1111/jiec.13063 https://www.c40.org/researches/consumption-based-emissions	Taken into account. Text about the city inequality has been briefly mentioned due word limit constraints.	Yinlong Xu	Institute of Environment and Sustainable Development in Agriculture, Chinese Academy of Agricultural Sciences	China
82849	24	46	24	47	Technically these would reflect "per capita food consumption-related-GHG footprints" rather than "carbon footprints", since a large proportion of diet-related GHG emissions are from GHGs other than CO2.	Accepted. Carbon footprints changed by GHG footprints	Raychel Santo	Johns Hopkins Center for a Livable	United States of America
85373	24	5	24	5	While the statement seems to be research-based, a political bias remains in terms of missing similar points with regard to the other transportation sectors. Additionally, such statements do not provide a clear way forward on emissions reductions or indicate the total amounts of CO2 produced. Research would need to be provided on other sectors in order to give a fair balance to such statements on aviation.	Rejected. The intended objective in this section is to highlight the importance of the variations in consumption based emissions. Regarding the ways forward reduction emissions these are included in sections 5.3-5.6	Neil Dickson	ICAO	Canada
3029	25	9	25	9	Should read '... cooling and powering houses...'	Noted. Thank you; however, this text has been deleted.	Beth Edmondson	Federation	Australia
15075	25	2	25	3	According to the original text of "5.3% of the Chinese population, the very rich urban residents, have carbon footprints of consumption at 6.4 tCO2 / cap, nearly four times of the average Chinese", 17.5% of the data are wrongly written Supporting literature : Wiedenhofer, D., Guan, D., Liu, Z. et al. Unequal household carbon footprints in China. Nature Clim Change 7, 75–80 (2017). https://doi.org/10.1038/nclimate3165	Noted. However, the text has been deleted considering the controversial points in the structural change mentioned along this paragraph. Also, the reference to individual countries become problematic in terms of the scarcity of studies to assess the facts in a comprehensive way.	Guoquan HU	National Climate Center of China Meteorological Administration	China
16323	25	5	25	11	To be clearer an explanation of the differences in energy consumption patterns of each category in China and India should be added.	Noted, thank you. However, the text has been deleted considering the controversial points in the structural change mentioned along this paragraph. Also, the reference to individual countries become problematic in terms of the scarcity of studies to assess the facts in a comprehensive way.	Government of Republic of Korea	Korea Meteorological Administration	Republic of Korea
20777	25	23	25	23	"and...levels": Please explain why	Taken into account. The phrase has been complemented highlighting the requirements of a massive deployment of technologies across the different sectors as well as demand-side reduction consumption.	Government of France	Ministère de la Transition	France

Comment Id	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
20779	25	38	25	39	"Wellbeing for all, increasingly seen as the main goal of sustainable economies (McGregor and Pouw 2017; Fioramonti et al. 2019; Women's Budget Group 2020) Add reference to Jany-Catrice and Gadrey, 2006; Méda, 2008; Sen, Stiglitz, Fitoussi, 2009 ; Jany-Catrice, Méda, 2013; Coyle, 2014; Jany-Catrice, Méda, 2015; Jany-Catrice, Méda, 2016; Schmeltzer, 2016; Laurent, 2017; Jackson, 2017; Cassiers, Maréchal, Méda, 2018; Cassiers 2016. All of this literature shows that, above a certain income threshold, growth is not related to well-being, and that growth is not the goal that societies should pursue, but that the well-being of all must be pursued. A large number of these works, written very early on by French people (from the end of the 1990s) led, in particular, to the establishment of the Sen/Stiglitz/Fitoussi Commission on the measurement of economic performance and social progress. Not all of them have been translated into English, but they constitute a very important part of the work on the limits of GDP and growth. References: Cassiers, Maréchal, Méda, (eds.) 2018: Post-growth Economics and Society. Exploring the path of a Social and Ecological Transition, Routledge, Studies in Ecological Economics ; Isabelle Cassiers, Changer d'indicateurs pour changer l'avenir, Agir par la culture, n° 45, Printemps 2016 ; Coyle, D., 2014: GDP: A Brief but Affectionate History - How GDP came to rule our lives—and why it needs to change, Princeton University Press ; Jackson, 2017 (2nd ed.); Prosperity without Growth. Foundations for the Economy of Tomorrow ; Jany-Catrice, F. and D. Méda, 2015: « The key methodological issues of the "new wealth indicators", in Nature and the wealth of the Nations, Revue du CGDD, http://temis.documentation.developpement-durable.gouv.fr/docs/Temis/0083/Temis-0083488/22322_ENG.pdf ; Jany-Catrice, F. and D. Méda, 2013: Well-Being and Wealth of the Nations: How are They to be defined ?, Review of Political Economy, 25:3, 444-460 ; Jany-Catrice, F. and D. Méda, 2016: Faut-il attendre la croissance ?, La Documentation française ; Jany-Catrice and Gadrey, 2006; Laurent, E., 2017, Measuring tomorrow, Accounting for Well-Being, Resilience, and Sustainability in the Twenty-First Century, Princeton University Press. ; Méda, D., 2008: Au-delà du PIB. Pour une autre mesure de la richesse, Flammarion ; Stiglitz, J., A. Sen, and J-P Fitoussi, 2009: Report by the Commission on the Measurement of Economic Performance and Social Progress. ; Schmeltzer, M., 2016: The Hegemony of growth, Cambridge university Press.	Accepted. Thank you for these references, added in the rewritten chapter.	Government of France	Ministère de la Transition écologique et solidaire	France
30513	25	2	25	3	There is an error in the data related to China. The original number in the reference is 5.3% but 17.5% in this report.	Noted. However, the text has been deleted considering the controversial points in the structural change mentioned along this paragraph. Also, the reference to individual countries become problematic in terms of the scarcity of studies to assess the facts in a comprehensive way.	Lingna Liu	China University of Geosciences (Beijing)	China
37491	25	6	25	8	"whereas in India it is the poorest category which contributes 63% of the carbon total"- Unlikely- to corroborate with recent inventory- latest is the 2016 inventory	Noted. However, the text has been deleted considering the controversial points in the structural change mentioned along this paragraph. Also, the reference to individual countries become problematic in terms of the scarcity of studies to assess the facts in a comprehensive way.	Government of India	Ministry of Environment, Forests and Climate	India
37503	25	5	25	8	It is important to elaborate upon the statement that 63% of emissions in India are caused by the "poorest" category of people by clearly stating what percentage of people have been categorised under the poorest category.	Noted. However, the text has been deleted considering the controversial points in the structural change mentioned along this paragraph. Also, the reference to individual countries become problematic in terms of the scarcity of studies to assess the facts in a comprehensive way.	Government of India	Ministry of Environment, Forests and Climate	India
55501	25	40	26	2	It looks like the sentence on the width of arrows might belong in the figure caption. Rework feedback number 3 in Figure 5.5 positively rather than negatively (e.g., equitable societies use energy and resources more efficiently), to match other relationships described.	Accepted. This diagram and its caption have been revised.	Government of United States of America	U.S. Department of State	United States of America
64169	25	20	25	26	These statements deserve to be expanded upon, since they are in apparent contrast with the rest of the paragraph.	Taken into account. Text revised and quantification added regarding the income-energy-emissions relationship.	Federica Cappelli	Roma Tre University	Italy
64171	25	27	25	31	Inequality also operates by inducing an increase in working hours that leads to higher economic growth and, consequently, higher CO2-eq emissions (Knight et al., 2013; Fitzgerald et al., 2015) and ecological footprint (Hayden and Shandra, 2009). [Fitzgerald, J. B., Jorgenson, A. K., & Clark, B. (2015). Energy consumption and working hours: a longitudinal study of developed and developing nations, 1990–2008. Environmental Sociology, 1(3), 213–223.; Hayden, A., & Shandra, J. M. (2009). Hours of work and the ecological footprint of nations: an exploratory analysis. Local Environment, 14(6), 575–600.; Knight, K. W., Rosa, E. A., & Schor, J. B. (2013). Could working less reduce pressures on the environment? A cross-national panel analysis of OECD countries, 1970–2007. Global Environmental Change, 23(4), 691–700.]	Taken into account. Thank you for the ideas and references provided. These has been inserted in the text.	Federica Cappelli	Roma Tre University	Italy
76513	25	1	25	16	You discuss cross-sectional differences as if they reflected what happens across time when countries become richer. The statements are incorrect. If you look at the many structural decomposition analyses on carbon footprints that have been published, they rarely find a clear signal from structural change. While services indeed increase, so do faster modes of transport which have high carbon intensities. Cross-country comparison of carbon intensities are almost meaningless as long as they are per unit expenditure, as relative prices and absolute price levels vary, and any differences you find are likely to be biased.	Noted, but the text has been deleted considering the controversial points in the structural change mentioned along this paragraph.	Edgar Hertwich	Norwegian University of Science and Technology	Norway
82267	25	20	25	26	I feel that this paragraph could benefit from some nuance, streamlining and/or quantification. I think the assessment presented here in itself is fair. However, it could benefit from acknowledging that (a) 'slightly' is interpretable [and could benefit from a quantification], and (b) income is not 1:1 related to DLS (though it shows similar international patterns, see e.g. Kikstra et al. 2021 in review).	Taken into account. Text revised and quantification added regarding the income-energy-emissions relationship.	Jarmo Kikstra	IASA	Austria
3031	26	18	26	24	Using old sources in the context of current patterns, practices and future improvements is problematic.	Noted. We have added more recent references.	Beth Edmondson	Federation	Australia
3033	26	28	26	28	The observation that 'no country now meets its citizens' basic needs at a level of resource use that is globally sustainable' is one that should be much more up-front in this chapter. It warrants fuller attention and substantive discussion. What and how can demand aspects of mitigation achieve in this setting? Answering this as a central question underpinning the chapter would help to achieve a clear focus and build a more cohesive narrative.	Accepted. Thank you. This observation has been elevated and is now discussed in the Introduction to the chapter.	Beth Edmondson	Federation University	Australia
6029	26	22	26	26	It would be worth pointing out that sufficiency strategies suffer from rebound effects which can erode a significant proportion of intended/expected energy/emission savings. See Sorrell, S., Gatersleben, B. and Druckman, A. (2020). The limits of energy sufficiency: A review of the evidence for rebound effects and negative spillovers from behavioural change. Energy Research & Social Science, 64 (2020) 101439	Accepted. Rebound effects are discussed elsewhere in the chapter; this section has been rewritten as well.	Angela Druckman	University of Surrey	United Kingdom (of Great Britain and Northern Ireland)
15933	26	1	26	2	What is the source of this graph?	Accepted. Figure 5.5's caption now states that the diagram depicts relationships noted in the chapter text and was derived from the literature.	Helmut Haberl	University of Natural Resources and Life	Austria
31239	26	26	26	26	Might be good to say what these policies are	Accepted. The sentence has been rewritten to mention specific policies.	Minal Pathak	WGIII TSU, Ahmedabad	India
52135	26	42	27	1	Figure 5.5 is incomprehensible. Fix.	Noted. Noted. We have tried to make Figure 5.5 easier to follow.	Government of Saudi Arabia	Sustainability Advisor to the Minister Ministry of	Saudi Arabia
66337	26	1	26	2	Figure 5.5 does not flow in an easy to read manner	Noted. We have tried to make the diagram easier to follow.	Alex Osborne-Saponja	Federalanalytics	Canada
3035	27	1	27	1	Unclear what this line means - or is intended to mean. This paragraph could be deleted - it doesn't really consider demand issues.	Noted. This paragraph and section 5.2 has been rewritten and condensed.	Beth Edmondson	Federation University	Australia
4211	27	1	27	19	More equitable societies here seem to be equated, for some incomprehensible reason, with 'more egalitarian in outcome'. But note that policies aimed at leveling inequality also creates relative deprivation in those who see their life prospects diminished, which may not help the popularity and thereby feasibility of egalitarian (climate or other) policies.	Noted. This paragraph and section 5.2 has been rewritten and condensed.	Marcel Wissenburg	Radboud University Nijmegen	Netherlands
71489	27	1	27	33	Fig. 5.6 is up-side down and cannot be read on the screen. Make it landscape level.	Accepted. The Figure has been printed properly in the revised text.	Philippe Tulkens	European Union (EU) - DG Research	Belgium

Comment Id	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
76515	27	49			This statement is contentious. I would not support it. It seems difficult to prove such an assertion.	Noted. Unclear which statement is referred to.	Edgar Hertwich	Norwegian University of Science	Norway
1423	28		28		figure 5.6 is better to rotate	Accepted. The Figure has been printed properly in the revised text.	Hamideh Dalaei	climatologist at Islamic Republic of IRAN Meteorological	Iran
3181	28		28		figure 5.6 is better to be placed in the horizontal mode.	Accepted. The Figure has been printed properly in the revised text.	Hamideh Dalaei	climatologist at Islamic Republic of IRAN Meteorological	Iran
27675	28		28		Figure 5.6 should be edited, text should be realigned.	Accepted. The Figure has been printed properly in the revised text.	Eleni Kaditi	Organization of the Petroleum Exporting	Austria
29547	28	1	28	33	Figure 5.6 is very helpful in a global setting, but maybe you could consider making similar figures based on different regions (Europe, Latin America, Asia, Africa?), or perhaps provide qualitative considerations on which regions/countries have been evaluated in the study.	Noted. Presenting at regional level won't be possible due to lack of knowledge/studies. However these diversity and	Government of Norway	Norwegian Environment Agency	Norway
29861	28	1	28	33	We think this is an informative figure. However, we suggest that the figure can be improved and better understood by simplifying it. For example by removing the numbers, which currently are too small to read. Please also specify what is meant by "over consumption" as a mitigation strategy (eat less?) and add "reduce" before "food waste", so that it does not look like food waste is a way to mitigate climate change. Furthermore, some of the links are not so intuitive, such as how "animal free protein" negatively impacts "communication". It would maybe be useful to review the names of the categories, or provide explanations to some of the links in the text, especially the less intuitive ones.	Accepted. Thank you. Figure 5.6 has been revised and clarified.	Government of Norway	Norwegian Environment Agency	Norway
31741	28	0			Sufficiency and Efficiency rows for Buildings: Please see chapter 9 table 9.5 Notes. It has explanations that can help in filling up "Social Protection" column	Accepted. We have included a reference to Chapter 9 in the caption.	Shreya Some	Ahmedabad University	India
31747	28	0			Shared mobility: Air quality: chapter 5 table 5.6 says high positive impact but chapter 8 table 8.6 says low/medium impact (please check) Evs: Health: : chapter 5 table 5.6 says low positive impact but chapter 8 table 8.6 says high impact (please check)	Accepted. We have revised this figure and it now agrees with Table 8.6.	Shreya Some	Ahmedabad University	India
43419	28		28		figure 5.6 is better to be placed in the horizontal mode.	Accepted. The Figure has been printed properly in the revised text.	sadegh zeyaeayan	Head of national center for forecasting and weather hazards management of	Iran
50325	28		28		figure 5.6 is better to be placed in the horizontal mode.	Accepted. The Figure has been printed properly in the revised text.	Government of Iran	Islamic Republic of Iran Meteorological Organization (IRIMO)	Iran
4007	29	1	29	33	A new study by Oswald and colleagues quantifies small increase in energy use associated with income equality (Oswald, Y., Steinberger, J.K., Ivanova, D., Millward-Hopkins, J., 2021. Global redistribution of income and household energy footprints: A computational thought experiment. Glob. Sustain.). "A quote from the study: Yet, the 'energy costs' of greater equity are small (and may not be significant, as per the simulation in section 3.3). In the simple inequality reduction simulation (section 3.1), the difference between the most equal world (~220 EJ) and the most unequal one (~200 EJ) is 20 EJ which is about 10% of current household energy demand, and ~5% of total global final energy consumption."	Accepted. Thank you for this reference which has been added in the revised text.	Diana Ivanova	University of Leeds	United Kingdom (of Great Britain and Northern Ireland)
5295	29	14	29	14	Is the IPCC calling for a "renewable energy transition", or a "low carbon energy" transition? Please, maend the wording to remain in line with IPCC policy.	Accepted. We have ensured the terminology used accords to IPCC policy.	Michel SIMON	Retraité/ Pdt d'association	France
8387	29	1	29	5	The argument tat reducing inequality helps to reduce emissions could be contested when exploring this cross-national comparison in a longitudinal perspective, especially for developed countries. Since development correlated with gains in equality, one could also argue that in a historical perspective societies become more equal have increased their emission - the question is whether there remains a net effect after controlling for other factors.	Noted. Increasing inequity in developed countries obscures this point. The section has been rewritten for more clarity	Pichler Florian	Energie-Control Austria für die Regulierung der Elektrizitäts- und Erdgaswirtschaft	Austria
20781	29	33	29	33	It is argued that socio-economic equity creates trust and participatory governance, which in turn reinforces climate mitigation on the demand side. There may be a causality problem here. It is the stakeholder engagement that generates trust and consequently leads to build consensus. Fairness, as proposed here, means considering ex-ante decision-making processes, that if they are good and fair they might be well accepted. This is far from the democratic standards based on participatory governance, which requires a very different framework and decision-making processes. in which citizens are involved in decision governance from the earliest stages.	Accepted. We have clarified the distinction between individual and collective social trust, participation and fair gover	Government of France	Ministère de la Transition écologique et solidaire	France
28669	29	1	29	5	It could be useful here to clarify a possible ambiguity. Considering footprint analysis like Chancel and Piketty, among others, many understand that reducing inequalities will bring emissions reductions. Yet, it is not the case when the elasticity between income and emissions is at 1 or below (which is the case in these kind of study). It means that taking 1€ to the top to give it to the bottom does not reduce the mission. This does not mean that fighting inequalities is not a way to reduce emissions, but maybe not directly. So i think that you could should clarify the mecanismts that are behind these references in order to clarify the links between inequalities and emissions. For example see Antonin Pottier, Emmanuel Combet, Jean-Michel Cayla, Simona de Lauretis, Nadaud Franck. Qui émet du CO2? panorama critique des inégalités écologiques en France. Revue de l'OFCE, Presses de Sciences Po, 2020. (hal-03130398)	Accepted. Thank you for this reference. This section has been rewritten and clarified.	MATHIEU SAUJOT	IDDRI	France
31241	29	24	29	27	Some duplication with text on page 24 line 25-28	Accepted.Thank you. We have rewritten the text to reduce duplication.	Minal Pathak	WGIII TSU, Ahmedabad	India
71491	29	24	29	28	Is this statement on the 'large proportion' of emissions caused by conspicuous consumption really valid? It seems to conflict with the SPM E3 statement (also derived from Ch5) that individual behaviour change cannot reduce GHG emissions significantly.	Accepted. Thank you. We have revised the SPM statement to clarify this point.	Philippe Tulkens	European Union (EU) - DG Research	Belgium
79749	29	1	29	4	One of the main findings of the paper referred to in the 2 previous comment cells (Monica Santillán V. et al, which studies the amount, structure and intensity of total GHG emissions related to the consumption of Mexican households by income level), is the large amount of carbon inequality between household income groups, with the bottom household decile emitting 2.7% of the total CO2e emissions, and the top decile emitting 26.8%.	Accepted. Thank you for this reference. This section has been rewritten to clarify this point.	Angel DE LA VEGA NAVARRO	UNAM - National Autonomous University of Mexico	Mexico
80573	29	24	29	28	On the other hand, the consumption by the poor of cheap low-quality goods (oftentimes with bad energy performance and short lifespan) is also responsible for avoidable GHG emissions.	Accepted. Thank you. We have rewritten the text to clarify this point.	Olga Savchuk	Instituto Superior Tecnico	Portugal
82627	29	14	29	14	suggest 'low-carbon' transition	Accepted. We have ensured the terminology used accords to IPCC policy.	Jonathan Cobb	World Nuclear Association	United Kingdom (of Great Britain and
20783	30	22	30	22	Page 30 line 22: what about precisng the quality of "essential good service delivery" to remain more in line with public concerns?	Accepted. Thank you.	Government of France	Ministère de la Transition	France

Comment Id	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
20785	30	23	30	24	page 30, lines 23-24. "There is strong evidence across many countries that government quality indicated by quality of service delivery and quality of democracy is linked to national happiness, mainly because effective governance implies better service delivery (Helliwell and Huang 2008; Ott 2011; Helliwell et al. 2018)." Add ref. to Cassiers & Delain 2006 ; Jany-Catrice, Méda, 2016. Isabelle Cassiers, Catherine Delain, La croissance ne fait pas le bonheur, les économistes le savent-ils ?, Regards économiques, mars 2006, numéro 38. Florence-Jany-Catrice, Dominique Méda, Faut-il attendre la croissance ? , La Documentation française, 2016	Accepted. Thank you for suggesting this reference.	Government of France	Ministère de la Transition écologique et solidaire	France
20787	30	41	30	42	The document shows different points of view, no doubt because it was constructed by several authors. Compared to previously, the need to promote a "Participatory governance involves understanding and engagement with policies, including climate policies" is emphasized here has another sense. This participation, contrary to what is indicated here, is not only about increasing the diversity of ideas to improve resilience. Rather, it is about putting different, often contradictory positions around the table, associated with various issues on which decisions must be made. Furthermore, it does not address the complexity of implementing participation. It is a very complex subject, even at the scale of a territory for a well-defined problem. In real life, the question is how to deal with a multitude of interrelated problems and issues that need to be considered at different scales (including institutional ones). The framework for implementing participation on climate change issues is not explained.	Accepted. Thank you for these points, which have been incorporated in the rewritten text.	Government of France	Ministère de la Transition écologique et solidaire	France
24977	30	41	31	10	The chapter's discussion on participatory governance and equity could be strengthened by insights from the literature on energy justice. Scholars here have conceptualised justice in energy transitions having dimensions of distributive, procedural, and recognition justice (Jenkins et al., 2016, http://dx.doi.org/10.1016/j.erss.2015.10.004). Emphasising these dimensions and what they represent for participatory governance (explicit recognition and inclusion of minorities is crucial for equitable transitions) would provide a more systematic discussion of the demands for justice laid out in this paragraph. This in turn provides experts and policy makers with a clearer perspective on how to make their climate mitigation and adaptation work more just and inclusive. Other useful sources on these dimensions of justice and participation include: http://dx.doi.org/10.1016/j.apenergy.2015.01.002 , http://dx.doi.org/10.1016/j.enpol.2017.03.018	Accepted. Thank you for these points and references, some of which have been incorporated in the rewritten text.	Emil Beemer	Dutch Research Institute For Transitions, Erasmus University Rotterdam	Netherlands
52109	30	21	30	28	Replace the word "democratic" with "governance"	Accepted.	Government of Saudi Arabia	Sustainability Advisor to the Minister Ministry of	Saudi Arabia
75647	30	41	31	10	It is critical to provide policy makers, governance leaders and other decision-makers with a deeper, multi-dimensional perspective on the justice and inclusivity aspects of climate mitigation & climate adaption. It is indeed of undoubted importance to emphasize the explicit recognition and inclusion of minorities for a truly equitable transition, whereby social marginalization has been specifically addressed and resolved. Therefore, this piece would strongly benefit from including literature on energy justice. See, for example, Jenkins et al.(2016, http://dx.doi.org/10.1016/j.erss.2015.10.004) for a discussion on the dimensions of distributive, procedural and recognition justice within the realm of participatory governance. Other useful references to include: I. http://dx.doi.org/10.1016/j.apenergy.2015.01.002 II. http://dx.doi.org/10.1016/j.enpol.2017.03.018 III. http://dx.doi.org/10.1016/j.apenergy.2015.01.002	Accepted. Thank you for these points and references, which have been incorporated in the rewritten text.	Amira El-Feiaz	Technische Universiteit Eindhoven	Netherlands
84397	30	45	30	48	Suggested bibliography on climate change activists that may be considered for inclusion: Heinrich Böll Foundation (2018) "Radical Realism for Climate Justice A Civil Society Response to the Challenge of Limiting Global Warming to 1.5°C" https://www.boell.de/sites/default/files/radical_realism_for_climate_justice_volume_44_all_2.pdf?dimension1=ds_radicalrealism	Accepted. Thank you for these points and references, which have been incorporated in the rewritten text.	Paola Villavicencio-Calzadilla	Universitat Rovira i Virgili	Netherlands
85001	30	41	31	10	The importance of climate mitigation and adaptation would benefit from including justice and inclusivity perspectives. These are often overlooked and are, in my opinion, one of the main reasons while previous efforts have failed. This paragraph points to the attention recently addressed to economic and environmental inequalities, but I think it is important that it is also recognized that these are not new topics, and that is something that should be mentioned more broadly in this section. Such concerns have been addressed in previous agreements and have set the path towards the efforts and goals that different countries have to set per the Paris Climate Agreement. However, and despite the recognition at the time of the climate inequalities, it seems that these issues are still not adequately addressed. Useful sources to check on the topic are: http://dx.doi.org/10.1016/j.apenergy.2015.01.002 http://dx.doi.org/10.1016/j.enpol.2017.03.018 http://dx.doi.org/10.1016/j.apenergy.2015.01.002	Accepted. Thank you for these points and references, some of which have been incorporated in the rewritten text.	Sofia Rosero Abad	University	Netherlands
3037	31	3	31	3	Old sources do not appropriately support the current claims being made here.	Accepted. More recent references have been included.	Beth Edmondson	Federation	Australia
4009	31	27	33	19	The box does not mention disability, which is by no means a rare experience and merits more attention from environmental scholars and policy makers. To date there is very limited research on the needs and experiences of disabled people in the environmental literature. Disabled people use less energy overall, and as a result have lower environmental impacts. While this can be interpreted as a positive effect (for the environment), it is important to note that some disabled households are likely to be under-consuming: in other words their energy use is not meeting their needs. Disabled people are also more likely to live with a risk of poverty and energy poverty. Disabled people may need additional support and consideration in policy even if they are not energy poor. The specific challenges that disabled households are likely to face are associated with these households' lower incomes, and higher consumption of particular energy services. An appropriate reference will be a study that is currently under review: Ivanova, D., Middlemiss, L., 2021. Energy use and needs of disabled people in the EU: towards inclusion in the energy transition. submitted. Other prior evidence on the needs and experiences of disabled people in the environmental literature include the following studies: Fenney Salkeld 2016;Charles 2007;Imrie 2008;Fenney 2011;Fenney Salkeld 2019;Leipoldt 2006;Wolbring 2012;	Accepted. Thank you for suggesting these points and references, some of which (recent ones relating to climate,) have been incorporated in the rewritten text.	Beth Edmondson Diana Ivanova	Federation University of Leeds	Australia United Kingdom (of Great Britain and Northern Ireland)
8389	31	28	31	32	Certainly true, but at this place - and with many other effects of increasing equity and equality - one could also wonder about „social feedbacks and rebounds“ similar to climate science. What happens to certain states (such as attitudes or policy preferences, employment) once women are empowered, or poverty is reduced? Are there amplifying or stabilising feedbacks at work which impact the state condition (i.e. change a-priori attitudes or life-styles positively associated with climate change mitigation)?	Noted; this very interesting point extends somewhat beyond the demand-focused literature we review within the scope of this chapter.	Pichler Florian	Energie-Control Austria für die Regulierung der Elektrizitäts- und Erdgaswirtschaft	Austria
30689	31	25	32	1	In Table 4.4, it is necessary to distinguish between a net zero year for CO2 and a net zero year for GHG.	THIS COMMENT SEEMS TO REFER TO CHAPTER 4, NOT CHAPTER 5	Government of Japan	Climate Change Division - Ministry of	Japan
52099	31	26			The authors concluded "high confidence" that addressing inequities in income, wealth, and DLS not only raises overall wellbeing and furthers the SDGs but also improves the effectiveness of climate change mitigation policies. This conclusion is beyond the chapter findings and the correlations presented in the literature between demand-side mitigation potential and equity.	Noted. The chapter has been revised to include more references on this point.	Government of Saudi Arabia	Sustainability Advisor to the Minister Ministry of	Saudi Arabia

Comment Id	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
55503	31	27	33	19	This box is titled "Gender, race, intersectionality and climate mitigation". However, the vast majority of this text focuses on women specifically, with men and boys receiving few mentions, and typically in a negative light. Climate mitigation measures will disproportionately impact men in key ways. For instance, the vast majority of workers in fossil fuel industries are men (Pearl-Martinez and Stephens, 2016), and reducing use of fossil fuels disproportionately impacts male workers (Burke et al., 2019). Closures of coal-fired power stations in Australia). These workers will need to find new livelihoods, which can be facilitated through effective public policy measures. Meaningful work provides a key source of personal identity for men, even in more gender-equitable societies, and the lack of employment has significant and disproportionate mental health consequences for men (Bijlsma et al., 2017).	Noted. The text has been revised. The references on men and mental health are beyond the Demand-side scope of the	Government of United States of America	U.S. Department of State	United States of America
60227	31	33	31	45	Add "geographical location" as factor for being affected by climate change. Climate change affect women more in poor countries than developed countries due to marginalization differences	Accepted. Thank you for this point, which has been included in the revised text.	Government of United Republic of	Tanzania Meteorological	United Republic of Tanzania
80147	31	1	31	10	In addition to spiritual and cultural ties, it may be valuable to note the established connection between Missing and Murdered Indigenous Women (MMIW), as well as other violence against Indigenous communities, and fossil fuel infrastructure, notably tar sands. The Canadian government's National Inquiry on MMIW and other formal government reports on the underlying causes of MMIW may be a good starting point. 10(1) Arizona Journal of Environmental Law and Policy, 34-67 (2019). URL: https://heinonline.org/HOL/P?h=hein_journals/arjel10&i=34 is additionally a more in-depth law review article on this topic.	Accepted. Thank you for these points, which have been incorporated in the rewritten text (gender box).	Robin Happel	Yale Center for Environmental Law & Policy	United States of America
84399	31	1	31	2	"Youth climate activists and Indigenous leaders are also exerting growing political influence towards mitigation", despite the de-legitimation they suffer from those in positions of power and the media, as well as diverse methods aimed to silence their voice. See, for instance: Zoe Bergmann & Ringo Ossewaarde "Youth climate activists meet environmental governance: ageist depictions of the FFF movement and Greta Thunberg in German newspaper coverage" Journal of Multicultural Discourses Vol. 15, Issue 3, 2020 https://doi.org/10.1080/17447143.2020.1745211 ; Lyndal Rowlands and Natalia Gomez Peña (2019), We Will Not Be Silenced: Climate Activism From The Frontlines To The UN, Civicus https://www.civicus.org/documents/WeWillNotBeSilenced_eng_Nov19.pdf ; Global Witness (2020) Defending Tomorrow: The climate crisis and threats against land and environmental defenders : https://www.globalwitness.org/en/campaigns/environmental-activists/defending-tomorrow/	Accepted. Thank you for this point, which has been included in the revised text.	Paola Villavicencio-Calzadilla	Universitat Rovira i Virgili	Netherlands
84401	31	1	31	4	Suggested bibliography on youth climate activists that may be considered for inclusion: Han & Wuk Ahn (2020) "Youth Mobilization to Stop Global Climate Change: Narratives and Impact", Sustainability 2020, 12(10), 4127; https://doi.org/10.3390/su12104127 ; O'Brien, K., E. Selboe, and B. M. Hayward. 2018. Exploring youth activism on climate change: dutiful, disruptive, and dangerous dissent. Ecology and Society 23(3):42. https://doi.org/10.5751/ES-10287-230342 ; O'Brien, K., E. Selboe, and B. M. Hayward (2018), "Exploring youth activism on climate change: dutiful, disruptive, and dangerous dissent", Ecology and Society 23(3):42. https://doi.org/10.5751/ES-10287-230342 ; Bright Nkrumah (2021) "Beyond Tokenism: The "Born Frees" and Climate Change in South Africa", International Journal of Ecology Volume 2021, Article ID 8831677, 10 pages https://doi.org/10.1155/2021/8831677	Accepted. Thank you for this point and reference, which have been included in the revised text.	Paola Villavicencio-Calzadilla	Universitat Rovira i Virgili	Netherlands
31339	32	28			leisure is generally associated with lower emissions? You mean higher, correct? Druckman 2012 claims "indirect rebound" linked to increase ghg/consumption (e.g. leisure, clothing). Druckman 2010 article implies only a relation between leisure and well-being, not lower carbon emissions.	Accepted. This sentence has been deleted.	Jacob HALCOMB	UNEP Affiliate	France
55505	32	22	32	23	This statement may require additional caveats. In least developed nations, women are disproportionately responsible for food preparation, often using fuelwood or charcoal. These fuels not only can generate serious health harms but, in some settings, are extracted unsustainably, exacerbating forest loss and degradation (Bailis et al., 2015).	Accepted. Thank you for this point and reference, which have been included in the revised text.	Government of United States of America	U.S. Department of State	United States of America
55507	32	33	32	34	The phrasing "nearly all" is not supported by more recent polling or evidence. For instance, recent polling from the Yale Program on Climate Change Communication (Ballew et al., 2018) notes that among the American public, 70% of men and 71% of women agree with the statement "Global warming is happening". Gender gaps are relatively small with most other statements tested in the Yale study. Findings from Australia (Quicke and Bennett, 2020; Climate of the Nation) show greater gender gaps, but with sizable shares of both the female and male populations not indicating concern about climate change. In this poll, 77% of females and 70% of males express concern about climate change.	Noted with thanks. There is unfortunately no space to include these references. The text has been revised.	Government of United States of America	U.S. Department of State	United States of America
80151	32	1	32	7	In addition to this section's discussion of the gender-responsive dimensions of the UNFCCC, it may potentially also be valuable to include CEDAW General Recommendation 37, which contains arguably some of the strongest language on the gendered impacts of climate change in the UN system.	Accepted. Thank you for this point, which has been included in the revised text.	Robin Happel	Yale Center for Environmental Law & Policy	United States of America
16327	33	25	33	25	ASI framework is one of the most important concepts in this Chapter because it provides a conceptual basis for identifying and categorising specific mitigation options in the perspective of demand-side. However, there are no explanation for ASI framework/strategies. To help regular readers understand this chapter easily, the brief explanation for ASI framework/strategies should be added in the beginning of subsection 5.3.	Accepted - we can ensure the ASI concept is defined more clearly in the next draft	Government of Republic of Korea	Korea Meteorological Administration (KMA)	Republic of Korea
17679	33		58		The structure/composition of 5.3 is for me the most problematic. The very general title suggests this. It juxtaposes several approaches and frameworks aimed at quantifying the potential of mitigation options (of which scenarios could be a part) and mapping them, a rather methodological part on how to identify potentials and a "megatrends" part, which is very important, but which do not necessarily constitute opportunities for mitigation. Is it not possible to organise it differently?	Taken into account - we will consider how to improve the structure and narrative flow in the next draft	Thomas Le Gallic	CNRS - CIRED	France
17681	33		39		"5.3.1 Efficient service provision:" Overlapping analytical frameworks (e.g. "Efficient service provision" and ASI) make this part difficult to read at a high level.	Taken into account - we will consider how to improve the clarity of the text in the next draft to reduce confusion about potential overlaps between stated concepts/frameworks	Thomas Le Gallic	CNRS - CIRED	France
17683	33		58		5.3.3. Scenario approaches, although there are too few of them, are important because they allow these potentials to be projected into the future. This also links to Chapter 2 and to the scenario sub-sections in the sectoral chapters.	Noted	Thomas Le Gallic	CNRS - CIRED	France
52101	33	45			Avoid-Shift-Improve is a conceptual framework used in almost all the literature (except one i.e., Cruetzig) in sustainable transport and mobility not for overall service provisioning. The way the authors presenting ASI framework and its benefits is very close to the existing and most commonly recognized framework which is Circular Economy (Reduce, Resuse, Recycle). This framework has been also recognized recently by G20 countries with adding the removal aspect which is demonstrated in the 4th R 'Remove'. The use of ASI for sectors outside transportation appeared in very few articles which limits the reliability of the framework for a larger scale outside transportation.	Taken into account - we will consider how to better describe the ASI framework as useful to service provision beyond the transport sector, since ASI is foundational to the chapter	Government of Saudi Arabia	Sustainability Advisor to the Minister Ministry of Petroleum and Mineral Resources	Saudi Arabia
74821	33	27	33	27	Consider using a simpler word than "succinctly" such as "clearly/briefly" for ease of understanding	Noted	Government of Kenya	Kenya	Kenya
3039	34	26	35	1	Useful and important table. Should be used much earlier in the chapter to highlight key issues.	Taken into account - we can refer to the table earlier	Beth Edmondson	Federation	Australia
3155	34	1			The A-S-I framework should ideally be reversed to become I-S-A. It is stated on many occasions that I easier to achieve than S, than A.	Rejected - ASI is foundational to all sections of the chapter, so can't easily be reengineered, also the main chapter focus is on A (demand reduction) whereas I is covered in sector chapters	Ian Gough	CASE, LSE	United Kingdom (of Great Britain and
10609	34	26	34	26	Table 5.1: for thermal confort change dressing codes may be a constraint. This is a general caveat. Perhaps it would be better to introduce this tablewith a deep and general discussion about sufficiency.	Taken into account - we can reference sufficiency studies when introducing this table but may not have space for deep discussions	Philippe Waldteufel	CNRS	France
16325	34	14	34	17	Title and description of Table 5.1 appear in the middle of the paragraph. It should be deleted.	Accepted - we will fix this	Government of Republic of Korea	Korea Meteorological	Republic of Korea
16335	34	11	37	27	Sub-sub section 5.3.1.1 shows how the ASI framework can be applied to identify mitigation options. It is said that "Service-oriented solutions in this chapter are discussed in the context of Table 5.1". Table 5.1 shows Avoid-Shift-Improve options in selected sectors and services. It's, however, difficult to relate the specific explanations and examples in the text with Table 5.1.	Taken into account - we will try to make the linkages between the text and table clearer in the next draft	Government of Republic of Korea	Korea Meteorological Administration	Republic of Korea

Comment Id	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
17093	34	14	34	17	There is something wrong here: different font, broken sentence	Accepted - we will fix this	Giulio Mattioli	TU Dortmund	Germany
55509	34	14	34	17	The Table 5.1 caption has been inserted in duplicate in the text here.	Accepted - we will fix this	Government of United States of	U.S. Department of State	United States of America
66339	34	28	35	1	Whilst these are demand side measures, there is a requirement for there to be a supply to encourage demand i.e. increased options for mobility, affordable electric vehicles	Noted - we discuss need for changes in infrastructure, institutions, etc. to enable demand changes extensively elsewhere in the chapter	Alex Osborne-Saponja	Sustainalytics	Canada
71493	34	1	37	27	Section 5.3.1.1 reviews the literature on three mega-trends; the sharing economy, digitalisation and circular economy to identify Avoid, Shift and Improve strategies for service-related mitigation options. In Fig. 5.7 the sectoral demand-side mitigation options from the mega-trends are assessed to be 40-80% in the end-use sectors of buildings, transport, food, industry and electricity. Given the importance of sector-couplings and other interlinkages such as cross-cutting soci-behavioural changes, there is a risk of rebound effects. This effect seems well documented, so does the evidence for the reduction estimate, however the rebound effect is not assessed quantitatively and seems uncertain. Page 37 mentions the rebound effect in the context of expanding the lifespan of inefficient products. What about the rebound effect in the context of the ASI framework. Surely there is a good chance of the Improvement leading to a rebound. How many computer screens does each author now use simultaneously?	Taken into account - we will consider how to better highlight the risk of rebound by potentially expanding the existing discussion and connecting to rebound points made in other chapters	Philippe Tulkens	European Union (EU) - DG Research & Innovation	Belgium
74823	34	28	35	1	On the 2nd Column of the table, consider adding the word 'factors' to the Emission decomposition	Noted	Government of Kenya	Kenya	Kenya
84063	34	26			Table 5.1 Please add "fewer long-haul flights" and "vacationing closer to home" to Avoid options in Mobility. Avoid options in aviation are underrepresented in both Chapter 5 and Chapter 10, which is unfortunate, given that "Improve" options in this sector are highly unlikely to provide sufficient mitigation (if any at all, if growth in demand continues)	Accept - to be added to Table 5.1	Michał Czepkiewicz	University of Iceland	Poland
28793	35	7	36	2	Are the references to food waste in this section only about waste of food, and not about food loss? When I read this, I wondered if the mitigation potential of food waste reductions (8.6 GtCO2eq yr) stated here also includes food loss reductions. If food loss is included in that estimate, then it should be distinguished from food waste in the previous sentence.	Accept - we will make the distinction between consumer food waste and production system food loss explicit in the next draft	Erin Biehl	Johns Hopkins Center for a Livable Future	United States of America
31243	35	4	35	4	During 2010–2016, global food loss and waste equalled 9–10% of total anthropogenic GHG emissions (medium confidence) Please refer to the more recent IPCC SRCCL report chapter 5	Accept - we will cite the more recent source suggested here	Minal Pathak	WGIII TSU, Ahmedabad	India
31341	35				Lighting/Lumens neglects to mention sufficiency in terms of lighting level, not every surface or room needs to have the same lumens per square meter as an operating theatre in a hospital. (gender considerations of course lighting=security, etc).	Noted	Jacob HALCOMB	UNEP Affiliate	France
74825	35	2	36	8	This could be added as an example of how reduction in milk spoilage in Kenya could potentially reduce the GHG emissions from the dairy sub sector. This is the link to the study - https://cgspace.cgiar.org/bitstream/handle/10568/100165/CCAFS%20R18.pdf .	Noted - we will evaluate the study and cite it if possible	Government of Kenya	Kenya Meteorological	Kenya
83669	35	0	35	0	Future assessment of "kg CO2 -eq" for diets should be based not just on calories consumed but on nutritional quality in terms of bioavailable nutrients consumed - the discussion of this section could therefore include this as a suggestion for future work as the kg CO2 -eq is likely to change when bioavailability of key nutrients is taken into account. (See Ertl, P., Knaus, W., and Zollitsch, W., An approach to including protein quality when assessing the net contribution of livestock to human food supply. <i>Animal</i> 2016 10(11): p. 1883-1889.)	Accept - we can mention that nutrient balance is an important dimension of adequate calories in the text	Lakshmi Dave	Massey University	New Zealand
3477	36	36	36	36	Please, add the following sentence: " New concrete mix designs will allow to increase the carbon dioxide uptake by cement-based materials (Sanjuán et al 2020), such as concrete made with GGBFS-cements (Andrade and Sanjuán 2018)". Sanjuán, M.Á.; Andrade, C.; Mora, P.; Zaragoza, A. Carbon Dioxide Uptake by Cement-Based Materials: A Spanish Case Study. <i>Appl. Sci.</i> 2020, 10, 339. https://doi.org/10.3390/app10010339 Andrade C, Sanjuán MA. Updating Carbon Storage Capacity of Spanish Cements. <i>Sustainability</i> 2018;10:4806. https://doi.org/10.3390/su10124806	Rejected - carbon update of in-place concrete is out of scope for Ch 5	Miguel Angel Sanjuán	IECA	Spain
3479	36	36	36	36	Please, add the following sentence: "Furthermore, luminiscent concretes can reduce the electrical energy consumption and the heat island effect in the cities (Sanjuán and Argiz, 2019)...". Sanjuán, M.Á.; Argiz, C. Cementos fotoluminiscentes. <i>AFINIDAD LXXVI</i> , 588 (2019) 262-269. https://www.raco.cat/index.php/afinidad/article/download/361875/456476/	Rejected - heat island/albedo effects of concrete are beyond the scope of Ch 5	Miguel Angel Sanjuán	IECA	Spain
10367	36	36	36	36	Please, add the following sentence: " New concrete mix designs will allow to increase the carbon dioxide uptake by cement-based materials (Sanjuán et al 2020), such as concrete made with GGBFS-cements (Andrade and Sanjuán 2018)". Sanjuán, M.Á.; Andrade, C.; Mora, P.; Zaragoza, A. Carbon Dioxide Uptake by Cement-Based Materials: A Spanish Case Study. <i>Appl. Sci.</i> 2020, 10, 339. https://doi.org/10.3390/app10010339 Andrade C, Sanjuán MA. Updating Carbon Storage Capacity of Spanish Cements. <i>Sustainability</i> 2018;10:4806. https://doi.org/10.3390/su10124806	Rejected - carbon update of in-place concrete is out of scope for Ch 5	Aniceto Zaragoza	Oficemen	Spain
10369	36	36	36	36	Please, add the following sentence: "Furthermore, luminiscent concretes can reduce the electrical energy consumption and the heat island effect in the cities (Sanjuán and Argiz, 2019)...". Sanjuán, M.Á.; Argiz, C. Cementos fotoluminiscentes. <i>AFINIDAD LXXVI</i> , 588 (2019) 262-269. https://www.raco.cat/index.php/afinidad/article/download/361875/456476/	Rejected - heat island/albedo effects of concrete are beyond the scope of Ch 5	Aniceto Zaragoza	Oficemen	Spain
11279	36	17	36	20	The very effective policy of reallocating road space deserves a mention in this section, particularly in light of the recent OECD - ITF report. e.g. "Specifically, reallocating road and parking space to exclusive public transit lanes, protected bike lanes and pedestrian priority streets can "evaporate traffic" and reduce vehicle kilometers traveled in urban areas." ITF (2021), <i>Reversing Car Dependency: Summary and Conclusions</i> , ITF Roundtable Reports, No. 181, OECD Publishing, Paris. www.itf-oecd.org/avoiding-car-dependency	Accept - we can cite this report as an example of infrastructure strategies for avoid and shift	Eric Doherty	Ecopath Planning	Canada
11523	36	36	36	36	Please, add the following sentence: " New concrete mix designs will allow to increase the carbon dioxide uptake by cement-based materials (Sanjuán et al 2020), such as concrete made with GGBFS-cements (Andrade and Sanjuán 2018)". Sanjuán, M.Á.; Andrade, C.; Mora, P.; Zaragoza, A. Carbon Dioxide Uptake by Cement-Based Materials: A Spanish Case Study. <i>Appl. Sci.</i> 2020, 10, 339. https://doi.org/10.3390/app10010339 Andrade C, Sanjuán MA. Updating Carbon Storage Capacity of Spanish Cements. <i>Sustainability</i> 2018;10:4806. https://doi.org/10.3390/su10124806	Rejected - carbon update of in-place concrete is out of scope for Ch 5	PEDRO MORA PERIS	UNIVERSITY	Spain
11525	36	36	36	36	Please, add the following sentence: "Furthermore, luminiscent concretes can reduce the electrical energy consumption and the heat island effect in the cities (Sanjuán and Argiz, 2019)...". Sanjuán, M.Á.; Argiz, C. Cementos fotoluminiscentes. <i>AFINIDAD LXXVI</i> , 588 (2019) 262-269. https://www.raco.cat/index.php/afinidad/article/download/361875/456476/	Rejected - heat island/albedo effects of concrete are beyond the scope of Ch 5	PEDRO MORA PERIS	UNIVERSITY	Spain
31293	36	11			Should also reference Transport chapter from AR5 here.	Accept - we can do this	Ralph Sims	Massey University	New Zealand
31295	36	22			Has there been good liaison with authors of other chapters quoted (eg 9, 10 etc) to ensure the points briefly quoted have indeed been covered in those chapters, when it states "See chapter 10"?	Taken into account - we are actively coordinating on key points with other chapters	Ralph Sims	Massey University	New Zealand

Comment Id	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
31297	36	22			It would help not just to quote "Chapter 10" but cross reference to the appropriate section in the Chapter e.g., 10.5.3 of whatever. Also for the other chapters mentioned elsewhere in the text. The reader can then check the same message is being given and the details without having to hunt through the whole chapter.	Taken into account - we will be more precise in the next draft	Ralph Sims	Massey University	New Zealand
49717	36	10	36	22	The A-S-I framework is extensively used in the Transport and Climate Change Global Status Report 2018. A comprehensive explanation is provided in Box 1. The report tracks the progress towards transport decarbonisation, indicating that the majority of implemented measures belong to the area of Improve. Avoid and shift measures are less utilised in climate action plans (NDCs, LTS). Reference: https://slocat.net/tcc-gsr/	Noted	Nikola Medimorec	SLOCAT Partnership on Sustainable, Low Carbon Transport	Republic of Korea
79457	36	10	36	22	The A-S-I framework is extensively used in the Transport and Climate Change Global Status Report 2018. A comprehensive explanation is provided in Box 1. The report tracks the progress towards transport decarbonisation, indicating that the majority of implemented measures belong to the area of Improve. Avoid and shift measures are less utilised in climate action plans (NDCs, LTS). Reference: https://slocat.net/tcc-gsr/	Noted	Mark MAJOR	Partnership on Sustainable Low Carbon Transport	Spain
82833	36	2	36	9	Apart from low meat diets or food waste decrease, another way of GHG lowering from food in households is possible - own food production which is often in organic quality and has no or almost no food miles. Vávra et al. (2018a) estimate GHG mitigation of self-grown fruits, vegetables and potatoes of gardeners in Czechia to be 42-92 kg CO2eq/person/year, which is approx. 3-5 % of overall food emission of Czech households. Moreover, home growing is common among various countries of Global North as several studies show (e.g. US, Scotland, Germany, Hungary, Poland, Czechia - see Vávra et al. 2018b; Smith and Jehlička 2013; Schupp and Sharp 2012). Vávra, J., Daněk, P., Jehlička, P. (2018a). What is the contribution of food self-provisioning towards environmental sustainability? A case study of active gardeners. Journal of Cleaner Production 185: 1015–1023. DOI: 10.1016/j.jclepro.2018.02.261. Vávra, J., Megyesi, B., Duží, B., Craig, T., Klufová, R., Lapka, M., Cudlínová, E. (2018b). Food self-provisioning in Europe: An exploration of socio-demographic factors in five regions. Rural Sociology 83 (2): 431–461. DOI: 10.1111/ruso.12180. 19. Smith, J., Jehlička, P. (2013) Quiet sustainability: Fertile lessons from Europe's productive gardeners. Journal of Rural Studies 32, 148–157. 26. Schupp, J.L.; Sharp, J.S. (2012) Exploring the Social Bases of Home Gardening. Agriculture and Human Values 29, 93–105.	Rejected - while we acknowledge that self production can lead to savings for small population segments in different regions, our focus is on strategies scalable to billions and we have limited space	Jan Vávra	University of South Bohemia	Czech Republic
84065	36	19	36	22	Unfortunately, Chapter 10 do not provide much details on "avoid" and "shift" options. This has to be improved, perhaps with the help of Chapter 5 authors?	Noted	Michał Czepkiewicz	University of Iceland	Poland
84067	36	17	36	18	Please add "and avoiding unnecessary flights"	Taken into account - we will ensure that flight avoidance is reinforced in the text in the most appropriate place	Michał Czepkiewicz	University of Iceland	Poland
3157	37	17			Figure 5.7: role of Infrastructure in Buildings looks much too low	Noted - we are working with the TSU and other chapters to revise this figure	Ian Gough	CASE, LSE	United Kingdom (of Great Britain and
5297	37	22	37	22	Replace Renewables by low carbon	Noted - this is a broader issue to be determined at the report level	Michel SIMON	Retraité/ Pdt	France
9703	37	11	37	16	Yes, there is a high emissions reduction potential from the demand side but that potential may be hard to realize compared to potentials on the supply side. History of demand side energy efficiency measures since 1970s shows that changing human behavior is challenging.	Noted - we cover these difficulties later in the chapter	Mustafa Babiker	Saudi Aramco	Saudi Arabia
16329	37	21	37	24	The concept of sector coupling apper in the description of Figure 5.7. In the text there is explanation for the role of sector coupling and the relationship between sector coupling and demand-side options. The elaborate and specific explanation should be added.	Noted - we are working with the TSU and other chapters to revise this figure	Government of Republic of Korea	Korea Meteorological	Republic of Korea
17095	37	5	37	5	New relevant reference: Brockway, P. E., Sorrell, S., Semieniuk, G., Heun, M. K., & Court, V. (2021). Energy efficiency and economy-wide rebound effects: A review of the evidence and its implications. Renewable and Sustainable Energy Reviews, 110781.	Accept - we will evaluate and cite this as appropriate as part of changes related to rebound effects also requested by other authors	Giulio Mattioli	TU Dortmund University	Germany
18179	37	20	37	20	In this line it notes that Figure 5.7 indicates a reduction of "40-80%" in each end-use sector. In the SPM, page 21, line 3, it notes that the same Figure (SPM.8) indicates mitigation potentials between "50-80%" in each end-use sector. Request that these figures are checked and amended here or in SPM as appropriate.	Noted - we are working with the TSU and other chapters to revise this figure	Government of United Kingdom (of Great Britain and Northern Ireland)	Department for Business, Energy & Industrial Strategy	United Kingdom (of Great Britain and Northern Ireland)
31299	37	19			Takes time to figure out what "Human settlements" meant. Not mentioned in caption. Also suggest put the term inside at the top of the dashed-line box to improve clarity	Noted - we are working with the TSU and other chapters to revise this figure	Ralph Sims	Massey University	New Zealand
55511	37	12	37	14	Clarify what assessment is being referred to here.	Accept - to be done in the next draft	Government of United States of	U.S. Department of State	United States of America
72515	37	20	37	20	SMII Table SMS.1 seems to show a range of 42-64% reduction in individual sectors, not 40-80% (or 50-80% as stated in SPM). It is not clear how the total mitigation potential per sector relates to the range and median % for each category.	Noted - we are working with the TSU and other chapters to revise this figure	Annette Cowie	New South Wales Department of Primary	Australia
84089	37				As to TS.29: This in principle is useful diagram but I have one major reservation. Many options hinge on combination of technology and behaviour. Indeed the UK Climate Change Committee, Sixth Carbon Budget, has a great chart which indicated that something like 40% of net zero could arise from combinations which combine behaviour and technology choices, notably, EVs and heat pumps. And of course EVs to important degree hinge on infrastructure. So this may need rethinking ...	Noted - we are working with the TSU and other chapters to revise this figure	Michael Grubb	UCL - Institute of Sustainable Resources	United Kingdom (of Great Britain and Northern Ireland)
84471	37	17	37	18	In Figure 5.7, the legend and axis titles do not directly explain the context of emissions and reductions as given in the caption. The focus on emissions from the electricity system may be further harmonized also in the bars on the right side as appropriate. Clarification will be useful since the phrase sector coupling is used while the emissions is not from an energy systems perspective.	Noted - we are working with the TSU and other chapters to revise this figure	Siir KILKIS	The Scientific and Technological Research Council of	Turkey
1425	38		38		figure 5.8 has low quality	Accept - a clearer hi-res version will be included in the next draft	Hamideh Dalaei	climatologist at Islamic Republic of IRAN Meteorological	Iran
3159	38	11			Figure 5.8 needs clarifying	Accept - a clearer hi-res version will be included in the next draft	Ian Gough	CASE, LSE	United Kingdom (of Great Britain and
3183	38		38		figure 5.8 has low quality. It should be noted that there are low quality figures in the IPCC Chapters as usual.	Accept - a clearer hi-res version will be included in the next draft	Hamideh Dalaei	climatologist at Islamic Republic of IRAN Meteorological	Iran
5299	38	7	38	7	Replace Renewables by low carbon. To reduce the GHG emissions, you need low carbon production, not necessarily renewable!!!	Noted - this is a broader issue to be determined at the report level	Michel SIMON	Retraité/ Pdt	France
16331	38	2	38	18	The term "Consumption option" appears first from sub-sub section 5.3.1.2. There are no explanation for this concept. Is consumption option different from specific energy service? In addition, it is said in line 3 that 771 options from reviewed journal paper were aggregated into 61 consumption options. However, Figure 5.8 shows only 60 demand side options. To be consistent, they should be corrected to coincide.	Accept - we will clarify the term and reconcile the different number of options cited in the text and figure	Government of Republic of Korea	Korea Meteorological Administration (KMA)	Republic of Korea
29549	38	2	38	10	Plant-based diets have been suggested as a measure to reduce GHG emissions for some years now. This section would benefit from an analysis of the challenges that different regions face to adhere to a plant-based diet. What are the main challenges faced by developed and developing countries? We think information that provides more nuances of challenges and barriers are interesting, maybe especially for plant-based diets, but also for other consumption options. Maybe you could either be more specific on regional challenges in the executive summary or preferably make an additional chapter box that gathers the most policy-relevant information on consumption options from 5.3, 5.4 og 5.6.	Taken into consideration - these issues are the purview of Chapter 12, and we will refer the reader to Ch 12 with the appropriate text in the next version	Government of Norway	Norwegian Environment Agency	Norway
31343	38	10			References wrong figures I believe, 5.4 is whisker plot of countries, doesn't seem related to this section?	Accept - we will fix this in the next version	Jacob HALCOMB	UNEP Affiliate	France

Comment Id	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
43421	38		38		figure 5.8 has low quality. It should be noted that there are low quality figures in the IPCC Chapters as usual.	Accept - a clearer hi-res version will be included in the next draft	sadegh zeyaeyan	Head of national center for forecasting and weather hazards management of	Iran
47337	38	12	38	18	figure 5.8 needs to be more illustrated because all contents are not readable	Accept - a clearer hi-res version will be included in the next draft	Khaled Mohamed Madkour	Ain Shams University, Cairo,	Egypt
50327	38		38		figure 5.8 has low quality. It should be noted that there are low quality figures in the IPCC Chapters as usual.	Accept - a clearer hi-res version will be included in the next draft	Government of Iran	Islamic Republic of Iran Meteorological Organization (IRIMO)	Iran
52111	38	11	38	12	Figure 5.8 is illegible	Accept - a clearer hi-res version will be included in the next draft	Government of Saudi Arabia	Sustainability Advisor to the Minister Ministry of	Saudi Arabia
55513	38	11	38	12	Figure 5.5 is dense and not easily readable. Suggest reevaluating as to whether and how this information can be presented clearly (even with higher image quality).	Accept - a clearer hi-res version will be included in the next draft	Government of United States of	U.S. Department of State	United States of America
71495	38	1	38	12	Fig. 5.8 includes very small and blurred text, which cannot be read.	Accept - a clearer hi-res version will be included in the next draft	Philippe Tulkens	European Union (EU) - DG Research	Belgium
74827	38		38		The details in the figure are not clear therefore it cannot be comprehended. Consider a large-scale figure with lesser details/illustrations	Accept - a clearer hi-res version will be included in the next draft	Government of Kenya	Kenya Meteorological	Kenya
79929	38	1	38	18	It's great to see Ivanova et al Table in here - it would be good to acknowledge that this paper, being based on the studies available, was inevitably skewed towards richer/Western countries. As such the findings/figures really do apply more to EU/USA etc than elsewhere. (Which in terms of mitigation is largely where ASI would need to happen)	Accept - we will add this caveat	Stuart Capstick	Cardiff University	United Kingdom of Great Britain and Northern Ireland
82629	38	7	38	7	Change 'renewable sources of electricity' for 'low-carbon sources of electricity'. This sentence is purely about emissions reductions potential, which is shared by all such generation forms.	Noted - this is a broader issue to be determined at the report level	Jonathan Cobb	World Nuclear Association	United Kingdom of Great Britain and
86781	38	6	38	8	We suggest avoiding generalization on the impacts of meat-based diets on low carbon options, and to follow 2030 Agenda language on sustainable transport. In that regard, we suggest the following wording (language between parenthesis/brackets deleted): "Choosing low-carbon options, such as (car-free living) SUSTAINABLE TRANSPORT, (plant-based diets without or very little animal products,) renewable sources of electricity and heating at home as well as local holiday plans, can reduce an individual's carbon footprint by up to 9tCO ₂ -eq".	Reject - low-meat dietary shifts are well researched and receive attention in Ch 12, so we would be remiss not to include them as an important shift option in Ch 5	Government of Argentina	Ministry of Environment and Sustainable development of Argentina	Argentina
10611	39	4	39	7	This seems similar to the split between intermediate production and final production in economics, or between BtoB and BtoC in trade.	noted. Agree with observation, but space limitations do not allow to explore the links to concepts in economic further.	Philippe Waldteufel	CNRS	France
8391	40	8	40	13	Figure 5.9 also highlights the relationships between energy efficiency (ratio useful/final energy; or food/crop, or steel in goods/crude) and end-use efficiency. While increasing end-use efficiency is certainly needed, it is also bounded by energy inefficiency further upstream. In other words, the most efficient use of an otherwise inefficient product only contributes little - high effort, low effect. This could be highlighted here as well.	noted. Agree with comment, but space limitations do not allow to add additional text. We hope nonetheless that the idea that systems determine overall efficiency comes across.	Pichler Florian	Energie-Control Austria für die Regulierung der Elektrizitäts- und Erdgaswirtschaft	Austria
59	41	1	41	7	"Illustrative exergy efficiencies of entire national or global service delivery systems range from 2.5% (USA, Ayres 1989) to 5% (OECD average, (Grubler et al. 2012b)) and 10% (global, Nakicenovic et al., 1996) respectively. Studies that adopt more restricted systems boundaries either leaving out upstream resource processing/conversion or conversely end-use and service provision, show typical exergetic efficiencies between 15% (city of Geneva, cf. (Grubler et al. 2012a)) to below 25% (Japan, Italy, and Brazil, albeit with incomplete systems coverage that miss important conversion losses (Nakicenovic et al. 1996)). Comment: These exergy references are VERY old. Two decades of research is largely absent, with only Grubler, Nakicenovic and Ayres being referenced. Either replace or add with these up to date references: World 11% - Cullen et al (2011); EU-15 10-15% (Serrenho et al 2016); UK (15%) and USA (12%) (Brockway et al 2014); China 13% (brockway et al 2015); Mexico 17% (Guevara et al 2017). REFS: 1. Cullen JM, Allwood JM. Theoretical efficiency limits for energy conversion devices. Energy. 2010 May;35(5):2059–69. ; 2. 1. Serrenho AC, Sousa T, Warr B, Ayres RU, Domingos T. Decomposition of useful work intensity: The EU (European Union)-15 countries from 1960 to 2009. Energy. 2014 Nov;76:704–15. 3. 1. Guevara Z, Sousa T, Domingos T. Insights on Energy Transitions in Mexico from the Analysis of Useful Exergy 1971–2009. Energies. 2016;9(7):488. 4. 1. Brockway PE, Barrett JR, Foxon TJ, Steinberger JK. Divergence of trends in US and UK aggregate exergy efficiencies 1960-2010. Environ Sci Technol. 2014;48:9874–9881. ; 5. 1. Brockway PE, Steinberger JK, Barrett JR, Foxon TJ. Understanding China's past and future energy demand: An exergy efficiency and decomposition analysis. Appl Energy. 2015;155:892–903.	accepted. Selected additional references added. As the exergy section had to be substantially reduced to to space limitations, only most important references can be added at this stage.	Paul Brockway	University of Leeds	United Kingdom of Great Britain and Northern Ireland
1427	41		41		figure 5.10 has low quality	accepted. Final draft will include Hi-Res Figure	Hamideh Dalaei	climatologist at Islamic Republic of IRAN Meteorological	Iran
3161	41	9			Figure 5.10: ditto	comment not understood.	Ian Gough	CASE, LSE	United Kingdom of Great Britain and
3185	41		41		figure 5.10 has low quality. It should be noted that there are low quality figures in the IPCC Chapters as usual.	accepted. Final draft will include Hi-Res Figure	Hamideh Dalaei	climatologist at Islamic Republic of IRAN Meteorological	Iran
15935	41	1	41	7	In my view it is a bit misleading to base arguments for energy efficiency potentials on exergy (in)efficiencies. In many cases, the conversion of energy/exergy to services (not commensurate) entails the largest saving potentials. If exergy/useful energy per service can be reduced, all the "upstream" conversion steps required to get the useful energy/exergy are saved as well. Unfortunately, as services cannot be measured in Joules, you can't express energy-service conversion inefficiencies in % of the used fuel, but still the largest potential is often there. E.g. space heating: A passive building does not require any active heating energy to have a comfortable room temperature, whereas the energy saved by replacing an inefficient heating system (efficiency perhaps 30-50%) with an more efficient one (95%) saves some energy, but the savings would be much larger by reducing useful energy demand through improved insulation and better design in the first place	noted. The application of the exergy calculus based on the Carnot formula compares two states actual vs. ideal max possible. It is thus possible to use to determine service efficiencies even if the output is not expressed in Joules. This was explained in detail in FOD but alas the section has to be shortened substantially due to space limitations. Hence we can refer to reviewer only to the established literature where such calculations are performed on a regular basis.	Helmut Haberl	University of Natural Resources and Life Sciences, Vienna	Austria
16333	41	9	41	23	Figure 5.10 is placed in section 5.3.2. However, there are no explanations associated with Figure 5.10 in the section 5.3.2. The first explanation related with Figure 5.10 appears first in section 5.3.3. Thus, the Figure 5.10 needs to be moved o the section 5.3.3. In addition, there are no enough explanations for Figure 5.10. The elaborate explanations should be added.	accepted. We have added text to integrate Figure 5.10 (which is a logical sequel to Fig 5.9) in Section 5.3.2.: "Figure 5.10 illustrates how energy demand reductions can be realized by improved resource efficiency cascades."	Government of Republic of Korea	Korea Meteorological Administration	Republic of Korea
27677	41		41		Figure 5.10 states that energy efficiency improvements are shown by region and end-use type. How are the regions defined and illustrated in this graph?	noted. Regional definitions of Global South and Global North follow established IPCC and UN regionalization.	Eleni Kaditi	Organization of the Petroleum Exporting	Austria

Comment Id	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
43423	41		41		figure 5.10 has low quality. It should be noted that there are low quality figures in the IPCC Chapters as usual.	accepted. Final draft will include Hi-Res Figure	sadegh zeyaeyan	Head of national center for forecasting and weather hazards management of	Iran
50329	41		41		figure 5.10 has low quality. It should be noted that there are low quality figures in the IPCC Chapters as usual.	accepted. Final draft will include Hi-Res Figure	Government of Iran	Islamic Republic of Iran Meteorological Organization (IRIMO)	Iran
55515	41	9	41	23	This comment refers to Figure 5.10. The resolution is very blurry and some text is impossible to read. From what can be discerned, the figure is confusing in terms of how it is displaying energy efficiency improvements between 2020 and 2050. Are the height of the bars the improvements, with the top of the bar being 2020 and bottom being 2050? Add more information to the figure or caption to make this clear	Accepted and noted. Next draft will incl. Hi-Res Figure. Space limitations do not allow to add additional text, but as the comment illustrates the figure is apparently clear (top 2020, bottom 2050, height proportional to energy savings (or increases).	Government of United States of America	U.S. Department of State	United States of America
71497	41	9	41	11	Fig. 5.10 includes text which is small and blurred and cannot be read.	accepted. Final draft will include Hi-Res Figure	Philippe Tulkens	European Union (EU) - DG Research	Belgium
84087	41				As Tech Sum comment Fig TS.28: Fascinating and comprehensive diagram, thanks. Somewhat confusing having darker and lighter blue for two different sectors, which then seem not consistent between c) and (d). Some classifications / attributions are puzzling (how is live car-free – Avoid – separate and additional to walking and cycling and use of public transit ?) And I am surprised EVs go into negative – I have not seen any recent evaluations which conclude that. Vehicle efficiency used to be a big deal.. Surprised if materials don't feature on the left, but then space is limited. Sorry not time or expertise to dig into detail though.	noted. EVs go negative only on the primary energy side (additional conversion losses for electricity generation). At the end-use side efficiently Evs contribute substantially to final energy demand reduction due to electrification.	Michael Grubb	UCL - Institute of Sustainable Resources	United Kingdom (of Great Britain and Northern Ireland)
8393	42	28	42	28	Low-cost? Reducing room temperature, reduced used of (expensive and appreciated) appliances, using public transport, eating less meat and recycling incur „huge“ (non-monetary) costs in contemporary societies, mainly in the most developed countries. If this is only seen in monetary terms, there is the danger of a significant overestimation of the emission-reduction potential. See also section 5.4.	Taken into consideration - we will draw linkages to Section 5.4 to make these non-monetary costs considerations clearer	Pichler Florian	Energie-Control Austria für die Regulierung der Elektrizitäts- und Erdgaswirtschaft	Austria
12017	42	1	47	6	This section explored deep emissions reduction changes, it could very usefully also include deep NETS/CDR social changes - e.g., deep changes in practices/habits which would create conditions that result in net CO2 removals. For example, changing bio stove cooking to biochar use can sequester significant CO2 and have health benefits (for a discussion see ANDERSON, P. 2020. Climate Intervention with Biochar: A White Paper about Biochar and Energy (BC&E) for Carbon Dioxide Removal (CDR) and Emission Reduction (ER). Woodgas Pyrolytics, Inc. Significant removals can also be achieved through changes in land management practices, in ways that increase soil's carbon concentrations. This is done by changing the balance between of carbon in the soil, predominantly through changes in embedded farming practices – for example, by leaving materials such as roots, litter and other residues in the soil, plus the addition of manure (Lal, 2011). The Royal Society and Royal Academy of Engineering (2018), in their review of approaches to remove GHGs from the atmosphere, identified a number of ways that carbon can be sequestered in soil through behaviour changes. These included, depending on soil type, usage and resource availability; improved crop varieties and changes in their rotation and cropping; managing nutrients and optimising fertiliser use through careful timing and precise applications; minimising tillage and maximising the retention of organic material; improving grasses, especially by promoting and planting those with deep roots, and grass density; and, improving grazing management, paying attention to feed sourcing/production and stock density.	noted. While we agree on the comment, biochar is beyond the scope of the demand-side focus of chapter 5 with space limitations not allowing to include further material.	Paul Rouse	Carnegie Climate Governance Initiative (C2G) - The Carnegie Council for Ethics and International Affairs	United Kingdom (of Great Britain and Northern Ireland)
29551	42	1	43	40	The section "Low demand scenarios" refers mainly to studies focusing in developed countries. This section would benefit from studies focusing on different regions, if such exist.	noted. Alas with the exception of the historic Goldemberg study from 1988, there is not much literature on demand-side strategies with focus on the global south. We also emphasise that the studies reviewed are global in scope and report results explicitly also for the Global South.	Government of Norway	Norwegian Environment Agency	Norway
52103	42	43	42	46	Contradicting findings in the statement 'In light of the limited number of mitigation scenarios that represent socio-behavioural changes explicitly, there is medium evidence in the literature that such changes can reduce emissions at regional and global levels, but high agreement that such changes hold gigaton-scale CO2 emissions reduction potentials.' If the socio-behavioural changes can reduce emissions at regional and global levels with medium evidence, the impact in the next sentence can not be of high agreement that such change holds gigaton reduction.	Taken into account – we will ensure consistency in the chapter on how confidence ratings are assigned, but contend it is possible to have a small number of studies in high agreement	Government of Saudi Arabia	Sustainability Advisor to the Minister Ministry of Petroleum and Mineral Resources	Saudi Arabia
71499	42	1	47	6	Deep demand-side reduction scenarios - incl. the modelled effects of lifestyle changes and cascade effects such as from digitalisation, sharing and circular economy - have previously not been well covered in IAM and other models, which tend to focus on supply side reduction options and technology solutions. Emerging research is providing solid evidence of the very significant reduction potential from demand side and service oriented solutions. Yet, to be more certain about low-demand results of modelling, better data is needed and also more research into the opportunities and barrier for life-style and behavioural changes, that are very context and cultural specific.	Accept - we agree and will ensure that research needs for better data on lifestyle and behavioral changes are clearly mentioned in the text	Philippe Tulkens	European Union (EU) - DG Research & Innovation	Belgium
83065	42	1	43	14	To avoid the common misunderstanding (even within the AR6 author team) that a term like "negative emissions technologies" covers all carbon dioxide removal options, you should indicate that you (obviously) don't talk about ecosystem-based CDR options here, like afforestation (which is still substantial in Grubler et al. 2018, and which is not really part of the minimization effort in van Vuuren et al. 2018)	Accept - we will make this clarification	Geden Oliver	German Institute for International and Security Affairs	Germany
61	43	33	43	33	"incorporation of rebound effects from avoided spending (van de Ven et al. 2018)". Comment: This is a very short statement on rebound. compared to the size of text that efficiency occupies. There are many rebound components, and many/most are missing in IAMS - see for example Brockway et al, 2021. In addition, there is limited discussion even within IAM circles about rebound - see for example Krey et al 2019 where rebound is not even mentioned at all. REFS: 1. Brockway P. E., Sorrell S.R., Semieniuk G., Heun M.K., Court V. (2021) Energy efficiency and economy-wide rebound effects: a review of the evidence and its implications, Renewable and Sustainable Energy Reviews. In review. 2. Krey V, Guo F, Kolp P, Zhou W, Schaeffer R, Awasthy A, et al. Looking under the hood: A comparison of techno-economic assumptions across national and global integrated assessment models. Energy. 2019;172:1254–67.	Accept - we will evaluate and cite this as appropriate as part of changes related to rebound effects also requested by other authors	Paul Brockway	University of Leeds	United Kingdom (of Great Britain and Northern Ireland)
28671	43	30	43	40	I quite disagree with this formulation ("Once the limitations..."), which tends to downplay the scientific challenges of integrating the different dimensions of demand into IAMs and suggests that this work on modelling would be the only avenue to explore. There are resources in the literature that indicate that "addressing the current limitations" will require methodological innovations in order to overcome multidisciplinary, political and scientific challenges, notably linked to the concept of lifestyles. These challenges are important to underline, because they challenge the policy relevancy of assessment. See Lifestyle changes in mitigation pathways: policy and scientific insights, Saujot, M., Le Gallic, T., Waisman, H. Environmental Research Letters, 2020, 10.1088/1748-9326/abd0a9	Accept - we will reword this point to better reflect the challenges and nuances stated by the reviewer, and will consider citing the suggested paper	MATHIEU SAUJOT	IDDRI	France
50069	43	24	43	24	AIM instead of AIMS?	Accept	Masahiro Sugiyama	University of Tokyo	Japan

Comment Id	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
83067	43	10	43	12	Mention of van Sluisveld et al. 2018 here doesn't support your argument. The article did only look at "meeting the European Unions' 80% greenhouse gas emission reduction objective for 2050", so it doesn't come as a surprise that their scenario does work without BECCS. Before the EU decided on its "net zero by 2050" target, almost nobody modelled EU 2050 trajectories with BECCS (I only know of 2 such scenarios, and they were outliers, not taken up in the literature), since the old target could easily be modelled without technological CDR (they usually contain afforestation, though)	Taken into consideration - we will revisit how we cite Van Sluisveld in the next draft	Geden Oliver	German Institute for International and Security Affairs	Germany
83909	43	30	43	40	IAMs would also benefit from exploring how the mechanisms generating the robust economic growth typically projected, and the ensuing structural change, especially from industrialization, may put upward pressure on energy demand, as discussed in Semieniuk et al. (2021) which could be cited here. Semieniuk, G. et al. (2021) 'Plausible energy demand patterns in a growing global economy with climate policy', Nature Climate Change, Accepted M. https://doi.org/10.1038/s41558-020-00975-7	Accept - these points are valid and the suggested source is relevant	Gregor Semieniuk	University of Massachusetts Amherst	United States of America
79931	44	1	44	1	Is one limitation of the scenarios listed here that the measures considered appear to be rather unambitious? Elsewhere in the chapter, there is talk of vegan diets and less long-haul travel, but the examples referred to in the Table are rather small and incremental e.g. 'standby loss' and 'reduced paper'. If these are the types of ASI/socio-behavioural changes incorporated, then would any estimated % from ASI/behavioural change be on the low side as a result? What if a scenario had included those more ambitious measures? Page 42's conclusions seem to be based on these scenarios, but if what went into the scenarios was 'better plastic recycling' and 'reduced appliance use' then perhaps even the 'Gigaton-scale' changes are rather conservative. [NB top of p.60 explicitly notes that 'recycling' has small potential, underlining this.]	Accept - we will add this caveat, which is true for many of the scenarios, and underscores the need for better data and methods to enable IAMs to look at more ambitious changes	Stuart Capstick	Cardiff University	United Kingdom (of Great Britain and Northern Ireland)
66021	46		46		Replace megawatt by Negawatt for the French scenario	Accept	Yamina Saheb	OpenExp	France
17685	48		58		In "5.3.4 Transformative megatrends", one important megatrend is clearly missing: the increase in the standard of living of a large part of the world's population. This is a megatrend that will be at least as important as those presented. This could be an opportunity to integrate literature in development economics and development geography, for example, which seems to me to be little present overall in this chapter.	Noted - well being is foundational to the chapter, and the three megatrends are discussed in the context of how they can support well being, as opposed to well being being its own megatrend	Thomas Le Gallic	CNRS - CIRED	France
17687	48		58		In "5.3.4 Transformative megatrends", I wonder about the absence of a sub-section dedicated to social, territorial and citizen movements that deal with the transition of social practices: slow cities, slow food, degrowth, veganism, transition town, the global ecovillage movement, etc. Are they not sufficiently presented in the literature to be mentioned? It is true that they are followed by minor parts of the population and are mainly present in the countries of the North, but these are the biggest emitters. Moreover, if there is no agreement on their effects, it is necessary to indicate that experimentation is exploring possible paths, while humanity is looking for new ways of development (see 2020 UNDP report). This comment is more of a question than a suggestion. I noticed that there is a mention of this in the "knowledge gap" paragraphs.	Noted - we will try to determine if these concepts are being covered elsewhere in the AR6 report and refer the reader to them if so	Thomas Le Gallic	CNRS - CIRED	France
31345	48	26			Unclear why "Blockchain" is included in this figure. Very little contained in this chapter on the topic.	Noted - blockchain is mentioned briefly as an example of digitalization that intersects with sharing and circular economy concepts, but we don't conduct deep analysis	Jacob HALCOMB	UNEP Affiliate	France
71501	48	1	48	39	The three transformative megatrends - sharing economy, circular economy and digitalisation - are all emerging and highly interdependent. Rebound effects exist, particularly from digitisation which increase GHG emissions but are highly uncertain and dependent on public regulation to avoid negative impacts. More research and policy relevant knowledge is needed to understand, estimate and manage both the opportunities and barriers for achieving a high mitigation potential from demand-side options.	Taken into consideration - we'll ensure that the research and knowledge needs for better understanding them are clear in the text	Philippe Tulkens	European Union (EU) - DG Research & Innovation	Belgium
8395	49	15	49	25	In electricity, digitalisation may or may not impact the physical reality of electricity flows. Whilst, for instance, peer-to-peer trading enables the economic accounting for electricity production and consumption between peers, there is no effect on the physical flows of energy between the same peers. It may thus only change the balance sheet of various actors (peers, electricity suppliers, grid operators) but have no further effect on emissions per se.	Taken into account - we will clarify that peer-to-peer trading may enable faster and/or more equitable uptake of clean energy technologies, which was the original intent	Pichler Florian	Energie-Control Austria für die Regulierung der Elektrizitäts- und Erdgaswirtschaft	Austria
10613	49	29	49	29	I do not understand the reference to chapter 9, the title of which is "buildings". How is this reference relevant for communication services?	Noted - we will be more precise in the next draft and point to specific section(s) in the Buildings chapter	Philippe Waldteufel	CNRS	France
4011	51	44	55	31	What about the broader environmental implications of sharing beyond the sharing economy? For example, shrinking household sizes and increasing dwelling space per person worldwide have meant that the household economies of scale and within-household sharing potential has been reducing dramatically. The implications for carbon and energy are huge, particularly in the context of housing, but also food, equipment and other consumption. In the context of housing, smaller dwellings have been shown to be associated with lower energy use compared to large ones, even when less energy efficient. Some relevant references: Ellsworth-Krebs, K., 2019. Implications of declining household sizes and expectations of home comfort for domestic energy demand. Nat. Energy 1–6. https://doi.org/10.1038/s41560-019-0512-1 ; Ivanova, D., Büchs, M., 2020. Household sharing for carbon and energy reductions: the case of EU countries. Energies 13, 1–28. https://doi.org/10.3390/en13081909 ; Yates, L., 2018. Sharing, households and sustainable consumption. J. Consum. Cult. 18, 433–452. https://doi.org/10.1177/1469540516668229 ; Also what about collaborative or communal sharing (e.g. community gardens, car cooperatives who own a fleet of cars not-for-profit), which has much stronger potential compared to the sharing economy to foster inter-personal relationships, connection to a common community purpose and wellbeing.	Comment noted. We completely agree with the observations of the reviewer. However in an assessment report which is severely space constrained we need to focus on individual phenomena (in this case the demand reduction potential of the sharing economy) rather than at each time repeating general observations, like the historical drivers of household changes and their impact on energy demand.	Diana Ivanova	University of Leeds	United Kingdom (of Great Britain and Northern Ireland)
5301	51	29	51	29	Replace Renewables by low carbon	Noted - this is a broader issue to be determined at the report level	Michel SIMON	Retraité/ Pdt	France
17097	51	15	51	17	Recent relevant study on the carbon impact of e-scooters: de Bortoli, A., & Christoforou, Z. (2020). Consequential LCA for territorial and multimodal transportation policies: method and application to the free-floating e-scooter disruption in Paris. Journal of Cleaner Production, 273, 122898.	Accept - we will evaluate and cite this as appropriate	Giulio Mattioli	TU Dortmund University	Germany
39055	51				"The energy requirements of cryptocurrencies is also a growing concern, although considerable uncertainty exists surrounding the energy use of their underlying blockchain infrastructure (Vranken 2017; Stoll et al. 2019; de Vries 2018; Masanet et al. 2019)." Well, yes. I was very surprised to see cryptocurrencies discussed, and apparently seen off, as a concern in just two or three sentences. To be fair, this is a very fast-moving target. But it's an increasingly broad concern: https://www.nytimes.com/2021/03/09/business/dealbook/bitcoin-climate-change.html?searchResultPosition=5	Accept - more recent papers have emerged with some numbers on cryptocurrency energy demand and trends that we can now cite	Robert Buhr	Green Planet Consulting Ltd.	United Kingdom (of Great Britain and Northern Ireland)
61537	51	23	51	23	More explanations on "marginal" are needed.	Accept - we will clarify in the next round	Takashi Homma	Research Institute of Innovative	Japan
74175	51	18	51	20	The issue of cryptocurrencies and energy demand is an issue that requires more than a sentence. This is a major driver of energy consumption and should be evaluated in a more systematic way. https://www.wired.com/story/iceland-bitcoin-mining-gallery/ ; https://www.datacenterdynamics.com/en/news/ukraine-plans-huge-cryptocurrency-mining-data-centers-next-nuclear-power-plants/ ; https://www.bbc.com/news/technology-56012952	Accept - more recent papers have emerged with some numbers on cryptocurrency energy demand and trends that we can now cite	Jeffrey Merrifield	Pillsbury Law Firm	United States of America

Comment Id	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
84375	51	6	51	24	The message expressed on the impact of digital economy on energy system appears too positive regarding the current technology level of ICT. As matter of fact, the issue of digitalization is probably the bigger long-term uncertainty in term of energy either to supply demand-side especially of the so-called "digital society", or to manage the energy system by itself with more intermittent sources, more connectivity, more electric and dispersed sources, less elastic/analogic loads, more (versatile) end-uses by migration towards carbon-free sources. Basically, the second principle of thermodynamics requires to spend an amount of energy to manipulate information. This value was assessed by Landauer [see e.g.: A. Berut, A. Arakelyan, A. Petrosyan, S. Cilberto, R. Dillenschneider, E. Lutz: Experimental verification of Landauer's principle linking information and thermodynamics, Nature, 483, pp. 187-192, 2012; N. Gershenfeld: Signal entropy and the thermodynamics of computation, IBM Systems Journal, 35, (3&4), pp.577-586, 1996; R. Landauer, "Irreversibility and Heat Generation in the Computing Process," IBM Journal of Research and Development 5, No. 3, 183–191 (1961); and: Energy Limits in Computations, Edited by : Lent, Orlov, Porod, Snider, Springer, 2019]. Current technologies (Random Access Memory, Phase Change Memory) require at least 6 orders of magnitude more to perform the binary operation of Landauer and a technological breakthrough is mandatory in order reduce it drastically by shifting from polarized technologies (with permanent leakage currents) to spintronics... or quantum computing for distant time horizon. The IT industry has already identified this critical issue [Semiconductor Industry Association/Semiconductor Research Corporation : "Rebooting the IT revolution" (Sept. 2015): https://www.semiconductors.org/resources/rebooting-the-it-revolution-a-call-to-action-2/] and has already faced to this kind of drastic energy reduction since it prevailed, along with other requirements such as reliability, cost, compactness and rapidity, in the replacement of cabled technology to the development of micro-electronics in the 1960s: at that time, 15MW (final) were needed to undertake 100 binary operations. To summarize, the energy dedicated for digitalization of economy and control of the energy system must be endogenized within the planning exercises of decarbonation including massive implementation of digitalization.	Noted - we will try to reflect the need for endogenizing digitalization in models and planning	Vincent MAZAURIC	Schneider Electric	France
3041	52	19	52	37	Discussion does not link clearly to mitigation issues. Paragraph adds little beyond some general comments and could be deleted.	Accepted. Deleted here.	Beth Edmondson	Federation	Australia
31347	52	15	52	18	THANK YOU for raising this very important point. Personally, I strongly dislike "sharing economy" as I never charged my friends a fee when sharing books, food, etc. It's great you raise the critique here.	Noted.	Jacob HALCOMB	UNEP Affiliate	France
31349	52	39	54	35	If feasible, it would be nice to see some language here on the gender differentiation of public/private mobility both safety but also differences in type and nature of travel/trips (e.g. men to office and home, women tend to string together many more stops for food, caregiving, etc.) Perhaps this is mentioned but I missed it.	Rejected. This is indeed of interest but there is insufficient literature that relates the gender shared mobility issue to climate change mitigation	Jacob HALCOMB	UNEP Affiliate	France
75649	52		52		It is recommended that bicycles be offered at a very reasonable prices to the citizens of large cities with large populations, such as cities such as Tehran, where. In addition to the problem of the population, there is air pollution and traffic to reduce pollution there. Free or low-cost bicycle distribution maybe effective.	Noted. Some references could have helped.	Mahnaz Ahmadi	Meteorology Organization of IRAN	Iran
82269	52	39	52	39	From the title itself it is not clear to me that this section focuses on shared 'private' transport, rather than also public transport (bus, rail, etc.) - while I understand this might not fall under the definition of 'Transformative Megatrends', I wonder if it should be clearly mentioned somewhere (if I have not missed it). Maybe refer to Box 5.7?	Reject. In developing countries comfortable and digital technology is providing new safe public transport and is helping in reverting the trend from private transport based system. We added an explanation on private vs public: Even though most shared mobility providers operate privately, their services can be considered as part of a public transport system in so far as it is accessible to most transport users and does not require private asset ownership.	Jarmo Kikstra	IASA	Austria
82835	52	26	52	28	Food sharing is widespread not only through active social groups but also through informal relations in families or friends networks. Such sharing contributes to lower waste and is important part of the social life of the society. More than half of population is, for example, somehow involved in food sharing in Czechia or Moldova (receiving, giving or both), see Jehlička and Daněk (2017); Piras (2020). This comment also relates to Fig. 5.11 on p. 48 - food is missing in the figure as a good example of non-digital sharing. 56. Jehlička, P.; Daněk, P. (2017) Rendering the actually existing sharing economy visible: Home-grown food and the pleasure of sharing. Sociologia Ruralis 57, 274–296. Piras, S. (2019) Home-grown food and the benefits of sharing: The "intergenerational pact" in post-socialist Moldova. Journal of Agrarian Change doi:10.1111/joac.12351.	Noted. We concur with the reviewer that private food sharing is an established practice in several regions and social settings. The example given is however VERY regional and defies the purpose of a global assessment if not complemented by suggested references from other regions. Space limitations also do not allow us to expand the number of references at this stage.	Jan Vávra	University of South Bohemia	Czech Republic
6105	53	25	53	39	bike sharing in Shanghai has one latest problem: supply is much higher than demand, meaning a huge number of bikes are not maintained and ended up in the dumpsite -> quantification of CO2 increment is not yet done	Noted. But no publication cited.	Liwah Wong	EIT Climate KIC, EIT RawMaterials	Germany
10615	53	19	53	21	lame sentence	Reject. This is supported by literature. No contesting literature suggested	Philippe Waldteufel	CNRS	France
17099	53	30	53	32	Recent relevant study on the impacts of ridehailing: Diao, M., Kong, H., & Zhao, J. (2021). Impacts of transportation network companies on urban mobility. Nature Sustainability, 1-7.	Accepted. This citation has been added along with relevant text on its findings (i.e., increased congestion, decreased transit ridership, little change in vehicle ownership)	Giulio Mattioli	TU Dortmund University	Germany
75651	53				Encourage governments to employ employees and even private-sector employees in research, programming, graphics, translation, or any other job that can be done remotely from distance, and provides remote work management platforms. Therefore, reduce urban problems such as high traffic volume, large population, air pollution and creating a revolution on the way of working and studying and accepting and recognizing more of them in the future to reduce the massive problems of metropolitan areas and make people live in places Encourage more privacy and pleasant weather.	Noted. Workfrom home mentioned in AR6 across chapters widely including this chapter. Any additional literature could have been helpful.	Mahnaz Ahmadi Namin	Meteorology Organization of IRAN	Iran
75653	53				Encourage governments to provide transportation services for government employees and even the private sector that shares a home-to-work environment to reduces urban problems such as high traffic, crowds, air pollution, in this case for large numbers of cars. A single-passenger fuel transport vehicle consumes fuel and reduces traffic load and fuel consumption.	Noted. Any additional literature could have been helpful.	Mahnaz Ahmadi Namin	Meteorology Organization of IRAN	Iran
77151	53				Encourage governments to integrate government offices and their homes a short distance from their workplaces and on the outskirts of large metropolitan areas that face problems with high traffic volumes, large populations, and air pollution.	Noted. We mention compact cities and urban forms as mechanisms for avoiding transport demand and shifting to public transit; policy recommendations for transport are made in Chapter 10.	Mahnaz Ahmadi Namin	Meteorology Organization of IRAN	Iran
4013	54	45	54	46	This is quite a simplification as multi-generational living for example has been another - potentially more significant driver of shared living.	Comment noted, but we disagree that our discussion is a simplification. The point of discussing new concepts of the sharing economy (like new businessmodels targeting students of professionals, e.g. "urban hives") is precisely that they are new and go beyond traditional sharing concepts like multiple generations sharing one dwelling). We agree with teh reviewer that these traditional within-family sharing may be more important as a driver of energy demand, but they do not constitute part of teh sharing economy where new clients for sharing are targeted by novel service deliver concepts. The disjoint between our section and the review is basically that we want to discuss new development and new business models of sharing, whereas teh reviewer would prefer a focus on traditional (non-commercial) sharing schemes.	Diana Ivanova	University of Leeds	United Kingdom (of Great Britain and Northern Ireland)
20789	54	27	54	29	Please develop this statement	Noted. We have reworded this sentence for clarity.	Government of France	Ministère de la Transition	France

Comment Id	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
24973	54	24	54	35	The section on shared mobility as part of the larger discussion on the transformative trend of the sharing economy provides a nuanced discussion of the issues with shared mobility. However, it does not reference the emerging body of literature around the dimensions of mobility justice. In particular this concluding paragraph, which reflects on the governance of shared mobility, would be enhanced by the inclusion of work on "mobility as commons". Scholars studying this concept place mobility in the category of common goods, which should be available for all to access and to govern collectively. I would recommend the following paper as a starting point on this subject: Nikolaeva, A., Adey, P., Cresswell, T., Lee, J. Y., NÓvoa, A., & Temenos, C. (2019). Commoning mobility: Towards a new politics of mobility transitions. <i>Transactions of the Institute of British Geographers</i> , 44(2), 346–360. https://doi.org/10.1111/tran.12287 . The following excerpts from the abstract may be valuable: "We present a new concept, "commoning mobility," a theorisation that both envisions and shapes practices that develop fairer and greener mobilities and more inclusive, collaboratively governed societies. (...) The logics of commoning shows a potential to reassess mobility not only as an individual freedom but also as a collective good, paving the way for fairer mobility transitions and a collaborative tackling of sustainable mobility challenges." Other useful references to include a mobility justice perspective on shared mobility could be: https://doi.org/10.1016/j.jtrangeo.2020.102798 and http://dx.doi.org/10.1016/j.erss.2016.03.026 .	Comment noted. We concur with the reviewer that shared mobility may have also important implications of justice, i.e. improving accessibility for disadvantaged, handicapped or the poor. However, this section's focus is on energy demand implications. Therefore due to space limitations we cannot expand the text further here including other aspects of shared mobility beyond energy (and GHG emissions).	Emil Beemer	Dutch Research Institute For Transitions, Erasmus University Rotterdam	Netherlands
70029	54	4	54	8	"even rivaling traditional metro/urban rail and bus options". This opinion needs evidence, but data of these mass transportations are not shown in Figure 5.13(a). It should be noted that electric vehicle requires more road space than public transportation.	Noted. We agree with the reviewer that electric vehicles require more space (and also energy and materials) that high capacity public transit. The "rivaling" statement comes from the observed trend in some Metro Areas (e.g. San Francisco) where Uber indeed has substituted trips previously on public transport. Spce limitations do not allow to add another micro literature review here.	Yoshiyuki Shimoda	Division of Sustainable Energy and Environmental Engineering, Osaka	Japan
75645	54	24	54	35	I appreciate the overview given on shared mobility – as a critical key component of the transformation towards a sharing economy. Nevertheless, the material provided would benefit from integrating the emerging literature on the topic of Mobility Justice and the concept of "Mobility as Commons". Research within this field refer to mobility as a common good – available for all, and governed collectively. To start, a possible reference for you to use (highly recommended): Nikolaeva, A., Adey, P., Cresswell, T., Lee, J. Y., NÓvoa, A., & Temenos, C. (2019). Commoning mobility: Towards a new politics of mobility transitions. <i>Transactions of the Institute of British Geographers</i> , 44(2), 346–360. (https://doi.org/10.1111/tran.12287). An illustrative excerpt from the abstract: "We present a new concept, "commoning mobility," a theorization that both envisions and shapes practices that develop fairer and greener mobilities and more inclusive, collaboratively governed societies. (...) The logics of commoning shows a potential to reassess mobility not only as an individual freedom but also as a collective good, paving the way for fairer mobility transitions and a collaborative tackling of sustainable mobility challenges." Other useful references to include: I. https://doi.org/10.1016/j.jtrangeo.2020.102798 II. http://dx.doi.org/10.1016/j.erss.2016.03.026 .	Identical comment as #24972. This raises serious precedural issues (reviewers coordinating to supply identical comments to "tilt" the review process). Our answer remains the same. The chapter is on mitigation potentials (energy and GHG emissions). The subject of transport justice is important but beyond teh scope of our assessment in this Section.	Amira El-Feiaz	Technische Universiteit Eindhoven	Netherlands
85569	54	24	54	35	An idea that fit well here but is not included yet is the idea of mobility as a commons. https://doi.org/10.1111/tran.12287	Noted. Suggested literature is beyond the (narrower) sope of this chapter and section with focus on mitigation (energy and GHGs).	Auke Hoekstra	Eindhoven University of	Netherlands
3043	55	23	55	31	It's a pity the important points made here are buried on page 55. They should be introduced much earlier in the chapter.	Noted. These evidence statements generally come at the end of sections in our chapter, so we'll retain this pattern for overall chapter coherence, but we note that these evidence points receive elevated visibility in the Technical Summary.	Beth Edmondson	Federation University	Australia
4015	55	26	55	31	Both sentenses start with "On the other hand", which makes it difficult to follow the contrast.	Accepted. The first sentence starts with "on the one hand" and the second starts with "on the other hand" in the final version	Diana Ivanova	University of Leeds	United Kingdom of Great Britain and
20791	55	20	55	22	Please explain why	Noted. We explain in Section 5.3 how policy can consider avoiding induced demand and rebound effects, which also apply here.	Government of France	Ministère de la Transition	France
31351	55	1	55	33	please double check grammar/some sentence structure seems a bit off. -this remains true for many sections after this. I understand copy-edit will happen later, but language in this section remains confusing at times.	Accepted. A final editing pass for English grammar occurs in the final version.	Jacob HALCOMB	UNEP Affiliate	France
52129	55	9	55	10	This strong claim relies on one source. This source derived its results from a low-sample online survey in 2014. Omit or support further.	Noted. We have softened this statement.	Government of Saudi Arabia	Sustainability Advisor to the Minister Ministry of	Saudi Arabia
15077	56	18	58	38	This whole section was written mainly from western perspectives, without seriously considering the CE practice in developing world at all, which may lead to biased conclusions. From terminology point of view, it is obvious that CE has different essence in different countries. Please see Will, M., Geng, Y., Huang, B., Bartekova, E., Bleischwitz, R., Turkeli, S., Kemp, R., Domenech, T., 2017. Circular economy policies in China and Europe. <i>Journal of Industrial Ecology</i> , 21(3): 651-661. This paper has clear statements on the different CE foci between EU and China. Please also include more CE literatures from developing world or east Asia (such as Japan and South Korea), where CE has become a key strategy to mitigate the overall CO2 emission. More case studies, especially with quantitative analysis on CO2 emission reduction through CE efforts, have been published during the last five years and should be cited to present different perspectives. Will, M., Geng, Y., Huang, B., Bartekova, E., Bleischwitz, R., Turkeli, S., Kemp, R., Domenech, T., 2017. Circular economy policies in China and Europe. <i>Journal of Industrial Ecology</i> , 21(3): 651-661.	Taken into consideration. We have added a reference to McDowall et al and mentioned that CE foci differ by regions. Regarding case studies, due to severe space limitations we could only add additional data points to Figure 5.13a as opposed to adding more case studies to the text; we conducted a thorough literature review of CE case studies but were limited to include those that provided quantitative data on specific CE strategies in Figure 5.13a.	Guoquan HU	National Climate Center of China Meteorological Administration	China
15937	56	18	58	38	In think the discussion of the macro (system-level) perspective for CE on p 57, lines 35-43 should be strengtened throughout the CE chapter. The key point is that as long as human societies are accumulating material stocks in buildings, infrastructures, machinery and long-lived goods, the fraction of material inputs into their "physical economies" must necessarily remain limited because growing stocks mean that virgin materials are required in large quantities, even in the hypothetical (and thermodynamically impossible) case of perfect loop closing (see caveat one). System-level approaches of socio-metabolic research (Haberl et al. 2019, <i>Nature Sustainability</i> , doi 10.1038/s41893-019-0225-2) not only show that the level of circularity is very low (Haas et al. 2015, <i>J Ind. Ecol.</i> , doi: 10.1111/jiec.12244) but also that it failed to improve in the last century (Haas et al., 2020, <i>Resources, Conserv. Recycl.</i> , doi 10.1016/j.resconrec.2020.105076). Humanity is accumulating stocks at an amazing rate, more or less in 1:1 unison with GDP (Krausmann et al. 2017, <i>PNAS</i> , doi https://doi.org/10.1073/pnas.1613773114) and these human-made material stocks have reached about the same order of magnitude as the mass of all plants on land (Krausmann et al. 2017, <i>PNAS</i> , doi https://doi.org/10.1073/pnas.1613773114 , Erb et al. 2018, <i>nature</i> , doi 10.1038/nature25138), as recently summarized in Elhacham et al. 2020. <i>Nature</i> https://doi.org/10.1038/s41586-020-3010-5 . The growth in material stocks in buildings, infrastructures, machinery and long-lived products is a key driver of lacking circularity of societies' metabolism, and needs to be addressed if loop-closing should be improved.	Accepted. We have added some brief text on the mismatch between stocks and flows and inserted the relevant citation provided by the reviewer.	Helmut Haberl	University of Natural Resources and Life Sciences, Vienna	Austria
27679	56	18	58	38	The subsection on circular economy could incorporate analysis related to the Circular Carbon Economy (CCE) as well, considering the recent adoption of this approach by the G20 countries.	Taken into account. The TS has included a cross-chapter box on circular economy in which the circular carbon economy concept has been included.	Eleni Kaditi	Organization of the Petroleum Exporting	Austria

Comment Id	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
29863	56	19	56	21	Please consider to add some detail. Suggestions and additional sources: The global consumption of materials such as biomass, fossil fuels, metals and minerals is expected to double in the next forty years (OECD (2018), Global Material Resources Outlook to 2060). Half of total greenhouse gas emissions and more than 90% of biodiversity loss and water stress come from resource extraction and processing (COM(2019) 640 final).	Noted. We appreciate the reference suggestions, but generally refrain from point forecasts in our chapter when discussing scenarios and attribution studies to reflect full scientific uncertainty.	Government of Norway	Norwegian Environment Agency	Norway
29865	56	21	56	21	Please consider to put "primary" in front of materials, to reflect that circular economy will contribute to replace primary/virgin materials with recycled materials.	Accepted. "Primary" has been added.	Government of Norway	Norwegian Environment Agency	Norway
29867	56	19	57	7	Please consider if circular economy needs some more explanation, e.g. the transition to a more circular economy means that the value of products, materials and resources is maintained in the economy for as long as possible, and the generation of waste minimised. This includes reduced demand for primary materials, reduced footprints of consumption, and increased circular material use rate.	Noted. We appreciate the suggestion to add more explanation but cannot comply due to severe space limitations. Besides CE is also explained and defined in the Glossary, so the concept is well covered even beyond this brief Section.	Government of Norway	Norwegian Environment Agency	Norway
31245	56	18	57	48	Circular Economy is among the six key mitigation options highlighted in the industry chapter. Yes CE alone is insufficient and faces challenges to upscaling. Request authors to please see if this assessment here is consistent with chapter 11	Taken into consideration. We have coordinated with the industry chapter in summarizing CE's limitations in the TS cross-chapter box on CE, and mention the potential limits of mitigation potentials in Section 5.3.4.3.	Minal Pathak	WGIII TSU, Ahmedabad	India
71503	56	18	58	38	Circular economy (CE) is estimated in one study (Blok et. al. 2016) to contribute more than 6 GtCO2 by 2030, provided tax system reform for GHG emissions and extraction of raw materials substitute labour taxes. Yet, in a review of 3244 peer-reviewed articles it is found by Cantxler et al. (2020) that just a few studies are able to provide meaningful insights on CE's impact on GHG emission reductions and most of these find just a small potential. Knowledge about CE's mitigation potential depend on institutional conditions such as tax reform. Also, significant risks exist for rebound effects from activity level actions and uncertainty persists about systemic impacts, though such analysis is sparse. Knowledge gaps persist regarding CE's overall mitigation potential and impacts.	Noted. We have stressed the knowledge gaps and importance of addressing them.	Philippe Tulkens	European Union (EU) - DG Research & Innovation	Belgium
5127	57	30	57	30	What is meant by "meaningful insights"? Meaningful in what way / from whose perspective?	Accepted. We changed the language to reflect that used in the cited article: "... only 10% of all studies contributed insights on how the CE can support mitigation."	Lina Hollender	n/a	Germany
6025	57	33	57	35	I recommend that this statement is strengthened: it needs to be clear that the notion that an economy can be fully circular contravenes the Second Law of Thermodynamics. I suggest that you cite Cullen, J. (2017) Circular Economy: Theoretical Benchmark or Perpetual Motion Machine?. Journal of Industrial Ecology, 21 (3), 483-486. https://doi.org/10.1111/jiec.12599	Accepted. We have revised this sentence.	Angela Druckman	University of Surrey	United Kingdom (of Great Britain and Northern Ireland)
6107	57	28	57	32	the systematic review has not included grey literature	Noted. However, we do include grey literature in the CE mitigation potentials review with the chapter.	Liwah Wong	EIT Climate KIC, EIT RawMaterials	Germany
15079	57	40	57	41	Beyond what you wrote, another barrier for recycling is production equipment & technology barrier for recyclable resource. For instance, iron/steel is regarded as one recyclable metal and with a large amount of stocks. However, modern iron/steel plant was designed to use iron ore to produce iron/steel and cannot accept secondary iron/steel as raw materials due to impurities and traditional process flows.	Noted. However, due to severe space limitations we cannot comment deeply on technology barriers to recycling in existing industrial plants; we defer to the industry chapter (Ch. 11) for such discussions.	Guoquan HU	National Climate Center of China Meteorological Administration	China
17817	57	33	48	48	Criticisms of CE also include that the way it is supported and operationalised by policy (in the EU) is reinforcing the paradigm of ecological modernisation, rather than leading to any meaningful shifts in consumption or sustainability practices (see Leipold, 2021 in Environmental Politics: https://doi.org/10.1080/09644016.2020.1868863) and that the materials being cycled through the circle can cause other environmental issues (see e.g. Haupt and Hellweg 2019 https://doi.org/10.1016/j.indic.2019.100005)	Comment noted. We agree with the reviewer's critical observations on CE. These critiques have been raised in the preceding paragraph p.57 I22-31. Space limitations do not allow us to add additional text and references here.	Julia Leventon	Global Change Institute of the Czech Academy of Sciences CzechGlobe	Czech Republic
29869	57	11	57	12	Please also consider to include that designing products in a circular economy includes improving product durability, reusability, upgradability and reparability, addressing the presence of hazardous chemicals in products, and increasing their energy and resource efficiency, and also to increase recycled content in new products.	Noted. See also our response to comment #29867. Severe space limitations do not allow to add further general (introductory, definitional) text in this Section.	Government of Norway	Norwegian Environment Agency	Norway
29871	57	28	57	31	The sentence indicates that circular economy mostly only has low potential to reduce GHG emissions. Considering that this varies a lot from different materials, please consider to nuance the message with this in mind. Recycling of metals have large benefits when it comes to reducing CO2. A report points at the wider benefits of the circular economy, including in lowering current carbon dioxide emissions levels.(Growth within: a circular economy vision for a competitive Europe, report by the Ellen MacArthur Foundation, the McKinsey Centre for Business and Environment and the Stiftungsfonds für Umweltökonomie und Nachhaltigkeit (SUN), June 2015.)	Noted. In all due respect, while we have reviewed extensive literature on the CE, our conclusion is that it has severe limitations, despite undeniable potentials to reduce emissions. An additional grey literature source is not going to change the balance of evidence from our extensive literature survey.	Government of Norway	Norwegian Environment Agency	Norway
52113	57	24	57	25	The concept of the circular economy (CE) and also specifically the concept of the circular carbon economy (CCE) was endorsed during the G20 meeting by the governments, the CCE framework includes Remove to complement the circular economy 3Rs. A report was published on the concept (https://www.cceguide.org/guide/). This concept should be covered in the section about circular economy.	Noted. We have mentioned the concept of a circular carbon economy in the final draft in the cross-chapter box on CE.	Government of Saudi Arabia	Sustainability Advisor to the Minister Ministry of Petroleum and	Saudi Arabia
17689	58		87		I find sections 5.4, 5.5 and 5.6 more coherent and consistent. On the other hand, I do not find the titles convincing. Perhaps more titles should be formulated as a verb+ING? (like in SR1.5). A few proposals: 5.4's heading is too general. A suggestion for inspiration: "Understanding the major drivers that play a role in a transition" Shouldn't 5.5 be a sub-part of 5.4? It is only 5 pages long, offers an integrative view based on theoretical frameworks from transition studies. I would not place this contribution at the same level as the other sections.	Noted - the headings reflect the chapter authors' approach to provide analysis (5.4), synthesis (5.5) and policy implications (5.6). As such the current structure has a logical order of presentation.	Thomas Le Gallic	CNRS - CIRED	France
18181	58	40	75	1	Fantastic to see this level of social science information being worked into an IPCC report. It seems one omission across section 5.4 is around the motivational influence of efficacy beliefs (e.g. self efficacy, response efficacy beliefs about behavioural effectiveness and collective efficacy). There is some mention of perceived control and agency, but efficacy has different implications for behaviour. The balance between perceived threat and efficacy is very consistently evidenced and referred to within health behaviour / health communications studies (studies which have further relevance given themes in this chapter about wellbeing, and covid-19). Could the research literature about efficacy be worked into section 5.4, along with policy relevance, and options to address efficacy? This could potentially be a very significant point for the report, as it implicates points about building people's motivation to take actions.	Noted- a reference to the effects of personal efficacy has been added to Section 5.4.1	Government of United Kingdom (of Great Britain and Northern Ireland)	Department for Business, Energy & Industrial Strategy	United Kingdom (of Great Britain and Northern Ireland)
20793	58	41	58	41	While the Supplementary Material (SM) emphasises and documents the systemic dimension of change (p. 172, line 45 ff.), this position is weakened in the body of chapter 5 and is almost absent from the ES. By maintaining its premises in individual demand rather than adopting a systemic perspective from the outset, chapter 5 of the AR6 (and especially its ES) does not seem to follow its intention to break with the AR5 (as described in the SM p.172 lines 19-28) and remains constrained by the dominance of an economic approach (with some exceptions, as in the introduction to section 5.4., pp.58-59). A full reading of this chapter gives the impression that the intentions have been profoundly narrowed to strict economist perspectives, whereas the issues at stake should be tackled by and with the help of all social sciences (anthropology as well as management, sociology as well as human geography, economic as well as philosophy). This has direct impact on some parts of chapter 5. Eg : the § 5.4 on transition toward high WB and low carbon demand societies focuses mainly on the role of individual behaviours (and beyond on personal responsibilities), in coherence with the mainstream economic framework. There is almost nothing on (1) the role of the business (2) the role of collective regulations and institutions with an excessive place given to the (contested) "nudge" issue for public action, (3) the role of the social constraints concerning demand (by lack of resources, by lack of institutions, due to the role played by marketing and the advertisement business, due to the strategies of premature obsolescence, or to the technological lock downs).	Noted - the chapter is a first step only, limited by space availability; hence the SsCP. It is not correct to say that the chapter text focuses only on economics or individual demand. Section 5.4 also focuses on businesses and corporations, institutions and social movements. Section 5.5 integrates approaches in a systemic perspective.	Government of France	Ministère de la Transition écologique et solidaire	France

Comment Id	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
20795	58	45	58	45	"These five drivers of human behaviour either contribute to the status-quo of a global high-carbon, consumption, and GDP growth oriented economy or help generate the desired change to a low-carbon energy-services, wellbeing, and equity oriented economy (Yuana et al. 2020) (Figure 5.14)." Add references : Cassiers 2014, Jackson 2017, Raworth 2017, Cassiers, Marechal & Méda 2018, Giraud, 2018, References: Cassiers, I. (ed.), 2014: Redefining Prosperity, Routledge, Studies in Ecological Economics.; Cassiers, I.K. Maréchal, K. and D. Méda, (eds.) 2018: Post-growth Economics and Society. Exploring the path of a Social and Ecological Transition, Routledge, Studies in Ecological Economics; Jackson, 2017 (2nd ed.); Prosperity without Growth. Foundations for the Economy of Tomorrow; Raworth, K., 2017: Doughnut Economics: Seven Ways to Think Like a 21st Century Economist. Random House Libri.; Giraud, G., 2015, Energy Challenges for Sustainable Development: How to Avoid a Collapse ?, HYPERLINK "https://www.cairn.info/revue-d-economie-du-developpement.htm"Revue d'économie du développement HYPERLINK "https://www.cairn.info/revue-d-economie-du-developpement-2015-HS.htm"HS (Vol. 23), pages 5-17	we have added the three most recent 2017 and 2018 references. Space constraints prevent us from adding too many	Government of France	Ministère de la Transition écologique et solidaire	France
31247	58	35	58	38	Again please check with chapter 11	Taken into consideration. Ch. 5 has coordinated with Ch. 11 on CE messaging.	Minal Pathak	WGIII TSU, Ahmedabad	India
31353	58	1	58	15	If appropriate, some consideration of "Prebound" effects may be worthwhile when reviewing these expected savings.	Reject. While interesting, it appears the "prebound effect" refers to the gap between expected and actual energy performance, first introduced for buildings. It is unclear how to apply this concept to the circular economy.	Jacob HALCOMB	UNEP Affiliate	France
77395	58	26			Requiring factories for the longer life product and the possibility of free repair of products in the case of a failure in long periods of time, this process reduces the consumerism and reduces the consumption of fossil fuels to produce new goods, and if factories are willing if they do not want to increase the lifespan of their products, they will be required to reduce their consumption of fossil fuels and replace them with clean fuels.	Noted. Due to severe space limitations, we can only describe the CE framework and evidence basis for energy and GHG emissions effects in this short section. While we find the reviewer's comments interesting, we do not offer policy analyses in this section as it is beyond our scope.	Mahnaz Ahmadi Namin	Meteorology Organization of IRAN	Iran
79933	58	40	58	46	Thank you for articulating this so well! It is encouraging to see an explicit recognition of the links between these different factors and scales - this I hope will help engender a more mature and nuanced dialogue about these things.	Thank you for this comment	Stuart Capstick	Cardiff University	United Kingdom of Great Britain and
1429	59		59		figure 5.14 has low quality	We revised Figure 5.14 in light of this comment	Hamideh Dalaei	climatologist at Islamic Republic of IRAN Meteorological	Iran
3045	59	10	59	19	These issues should be foregrounded much earlier in the chapter. They could be used to underpin a more systematic consideration of ASI and demand-mitigation efforts.	We now point to this discussion of ASI in earlier parts of the chapter	Beth Edmondson	Federation University	Australia
3163	59	20			Figure 5.14 adds little and should be dropped	We revised Figure 5.14 in light of this comment	Ian Gough	CASE, LSE	United Kingdom of Great Britain and
3187	59		59		figure 5.14 has low quality. It should be noted that there are low quality figures in the IPCC Chapters as usual.	We revised Figure 5.14 in light of this comment	Hamideh Dalaei	climatologist at Islamic Republic of IRAN Meteorological	Iran
15939	59	24	60	47	In my view the "practice theory" perspective on consumption (that are robustly discussed later in ch 5.5.1) is underappreciated and, where alluded to, not well represented in this chapter. In line 33, practices are described as being contingent on people's mindset, which does not grasp the central ideas of this approach. See for example Røpke, 2009. Ecol. Econ. https://doi.org/10.1016/j.ecolecon.2009.05.015, Warde, 2005. J. Consum. Cult. 5, 131–153, https://doi.org/10.1177/1469540505053090, Warde, 2014. J. Consum. Cult. https://doi.org/10.1177/1469540514547828, Shove, 2010. Environ. Plann. A Econ. Space 42, 1273–1285, Shove, E., Pantzar, M., 2005. J. Consum. Cult. 5, 43–64. https://doi.org/10.1177/1469540505049846, Schäfer, 2018. Sustainability 10, 1047. https://doi.org/10.3390/su10041047, Hausknost et al. 2018. Environ. Policy Gov. 28, 371–382. https://doi.org/10.1002/et.1804. See also Haberl et al. 2021, Ecol Econ https://doi.org/10.1111/jiec.13055 for a review of practice theory approaches in relation to patterns of material stocks and resource use	We removed the word "practice" in line 33, to avoid allusion to practice theory here. As the reviewer points out, the la	Helmut Haberl	University of Natural Resources and Life Sciences, Vienna	Austria
17819	59	24	63	15	Yes, I like this presentation of the way in which values, norms, etc shape behaviour change. There is recognition early in this section, and in the build up to it that broader contextual factors shape how individuals can act on values, etc. However, this is not elaborated, and I think misses an important point. I would suggest a contribution from work such as the energy cultures framework (Stephensen et al., 2010 https://doi.org/10.1016/j.enpol.2010.05.069; Stephensen et al, 2015 https://doi.org/10.1016/j.erss.2015.03.005; and its application in e.g. rural areas in Klaniček et al., 2020 https://doi.org/10.1016/j.enpol.2019.111092) This is really useful work for unpacking how motivations and values intersect with e.g. material cultures/infrastructure and social factors. In this part of the report, it would help to contextualise the role of values, norms, and add nuance to how behaviour change works in different contexts, and how we define interventions to facilitate behaviour change	We incorporated this comment and two of the references into Section 5.4.1 and now say: Information provision and a	Julia Leventon	Global Change Institute of the Czech Academy of Sciences CzechGlobe	Czech Republic
18183	59	17	59	23	Figure 5.14: Could a key within this figure or further commentary underneath be added to indicate the significance/influence of the centrally positioned measures (e.g. nudges and incentives, sustainable infrastructure etc) and something to clarify their influence on the other elements of the graphic? Also, the positioning of 'nudges and incentives' in this graphic seems to imply prominence of nudges that perhaps doesn't reflect the message of what is written elsewhere in the chapter. Suggest potentially reducing the central prominence of nudges here?	We revised Figure 5.14 in light of this comment	Government of United Kingdom (of Great Britain and Northern Ireland)	Department for Business, Energy & Industrial Strategy	United Kingdom (of Great Britain and Northern Ireland)
18185	59	31	59	33	A general comment for the chapter, but particularly relevant to note here... It's somewhat unclear where 'reduce' type behaviours fit into the Avoid-Shift-Improve framework referred to - i.e. whether they fall under avoid or shift. Reducing flights or meat consumption could be interpreted as either avoid or shift presumably? The phrasing 'avoid' implies something very binary and absolute (i.e. no longer carrying out a behavioural at all). As a side note, I wonder if this framing/language could potentially be unhelpful when disseminating given an 'avoid' framings could be interpreted through a lens of loss/sacrifice, which some social science research suggests is demotivational, while 'reducing' could be more interpreted as more achievable. The action here would be to consider further where reduce behaviours are categorised, to clarify further somewhere, or consider if another category is required?	Reduce behaviours do indeed fall under the avoid category, which is not intended to be simply binary. We say so now	Government of United Kingdom (of Great Britain and Northern Ireland)	Department for Business, Energy & Industrial Strategy	United Kingdom (of Great Britain and Northern Ireland)
20797	59	25	59	25	It is necessary : 1) to give a definition of behavior, because the French translation ('comportement') does not necessarily refer to the same idea. 2) to specify the scope included through this term, because this term can refer to the idea of conditioned behaviour in response to a stimulus, like beh. Does it leave room for other approaches, in which the individual is endowed with reflexivity?	This is an important comment and triggered us to make sure that the term behaviour will be defined in the report glos	Government of France	Ministère de la Transition écologique et	France
31355	59	22			Suggest changing the shape of the "Avoid Shift Improve" box to better highlight the disproportionate impact wealthy/middle class have. Right now it visually doesn't show, perhaps add little people inside to represent x% of humans?	We revised Figure 5.14 in light of this comment	Jacob HALCOMB	UNEP Affiliate	France
43425	59		59		figure 5.14 has low quality. It should be noted that there are low quality figures in the IPCC Chapters as usual.	Our apologies, this has been corrected.	sadegh zeyaeayan	Head of national center for forecasting and weather hazards management of	Iran

Comment Id	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
50331	59		59		figure 5.14 has low quality. It should be noted that there are low quality figures in the IPCC Chapters as usual.	Our apologies, this has been corrected.	Government of Iran	Islamic Republic of Iran Meteorological Organization (IRMO)	Iran
52131	59	25	59	26	"capacity for change" is introduced here, and is used as a strong conceptual background for this section. Nowhere in the chapter is a reference given for this concept. Provide references.	We added two references here.	Government of Saudi Arabia	Sustainability Advisor to the Minister Ministry of	Saudi Arabia
3165	60	4		12	This paragraph belongs in the Intro to the whole chapter	We moved this paragraph to the chapter introduction	Ian Gough	CASE, LSE	United Kingdom (of Great Britain and
18187	60	16	60	18	Should this statement about role models be expanded further to note influence of trusted communicators beyond celebrities, given celebrities may have varied influence depending on an individuals values/interests? e.g. communicators perceived as part of in-group often more influential than out-group members so wonder if this statement should reflect this.	This is a valid point and we modified the text. The sentence now reads:"The provision of targeted information, social a	Government of United Kingdom (of Great Britain and Northern Ireland)	Department for Business, Energy & Industrial Strategy	United Kingdom (of Great Britain and Northern Ireland)
20799	60	12	60	12	About the sentence "AR6 in the current chapter and SScP attempt to fill this omission". Although the SScP provides the necessary material, the chapter itself hardly succeeds in filling the omission	Noted - the chapter is a first step only, limited by space availability; hence the SScP	Government of France	Ministère de la Transition	France
20801	60	16	60	18	But all of these - especially advertising and celebrity role-models, increasingly through social media, too - can also be used in parallel (and perhaps more successfully) to foster demand for high consumption, and often high-carbon lifestyles	Very true and they surely are being used for that by	Government of France	Ministère de la Transition	France
20803	60	24	60	24	In this section, the reduction of meat consumption is mentioned. It would be possible to refer to studies that show the energy efficiency of the production of other dietary protein sources	There is insufficient space to refer to this issue.	Government of France	Ministère de la Transition	France
31249	60	34	60	35	There is some information on this. Please check	We have added the fact that the Climate Change Committee have made recommendations to policy for dietary shift and reduced meat and dairy consumption.	Minal Pathak	WGIII TSU, Ahmedabad	India
31357	60	12			What is SScP?	We now spell out the acronym: it is the supplementary Social Science Primer (SScP)	Jacob HALCOMB	UNEP Affiliate	France
79935	60	1	60	3	It is true that "Most personal actions taken have small mitigation potential" - but a pretty major qualification needed here: this is, at least in part, because actions such as recycling have been pushed as the types of actions that ordinary people can take! We can't know the counterfactual, but what if for the past 20 years we had actually been talking about and promoting low-carbon diets, sufficiency, less flying etc? If most personal actions have small mitigation potential, perhaps this is because people have been unwittingly duped into this being the type of thing they should be doing. The implication for the text is not to frame this as an inevitability or a given: most actions... have so far had... because this has what has been promoted and enabled.	This is a valid point and we modified the text to add the "so far" caution. The sentence now reads:"Most personal actions	Stuart Capstick	Cardiff University	United Kingdom (of Great Britain and Northern Ireland)
79937	60	24	60	41	With a focus on the UK here, this Box might do well to acknowledge that the UK's Committee on Climate Change is now formally stating that (red) meat consumption needs to decrease - they are not quite policy-makers, but this is now official advice to govt.	We have added this point to the text, citing the CCC's 6th Carbon Budget.	Stuart Capstick	Cardiff University	United Kingdom (of Great Britain and
79939	60	43	61	12	I think this statement is problematic: "People's perceptions of climate risks, first covered in AR5, help create motivation for behaviour change, though related more proximate and personal concerns such as extreme weather and natural disasters may be more effective (Bergquist et al. 2019)." The value-based, abstracted sense of 'risk' about climate - including vicarious concern for others - is likely at least as important as direct experience of weather events. There is good data to show that extreme weather etc does indeed raise concern and behavioural intentions, but this may fade quickly - https://onlinelibrary.wiley.com/doi/full/10.1002/wcc.321 . Furthermore, experience-based research assumes a rather self-interested (rather than other-interested) set of motivations. (Also Bergquist I think is missing in the list?)	We reworded this sentence to indicate that both generalized perceptions of risk and feelings of being more personally at risk play a role, with the latter perhaps being somewhat transient. And the Berquist reference is part of the chapter references.	Stuart Capstick	Cardiff University	United Kingdom (of Great Britain and Northern Ireland)
79941	60	47	61	3	This is a serious hostage to fortune! While yes it does seem that concern about climate change has held up despite covid, the cited research is 2020. We don't yet know whether it will yet hold up. The 'finite pool of worry' point is tricky too: is it that (a) covid didn't displace climate change as a competing concern in people's reserves, or (b) climate change and covid are sufficiently aligned in people's perceptions and concerns - they are both, perhaps, evidence of a disrupted, damaged, natural world - and so being concerned about one is not at odds with concern about the other.	Good points raised, and with any luck a study that we now cite will be accepted for publication that shows that climate concern remains high as late as early this year, even as Covid concerns are high, and that this is not restricted to individuals who see strong connections between the two hazards.	Stuart Capstick	Cardiff University	United Kingdom (of Great Britain and Northern Ireland)
5303	61	40	61	41	Delete : together with the ongoing decrease in prices of renewable energy technologies,"which is an irrelevant statement in that section.	Noted - this statement has been deleted.	Michel SIMON	Retraité/ Pdt d'association	France
18189	61	8	61	10	I'd like to query this point about direct experience leading to concern and action. The literature seems somewhat mixed with some results suggesting personal experience increases concern, and others not. Some literature also suggests experience mediated by factors like personal values, so it's perhaps more complex than this point suggests. Suggest double checking this statement, and potentially amending to reflect mixed results.	Noted - while not all studies find support for the relationship, the overwhelming majority do. We added a reference to a paper that describes moderators and mediators and a reference to a paper that finds strong evidence for the relationship across all 24 countries in which it was studied.	Government of United Kingdom (of Great Britain and Northern Ireland)	Department for Business, Energy & Industrial Strategy	United Kingdom (of Great Britain and Northern Ireland)
18191	61	7	61	10	Given the point here is about climate change as an abstract, distant issue... Could something more be said here (or elsewhere in this chapter) regarding psychological distance effects - i.e. do most people feel climate change will affect people in other countries, or impacts wont manifest for many years. What implications does this have for mitigation, what is the policy relevance, and what are the options to address this? Potentially relevant here also is growing literature around public health framings (e.g. Maibach et al 2010)	We already provide two references to point we make about climate change being seen as a distant issue. Unfortunately	Government of United Kingdom (of Great Britain and Northern Ireland)	Department for Business, Energy & Industrial Strategy	United Kingdom (of Great Britain and Northern Ireland)
18193	62	21	62	25	Could the literature that goes beyond 'perceived control' be worked in here? This would add nuance to points regarding the influence of efficacy beliefs discussed earlier in the chapter.	We now include efficacy beliefs in this list, together with a reference.	Government of United Kingdom (of Great Britain and Northern Ireland)	Department for Business, Energy & Industrial Strategy	United Kingdom (of Great Britain and Northern Ireland)
20805	62	30	62	33	There are two important additions to be made to this paragraph: 1) What is indicated on page 7 (executive summary) should be added: "Behavioural nudges can promote easy behaviour change, improve actions like energy efficiency investments, but fail to motivate harder lifestyle changes." 2) We can add what ADEME says, which seems very relevant: "If behavioural sciences and nudges are indeed part of the levers identified, this cannot dispense with the use of more traditional tools of public action, even if these would be more expensive and less popular". Source : ADEME, Changer les comportements. Faire évoluer les pratiques sociales vers plus de durabilité", 2016, 183 p.	Noted - but rather than adding these precautionary comments about the effectiveness of nudges here, we have strengthened those cautions at the beginning of the section.	Government of France	Ministère de la Transition écologique et solidaire	France
27681	62	35	62	39	Delete "Simplifying access to greener options (and hence lowering effort) can promote ASI changes (Mani et al. 2013). Setting effective "green" defaults may be the most effective policy to mainstream low-carbon energy choices (Sunstein and Reich 2014), adopted in many contexts (Jachimowicz et al. 2019) and deemed acceptable in many countries (Sunstein et al. 2019)."	No argument was provided for why these two sentences should be deleted. They accurately reflect the literature and	Eleni Kaditi	Organization of the Petroleum Exporting Countries, OPEC	Austria
31359	62	6	62	9	It would be helpful to have a bit more language here on what is meant by these keywords (commercialized, etc.) instead of having to jump down to the supplementary materials section	The general definitions of these terms as they appear in dictionaries apply	Jacob HALCOMB	UNEP Affiliate	France
31361	62	16	62	20	Addition of a figure that succinctly outlines the three world views would be welcome	Space constraints prevent us from adding such a figure. The three worldviews are well described by their adjectives (e.g.	Jacob HALCOMB	UNEP Affiliate	France
70031	62	26	62	26	"Table 5.4" should be "Table 5.3". However there are no "obstacles" in table 5.3.	No, we do mean Table 5.4 here, that appeared on pp. 73-75 in the reviewed version of this chapter and which does d	Yoshiyuki Shimoda	Division of Sustainable Energy and Environmental	Japan

Comment Id	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
20807	63	6	63	15	This critique about "nudge and democracy" is too important to be addressed so casually. The key point in the critique of nudging is not just that it relies on manipulation and deception, but that the very efficiency of nudges indeed requires manipulation and deception. "Libertarian paternalism", as Sunstein and Thaler put it, states that individuals spontaneously make "wrong" decisions. Designing choice architectures allows people to decide freely since they will make the right decision without realizing it. Explaining the design of the choice architecture and its purpose would jeopardize its efficiency.	We respectfully disagree. It is not true that the effectiveness of choice architecture interventions depends on deception.	Government of France	Ministère de la Transition écologique et solidaire	France
5305	67	1	70	10	This section 5.4.2. is very long. I am not convinced that such length is justified. I read it like a playdoyer in favor of renewables. Why not? But the true concern is the promotion of low carbon sources, not only renewables! Is IPCC in his role with such an oriented tribune?	This section refers to renewable and low carbon energy sources.	Michel SIMON	Retraité/ Pdt d'association	France
20809	67	9	67	13	this formulation could potentially give the impression that the reduction of greenhouse gases is only a matter of technological innovation.	The text has been revised to ensure that the point being made - about socio-cultural meanings - is more clearly associated with certain technologies or certain practices concerned with climate mitigation.	Government of France	Ministère de la Transition	France
31363	67	21			If the authors are going to plug books, they may also wish to consider the recently published "The Ministry for the Future" by Kim Stanley Robinson, https://en.wikipedia.org/wiki/The_Ministry_for_the_Future	A single example of climate fiction was required in the text (Ghosh, 2016).	Jacob HALCOMB	UNEP Affiliate	France
31365	67	47		38	If no trust in utilities solutions are for using any non-profit? Or does NGO need to be trusted?	Yes, it is necessary for any delivery agent to be trusted, not only utilities. We have clarified this point to the text.	Jacob HALCOMB	UNEP Affiliate	France
48251	67	9	67	9	What are the two levels of analysis? This is unclear and remains unclear throughout the passage.	The text has been revised to ensure that the point being made - about socio-cultural meanings - is more clearly associated with certain technologies or certain practices concerned with climate mitigation.	Susana Hancock	University of Oxford	United States of America
82837	67	1	69	40	Comment on a section "5.4.2 Socio-cultural drivers of climate mitigation". Social practices (already included in different part of this Chapter) could be part of this section as well. This could be based on already mentioned work of Elizabeth Shove or Scholsberg and Coles' (2016) concept of sustainable materialism or Smith and Jehlička's (2013) quiet sustainability. In general these concepts refer to the importance of behaviour - even behaviour which often lacks any pro-environmental motivation can lead to environmentally beneficial outcomes. Smith, J.; Jehlička, P. (2013) Quiet sustainability: Fertile lessons from Europe's productive gardeners. Journal of Rural Studies 32, 148–157. Scholsberg, D., Coles, R., 2016. The new environmentalism of everyday life: sustainability, material flows and movement. Contemp. Polit. Theory 15, 160e181. https://doi.org/10.1057/cpt.2015.34 .	Noted. Social practices were already referred to in this section. An additional mention of social practices has been made in the first paragraph. We have added the citation of Scholsberg and Coles (2016) to a later paragraph referring to collective action.	Jan Vávra	University of South Bohemia	Czech Republic
4159	68	27	68	44	This section is heavily based in the psychology literature, but we summarise similar findings in the sociology/human geography space, using the concept of social relations, and showing how people's relationships with each other shape energy demand. The broad finding of this work is that people's energy consumption is shaped by relationships with friends and family, with local institutions, and by identity. Note that this is not always a positive relationship - it can also result in increased consumption of resources. Your example of solar panel installation misses the point that when people object to/reject solar panels this can also be 'contagious'. As such, the influence of social relations should be understood as potentially damaging for climate change. The reference for our social relations work is: Hargreaves, T., Middlemiss, L. 2020, The importance of social relations in shaping energy demand. Nature Energy. This is a review paper and as such summarises a substantial body of the literature.	Noted but the key point is already made in the text.	Lucie Middlemiss	Sustainability Research Institute, University of Leeds	United Kingdom (of Great Britain and Northern Ireland)
18195	68	23	68	26	If deemed useful by authors, could it be clarified if 'trending norms' refers to the same concept as 'dynamic social norms' and could an example of priming also be given as has above in parantheses for descriptive/injunctive norm priming?	Trending norms are not the same as dynamic social norms. Theoretically, all social norms are flexible and so potentially dynamic. However, 'trending norms' refers to the particular phenomenon when information about changing practices are presented to individuals as a means of encouraging them to respond and to imitate a new norm. We have added an example to illustrate what a trending norm might look like, from the Mortensen et al (2019) empirical study.	Government of United Kingdom (of Great Britain and Northern Ireland)	Department for Business, Energy & Strategy; Industrial Strategy	United Kingdom (of Great Britain and Northern Ireland)
20811	68	8	68	44	The idea that social dynamics can be triggered through imitation per se is highly disputable and, to a large extent, outdated. Indeed, throughout the chapter (see also section 5.4), processes of imitation ("role models", "cascading effects", "the power of role models like celebrities", "perceptions of behaviours common in others", "trending norms", "behavioural contagion", "copycat", "ideas and behaviours often spread like infectious disease", "what we do influences others", etc.) are instrumental for transformations at the individual level. Two critiques are of special importance here. First, such "behavioural" changes cannot be decoupled from economic and cultural dimensions - a lower "socio-economic status" may durably distract individuals from adopting behaviours which ultimately lead to emissions reductions. Secondly, the belief that social dynamics are processes of imitation of so-called "role models" imply social norms are subject to external pressures rather than internalization or incorporation. These mechanisms have been confirmed by major works in social sciences (and especially sociology and anthropology) since the late 19th century (from Max Weber to Pierre Bourdieu, to name two major sociologists). More generally, it questions how the authors of the chapter conceive what "social" means. Indeed, it resembles an economic understanding of the notion, where "social" and "collective" are synonymous, and relations to others are reduced to the mere spreading of information (Ego starts behaving in a certain way, and therefore informs Alter of such a change, which encourages him/her to behave in the same way). As a result, while nudges may be efficient in transforming behaviours, a real efficiency (ie. persistent or durable) implies individuals incorporate the new social norms, for example through education, social movements.	The text states that the effect size of providing feedback about how someone's behaviour compares to others is not strong in general, and the effect size of trending minority norms is relatively small. As such, the text does not over-emphasize the impact of these social processes. More broadly, the interpretation of 'social' in this chapter is pluralist. It does encompass social movements and collective actions, as indicated by the text on those issues in this section.	Government of France	Ministère de la Transition écologique et solidaire	France
20813	68	27	68	28	The sociologist Raymond Boudon is very critical of the model of contagion in relation to the construction of a collective belief. For Raymond Boudon, there are always good reasons for a person's beliefs and actions. Studying these good reasons can make it possible to identify precisely why certain beliefs do not spread. We can refer to Raymond Boudon, L'idéologie ou l'origine des idées reçues, Fayard, 1986 ; Raymond Boudon, L'Art de se persuader des idées fragiles, douteuses ou fausses, Paris, Fayard, 1990	Noted. Rejected since out of scope.	Government of France	Ministère de la Transition écologique et solidaire	France
20815	68	45	68	46	Not necessarily, someone can be affected by climate policies and even play an important role even if he is not directly affected by climate change.	Noted - text has been revised accordingly.	Government of France	Ministère de la Transition	France
24979	68	45	69	11	The chapter's discussion on public and stakeholder participation as a socio-cultural driver of climate mitigation would benefit from a more explicit inclusion of the 'justice in transitions' literature, which gives significant weight to the recognition of marginalised communities and their inclusion in decision-making. Jenkins et al. (2016, http://dx.doi.org/10.1016/j.erss.2015.10.004) and Sovacool & Dworkin (2015, http://dx.doi.org/10.1016/j.apenergy.2015.01.002) in particular provide useful overview of the role of procedural justice and the concrete forms this takes.	The text already cites 'just transition' principles as key to ensuring widespread trust and legitimacy for new policies, citing numerous relevant authors (e.g. Heffron and McCauley, 2016).	Emil Beemer	Dutch Research Institute For Transitions, Erasmus University Rotterdam	Netherlands
28459	68	45	69	11	The chapter's discussion on public and stakeholder participation as a socio-cultural driver of climate mitigation would benefit from a more explicit inclusion of the 'justice in transitions' literature, which gives significant weight to the recognition of marginalised communities and their inclusion in decision-making. Jenkins et al. (2016, http://dx.doi.org/10.1016/j.erss.2015.10.004) and Sovacool & Dworkin (2015, http://dx.doi.org/10.1016/j.apenergy.2015.01.002) in particular provide useful overview of the role of procedural justice and the concrete forms this takes.	Reject. The text already cites 'just transition' principles as key to ensuring widespread trust and legitimacy for new policies, citing numerous relevant authors (e.g. Heffron and McCauley, 2016).	Naud Loomans	Eindhoven University of Technology	Netherlands
52115	68	36	68	40	This paragraph relies too heavily on one source (Frank, 2020)	Noted. We have revised this paragraph.	Government of Saudi Arabia	Sustainability Advisor to the Minister Ministry of	Saudi Arabia

Comment Id	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
61161	68	27	68	44	The simple contagion model may be applicable to the spread of certain behaviours, norms, habits and technologies but building and sustaining political and policy coalitions requires a different model. Otto et al. repeatedly invoke a simple contagion model. However, theoretical work on the diffusion of complex behaviors, leading-edge “big organizing” strategies, and case studies of social network building over time demonstrate that a complex contagion model, characterized by local clusters of strong ties, is a better way of conceptualizing this process. This point is explored in the response to Otto et al (2020) by Smith, Christie and Willis (2020) “Social tipping intervention strategies for rapid decarbonization need to consider how change happens” www.pnas.org/cgi/doi/10.1073/pnas.2002331117	Noted. The additional citation is not required as the text does not support a simple contagion model.	Steven R Smith	CES, University of Surrey	United Kingdom (of Great Britain and Northern Ireland)
72519	68	8	68	26	Please consider adding to the indicated paragraph: Media play a crucial role in mainstreaming low-carbon lifestyles and breaking the social silence (also known as the spiral of silence) around climate change (McLoughlin et al., 2019). For example, several studies have shown that while most people in the UK are in favour of renewable energy technologies, they don't think other people are (ECIU, 2014). ‘Talking climate’, allowing the links between different low-carbon behaviours to be made ‘conscious’, and positively influencing the perception of social norms in the process, is a crucial element in mainstreaming low-carbon lifestyles in any cultural context (McLoughlin et al., 2019). References: ECIU - Energy & Climate Intelligence Unit (2014). Study shows widespread misconceptions about energy and climate change. Retrieved from: http://eciu.net/press-releases/2014/survey-reveals-widespread-misconceptions-about-energy-and-climate-change . McLoughlin, N, Corner, A., Clarke, J., Whitmarsh, L., Capstick, S. and Nash, N. (2019) Mainstreaming low- carbon lifestyles. Oxford: Climate Outreach	Noted. Space limitations do not allow to add additional examples.	Annamária Lehoczky	Fauna and Flora International	United Kingdom (of Great Britain and Northern Ireland)
84069	68	31	68	34	Citation needed	Noted - we have substantively revised this section and removed this sentence entirely.	Michał Czepkiewicz	University of Iceland	Poland
2103	69	26	69	40	The discussion of the role of social movements is extremely limited. The climate movement is much broader than depicted in this text, and there is ample scholarship that discusses this. This part of the report needs to be completely rewritten to accurately reflect scholarship in this area. See the references below:	The text on social movements has been re-written to take better account of existing sociological literature on this topic. It has also been more clearly related to the section on Religion and religious institutions, drawing an example of civil society action on climate mitigation.	Robert Brulle	Brown University	United States of America
2105	69	26	69	40	Bäckstrand, K. and E. Löwbrand. 2007. Climate Governance Beyond 2012:”, pp. 123-148 in Pettenger, M. ed. The Social Construction of Climate Change. Ashgate, Hampshire UK	This citation has not been added as the details of framings are not central to the key messages of this section.	Robert Brulle	Brown University	United States of America
2107	69	26	69	40	Bäckstrand, K. and E. Löwbrand. 2016. The Road to Paris. Journal of Environmental Policy & Planning 1-19.	This citation has not been added as the details of framings are not central to the key messages of this section.	Robert Brulle	Brown University	United States of America
2109	69	26	69	40	Brulle, Robert J. 2014. The Development, Structure, and Influence of the U.S. National Climate Change Movement in Climate Change Policy and Civil Society, Y. Wolinsky (Ed) Washington DC: CQ Press	This citation has not been added, due to its specific focus on one country.	Robert Brulle	Brown University	United States of America
2111	69	26	69	40	Caniglia, Beth, R. Brulle, and A. Szasz. 2015. Chapter Ten in R. Dunlap and R. Brulle (Eds.) Sociological Perspectives on Climate Change Oxford: New York	This citation has been added to the text.	Robert Brulle	Brown University	United States of America
2113	69	26	69	40	Cheon, A. and J. Urpelainen. 2018. Activism and the Fossil Fuel Industry. New York: Routledge	This citation has been added to the text.	Robert Brulle	Brown University	United States of America
2115	69	26	69	40	Della Porta, D. and L. Parks. 2014. Framing Processes in the Climate Movement, pp. 19–30 in M. Dietz and H. Garrelts (Eds.) Routledge Handbook of the Climate Change Movement. Routledge: New York	This citation has been added to the text.	Robert Brulle	Brown University	United States of America
2117	69	26	69	40	Endres, D., L. Sprain, and T Peterson (Eds.) 2009. Social Movement to Address Climate Change. Amherst, NY: Cambria Press.	This citation was not added due to space constraints.	Robert Brulle	Brown University	United States of America
2119	69	26	69	40	Hadden, J. 2015. Networks in Contention. Cambridge, London	This citation was not added due to its focus being outside of the key messages of this section.	Robert Brulle	Brown University	United States of America
4161	69	12	69	25	This section is very positive about the potential for community in addressing climate change issues. In a critical review of the recent literature on this we find that such initiatives have a range of positive and negative outcomes, and as such we must not offer them up as a simple solution. For instance, community action is often instigated by government as an arms length measure, with the intention of delegating the responsibility for climate action to communities. This can lead to community burn out and also cause conflict where community objectives are different to those of government. Community action is not necessarily inclusive, and tends to happen in white, middle-class and well resourced communities. Any recommendation to engage communities in climate action must take the latter into account: otherwise we risk further entrenching inequalities between communities. Full reference; Taylor-Aiken, G., Middlemiss, L., Sallu, S. and Hauxwell-Baldwin, R. 2017. Researching Climate Change and Community in Neoliberal Contexts: an emerging critical approach WIREs Climate Change, e463.	The text does not suggest that community initiatives are simple solutions to the climate challenge. We have added your points , including the recommended citation, about community initiatives not necessarily being inclusive and require policy support to reach all socio-economic groups in society.	Lucie Middlemiss	Sustainability Research Institute, University of Leeds	United Kingdom (of Great Britain and Northern Ireland)
4163	69	34	69	37	Note that these may have given voice to young people, but this has not yet resulted in a real change in influence. Detailed evidence of youth engagement in UNFCCC show that young people might be included but they are not yet listened to. Thew, H., Middlemiss, L. & Paavola, J., 2020. Does youth participation increase the democratic legitimacy of UNFCCC-orchestrated global climate change governance? Environmental Politics and Thew, H., Middlemiss, L. & Paavola, J. 2020. “Youth is not a political position”? Recognition and representation justice in the UNFCCC. Global Environmental Change.	These points are outside of the scope of the chapter.	Lucie Middlemiss	Sustainability Research Institute, University of Leeds	United Kingdom (of Great Britain and Northern Ireland)
17821	69	20	25	25	On religion (and more broadly, spirituality), this is also linked back to shaping people's values. See e.g. Ives and Kidwell 2019 (https://doi.org/10.1007/s11625-019-00657-0) and Woivode et al., 2021 (https://doi.org/10.1007/s11625-020-00882-y). The point being that religion and spirituality shape our normative behaviours by being communities where we observe, learn and ‘catch’ behaviours, but they are also deeper vehicles for shaping our inner values, leading to deeper changes across many behaviours.	We have included both citations in new added text.	Julia Leventon	Global Change Institute of the Czech Academy of Sciences CzechGlobe	Czech Republic
20817	69	20	69	25	We suggest nuancing this paragraph for the following reasons: 1) The concept of religion presupposes the identification of something common in all the diversity of religious beliefs, which is not self-evident. 2) All religious beliefs and all religions do not have the same way of conceiving of man's relationship with nature. Therefore, we cannot conclude on the positive role of religion in the fight against climate change. Sources : Max Weber, Die protestantische Ethik und der “Geist” des Kapitalismus, 1905 ; Darren Dochuk, Anointed with Oil: How Christianity and Crude Made Modern America, 688 pages; Basic Books; 2019	We have nuanced the response to make the role of religion more conditional: “Religion could play an important role in enabling collective action on climate by providing cultural interpretations of change and institutional responses”.	Government of France	Ministère de la Transition écologique et solidaire	France
20819	69	31	69	32	There is an error in this sentence. This should be “shifting to public transport or car sharing”.	We have corrected this error.	Government of France	Ministère de la Transition	France
31367	69	32			You write “public transportation” when I believe you mean “private transportation”	The statement was in error and has been modified.	Jacob HALCOMB	UNEP Affiliate	France
37069	69		69		Discussion reported was biased in favour of solar and wind, and against nuclear.	The focus on solar PV is necessary for the case study.	Arun kumar Nayak	Bhabha Atomic Research Centre	India
37071	69		69		Targeted example is not appropriate. This statement is largely biased.	It is not clear what is being referred to here.	Arun kumar Nayak	Bhabha Atomic Research Centre	India
48253	69	34	69	36	Numbers here are inconsistent with those given elsewhere in the documents. Box 13.6 gives a number in the range of 6million and Ch14 p72 in 36 cites more than 200 countries involved.	Accepted. We have modified the text to be consistent across chapters.	Susana Hancock	University of Oxford	United States of America
48255	69	38	699	38	Gilet Jaunes are referenced here, but Yellow Vests elsewhere (eg Ch13 In 42)	We have ensured consistency across the chapters by referring to Gilet Jaunes (Yellow Vests) in all places.	Susana Hancock	University of Oxford	United States of America

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72517	69	26	69	40	Please, consider adding to the indicated paragraph: Social movements also sparked bigger media attention and climate coverage, as well as inspired the adoption of stronger language on climate change to better convey the seriousness of the problem. The prestigious British daily newspaper, The Guardian has updated its style guide to introduce terms that more accurately describe the environmental crisis unfolding around the world, for example instead of "climate change" the preferred terms are "climate emergency, crisis or breakdown" (1). The Guardian's decision has prompted various other media outlets around the world to reconsider the terms they use in their own coverage (2). References: 1 https://www.theguardian.com/environment/2019/may/17/why-the-guardian-is-changing-the-language-it-uses-about-the-environment 2 https://www.theguardian.com/environment/2019/may/24/media-outlets-guardian-reconsider-language-climate	Noted - we already cite peer reviewed literature on this point about social movements and framing effects.	Annamária Lehoczky	Fauna and Flora International	United Kingdom of Great Britain and Northern Ireland)
77745	69	26	69	40	Social movements can also generate new moral norms, such as norms against fossil fuels: Green, Fergus, 'Anti-Fossil Fuel Norms', Climatic Change, 150 (2018), 103–16.	Noted. Already addressed in text.	Fergus Green	Utrecht University	Netherlands
80149	69	36	69	37	The focus on youth climate activism moving online might additionally be enhanced with the recent Youth For Nature Manifesto, an ongoing campaign by UNEP's Major Group of Children and Youth and other advocacy groups that incorporates both climate activism and biodiversity loss. (Link to the online report: https://fornature.undp.org/content/fornature/en/home/our-manifesto.html). By way of disclosure, as a student member of UNEP MGCY I am a signatory of this document.	Noted - outside of scope.	Robin Happel	Yale Center for Environmental Law & Policy	United States of America
84071	69	31	69	32	Is shifting from public transportation to car sharing considered a viable mitigation option here? Also, there are many other examples of advocating behavioural change that could be references here, such as "We Stay on the Ground" in Sweden and numerous social media group where people who quit flying support each other.	There was an error in the text, now corrected.	Michał Czepkiewicz	University of Iceland	Poland
84403	69	6	69	9	Participatory processes on renewable energy: also important in developing countries where the implementation of (large-scale) renewable energy technologies is facing challenges (related to participation and respect of human rights): Business & Human Rights (2018), RENEWABLE ENERGY RISKING RIGHTS & RETURNS: An analysis of solar, bioenergy and geothermal companies' human rights commitments, https://media.business-humanrights.org/media/documents/files/Solar_Bioenergy_Geothermal_Briefing_-_Final_0.pdf ; Business & Human Rights (2016), Responsible Renewable Energy With rising allegations of abuse, are 50 wind & hydropower companies' human rights policies fit for https://media.business-humanrights.org/media/documents/files/Towards_Responsible_Renewable_Energy_Briefing_-_Final_1.pdf ; Mauger, R., & Villavicencio Calzadilla, P. (2017). The UN's new sustainable development agenda and renewable energy: the challenge to reach SDG7 while achieving energy justice. Journal of Energy and Natural Resources Law, 36(2), 233–254. https://doi.org/10.1080/02646811.2017.1377951	Accepted. We have added the point about achieving SDG7 and energy justice simultaneously, in the text, together with the journal article citation.	Paola Villavicencio-Calzadilla	Universitat Rovira i Virgili	Netherlands
84405	69	10	69	10	In addition to the UK's case, see also the Citizens Climate Convention (France) https://www.conventioncitoyennepourleclimat.fr/	Accepted - we have added this example.	Paola Villavicencio-Calzadilla	Universitat Rovira i Virgili	Netherlands
2121	70	19	70	21	It is not true that "a small number of corporate agents" opposes action on climate change. Rather, the peer reviewed literature clearly shows that there is widespread organized opposition to climate action by thousands of organizations (Dunlap and McCright 2015). Brulle (2018) identified over 2,000 organizations involved in coalitions opposed to climate action. Furthermore Cory et al. (2021) shows that a wide range of corporations involved in the supply chain both upstream and downstream of fossil fuel companies composed the majority of organizations opposed to climate action. Their data set identifies 13,783 organizations involved in opposition to climate action. This sentence needs to be updated to reflect the peer reviewed literature and the extent and nature of organized opposition to climate action.	Noted, we have inserted new material to reflect coalitions opposed to climate action in the US, drawing on recommended citations.	Robert Brulle	Brown University	United States of America
2123	70	19	70	21	Brulle, R. J. (2019). Networks of opposition: a structural analysis of US climate change countermovement coalitions 1989–2015. Sociological Inquiry.	Added to text.	Robert Brulle	Brown University	United States of America
2125	70	19	70	21	Cory, J., Lerner, M., & Osgood, I. (2021). Supply Chain Linkages and the Extended Carbon Coalition. American Journal of Political Science, 65(1), 69–87.	Added to text.	Robert Brulle	Brown University	United States of America
2127	70	19	70	21	Dunlap R, McCright A (2015). Challenging climate change: the denial countermovement. In: Dunlap R, Brulle RJ (eds.) Climate change and society: Sociological perspectives on climate change (pp. 300–332). Oxford University Press, New York	Not required due to addition of peer reviewed articles above.	Robert Brulle	Brown University	United States of America
2129	70	21	70	25	The discussion of corporate advertisement and brand building strategies is limited and fails to consider the emerging literature on the role of public relations and the greenwashing of corporate reputations as a strategy to avoid responsibility for carbon pollution, and to reduce the rise of regulation. This activity runs into the hundreds of millions of dollars per year (Brulle 2019) and involves actions by many major oil companies and trade associations. This activity is well documented, and some key references are listed below. This portion of the assessment needs to be greatly expanded to account for the extensive literature on this topic.	Rejected - outside the scope of the section.	Robert Brulle	Brown University	United States of America
2131	70	21	70	25	Bell, S. E., & York, R. (2010). Community economic identity: The coal industry and ideology construction in West Virginia. Rural Sociology, 75(1), 111–143.	Noted	Robert Brulle	Brown University	United States of America
2133	70	21	70	25	Bortree DS (2009) The impact of green initiatives on environmental legitimacy and admiration for the organization. Public Relations Review 35:133–135	Noted	Robert Brulle	Brown University	United States of America
2135	70	21	70	25	Brulle, RJ, Aronczyk, M & Carmichael, J 2020, 'Corporate promotion and climate change: An analysis of key variables affecting advertising spending by major oil corporations, 1986–2015', Climatic Change, vol. 159, pp. 87–101.	Noted	Robert Brulle	Brown University	United States of America
2137	70	21	70	25	Cooper C, Nownes A (2004) Money well spent? An experimental investigation of the effects of advertorials on citizen opinion. American Politics Research 32(5): 546–569	Noted	Robert Brulle	Brown University	United States of America
2139	70	21	70	25	Greenberg J, Knight G, Westersund E (2011) Spinning climate change: Corporate and NGO public relations strategies in Canada and the United States. International Communication Gazette 73(1–2):65–82	Noted	Robert Brulle	Brown University	United States of America
2141	70	21	70	25	Michaels, I and K. Anger (2020) The climate smokescreen, pp. 159–177 in Almiron, N., & Xifra, J. (Eds.). (2019). Climate Change Denial and Public Relations: Strategic communication and interest groups in climate inaction. Routledge.	Noted	Robert Brulle	Brown University	United States of America
2143	70	21	70	25	Miller BM, Lellis J (2016) Audience responses to values-based marketplace advocacy by the fossil fuel industries. Environmental Communication 10(2):249–268	Noted	Robert Brulle	Brown University	United States of America
2145	70	21	70	25	Mix TL, Waldo KG (2015) Know(ing) your power: risk society, astroturf campaigns, and the battle over the Red Rock coal-fired plant. The Sociological Quarterly 56(1):125–151	Noted	Robert Brulle	Brown University	United States of America
2147	70	21	70	25	Plec, E, Pettenger M (2012) Greenwashing consumption: The didactic framing of ExxonMobil's energy solutions, Environmental Communication 6(4): 459–476	Noted	Robert Brulle	Brown University	United States of America
2149	70	21	70	25	Schlichting I (2014) Consumer campaigns in corporate public affairs management: The case of climate change and the German energy industry. Journal of Communication Management 18(4):402–421	Noted	Robert Brulle	Brown University	United States of America
2151	70	21	70	25	Schneider, J. S. Schwarze, P. Bsumek, and J. Peoples. (2016). Under pressure. Palgrave: London.	Noted	Robert Brulle	Brown University	United States of America
2153	70	21	70	25	Sheehan, K. (2018). This Ain't your daddy's greenwashing: an assessment of the american petroleum institute's power past impossible campaign. In Intellectual property and Clean Energy (pp. 301–321). Springer, Singapore.	Noted	Robert Brulle	Brown University	United States of America
2155	70	21	70	25	Supran G, Oreskes N (2017) Assessing ExxonMobil's climate change communications (1977-2014). Environ. Res. Lett 12:1–18.	Noted	Robert Brulle	Brown University	United States of America

Comment Id	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
3047	70	42	71	3	Adds nothing new - repeats previously made minor point. Delete.	Taken into account - text revised to remove duplication and emphasise main point of sentence about role of professionals in climate mitigation.	Beth Edmondson	Federation University	Australia
3167	70	11		41	This section on business and corporate drivers is weak and unacceptable. Advertising and brand development can cause very strong emissions, eg recent research on explosion of SUV numbers. Divisions between green and brown business sectors, etc. If this developed in another chapter, the conclusions need bringing in here.	Noted. This is better suited for national and international policy chatters	Ian Gough	CASE, LSE	United Kingdom (of Great Britain and Northern Ireland)
5307	70	19	70	19	delete "renewable". What is important is "Cleaner", whatever the electricity is produced.	We followed the terminology used in the assessed literature	Michel SIMON	Retraité/ Pdt	France
17101	70	12	70	16	Business and corporate organisations are also behind unsustainable trends towards increased emissions such as SUVs, fast fashion and fracking - and these tend to be overlooked in sustainability research - see Antal et al. 2020. REFERENCE: Antal, M., Mattioli, G., & Rattle, I. (2020). Let's focus more on negative trends: A comment on the transitions research agenda. Environmental Innovation and Societal Transitions, 34, 359-362.	Similar argument is included in 5.4.3 and also in Executive summary	Giulio Mattioli	TU Dortmund University	Germany
17103	70	21	70	25	A new relevant reference on this is Lamb, W. F., Mattioli, G., Levi, S., Roberts, J. T., Capstick, S., Creutzig, F., ... & Steinberger, J. K. (2020). Discourses of climate delay. Global Sustainability, 3	A number fo references by the same author have been cited.	Giulio Mattioli	TU Dortmund University	Germany
20821	70	21	70	24	page 70, lines 21-25. about the sentence "Corporate advertisement and brand building strategies also attempt to deflect corporate responsibility to individuals, and/or to appropriate climate care sentiments in their own brand building; climate change mitigation is uniquely framed through choice of products and consumption, avoiding the notion of the political collective action sphere". This deserves to be emphasised in the ES, for instance as a replacement for lines 33-37 on page 7	Noted - The ES bullet on Section 5.4.3 has been reworded	Government of France	Ministère de la Transition écologique et solidaire	France
20823	70	42	70	42	This point could be developed. Professional actors can be essential as leaders of new values in business, industry, and innovation objectives. In engineering schools, more and more young students expect eco-design methods and ecological-oriented courses; they foster change in academic knowledge diffusion and support new sustainability values. Redefining professional ethics around sustainability issues is more and more widespread in many professions. In developing countries despite "fragile" states, the emergence of a class of technicians, engineers, experts of the country engaged in public or private agencies, local companies can counterbalance the difficulties of governance and political decision-making.	Noted - and elaborated now in Section 5.4.3.	Government of France	Ministère de la Transition écologique et solidaire	France
27683	70	16	70	19	Delete "Still existing lock-in in infrastructures and business models advantages fossil fuel industry over renewable and energy efficient end use industry (Kitkou et al. 2015). The fossil fuel energy generation and delivery system therefore epitomises a barrier to the acceptance and implementation of new and cleaner renewable energy technologies (Karluiki 2018)."	Rejected - no reason is given for the requested deletion and the text describes consensus in these issues in the academic literature.	Eleni Kaditi	Organization of the Petroleum Exporting Countries, OPEC	Austria
31369	70	42	71	3	It would be good to see more written here on the importance of "middle actors." Specifically as it relates to their important role in ensuring sustainable energy systems/energy efficiency measures are maintained and continue to function as designed. In buildings energy savings measure often do not persist and benefits are lost without maintenance. This can impact expected GHG reductions, etc. LBNL has some good information on this as it relates to building commissioning.	Rejected due to space constraints. The point about the importance of middle actors is already made in the text.	Jacob HALCOMB	UNEP Affiliate	France
71505	70	11	71	3	Corporate claims to zero-carbon footprints is an important and growing demand for carbon credits and thereby (hopefully) enhanced mitigation ambition. This is not mentioned in the section 'Business and Corporate Drivers'. A source documenting the growth in voluntary and compliance carbon markets is the 'Emissions Trading Worldwide. Status Report 2020' by the International Carbon Action Partnership.	Noted - and now mentioned in Section 5.4.3.	Philippe Tulkens	European Union (EU) - DG Research & Innovation	Belgium
72513	70	11	70	41	This section does not present an accurate overview of corporate drivers. It is missing recognition of the current strong interest in climate change reporting, risk assessment, decarbonisation reflected TCFD, GHG Protocol, SBTi, Race to Zero, for example.	In this chapter we are assessing demand side literature.	Annette Cowie	New South Wales Department of Primary	Australia
74177	70	4	70	6	What this sentence fails to note is that the drive to shut down the German nuclear units led to increased dependence on lignite coal units and caused an increase in carbon emissions in Germany. https://www.wired.com/story/germany-rejected-nuclear-power-and-deadly-emissions-spiked/	Noted, but this point about unintended consequences is not the primary goal of this case study, which aims to very briefly illustrate the role of consumer demand and preferences in PV innovation - hence the relevance of this case study for chapter 5.	Jeffrey Merrifield	Pillsbury Law Firm	United States of America
82631	70	6	70	8	The abstract of the paper referenced notes "We propose that with coordinated advances in multiple components of the energy system, PV could supply 30–50% of electricity in competitive markets." The current text saying solar could supply half of global electricity is taking the extreme end of this and therefore presents a misleading picture. We would suggest providing the range 30 – 50%	Accepted - we have revised the text to provide the range of 30-50% as suggested.	Jonathan Cobb	World Nuclear Association	United Kingdom (of Northern Ireland)
37493	71	24	71	26	Repetition	Noted and text revised accordingly.	Government of India	Ministry of Environment,	India
37537	71	21	71	46	Box 5.7: "A key role is played by the state government to improve the system as whole and formalise certain semi-formal modes of transport." Please emphasise that in India that the States/Union Territories work closely with each other and the result is the positive outcomes.	Noted and the issue of state collaboration has been added to the text.	Government of India	Ministry of Environment, Forests and Climate	India
71507	71	5	72	25	In section 5.4.4 on Institutional Drivers it is not clear, what kinds of institutions the section is talking about and how Box 5.7 about shifts from private to public transport in Indian megacities is relevant to the issue of institutions and drivers. A reference to the Supplementary Material is made, where concepts and frameworks are explained. Explanations and examples in section SM 5.4.2 are more clear regarding institutions as both drivers and barriers for demand side mitigation options incl. fossil fuel subsidies and the politics of institutional inertia.	Noted. This section is about institutions as related to formal institutions and informal institutions, i.e. 'rules of the game' at various scales. We have taken note of the concern and will clarify in the next draft. We will also work the text in SN 5.4.4 with SN 5.4.2.	Philippe Tulkens	European Union (EU) - DG Research & Innovation	Belgium
9895	72	1	72	2	Noting that local policies can and will play very strong influential roles, especially in the era of decentralization (high evidence and agreement) in encouraging community behavior to support climate change mitigation and adaptation well-being and low-carbon demand (for example Hopke, 2016, Sommerfille, 2019). This fact is also impliedly perceived in the draft of this report in Chapter 5, pages 5-59, lines 29 to 30, that people in informal settlements or rural area are incapacitated by social-political realities (read: local policy). Suggesting that (local) policy which in fact play strategic shifting social behaviour toward low-carbon regime to be added in addition to the having been stated 5 (five) drivers (behavioral socio-cultural, business and corporate, institutional and technological/infrastructural),	Rejected. While we recognise the importance of local policies to influencing changes in social behaviour, this is covered in detail across SN 5.2 and other parts of 5.4.	Government of Indonesia	Ministry of Environment and Forestry	Indonesia
17825	72	14		25	Linking to comment 5. This is a good section on political economy, and questions of path dependency are raised. In thinking about climate change mitigation, we need to think about how we intervene in these political economies, and steer them towards broader change. Evidence is clearly lacking on how they evolve and change, and how targeted interventions shape these systems and thus mitigate emissions. However, we do have broader understandings of institutional change, path dependency, and the factors that shape how institutions evolve (e.g. Mahoney and Thelen, 2010; ISBN 978-0-521-13432-3 Explaining Institutional Change: Ambiguity, Agency and Power). There is great potential to draw on such understandings within the specific context of climate change and thus expand this body of work that's demonstrated by the stunning Mattioli paper referenced in this section.	Noted. This is a very good point. We will revisit the text with these suggestions in mind and made connections with SN 5.6.	Julia Leventon	Global Change Institute of the Czech Academy of Sciences CzechGlobe	Czech Republic
20825	72	23	72	25	Consider including other potential drivers of institutional change, such as technical change, new scientific understanding of environmental issues, emergence of social norms, etc. See e.g. Young, O.R. (2010). Institutional dynamics: Resilience, vulnerability and adaptation in environmental and resource regimes. Global Environmental Change, 20(3), 378-385.	Rejected. Wmuch of this is covered in Section 5.4.2 and 5.4.5.	Government of France	Ministère de la Transition écologique et	France

Comment Id	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
20827	72	27	72	27	Page 72 Line 27 to page 73 Line 11: a focus on infrastructure but a missing point about easy-to-use devices, more and more developed to make citizens actors and independent in informing, deciding, and practicing, for example, little solar lamps in place of national energy grids, mobile apps to assess environmental impacts of a product and so on. It would also be interesting to mention frugal innovation, grassroots innovation, and low-tech innovation perspectives that open to new methods (end-user centered and low impact oriented) of innovating and designing technologies.	Noted : Easy-to-use devices are treated in the ASI section and are not considered in this infrastructure section.	Government of France	Ministère de la Transition écologique et solidaire	France
37539	72	33	72	36	Difference in representing India and other country: Please emphasise that in India that the States/Union Territories work closely with each other and the result is the positive outcomes.	Noted : we do not understand what positive outcomes you are especially referring to.	Government of India	Ministry of Environment,	India
52117	72	31	72	31	"based on intermittent renewable" missing "energy"	Noted : we believe it is still clear.	Government of Saudi Arabia	Sustainability Advisor to the Minister Ministry of	Saudi Arabia
55517	72	27	75	1	The concept of "path dependence" from urban planning may be useful here as the authors move toward an integrated view of transitioning. In addition to the different forms of lock-in detailed in Table 5.4, there is also momentum for public and private financing to build on existing infrastructure assets. For example, in the U.S., there has historically been greater investment in road and aviation infrastructure, compared to transit. Therefore, it is likely that state/local governments will continue to invest in these systems to maintain and increase usage of these assets rather than invest in new or innovative infrastructure assets.	Noted : we aren't aware of any specific literature to cite to address this point.	Government of United States of America	U.S. Department of State	United States of America
80575	72	31	72	31	Variable renewable energy instead of intermittent renewable. Reference: https://doi.org/10.1038/s41560-020-00695-4	Rejected : both can be used. We prefer intermittent.	Olga Savchuk	Instituto Superior	Portugal
5129	73	5	73	11	If available, it would be good to include the time scale over which people apply changes to their choices and behaviour	Noted : We are, 't aware of avillibility.	Lina Hollender	n/a	Germany
30691	73	12	73	12	The example "Nuclear power in Japan and Germany post Fukushima" needs to be clarified in the table. There is much room for interpretation.	Noted - and clarified	Government of Japan	Climate Change Division - Ministry of	Japan
31371	73	12	75	0	Table is hard to read due to formatting. Unclear if each item in column A/B/C relates to the items on the same row or not. A touch more visual cues will help with clarity.	Noted - and clarified	Jacob HALCOMB	UNEP Affiliate	France
47339	73	12	73	12	in table 5.4 we should add a statement in (what needs to change?). We want to urge governments to provide the necessary support and support international stakeholders and initiatives to reduce the personal carbon footprint and support it internationally	Noted - this is an important point, but one that applies at a very general level and across the board. It does not seem to lend itself to be incorporated into Table 5.4, that addresses the role of five specific drivers of climate.	Khaled Mohamed Madkour	Ain Shams University, Cairo, Egypt	Egypt
52119	73	12	73	12	Spacing in table needs to be defined	Noted - and clarified	Government of Saudi Arabia	Sustainability Advisor to the Minister Ministry of	Saudi Arabia
79943	73	12	73	12	"Only personal and dreaded risks trigger action, and climate change distant and not feared." This is not correct: many things trigger action, not least concerns about others; also it is very questionable whether climate change is still seen as distant or not feared. Most see it as happening now, and concerning, as elsewhere noted.	Noted - and reworded	Stuart Capstick	Cardiff University	United Kingdom (of Great Britain and Northern Ireland)
24951	74		74		Under Business and Corporate, Uber is mentioned as an example of a positive change. I think you should remove Uber from this list as Uber is controversial and not legal in every country. In Norway for instance it has been brought to court several times as you need to have a licence to work in personal transport.	Noted - and removed	Snorre Kverndokk	Frisch Centre	Norway
5131	75	3	75	36	While I'm not too familiar with social practice theory, I was wondering why cost aspects were not included in this section (such as financial incentives to change one's behaviour)	Noted. This section distinguishes between elements of change and drivers of change, which are more deeply discussed in section 5.4. Costs are certainly an important driver. They are discussed in section 5.4, but also mentioned several times in section 5.5, e.g. in line 25-26 which says that: "Shifts towards low-meat diets, for instance, are motivated by costs and by beliefs about the undesirability of meat".	Lina Hollender	n/a	Germany
8397	75	28	74	36	Avoid and shift options also have important implications for the „supply" side - i.e. industry sector disappearance and downsizing with all its consequences. Improve options most often do not have such far-ranging consequences.	Agreed. Business implications have been added in the text that the comment refers to.	Pichler Florian	Energie-Control Austria für die Regulierung der Elektrizitäts- und Erdgaswirtschaft	Austria
17827	75		77		Linking to comment 5. On transitions. There is a growing body of work on leverage points for systems change. See Abson et al., 2017 (https://doi.org/10.1007/s13280-016-0800-y) and how this has been operationalized across a range of systems and topics (e.g. https://link.springer.com/journal/11625/topicalCollection/AC_0586d76989122be98437b68eb3b6f01a). To complement transitions work, this work looks at systems properties, and how target meaningful interventions for fundamental change. It helps to draw together the role of individual and collective action, and touches on issues of structure, values, behaviour change. There is scope for such a perspective to shape how and where we target interventions to create transitions, and the phasing of policy and infrastructure interventions. The challenge lies in the current lack of empirical evidence...	Noted. The leverage point literature is indeed interesting. It has not been included, however, because it currently lacks substantial empirical evidence, as you note.	Julia Leventon	Global Change Institute of the Czech Academy of Sciences CzechGlobe	Czech Republic
71509	75	34	75	34	Two references from 2014 and 2016 serve as documentation that tele-working did not diffuse widely before the Covid-19 crisis. Additional references and explanation regarding the impacts of Covid-19 on behavioral changes for demand-side mitigation solutions would be good.	Agreed. Two references from 2020 have been added, including one analysing the effects of Covid-19 on teleworking	Philippe Tulkens	European Union (EU) - DG Research & Innovation	Belgium
79945	75	7	75	7	Unfortunately, social practice theory terms are always so esoteric as to be meaningless to the uninitiated. What does "interactions between artefacts, competences, and cultural meanings" actually mean in reality? What is a policy-maker or campaigner supposed to do with this?	Noted. The opening paragraph simply notes that there are, at least, three integrative frameworks, of which social practice theory is one. The remainder of section 5.5 draws more on the other two frameworks than on social practice theory, so the review comment relates to one sentence rather than the wider section.	Stuart Capstick	Cardiff University	United Kingdom (of Great Britain and Northern Ireland)
8399	76	4	76	15	Is this not true for any kind of innovation? Starting small? Successful radical innovations would start small and diffuse very quickly despite facing opposition.	Noted. Yes, this pattern applies to most innovations, and thus also to demand-side innovations, which are discussed here.	Pichler Florian	Energie-Control Austria für die Regulierung der Elektrizitäts- und Erdgaswirtschaft	Austria
10617	76	13	77	40	Would you say that these analyses are specific of the demand side? One feels that struggles, frequent failures as well as the sequence of four phases similarly occur in the supply side case.	Noted. Since demand and supply are closely related in innovation processes, the analyses do indeed not only apply to the demand side, but have wider relevance.	Philippe Waldteufel	CNRS	France
20205	76	13	76	15	To underpin: Nikas, A., Lieu, J., Sorman, A., Gambhir, A., Turhan, E., Baptista, B. V., & Doukas, H. (2020). The desirability of transitions in demand: Incorporating behavioural and societal transformations into energy modelling. <i>Energy Research & Social Science</i> , 70, 101780.	Accepted. The reference has been included	Nikas Alexandros	National Technical University of Athens	Greece
24953	76	17	77	40	It is essential that the phases of transition are described in a consistent way throughout the WGIII report. It may be, but you should at least check with chapter 1 section 1.6.4 and chapter 17.	Noted. No discrepancies with the suggested sections were observed.	Snorre Kverndokk	Frisch Centre	Norway
29873	76	17	77	40	This section on transition phases is particularly important for policy makers to understand, since the characteristics of the different stages of transition are important for policy design. Especially since these chapters are new to AR6 we think it would be useful to refer to these transition phases also in the SPM, which in turn can direct policymakers to this section. Please consider where this could be most relevant to include in the SPM.	Noted. Despite space constraints, we will consider including this in the SPM.	Government of Norway	Norwegian Environment Agency	Norway
55519	76	17	77	40	Section 5.5.2, Phases in Transitions, is useful and would benefit from further exploration. What are the drivers that can support a move from Phase 2 to 3? What are lessons for Phase 3 regarding factors that can determine success, and minimize political-economic backlash?	Noted. The first paragraph discussing the third phase already identifies various drivers of change. Further discussion would be interesting, but not possible due to space constraints.	Government of United States of America	U.S. Department of State	United States of America

Comment Id	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
3049	78	21	78	21	If complexities and unit-scale links matter for demand-mitigation they should be more fully considered. It's not at all clear why this general statement is made here.	noted. This is a condensed high-level literature review. Important relationships can only be highlighted but not discussed.	Beth Edmondson	Federation University	Australia
20207	78	26	78	29	On coalitions: Koasidis, K., Nikas, A., Neofytou, H., Karamaneas, A., Gambhir, J., Wachsmuth, J., & Doukas, H. (2020). The UK and German low-carbon industry transitions from a sectoral innovation and system failures perspective. <i>Energies</i> , 13(19), 4994.	Rejected. The point on coalitions is already supported with three references, so an additional reference is not needed.	Nikas Alexandros	National Technical University of Athens	Greece
20209	78	29	78	31	Also: Nikas, A., Neofytou, H., Karamaneas, A., Koasidis, K., & Psarras, J. (2020). Sustainable and socially just transition to a post-lignite era in Greece: a multi-level perspective. <i>Energy Sources, Part B: Economics, Planning, and Policy</i> , 15(10-12), 513-544.	noted. Additional reference suggested not central to section discussion. Therefore not included in line with space constraint.	Nikas Alexandros	National Technical University of Athens	Greece
71511	78	36	79	13	It is great to have a box entitled is leapfrogging possible? Could the box attempt to provide a more direct answer to this question. Can we assume that the answer is "yes" because the box gives examples? Or is there good reason to believe these are special cases?	noted. As usual the answer would be "it depends" and a comprehensive discussion of the factors underlying the diverse experiences of leap-frogging is add beyond the scope and space limitation as a box.	Philippe Tulkens	European Union (EU) - DG Research & Innovation	Belgium
80211	78	21	78	25	CDR and SRM should be included in this assessment of complexity and ease of acceleration and implementation to enhance policy relevance in context of a risk management decisionmaking framework. Assessing and developing options for climate intervention and improving Earth system prediction requires accelerated adoption of advanced and emerging technologies such as cloud computing and remote sensing, innovation in platforms such as exascale computing and stratospheric aircraft, and the development of new technologies for aerosol generation and delivery. This will require consideration for the design of research programs and adaptation of funding and staffing models to better support adoption of commercially available advanced capabilities (e.g., cloud computing) and better access to specialized expertise (e.g., data scientists and developers)."	noted. Space limitations do not allow to add additional examples.	Kelly Wanser	SilverLining	United States of America
3051	79	19	79	19	Arguing about future possible solutions (and there limits) based on sources that are 30 years old is problematic.	noted, but disagree with comment. Indeed the basic concept is old (but is not capitalism also?). References span all the way to 2017.	Beth Edmondson	Federation University	Australia
8401	79	39	79	42	On the policy-transition nexus, several learnings from COVID-19 measures and citizens' behaviour in response could be addressed here. 1) COVID-19 policies clearly show that policy can lead to (short-term) behavioural change very quickly. 2) It may crucially depend on how such required policies are communicated to have longer enduring effects in democracies (think of differences between New Zealand and Europe, or US and other countries). 3) There might also be a share of the population not willing to transition - policy should address these groups as well and aim at best-possible inclusion of such opposition.	Noted. But a discussion of COVID-19 is beyond the scope of Chapter 5 in general and this section in particular.	Pichler Florian	Energie-Control Austria für die Regulierung der Elektrizitäts- und Erdgaswirtschaft	Austria
28607	79	26	79	28	Disagree with "high technological risk". CCS technologies are proven at large-scale. See GCCSI Global Status Report (2019), IEAGHG reports 2015-06 Boundary Dam project, 2018-05 Port Arthur project, 2019-04 Quest project.	rejected. The reviewer confuses degree of technological maturity with technological risk. First CCS is not proven at large-scale (which would be GT and not the kt of demonstration projects), and second it has a number of technological risks (leakage, accidents, etc.) that are fundamental and independent from its degree of technological maturity.	Tim Dixon	IEAGHG	United Kingdom (of Great Britain and Northern Ireland)
31251	79	32	79	33	Should we consider hyperloop as a demand side public transport infrastructure?	Noted. It can be considered a demand-side option, even if it is extremely capital intensive.	Minal Pathak	WGIII TSU, Ahmedabad	India
82633	79	27	79	27	Suggest removing nuclear from this sentence. Nuclear energy categorically does not entail high 'technological risks'. It is a proven mature technology that currently provides 10% of global electricity. In fact nuclear energy has already demonstrated its ability to 'scale up' and 'diffuse' rapidly (see nuclear capacity additions in the 1980s) while CCS and CDR are less technologically mature - (see IEA Energy Technology Perspectives Clean Energy Technology Guide https://www.iea.org/articles/etp-clean-energy-technology-guide) Nor is it globally accurate to say that nuclear energy 'depends' on a stable carbon price. In fact there are many countries where new nuclear construction is proceeding today that do not have carbon prices - places like China, India, UAE and Bangladesh. In other countries a carbon price is one of many mechanisms that could potentially support nuclear development – with arguably the most impactful being government intervention to reduce financing costs. The LCOE and competitiveness of new nuclear is described in the latest IEA-NEA publication of the Projected Costs of Generating Electricity (https://www.iea.org/reports/projected-costs-of-generating-electricity-2020). It states the following "Electricity from new nuclear power plants has lower expected costs in the 2020 edition than in 2015. Again, regional differences are considerable. However, on average, overnight construction costs reflect cost reductions due to learning from first-of-a-kind (FOAK) projects in several OECD countries. LCOE values for nuclear power plants are provided for nth-of-a-kind (NOAK) plants to be completed by 2025 or thereafter. Nuclear thus remains the dispatchable low-carbon technology with the lowest expected costs in 2025. Only large hydro reservoirs can provide a similar contribution at comparable costs but remain highly dependent on the natural endowments of individual countries. Compared to fossil fuel-based generation, nuclear plants are expected to be more affordable than coal-fired plants. While gas-based combined-cycle gas turbines (CCGTs) are competitive in some regions, their LCOE very much depend on the prices for natural gas and carbon emissions in individual regions. Electricity produced from nuclear long-term operation (LTO) by lifetime extension is highly competitive and remains not only the least cost option for low-carbon generation - when compared to building new power plants - but for all power generation across the board."	rejected. As above, also this reviewer confuses technological maturity with technological risks. We note that nuclear energy "does not entail high technological risks" in the view of the reviewer, but after Chernobyl and Fukushima we rather beg to differ in our assessment.	Jonathan Cobb	World Nuclear Association	United Kingdom (of Great Britain and Northern Ireland)
20829	80	22	80	22	The case for growth of informal economy should be made	Noted. We believe we have made this case throughout the Chapter 5. We have also done further work in Section 5.2 and 5.4 to do justice to the increasing growth of the informal economy.	Government of France	Ministère de la Transition	France
20831	80	28	80	29	Please further explain this statement	Noted. Explained better.	Government of France	Ministère de la Transition	France
55521	80	16	81	13	This section (including Box 9) addresses governance concerns and specifically calls out informal settlements. But it does not distinguish between local, state/provincial, regional, or national mitigation policy. The governance challenges across scale are unique, so the authors should define which scale is most appropriate for their arguments. Additionally this discussion would benefit greatly from some estimates or nuanced discussion of enforcement challenges to the ASI policies being promoted. If there are no solutions suggested for enforcement challenges in informal communities or developing countries in general, then it is more likely that international policymakers will be wary of depending on outcomes from policies implemented in these communities.	Rejected. This is a broad discussion around the importance of the informal sector (not settlements) and how it is likely to be affected by policies. More detailed discussions are found in Section 5.2	Government of United States of America	U.S. Department of State	United States of America
82271	80	41	80	41	DSL -> DLS ?	Accepted - we will fix this	Jarmo Kikstra	IIASA	Austria
3053	81	16	86	17	This section more clearly articulates the substantive issues that are the central purpose/focus for this chapter. This section should appear much earlier in the chapter.	Rejected. Moving this section to an earlier section will not be possible since the content is already settled. However, we have flagged up the key issues in SN 5.1, 5.2 and 5.4.	Beth Edmondson	Federation University	Australia
11127	81	22	81	22	I wonder if it is possible to complexify this statement, and perhaps (to the extent consistent with the literature) disaggregate into the ASI framework. I would suspect that Wilson 2012 is too old a citation to be relevant. The three remaining references all focus in particular on the Avoid piece of the ASI framework. I would be interested in whether the Improve side is seeing a different story evolving, and if there is literature documenting this. For example, European policies focusing on residential and commercial heating systems, and more recently light vehicles, appear to be having marked effects on the adoption of demand side technologies associated with electrification, potentially at a pace consistent with deepdecarbonization by mid-century, at least in the countries adopting them in their most ambitious form.	Noted. We have made some adjustment to meet this suggestion	Anthony Patt	ETH Zürich	Switzerland

Comment Id	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
31387	81	36			It would be encouraging to read more here on the need for policy-makers to take bold steps and overcome their hesitancy to affect individual behavior. They have an opportunity to lead by example, etc. Perhaps there is limited literature on how to overcome the political sensitivities on "Avoid" but it would be nice to see more language here.	Noted. We have added some text to strengthen the need for bold steps	Jacob HALCOMB	UNEP Affiliate	France
79947	81	39	81	39	"government efforts to shape and modify individual-level behaviour" seems to fall into the individualisation trap again. While I appreciate this line is referring to gov perceptions and sensitivities, an alternative framing is that such efforts are as much - or should at least be - about government efforts to help shape society, norms, culture, expectations etc.	Noted. We have added some text to strengthen the need for bold policies.	Stuart Capstick	Cardiff University	United Kingdom (of Great Britain and Northern Ireland)
84073	81	18	81	20	It remains to be a problem also in the sectoral Chapter 10 where "improve" options dominate. This should be improved, perhaps with the help of Chapter 5 authors?	Noted. Our Chapter ambassador has taken this message to Chapter 10	Michał Czepkiewicz	University of Iceland	Poland
84075	81	16	82	18	There is too little coverage of "avoid" options in aviation in this section and table 5.5., such as avoiding unnecessary flights by officials and promoting that among the public, introducing taxes (!) and removing subsidies in aviation, and curtailment of aviation infrastructure (see Larsson, J., Elofsson, A., Sterner, T., & Åkerman, J. (2019). International and national climate policies for aviation: a review. <i>Climate Policy</i> , 19(6), 787–799. https://doi.org/10.1080/14693062.2018.1562871 , Larsson, J., Elofsson, A., Sterner, T., & Åkerman, J. (2019). International and national climate policies for aviation: a review. <i>Climate Policy</i> , 19(6), 787–799. https://doi.org/10.1080/14693062.2018.1562871 and others). Perceived struggles to overcome in this regard could include perception of air connectivity as important for local development (see Elofsson, A., Smedby, N., Larsson, J., & Nässén, J. (2018). Local governance of greenhouse gas emissions from air travel. <i>Journal of Environmental Policy & Planning</i> , 20(5), 578–594. https://doi.org/10.1080/1523908X.2018.1473152)	Rejected. Too specific to be covered in this section	Michał Czepkiewicz	University of Iceland	Poland
84077	81	16	82	18	The section also lacks a discussion of reductions in car ownership which is deemed necessary in many of the IAMs and other scenarios and models compatible with keeping warming below 1.5 degrees. Perhaps it should be in Chapter 10, but is not there. (e.g. Grubler, A., Wilson, C., Bento, N., Boza-kiss, B., Krey, V., Mccollum, D. L., ... Valin, H. (2018). A low energy demand scenario for meeting the 1.5 °C target and sustainable development goals without negative emission technologies. <i>Nature Energy</i> , 3(June), 515–527. https://doi.org/10.1038/s41560-018-0172-6).	Noted. This should appear in Chapter 10. We have liaised with authors in CH10	Michał Czepkiewicz	University of Iceland	Poland
31373	82	19			"ceiling on private property ownership" seems a bit extreme, suggest instead "tax residential properties with high per capita area" or similar	Accepted.	Jacob HALCOMB	UNEP Affiliate	France
31375	82	19			Change of consumer preference for perfect foods, "ugly food movment"	Reject. We would remain consistent with language used in the literature.	Jacob HALCOMB	UNEP Affiliate	France
31377	82	19			unclear what "discount for public parking lot space" means? Remove parking requirements for commercial buildings? Lower prices for public parking?	Noted. Adjusted as suggested	Jacob HALCOMB	UNEP Affiliate	France
55523	82	19	83	2	Authors should explicitly describe how the "avoid" policy options differ in the Global North vs. Global South. For example, compact urban development and strategies to increase density likely result in reduced VMT/VKT in the OECD countries, but may have no effect in highly dense urban areas in the Global South. Authors should be explicit about these differences across all ASI policy options, but it is critical to address this for the "Avoid" options.	Noted. This is a good point. We will consider the suggestion made in the next round.	Government of United States of America	U.S. Department of State	United States of America
79949	82	19	82	19	I'm a little concerned the extent to which the chapter, and this Table, leans on 'nudge' - this approach has its place, but is the "very opposite" of the types of transformative, inclusive, participatory approaches elsewhere advocated. Nudge by definition is barely even consciously registered by people (and is often not effective anyway, e.g. "... the effectiveness of these policies on behaviour change overall may be limited". A more expansive view on how to achieve these ends would be welcome. Perhaps also more ambition or clarity warranted on the policies: rather than overcoming existing planning practices, perhaps shift in investment from road-building and permissions to expand airports, towards public investments not spent on road building, and airports not permitted to expand in the first place?!	Noted. Very good points. But the confusion is to do with the caption 'nudge/incentives'. This has now been adjusted.	Stuart Capstick	Cardiff University	United Kingdom (of Great Britain and Northern Ireland)
3169	83	4	86	10	This section on Policies to strengthen A-S-1 needs improvement and extension. Public regulation underplayed throughout despite evidence on effectiveness. Policies missing: smart VAT, compulsory labelling, social tariffs for utilities etc etc. See Gough 2017; Gough, Ian (2020) Defining floors and ceilings: the contribution of human needs theory. <i>Sustainability: Science, Practice and Policy</i> , 16 (1), 208 - 219. ISSN 1548-7733; Gough, Ian (2019) Necessities and luxuries: how to combine redistribution with sustainable consumption. In: Meadowcroft, James, Banister, David, Holden, Erling, Langhelle, Oluf, Limerud, Kristin and Gilpin, Geoffrey, (eds.) <i>What Next for Sustainable Development?: Our Common Future at Thirty</i> . 2019. Edward Elgar, Cheltenham, UK, pp. 138-158. ISBN 9781788975193	Rejected. We are covering the broad spectrum of ASI policies in this section.	Ian Gough	CASE, LSE	United Kingdom (of Great Britain and Northern Ireland)
11281	83	14	84	1	In Table 5.6 Examples of policies to enable "shift" options (first section, "more walking, less car use") The policy of reallocating road space should be explicitly mentioned, and ITF (2021), <i>Reversing Car Dependency: Summary and Conclusions</i> , ITF Roundtable Reports, No. 181, OECD Publishing, Paris. www.itf-oecd.org/avoiding-car-dependency cited.	Rejected. This is already mentioned in the Creutzig (2020) reference	Eric Doherty	Ecopath Planning	Canada
15941	83	14	83	14	Whether a tax on meat/beef can alleviate the problem of protein deficiency in poor countries (or for poor people in rich countries) seems questionable. I am all in favor of pushing back meat, but I think this particular measure could backfire, if poorly implemented, and the instrument proposed does not match the problem mentioned in the left column	Accepted - we will fix this	Helmut Haberl	University of Natural Resources and Life Sciences, Vienna	Austria
15943	83	14	83	14	In my view, the option of creating supply structures that favor the adoption of healthy and climate-friendly diets is missing. A lot of food is consumed in publicly sponsored or even entirely public canteens or cafeterias (in childcare, schools, universities, office buildings, companies etc.). Changing the food available there, in particular providing tasty low-GHG foods, can have a big impact on eating habits people adopt.	Noted. however published material on the public canteens and cafeterias is very limited.	Helmut Haberl	University of Natural Resources and Life Sciences, Vienna	Austria
15945	83	14	83	14	Another option worth mentioning here are efforts to provide better public transport, not only in cities, but throughout countries. Dense, convenient and fast public transit accessible at affordable rates can help to achieve high rates of adoption of these forms of traffic in urban and peri-urban settings. Even on the national scale, efficient and well-organized (interoperable) train and bus systems can achieve high market shares. Synchronized timetables and hub systems (e.g. the Swiss train system) can be very helpful in this context. I note that some aspects of that are discussed in the text below the table, but I think it should be included in the Table as well.	Noted. We have adjusted as suggested.	Helmut Haberl	University of Natural Resources and Life Sciences, Vienna	Austria
20833	83	11	83	11	Page 83 line 11: a word could be said about policies for the disposal of plastics in packaging and establishing new standards requiring new materials for packaging and single-use products.	Noted. This issue will appear in the industry and policy chapters.	Government of France	Ministère de la Transition	France
5309	84	21	84	21	The author writes: "together with the ongoing decrease in prices of renewable energy technologies,". What is the logic to establish the link between the cooking and the renewable electricity? Is the sou better tasting? Please, delete this part of sentence, which is inappropriate.	Reject. The reason this is here is that cooking transitions to electricity from renewable energy implies much lower emissions, as opposed to fossil-based electricity generation.	Michel SIMON	Retraité/ Pdt d'association	France
10619	84	8	84	10	In terms of CO2 emissions, what is critically relevant, along with the growth of cycling, is the corresponding reduction in using private car transportation, and probably the corresponding reduction also in owning private cars. Inasmuch as this aspect is not examined, one cannot speak of transition!	Noted. The dynamics of transport modes is important. This would be covered in the transport chapter.	Philippe Waldteufel	CNRS	France
31379	84	0			"Resistence by architects.." They resist because they are legally liable and buildings must be insurable, meet fire ratings, code, etc. this suggests a need for changing permitting/legal requirements more so than simply providing more information on embodied carbon standards. (e.g. permitting mid-rise commercial buildings with laminated wood structure, etc.	Noted. We propose this as an important incentive in the next column	Jacob HALCOMB	UNEP Affiliate	France

Comment Id	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
31381	84	0			I think there is a formatting issue here, the last two rows don't make sense to me. Why product packaging and air quality is linked to architectural issues. Don't air quality issues (NOx, Ozone) in cities often related to the materials used, glues, adhesives, and other sources of volatile organic compounds (as well as NOx from transport)? I don't understand how more building shading is going to help with air quality unless you're talking reducing energy demand and thereby lowering emissions at power plants?	Accepted. We have removed the final three lines.	Jacob HALCOMB	UNEP Affiliate	France
43259	84	2	84	8	In these data, is it different from the public transport tendered versus the state one?	Reject. Not clear	Government of Chile	Ministry of	Chile
50869	84	20	84	22	Comment: In South Africa, households use coal stoves for cooking AND (affordable and effective) heating. This means that, even if electrical cooking appliances were readily available and affordable, the households would hesitate to move away from coal stoves, because of its dual function, particularly in winter (when household air pollution and GHG emissions will be at their worst). A coal stove will provide a source of energy for cooking, yes, but also, a very effective and cheap heating source. A gas heater or electric heater does not do the same job as a coal stove. Any related nudge/ incentive would need to take this into account to be successful in such a setting. This applies to many countries, not just RSA.--> Main message: this transition to clean cooking is more complex than it seems.	Noted. Very good point. Availability of published material on the issue of dual function of stoves..	Bianca Wernecke	South African Medical Research Council	South Africa
50871	84	29	85		Table 5.7 "Improve efficiency of cooking appliances" --> Should include coal here (not just "fuelwood"), if this example is to be universally applicable.	Noted. We have added coal as suggested.	Bianca Wernecke	South African Medical Research Council	South Africa
50873	84	29	85		Table 5.7 Efficiency of cooking appliances, insulation, lighting and water heating are included in this table, but space heating sources as sources for GHG emissions are not emphasized - e.g., coal stove used for cooking and heating (in a low-income setting, at least).	Noted. This is well covered in the building chapter.	Bianca Wernecke	South African Medical Research Council	South Africa
60221	84	29	85		Some of the suggested IMPROVE policy options might be difficult to adopt in poor countries like Sub-Saharan Africa due to their economic status and capacities. Therefore options may not be the same across societies	Noted. We do make this point in different parts of the chapter such as 5.1, 5.2 and 5.4	Government of United Republic of	Tanzania Meteorological	United Republic of Tanzania
74829	84		84		In Table 5.6 consider including the Kenyan example of banning of plastic carrier bags through legislation. In 2018, The Kenyan Government was able to ban the use of plastic carrier bags through a legislation outlawing the manufacture and sale of plastic bags. The regulations were enacted under the EMCA Act and the main objective of the regulations was to ensure a clean environment through promotion of alternative biodegradable packaging material. Failure to comply with the provisions of the regulations is considered an offence liable upon conviction to imprisonment or fine as provided in the Act. By 2020 the Authority reported increased levels of compliance with the ban. Public attitude had also changed towards their view on plastic bags and their usage in relation to the environment. With the ban Kenya becomes one of the few countries to ban plastic bags globally acting as a benchmark to most countries in the world. If proper consultations are undertaken, sensitization conducted, then public perception can be overturned and 'unpopular' policies enacted.	Rejected. Good point, but too specific to be included here	Government of Kenya	Kenya Meteorological Service	Kenya
74831	84	16	84	26	In 2018, the Kenyan Government launched the Kenya National Electrification Strategy (KNES) a road map for achieving universal access to electricity by 2022. This has been made possible by the rich renewable resources the country boast of, such as geothermal resources. Thanks to this initiative and through the support of private sector and development partners 75% of the population stand to gain from through grid and off grid solutions (e.g solar energy). Most of the populations, especially those living in the rural areas have for a long time relied on fossil fuel as a source of lighting and energy. This was not only polluting the environment but causing respiratory problems to the users. This shift if successful will not only reduce pollution levels but also improve quality of life. According to the Energy Progress Report released by the World Bank on 2nd May covering the period upto 2016, Kenya was been listed among countries where much gains were made in ensuring that more citizens access electricity for lighting, cooking and driving buses	Noted.	Government of Kenya	Kenya Meteorological Service	Kenya
82839	84	29	86	1	Home grown food can be a good example of another improve solution - see comment to p. 36, l. 2-9.	Rejected. This would need to be covered in the agriculture chapter.	Jan Vávra	University of South	Czech Republic
27685	85	31	85	31	Delete "removing subsidies (for cheap petrol or fuel oil)", or you need to refer to inefficient subsidies that encourage wasteful consumption	Noted. We have adjusted as suggested.	Eleni Kaditi	Organization of the Petroleum Exporting	Austria
5311	86	15	86	15	Same remark: You state: "complemented by the sharp reduction in the cost of renewable energy technologies". This is irrelevant: the consumer sees the price billed by the electric company, and not the production cost. There is a link between the two items, but the experience demonstrate that the development of renewables has produced an increase in electricity price (See Germany for example). The abuse segment should be deleted..	Rejected - the sharp reduction in renewables also delivers cheaper electricity from renewables.	Michel SIMON	Retraité/ Pdt d'association	France
5395	86	42	86	42	Replace renewable by "low carbon."	Rejected. There is no line 42 on page 86	Michel SIMON	Retraité/ Pdt	France
11129	86	43	87	31	I really like this box. Wouldn't it make sense for this to be a cross chapter box with chapter 13?	Rejected. The box needs to stay here as it relates to demand-side policies.	Anthony Patt	ETH Zürich	Switzerland
30515	86	8	86	10	Change the description of the current situation of China's electric bicycles. The description of "have replaced" does not match the original text of the reference.	Rejected - not clear what the reviewer is asking	Lingna Liu	China University of Geosciences (Beijin)	China
37517	86	4	86	6	India's policy on electric vehicles has not set a target of 100% vehicle fleet to be electric by 2030. It was a proposal but was not converted into a policy.	Accepted - we will fix this	Government of India	Ministry of Environment,	India
47341	86	34	87	31	add Box 5.10 add new item about carbon trading and carbon pricing "Create a new or a unified platform for trading voluntary carbon credits and create or developed one standard for calculating, accrediting and documenting all voluntary credits under the UN or IPCC with a compiles with the Paris agreement to take more control of the carbon market and facilitating procedures for verifying and issuing carbon credits and for the compliance carbon credits market". as one of the mitigation and development pathways in the near- to the midterm	Rejected. There is plenty in the box already and we don't think this would add value to the issue of demands and services	Khaled Mohamed Madkour	Ain Shams University, Cairo, Egypt	Egypt
48257	86	2	86	3	Is there space to discuss the increased production emissions of EVs over gasoline-powered cars? Does having emissions more concentrated (eg production sites of electric vehicles and electricity) affect cumulative emissions? What about environmental justice issues associated with mining for metals for batteries?	Noted. Good points. But this is out of the scope of this chapter. Covered in other chapters, i.e. energy, industry, and cross reference	Susana Hancock	University of Oxford	United States of America
8403	87	41	87	45	Grid stability itself is hardly ever contested in the literature and in policy-making. If a 100% reliable grid is non-negotiable (or a decline in grid stability in general), alternative energy systems may always face a structural disadvantage which translates in significantly higher cost and lower public acceptance. In other words, the 100% reliability may be an enormous constraints on alternatives. It might be that some small relaxation of the reliability standards do not impact well-being whilst opening doors to significantly cheaper and more acceptable alternatives.	Noted. This would be covered in the Energy chapter	Pichler Florian	Energie-Control Austria für die Regulierung der Elektrizitäts- und Erdgaswirtschaft	Austria
10621	87	18	87	18	You might wish to insert "negatively" in front of "correlated"	Accepted - we have fixed this	Philippe Waldteufel	CNRS	France
11131	87	6	87	7	Does the statement that "carbon pricing is the most effective way to reduce emissions" have any theoretical or empirical support? I know there are papers documenting that carbon prices do reduce emissions, but there are others documenting that they do not lead to increased investment in zero carbon energy supply technologies (e.g. Lilliestam et al 2021 doi.org/10.1002/wcc.681), as well as literature from political science suggesting how regulatory instruments such as performance standards and technology standards can be effective. Wouldn't the more accurate statement be that there are reasons to believe that carbon pricing is the most efficient way to reduce emissions, but for overall effectiveness not compare them?	Accepted - we have fixed this	Anthony Patt	ETH Zürich	Switzerland
11133	87	33	89	36	I really like this section on policy sequencing and policy packages. I wonder, however, whether it ought to be here, or in Chapter 13, because it covers not only demand-oriented policies, but also to some extent energy supply issues. Chapter 13 currently does a much poorer job of covering these issues.	Noted. We have liaised with Ch13 about this issue. We have decided for the section to stay here, for the sake of presenting a coherent storyline.	Anthony Patt	ETH Zürich	Switzerland

Comment Id	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
17105	87	13	87	13	Another relevant reference is Berry, A. (2019). The distributional effects of a carbon tax and its impact on fuel poverty: A microsimulation study in the French context. <i>Energy Policy</i> , 124, 81-94.	Noted.	Giulio Mattioli	TU Dortmund University	Germany
20835	87	10	87	10	indeed it is a long term effect, about three times larger than the short term one. Ref: Goodwin, P., Dargay, J., Hanly, M., 2004. Elasticities of road traffic and fuel consumption with respect to price and income: a review. <i>Transp. Rev.</i> 24, 275– 292.	Noted.	Government of France	Ministère de la Transition	France
20837	87	18	87	18	It could be wise to identify the carbon component of fuel taxation	Noted.	Government of France	Ministère de la Transition	France
27687	87	6	87	7	Delete "While carbon pricing is the most efficient way to reduce emissions", as this argument is not consistent with previous analysis showing potential pros and cons of this market mechanism.	Noted. We have adjusted the statement to be less bold.	Eleni Kaditi	Organization of the Petroleum Exporting	Austria
27689	87	27	87	28	Delete "This is especially the case for using the proceeds on "green investment" in infrastructure or energy efficiency programmes (Kotchen et al. 2017).", as this approach does not address fairness issues.	Rejected. This is about investment in greener technologies	Eleni Kaditi	Organization of the Petroleum Exporting	Austria
52105	87	6	87	7	The argument "While carbon pricing is the most efficient way to reduce emissions" is not supported by evidence	Noted. The evidence is stronger on the side of carbon pricing as an efficient way to reduce emissions; but we will adjust to capture that this may not be the case everywhere.	Government of Saudi Arabia	Sustainability Advisor to the Minister Ministry of	Saudi Arabia
55525	87	33	89	36	Section 5.6.4 is important but a lot of the text is written awkwardly or indelicately. There are some good examples here, but suggest redrafting the text for greater clarity and neutrality, and to avoid policy prescriptiveness. This is especially true for page 5-88, lines 14-25 and 40-45, and line 46 to line 9 on page 5-89.	Noted. We have worked through the text to avoid policy prescriptiveness.	Government of United States of America	U.S. Department of State	United States of America
74151	87	33	89	36	Synergy between demand-side and supply-side policies: Li, X., & Yao, X. (2020). Can energy supply-side and demand-side policies for energy saving and emission reduction be synergistic?—A simulated study on China's coal capacity cut and carbon tax. <i>Energy Policy</i> , 138, 111232. https://doi.org/10.1016/j.enpol.2019.111232	Noted.	Mayuri Utturkar	University of Delaware, USA	United States of America
5313	88	13	88	13	To deliver a fair information, it seems necessary to add a sentence to this paragraph explaining that in spite of the strong financial support by public authorities, the development of renewable has led to a strong increase of the price of electricity for the final customers. Today, german consumers pay about twice more than french customers. To avoid such a burden to the industry, the industrial tariff supports less taxes.	Noted. However, this issue is out of place to add here.	Michel SIMON	Retraité/ Pdt d'association	France
5315	88	44	88	44	Replace Renewables by low carbon	Rejected. We are strictly talking about renewables here	Michel SIMON	Retraité/ Pdt	France
11135	88	3	88	13	Pahle et al argue for policy sequences to enable stringent carbon prices, but one could also see other stringent policies -- such as technology bans or strict performance standards that effectively eliminate emissions, as the endpoint. For example, a growing list of countries are using policy sequences to eliminate internal combustion engine (ICE) vehicles, not with a hach carbon price as the later stage policy, but rather a prohibition on the sale of new ICEs. Similarly, the EU engaged in a sequence of policies with respect to heating systems where strict building codes for new construction and renovation was the end-point. Look at papers such as Rogge https://doi.org/10.1016/j.erss.2017.10.004 describin phase-out policies.	Accepted. We have added text and Rogge and Johnstone (2017) reference to illustrate the simultaneous phase-out of old regimes and phase-in of new options.	Anthony Patt	ETH Zürich	Switzerland
15081	88	29	88	30	This paragraph proposes the complementary and contradictory effects of a package of policies, but most of the cited literatures are to illustrate the complementary effects of demand side emission reduction, and there is no literature on the contradictory policy effects. In the following literature, Shaughnessy et al (2020) discusses the impact of five existing policy and business model interventions (i.e., financial incentives, financial incentives for low and middle income groups, system leasing, clean energy financing for property evaluation and solar activities) on the fairness of rooftop PV deployment. It is found that three specific measures promote the fairness, and the remaining two may aggravate the unfairness. Therefore, it is suggested to supplement this literature in this part to explain the opposite effects of different policies in the package. Shaughnessy et al, 2020: The impact of policies and business models on income equity in rooftop solar adoption. <i>Nat. Energy</i> , 6, 84–91, https://doi.org/10.1038/s41560-020-00724-2 .	Rejected. Thank you for the good suggestion and references, but we are not intending to into detail fleshing out the contradictory effects of policy packages here.	Guoquan HU	National Climate Center of China Meteorological Administration	China
17829	88	26		45	Linking to comment 5. On the interactions between policy instruments – there is much written across environmental topics on this question of interplay between sectors and policy instruments (e.g. Young, 2006 http://www.ecologyandsociety.org/vol11/iss1/art27/ ; and plenty of network analyses that explore the interplay between actors and policies – e.g. Bodin et al., 2020: https://doi.org/10.1146/annurev-environ-011020-064352), indeed, these combined point to a need to consider the broader context as to how climate change mitigation is delivered through policy and institutional structures; what powers and responsibilities are given to whom, and how effective that is in the broader political economy.	Reject. We have covered this issue quite well. Adding these references will not add much to what has been discussed already	Julia Leventon	Global Change Institute of the Czech Academy of Sciences CzechGlobe	Czech Republic
27691	88	20	88	23	Delete "This makes it important to precede carbon pricing with investments renewable energy and low carbon transport modes (Biber et al. 2017; Tvinnereim and Mehling 2018), and especially support developing countries by building up low-carbon energy and mobility infrastructures and technologies, thus reducing resistance to carbon pricing (Creutzig 2019).", as approaches such as carbon pricing should not be considered as one-size-fits-all approach, but the special needs and national circumstances of developing countries should be considered identifying more appropriate and win-win solutions.	Reject. We will not delete but will review the existing text and adjust to give it some balance	Eleni Kaditi	Organization of the Petroleum Exporting Countries, OPEC	Austria
28437	88	36	88	48	It is interesting how technological developments could alter this. With hydrogen of 1-2\$/kg like IRENA (2020) and Fasihi & Breyer (2020) suggest, although still not easily cost competitive to current fossil fuel prices it does open up opportunities, certainly with increased CO2 costs and net-zero targets. See: Fasihi & Breyer 2020 DOI: https://doi.org/10.1016/j.jclepro.2019.118466 and Green Hydrogen Cost Reduction: Scaling up Electrolysers to Meet the 1.5°C Climate Goal, International Renewable Energy Agency, Abu Dhabi. Other sources such as Fasihi & Breyer, 2020	Reject. This would be covered in the Energy chapter	Naud Loomans	Eindhoven University of Technology	Netherlands
52121	88	34	88	34	financial "incentives" not "incentive"	Accepted - we will fix this	Government of Saudi Arabia	Sustainability Advisor to the Minister Ministry of	Saudi Arabia
74833	88	26	88	45	Due to the high dependency on natural resource for sustenance of her economy, the Government of Kenya developed the National Climate Change Framework Policy, to provide a clear and concise articulation of overall response priorities to climate variability and change. The policy focuses on the interlinkages between sustainable national development and climate change which adversely impacts key sectors that are important to the economy and society; Environment, Water and Forestry, Agriculture, Livestock and Fisheries, Trade, Energy, Physical Infrastructure, Tourism and Health. Accordingly an overarching mainstreaming approach has been adopted to ensure the integration of climate change considerations into development planning, budgeting and implementation in all sectors and at all levels of government.	Reject. Not space for it, also out of place.	Government of Kenya	Kenya Meteorological Service	Kenya
85767	88	15	88	17	Suggest clarification: The sentence structure or meaning seems disjointed. It is unclear how 'Prices may be regressive and perceived as additional costs by households and industry' is leading to the outcome 'making investments into green infrastructure politically feasible'. Is 'feasible' the right term here to convey the meaning? The next sentences emphasize the importance of preceding carbon pricing with investments into green infrastructure (i.e. renewable energy, low carbon transport modes), to avoid causing higher household energy expenses. Unclear if this is why investments in green infrastructure are 'politically feasible'.	Accepted. We have adjusted this sentence to read as 'Prices may be regressive and perceived as additional costs by households and industry' is leading to the outcome 'making investments into green infrastructure politically unfeasible'	Government of Australia	Department of Industry, Science, Energy and Resources	Australia
15947	89	39	90	3	In my view, beyond GDP indicators respectively indicator systems to address the multifaceted wellbeing and sustainability concerns need to be mentioned here.	Rejected. The wellbeing and sustainability concerns are covered throughout the chapter	Helmut Haberl	University of Natural Resources and Life	Austria

Comment Id	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
17691	89		90		Related to section 5.3 but to be considered for 5.7 section : Quantifying the potential is very important, and is the subject of much research. But it seems that there is now a lot of knowledge about quantification, and much less on the conditions that enable changes in practices and lifestyles (understanding, policies, ...), effects on well-being, effects of policies, etc. As a result I share the recommendations for further research in 5.7. I would just add that we could probably find useful knowledge in other fields, i.e. social science studies not applied to climate mitigation, so not (and not to be) captured and mentioned in this chapter.	Accepted. We agree with the reviewer. Barriers and drivers of social change remain important future research topics, to be discussed in Section 5.7. No action required here in Section 5.3. as also reviewer suggest a discussion in Section 5.7	Thomas Le Gallic	CNRS - CIRED	France
20839	89	43	89	44	"GDP is a poor metric of human wellbeing, and climate policy evaluation requires better grounding in relation to decent living standards and or similar benchmarks". A certain number of works have already been published, it is important to mention them. Suggested references: Cassiers and Delain (2006), Méda (2008), Jany-Catrice, Gadrey, (2006), Stiglitz, Sen & Fitoussi 2009, Cassiers and Thiry 2009, Méda, 2013, Thiry 2015, Jany-Catrice, Méda, 2015 et 2016, Malay 2021. ; Cassiers, I., & Delain, C. (2006). La croissance ne fait pas le bonheur: les économistes le savent-ils?. Regards économiques, 38, 14. ; Méda, D., 2008: Au-delà du PIB. Pour une autre mesure de la richesse, Flammarion ; Jany-Catrice, F. and J. Gadrey, 2006, New indicators of well being and development, Palgrave McMillan/ No Pill (Italian) / Os novos indicadores de riqueza (Portugise) / ; Stiglitz, J., A. Sen, and J-P Fitoussi, 2009: Report by the Commission on the Measurement of Economic Performance and Social Progress ; Cassiers and Thiry 2009, Au-delà du PIB : réconcilier ce qui compte et ce que l'on compte, Regards économiques, 75, https://www.regards-economiques.be/index.php?option=com_reco&view=article&cid=86 ; Méda, D., 2013: La mystique de la croissance, Flammarion ; Thiry, G., 2015: Beyond GDP: Conceptual grounds of quantification. The case of the Index of Economic Well-Being (IEWB). Social Indicators Research, 121 (2) 313-344. ; Jany-Catrice, F. and D. Méda, 2015: « The key methodological issues of the "new wealth indicators", in Nature and the wealth of the Nations, Revue du CGDD, http://temis.documentation.developpement-durable.gouv.fr/docs/Temis/0083/Temis-0083488/22322_ENG.pdf ; Jany-Catrice, F. and D. Méda, 2016: Faut-il attender la croissance ?, La Documentation française ; Malay, O., 2021: How to Articulate Beyond GDP and Businesses' Social and Environmental Indicators? Social Indicators Research, https://doi.org/10.1007/s11205-020-02583-6	Noted.A large of literature already listed. Page limits exceeded.	Government of France	Ministère de la Transition écologique et solidaire	France
48259	89	39	89	39	I don't know what this headline means.	Changed to "Better metric to measure actual human wellbeing"	Susana Hancock	University of Oxford	United States of
55527	89	29	89	36	The summary paragraph on page 5-89, lines 29-36, could be better connected with the preceding text. The issue of equality isn't much of an explicit feature in the examples provided.	Noted. Adjusted as suggested	Government of United States of	U.S. Department of State	United States of America
55529	89	39	89	39	The title for knowledge gap 1 is easily subject to misinterpretation (implying that the AR6 is written as if people don't matter). Suggest revising it to: "Better metrics to measure actual human well-being".	Accepted. Changed to "Better metric to measure actual human wellbeing"	Government of United States of	U.S. Department of State	United States of America
60223	89	40	89	40	natural environment of certain geographical location also affects the lifestyles of communities, so, I suggest a stement to read "...how people live in various environments, cultures, contexts"	Accepted. Added.	Government of United Republic of	Tanzania Meteorological	United Republic of Tanzania
80577	89	39	89	39	Suggested title: Climate action considering human well-being	Changed to "Better metric to measure actual human wellbeing"	Olga Savchuk	Instituto Superior	Portugal
15949	90	15	90	25	In my view, the core problem is the tension between measurability and meaning of service indicators and concepts. Most quantitatively measurable service indicators (e.g. pkm or tkm) are highly problematic because they do not actually measure services in the sense of well-being contributions (transporting people over physical distances may or may not contribute to wellbeing, indeed it can often be quite detrimental to wellbeing if one has to travel far to reach a certain goal). More research is hence needed on how to measure the things we really want to know, e.g. accessibility, social inclusion etc. Otherwise services will also be poorly represented in scenarios. See e.g. Kalt et al. 2019, En Res Soc Sci. 10.1088/1748-9326/ab842a	Accepted. Added "Most quantitatively measurable service indicators e.g. pkm or tkm are also inadequate to measure services in the sense of well-being contributions. More research is needed on how to measure e.g. accessibility, social inclusion etc. Otherwise services will also be poorly represented in scenarios. "	Helmut Haberl	University of Natural Resources and Life Sciences, Vienna	Austria
20841	90	6	90	13	The use of digital technologies can also provide novel ways of organising and structuring action - to reduce emissions, but also risks for increased consumption, especially through the rise of social media and applications that can assist or encourage consumer choices	Accepted. Added "increased use of social media and influence of consumption and choices, "	Government of France	Ministère de la Transition écologique et	France
55531	90	5	90	13	Knowledge gap 2 is not fully clear (especially the reference to a great narrative). Suggest revising it to: "Evaluation of the climate implications of the digital economy".	Accepted. Changed the title by adding "climate implication of "	Government of United States of	U.S. Department of State	United States of America
74153	90	27	90	43	How Covid-19 restrictions impacted individual capacity and willingness for behavioral change	Accepted. Added "(?) how shocks like prolonged pandemic impacts willingness and capacity to change and their permanency for various social actors. "	Mayuri Utturkar	University of Delaware, USA	United States of America
80579	90	20	90	25	Paraphrasing: There is a need for more sensitivity analysis studies on two aspects to better guide further detailed studies on societal response to policy. These aspects are the effect of socio-behavioural and organisation changes on emission reduction, and the scale for take-back (rebound?) effects.	Accepted. Changed the sentence appropriately.	Olga Savchuk	Instituto Superior Tecnico	Portugal
319	91	1	91	16	This chapter discusses extensively the climate benefit of reducing meat consumption, so it is strange not to see this aspect mentioned in FAQ 5.1	Noted. Added now in 5.1 but it is also there in FAQ 5.2 line 27	Sandro Fuzzi	ISAC CNR	Italy
4017	91	33	91	45	While the chapter concludes emphasising the strong connection between economic growth and environmental impacts, it is lacking earlier focus on the policy implications for that and what changes it would require from other stakeholders as well. Making some of these implications more explicit will be key for the wider societal transformations that this chapter informs.	Noted. Space limitation does not allow to expand this more. Details are in section 5.4 and some mention is there in 5.2.	Diana Ivanova	University of Leeds	United Kingdom (of Great Britain and Northern Ireland)
5317	91	36	91	37	Replace Renewables by low carbon, on these two lines;	Rejected. The strongest empirical data point specifically to renewables in this context. See for example: https://www.nature.com/articles/s41558-019-0419-7	Michel SIMON	Retraité/ Pdt d'association	France
8405	91	2	91	10	The vast majority of persons, especially the population 20+, has not been (more formally) educated about climate change even in the most developed economies and societies- or only very little. Hence, most people may still lack basic knowledge about climate and climate change. One of the first steps what persons thus could (and most likely should) do is learn about climate change in one way or the other. Once some basic knowledge has been learned successfully, it can be imagined that (individual) action will much more easily follow through (as well as pressure on policy-makers, companies, ... to act accordingly). The role of education and knowledge transfer to the general population has attracted rather little attention in the chapter throughout.	Noted. Added a sentence in the FAQ	Pichler Florian	Energie-Control Austria für die Regulierung der Elektrizitäts- und Erdgaswirtschaft (Regulatory)	Austria
9303	91	11	91	16	Are policymakers addressed here as individuals (this is what I would expect when reading the FAQ question) or does the last paragraph of this FAQ address the policy context? If the latter is your intention, I would highlight that individual decisions are made in a certain context or can be guided, for example by the measures that you have listed. This would avoid a potential confusion.	Accepted. Added appropriately. Policy makers support individual actions in certain contexts ...	Maïke Nicolai	Helmholtz Centre Geesthacht	Germany
9305	91	19	91	19	Please use "human-induced" instead of "man-made". Even if "man" can be understood as a short form of "human", I would prefer a term that is clearly gender neutral.	Thanks. Accepted.	Maïke Nicolai	Helmholtz Centre Geesthacht	Germany
9307	91	21	91	21	I would not assume that the changes you have listed make everyone anxious (this is how I interpret this very simple sentence). There might for example be people who see opportunities or are more able to deal with uncertainties than others. Can this sentence be phrased in a more balanced way or probably omitted?	Accepted. Deleted the sentence	Maïke Nicolai	Helmholtz Centre Geesthacht	Germany
9309	91	24	91	34	My suggestion would be to shorten the descriptions of current common discourses and focus more on the novel narratives and how they can support change. Repeating statements that you would actually like to debunk also bears the risk of cementing them. Are there any novel narratives you are able to describe as specifically as the traditional ones?	Noted with thanks and flipped the examples as suggested.	Maïke Nicolai	Helmholtz Centre Geesthacht	Germany
9311	91	33	91	45	Reading the question from a layperson's perspective, I would have expected information about the effects of individual demand reduction on general economic growth. Because the FAQ focuses more on the general demand in fossil fuels and expands on income growth, it might be helpful to adjust the question.	Thanks. Accepted and changed the question and shifted and changed the sentences.	Maïke Nicolai	Helmholtz Centre Geesthacht	Germany
9313	91	40	91	45	The comparison between income growth and other indicators of national welfare sounds very interesting to me. I would also think it is worth pointing out that welfare has many aspects, some of which benefit from mitigation measures. A focus like this might be quite attractive to your audience, but would require rephrasing the question and restructuring the answer.	Noted. Changed. In line with previoyd comment.	Maïke Nicolai	Helmholtz Centre Geesthacht	Germany

Comment Id	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
9315	91	43	91	45	I think this FAQ would become more useful if the solutions mentioned in the last sentence could be expanded on. This reference to the chapter might be of little help if the FAQs are read outside the context of the chapter.	Accepted. Taken out the term chapter	Maïke Nicolai	Helmholtz Centre Geesthacht	Germany
10623	91	28	92	28	Please keep in mind that plant-based liquids cannot be labeled as "milk" within the European Union (and in UK too)	Noted. Changed and appropriately rephrased.	Philippe Waldteufel	CNRS	France
17789	91	1	91	16	(FAQ 5.1) Very useful: we're always being asked this. Could include a line pointing out that this is complementary to the efforts of energy producers, industry etc, some of whom are keen to put the burden of action on individuals rather than themselves. (NB "petrol" line 14 is a UK term, US would be "gasoline" or perhaps "motor fuel"?)	Accepted. We include gasoline with petrol now	Jonathan Lynn	IPCC	Switzerland
20843	91	43	91	45	Please consider mentioning advertising, images and the entertainment society, which disseminate standards that can totally go against climate change mitigation and which therefore require regulation.	Accepted. Added in the revised text.	Government of France	Ministère de la Transition	France
27693	91	7	91	8	Delete "As investors, for those rich enough, we can divest from fossils and invest in carbon-neutral technologies.", as the risks related to a sudden divestment needs to also be considered, given the need for sustained energy markets, energy security and efforts to eradicate poverty in energy-exporting developing countries.	Partially accepted. Revised the sentence to bring in strategic divestment aspect.	Eleni Kaditi	Organization of the Petroleum Exporting Countries, OPEC	Austria
27695	91	13	91	14	Delete "choice architectures and nudges that set green options as default. Removing subsidies for cheap petrol.", as these are not policy neutral statements and when referring to subsidies one should consider inefficient subsidies that encourage wasteful consumption.	Partially accepted. Sentence revised to maintain policy neutrality.	Eleni Kaditi	Organization of the Petroleum Exporting Countries, OPEC	Austria
27697	91	37	91	39	Delete "High deployment of renewables and associated rapid reduction in demand and use of coal, gas, and oil can further reducing the interdependence between economic growth and GHG emissions."	Rejected. This sentence is in agreement with the literature.	Eleni Kaditi	Organization of the Petroleum Exporting Countries, OPEC	Austria
27699	91	43	91	45	Delete "This chapter shows that many solutions that reduce primary material and fossil energy demand provide better services to help achieve wellbeing for all while reducing GHG emissions drastically.", as regional and (sub)national circumstances and needs should be considered to also ensure achievement of the wellbeing "for all".	Partially accepted. Sentence revised.	Eleni Kaditi	Organization of the Petroleum Exporting Countries, OPEC	Austria
31383	91	23			I agree that tolerating ambiguity can be learned but it would be good to see a source cited here, specifically the link to history, poetry, arts (I'd add religion/philosophy).	Noted. FAQs are not meant for adding references. Religion, philosophy added.	Jacob HALCOMB	UNEP Affiliate	France
31385	91	28			Suggest changing "plant-based milk" to "plant-based alternatives" as some recent legal decisions prohibit these products from being marketed as milk. Additionally, previous sentence references both meat and milk.	Noted. Sentence has been revised also keeping in mind couple of other comments and suggestions above.	Jacob HALCOMB	UNEP Affiliate	France
46473	91	3	91	9	FAQ 5.1.: please avoid phrasing sentences in the "we"-perspective. The text should be generally applicable to any reader. Rephrase e.g. "Citizens can organise...."	Accepted. Changed .	Government of Germany	Federal Ministry for the Environment, Nature Conservation and Nuclear Safety	Germany
46475	91	11	91	16	FAQ 5.1.: "policy makers support" gives the impression that individual action is the most important factor, simply being supported by policy makers. Please consider rephrasing in order to stress the effectiveness of system change initiated on the policy-level (if supported by evidence).	Noted. The sentence has been revised also keeping in view related comments made above.	Government of Germany	Federal Ministry for the Environment, Nature Conservation and Nuclear Safety	Germany
46477	91	18	91	31	FAQ 5.2: this FAQ uses language that may be interpreted as policy-prescriptive/not neutral ("openly embrace"). The examples chosen (automobility, dairy) and the way they are framed are conveying a predetermined policy bias. Please find a more neutral way to describe the psychological and sociological findings discussed.	Noted. Changed and appropriately rephrased also in the light of earlier comments.	Government of Germany	Federal Ministry for the Environment, Nature Conservation and Nuclear Safety	Germany
46483	91	33	91	45	FAQ 5.3: the question posed as FAQ-title is not really answered in the text. It should be clarified which demand (for what?) is being referred to - energy demand / consumption in general / demand for fossil fuels? All these imply different reasonings, especially when taking into account effort to decarbonize the energy sector. If the take-away message of this FAQ is the emerging realisation of the importance of alternative measures for national welfare, you might consider rephrasing the title.	Noted. Changed also to be consistent with related comments.	Government of Germany	Federal Ministry for the Environment, Nature Conservation and Nuclear Safety International Climate	Germany
55533	91	27	91	28	The reference to transitions to plant-based milk is prescriptive, as though this is an essential element of reducing emissions. Suggest deleting, and revising the text to make a more general point.	Noted. Revised the sentence to make it more general rather than prescriptive.	Government of United States of	U.S. Department of State	United States of America
55535	91	33	91	45	Suggest reframing somewhat to more explicitly make the role that decoupling emissions from GDP growth is possible (e.g., California has done this to significant degree) and will play an important role in almost any mitigation scenario. Then strengthen the second paragraph to argue for the alternative metrics of well-being that are referenced in knowledge gap 1. Aggregate economic growth measured in units of currency is not the only metric of well-being, and may not be the best metric, especially once middle-class incomes are reached. This response is likely to draw significant interest and attention, so will need to be carefully crafted.	Noted with Thanks. Revised the presentation sequence and also to take into consideration earlier comments in similar line.	Government of United States of America	U.S. Department of State	United States of America
79951	91	33	91	33	It would be great for the authors to be really clear on the FAQ "Is demand reduction compatible with economic growth?" The answer seems basically to be 'no' (or at least, only a few places have done this, to a very limited extent and certainly not at level needed for 1.5C). Please say so in unambiguous terms: the growth paradigm deserves to be challenged head-on and in as clear and uncompromising language as you are able to do!	Noted. Changed the question and changed the text also to reflect the line of argument.	Stuart Capstick	Cardiff University	United Kingdom (of Great Britain and Northern Ireland)
85599	125	21	125	29	First author name is missing.	Reject. It is a standard practice to omit the repeating name .	San Win	Environmental Conservation Department, Ministry of Natural	Myanmar
3055	172		205		Valuable new inclusion to the Report.	Thank you.	Beth Edmondson	Federation	Australia
10625	172	42	172	42	"use" rather than "used"	Noted	Philippe Waldteufel	CNRS	France
17693	172		206		The supplementary materials are very rich and provide extremely useful theoretical and comprehension frameworks (at least SM5.1, SM5.2, SM5.3 and SM5.4, as I haven't read the SM5.5 and SM5.6) and are overall remarkably well written. On the one hand, it is a pity to do without this in the main text (what will be the status of these SM in the final document?), but on the other hand, I understand this difficult choice made by the authors (especially as comments during the FOD had probably led to this arbitration). The field of research covered by this chapter contains a large number of theoretical frameworks and concepts that are not always compatible with each other, and their accumulation may hinder the readability of the document. However, I encourage the authors to re-examine the possibility of reintegrating some of these elements into the main text if this seems beneficial to them (in particular SM5.2, SM5.3 and SM5.4 as they are complementary, and some part of SM5.1 to introduce the SM5.2)	Thanks and noted. But space constraint debars us to elevate sections in the main chapter text. However, this will be available for public use with the chapter so we decided to revise and enrich.	Thomas Le Gallic	CNRS - CIRED	France
31301	172		220		Am not convinced the Social Science Primer is needed in an assessment Report. Suggest delete and publish separately. Chapter long enough as it is.	Noted. Multiple comments appreciated inclusion of the primer and also suggestions came in how it can be made better. So we decided to keep it with appropriate revisions.	Ralph Sims	Massey University	New Zealand
31389	172	41	172	46	Sentence is long and a bit confusing. Perhaps revisiting and restructuring will help.	Noted and thank you. Sentence has been revised	Jacob HALCOMB	UNEP Affiliate	France
55537	174	1	174	3	The color coding of the box in row 3 column 2 of Figure SM5.15 appears incorrect. It should likely be the Policy Cluster.	Accept. Thanks for pointing that out. We have changed as suggested.	Government of United States of	U.S. Department of State	United States of America
60225	174	2	174	3	The text in the picture is poor and not readable or unprofessionally presented. It should be reorganized	Noted. Readability enhanced.	Government of United Republic of	Tanzania Meteorological	United Republic of Tanzania
3057	175	25	175	25	Should begin new paragraph at 'Empirical social sciences...'	Noted and implemented, thank you!	Beth Edmondson	Federation	Australia

Comment Id	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
3059	176	4	176	8	Links between what's more promising about demand-side mitigation and better climate/mitigation outcomes are not clear here. Apart from the social benefit of consumers enjoying choices/preferences regarding their own well-being and their preferred trade-offs, what benefits are offered by demand-side approaches?	Those are precisely the benefits, as stated. Not clear why does the reviewer think that these benefits are negligible?	Beth Edmondson	Federation University	Australia
52123	176	4	176	8	Very strong claim that demand-side mitigation is better than other approaches supported by just one reference (Creutzig et al. 2021). The claim needs to be supported by more evidences from the literature.	Noted. Sentence revised. However, please note that the reference used is a review article of large number of peer reviewed literature .	Government of Saudi Arabia	Sustainability Advisor to the Minister Ministry of	Saudi Arabia
3061	178	26	178	39	Focus of this paragraph shifts between different issues. Worth revising for clarity and focus.	Noted and revised	Beth Edmondson	Federation	Australia
31391	179	25	179	29	why no mention or consideration of Emergy?	Noted, term and reference has been added	Jacob HALCOMB	UNEP Affiliate	France
31393	179	30	179	40	Sentences are long and a bit confusing. Perhaps revisiting and restructuring will help. Previous sections seem to provide a kind of definition or scope on the sub-topic but here there really is only mention that equity is gaining attention in literature? Or is this more that could be defined, explained here?	Noted - revised and restructured	Jacob HALCOMB	UNEP Affiliate	France
55539	179	31	179	40	The content in this paragraph is good, but it needs major edits for grammar and complete and clear sentences.	Noted - revised and restructured	Government of United States of	U.S. Department of State	United States of America
3063	180	8	180	46	Needs splitting into focused paragraphs.	Noted - and revised	Beth Edmondson	Federation	Australia
27701	180	35	180	37	Delete "In principle, a carbon tax has many advantages over any other approach, because it forces consumers to bear the cost of their activities (Nordhaus 2013). But automatic enrolment in green energy might be a useful complement to a carbon tax, especially if that tax is too low.", as affordability issues arise in developing countries where energy poverty prevails.	Reject. We have assessed the literature and not just one literature to reflect what is in agreement and disagreement in the literature. So this sentence needs to be read with following sentences and in what context this statement is added also please read the Box 5.11.	Eleni Kaditi	Organization of the Petroleum Exporting Countries, OPEC	Austria
52125	180	35	36	36	Very strong claim about carbon tax, which is claimed to be better than other approaches to influence behaviour supported by just one reference (Nordhaus 2013). The claim needs to be supported by more evidences from the literature.	Reject. We have assessed the literature and not just one literature to reflect what is in agreement and disagreement in the literature. So this sentence needs to be read with following sentences and in what context this statement is added also please read the Box 5.11.	Government of Saudi Arabia	Sustainability Advisor to the Minister Ministry of	Saudi Arabia
3065	181	2	181	3	Arguing in the current tense while relying upon sources that are 9-12 years old is problematic. These patterns might well have changed. Delete sentence or update evidence.	Reject. We have assessed the literature and not just one literature to reflect what is in agreement and disagreement in the literature. So this sentence needs to be read with following sentences and in what context this statement is added also please read the Box 5.11.	Beth Edmondson	Federation University	Australia
3067	181	36	181	44	It's likely that the links/patterns identified by Shove nearly 2 decades ago have changed because many other social elements and social-economic factors have changed during this timeframe. Also, these patterns relate only to certain societies?	Noted - though we provide many references more recent than Shove 2003. And while empirical studies of the influence of intermediary actors come mostly from Western countries, the conceptual papers cited describe many different types of such actors and there is no reason why they should not differ by type of society	Beth Edmondson	Federation University	Australia
27703	183	23	183	29	Delete "Pro-environmental, green, sustainable, or 'low-carbon' lifestyles have two different interpretations, broadly distinguished by intention and impact (van den Berg et al. 2019). Emphasising intentions, a green lifestyle has been defined as "a collection of practices by which people today try to address an interrelated set of environmental problems" (Lorenzen 2012). Applied to climate change, 'low-carbon' lifestyles can be identified by the values, intentions or goals of individuals seeking to reduce their carbon footprint. Emphasising impacts, low carbon lifestyles can also be identified by reductions in energy and material use or other consumption-based reductions in greenhouse gas emissions (Le Gallic et al. 2018)."	The reviewer gives no reason for why this paragraph should be deleted. Subsequent paragraphs make no sense without this one, which defines the two ways in which the term "low-carbon lifestyle" is used, so we kept it.	Eleni Kaditi	Organization of the Petroleum Exporting Countries, OPEC	Austria
3069	184	28	184	42	Focus is implicitly skewed towards the affluent/wealthy. What about the poor?	Noted - and revised	Beth Edmondson	Federation	Australia
3071	185	7	185	25	Unclear why universities are focused on when most people do not receive university educations	This paragraph applies to education in general, not to university education	Beth Edmondson	Federation	Australia
3073	185	27	186	14	White, western, Christian focus is highly problematic.	Noted - and revised	Beth Edmondson	Federation	Australia
84561	185	29	185	30	Please, amend the text into: "... Leiserowitz 2013), even though the situation may differ in other countries, for example in Sweden, where Evangelic Christians rather support progressive climate policies (Edvardsson Björnberg and Karlsson, 2019).	Noted - and revised and reference added	Mikael Karlsson	KTH Royal Institute of Technology	Sweden
3075	186	18	186	18	Relying upon a dated source to develop a future focused argument is problematic. Also, this chapter hasn't really been trying to establish an overall people-centred view of mitigation.	Rejected - sources that are not recent are still useful if they are foundational texts for theoretical perspectives, as this one is. And the point about people-centered mitigation is important to counter conventional technological or cost-oriented narratives of change that underplay social aspects of mitigation.	Beth Edmondson	Federation University	Australia
18197	186	16	187	27	Could these sections potentially also clarify the implications of imagery and visuals for climate mitigation as opposed to textual storytelling / narratives?	Rejected - there is insufficient space to add references on imagery and visuals for mitigation.	Government of United Kingdom (of Great Britain and Northern Ireland)	Department for Business, Energy & Industrial Strategy	United Kingdom of Great Britain and Northern Ireland
55541	186	16	187	4	SM5.3.5 should address the aspects of meaning that are bundled with high-carbon lifestyles, consumption, and production. This is one of the most significant obstacles to rapid change. It is essential to acknowledge that there is meaning attached to, e.g., continuing a family history of working in coal mines, or driving a certain type of vehicle, or eating certain foods, etc., before attempting to challenge or re-direct this meaning. It is very useful that the AR6 is delving into these issues; this chapter should also address the social, cultural, and individual meaning that is bound up with the status quo.	Noted - this point is elaborated in Section 5.4.2 of the main chapter and so does not require further elaboration here.	Government of United States of America	U.S. Department of State	United States of America
3077	187	16	187	16	Arguing about current unsustainable societies, the assumptions made within them, and any possible lock-in patterns requires some contemporary evidence. Relying upon 1 source that is nearly 2 decades old is highly problematic.	Noted. But there is no suggested relevant literature	Beth Edmondson	Federation University	Australia
3079	187	29	189	45	This section could be thoughtfully edited/revised into 2 clear focused paragraphs. There's a lot of generalising going on here without clear links to the point of the chapter.	Noted. More specifics have been added in the revised draft taking out generalisations.	Beth Edmondson	Federation University	Australia
55543	188	9	188	20	Revise for clarity. It's not quite clear until the last sentence what perspective the author is taking.	Noted. Revisions are now included in the revised version	Government of United States of	U.S. Department of State	United States of America
85597	190	15	191	18	In the context of indigenous knowledge and technology, there are a number of unique technologies applied by the indigenes people which support both mitigation and adaptation to climate change. In Myanmar, one of unique indigenologies, floating garden, can be observed in Inle Lake in Southern Shan State, one of eight major ethnic groups.	Noted. However, no reference to literature is included and it was difficult to get peer reviewed literature on the practice mentioned and mitigation potential.	San Win	Environmental Conservation Department, Ministry of Natural	Myanmar
3081	191	30	191	30	Current functions of institutions and current interactions between instruments for low carbon transitions require a more recent source.	Noted. These theoretical conclusions are well established which are included in the Primer and no new literature suggested.	Beth Edmondson	Federation University	Australia
27705	191	41	191	43	Delete "An example of this is the fossil fuel subsidy that advantages incumbent actors in this sector over those from the renewable, leaving individuals or businesses who wish to invest in green energy, receiving much less support (Lockwood 2015; Healy and Barry 2017; Rentschler and Bazilian 2017)."	Reject. IPCC reports is an assessment of the literature	Eleni Kaditi	Organization of the Petroleum Exporting Countries, OPEC	Austria
2157	192	31	193	16	This discussion fails to engage with the robust sociological literature that connects individual identity, institutional processes, and cultural beliefs that impact climate behavior. This paragraph needs to be expanded and updated to reflect the current peer reviewed literature in this area (see references below).	Noted. The literature is vast and expanding fast. Box 5.1 mentions that this chapter tried to focus on non repetitive literature and focus on main messages coming out from the literature. Given the page limits it is hard to list all the literature.	Robert Brulle	Brown University	United States of America
2159	192	31	193	16	Brulle, R. J., & Norgaard, K. M. (2019). Avoiding cultural trauma: Climate change and social inertia. Environmental Politics.	Please seeresponse to comment no 2157	Robert Brulle	Brown University	United States of
2161	192	31	193	16	Kasper, D. Ecological Habitus. Organization & Environment 22(3):311-326.	Please seeresponse to comment no 2157	Robert Brulle	Brown University	United States of
2163	192	31	193	16	Kurtz, T. B. Gardner, B. Verplanken, and C. Abraham. 2015. Habitual behaviors or patterns of practice? WIREs Climate Change, 6:113-128.	Please seeresponse to comment no 2157	Robert Brulle	Brown University	United States of America
2165	192	31	193	16	Lucas, C., Leith, P. and Davison, A., 2014. How climate change research undermines trust in everyday life: a review. Wiley Interdisciplinary Reviews: Climate Change, 6(1), pp.79-91.	Please seeresponse to comment no 2157	Robert Brulle	Brown University	United States of America
2167	192	31	193	16	Norgaard, K. M. (2011). Living in denial: Climate change, emotions, and everyday life. MIT Press.	Please seeresponse to comment no 2157	Robert Brulle	Brown University	United States of

Comment Id	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
2169	192	31	193	16	Rickards, L., Wiseman, J. and Kashima, Y., 2014. Barriers to effective climate change mitigation Wiley Interdisciplinary Reviews: Climate Change, 5(6):753-773.	Please seeresponse to comment no 2157	Robert Brulle	Brown University	United States of America
2171	192	31	193	16	Rosenschold, J. Rozema, and L. Frye-Levine 2014. Institutional inertia and climate change: a review of the new institutionalist literature. WIREs Climate Change 5:639-648	Please seeresponse to comment no 2157	Robert Brulle	Brown University	United States of America
2173	192	31	193	16	Stawinski, N. J. Pinkse, T. Busch, and S. Banerjee. 2015. The role of Short-Termism and Uncertainty Avoidance in Organizational Inaction on Climate Change. Business and Society 1-30.	Please seeresponse to comment no 2157	Robert Brulle	Brown University	United States of America
3083	192	5	192	29	Unclear connectins between the heading and the sentences that follow	Taken into account - text revised to clarify connection between heading and following sentences.	Beth Edmondson	Federation	Australia
17107	193	7	193	8	A new relevant reference on this is Lamb, W. F., Mattioli, G., Levi, S., Roberts, J. T., Capstick, S., Creutzig, F., ... & Steinberger, J. K. (2020). Discourses of climate delay. Global Sustainability, 3	Noted. New references updated in the revised version of the chapter	Giulio Mattioli	TU Dortmund University	Germany
17109	193	9	193	16	Mattioli et al. 2020 (already cited in the chapter) provides a discussion of all these different types of lock-in in the road transport sector.	Noted. Cited in the chapter	Giulio Mattioli	TU Dortmund University	Germany
55545	193	28	194	31	SM5.5.3 seems duplicative of Section 5.5.2 in the main chapter.	Noted. Supplementary material is somewhat more elaborate comared to the one appearing in the main chapter. Despite cole similarity we keep in the supplementary material to keep theflow of the text better and not to loose the details which coul not be accommodated in the chapter. .	Government of United States of America	U.S. Department of State	United States of America
55547	196	9	197	1	Table SM5.8 would benefit from a color-coded approach to better show the different levels of challenge. This could be moved to the main text of the chapter. There is utility in clumping the options by the Improve/Shift/Avoid framework, but do all options fit in this paradigm?	Noted. Page limit does not allow us to include in the main chapter.	Government of United States of America	U.S. Department of State	United States of America
15235	197	28	197	28	The reference "Wu and Mathews 2012" incorrectly put Taiwan in parallel with China. Taiwan is a province of China, not an independent country. The current statement is seriously wrong. This reference must be deleted.	Accepted - reference deleted.	Government of China	China Meteorological	China
20211	197	3	197	3	To show the complexity in forces of change in PV adoption, there should also be reference to the non-linear growth pattern (and the associated interplay among transition processes/functions), e.g. in Germany, and to how huge consumer response in conjunction with reckless regulatory opportunities backfired, e.g. in Spain or Greece: - Sorman, A. H., Pizarro-Irizar, C., García-Muros, X., González-Eguino, M., & Arto, I. (2019). On a rollercoaster of regulatory change—risks and uncertainties associated with renewable energy transitions. Narratives of Low-Carbon Transitions, 121. - Nikas, A., Stavrakas, V., Arsenopoulos, A., Doukas, H., Antosiewicz, M., Witajewski-Baltviks, J., & Flamos, A. (2020). Barriers to and consequences of a solar-based energy transition in Greece. Environmental Innovation and Societal Transitions 35, 383-399.	Rejected - the aim of this section is not to provide a comprehensive analysis of the complexity of PV innovations, which is beyond the scope of this chapter. Instead, it is to illustrate how consumer led demand and preferences for PV enabled innovation in policy and technology, with a particular focus on Germany and Japan. A focus on Spain or Greece is outside the scope.	Nikas Alexandros	National Technical University of Athens	Greece
3085	198	17	198	30	Is the key learning here that it takes social movements about 30 years to effect legislative and broader change?	Reject. Argument is to show how bottom up social demand could drive change.	Beth Edmondson	Federation	Australia
1507	199	9	199	9	Bikram and Thakuri should be just Thakuri 2009.	Accepted. Done	Mani Nepal	International Center for Integrated Mountain	Nepal
1509	199	19	199	19	Please add this sentence after the period: Well intended subsidy programs oftern do not help world's poorest to adopt cleaner fuel, suggesting a need for targetted porigrams (Bhattarai, D., Somanathan, E., & Nepal, M. (2018). Are renewable energy subsidies in Nepal reaching the poor?. Energy for Sustainable Development, 43, 114-122.)	Accepted. Done	Mani Nepal	International Center for Integrated Mountain	Nepal
1511	199	8	199	8	Please add this latest reference after Pattanayak et al. 2004 (Sharma, B. P., Karki, B. S., Nepal, M., Pattanayak, S. K., Sills, E. O., & Shyamundar, P. (2020). Making incremental progress: impacts of a REDD+ pilot initiative in Nepal. Environmental Research Letters, 15(10), 105004.)	Accepted. Done	Mani Nepal	International Center for Integrated Mountain	Nepal
1513	199	19	199	19	Please add this latest reference at the end of the list of existing referneces (Bluffstone, R., Beyene, A., Gebreegziabher, Z., Martinsson, P., Mekonnen, A., & Vieider, F. (2020). Does providing improved biomass cooking stoves free-of-charge reduce regular usage? Do use incentives promote habits?. LAND ECONOMICS.)	Accepted. Done	Mani Nepal	International Center for Integrated Mountain	Nepal
1515	199	3	199	3	Please add this latest references at the end of currnet refernce list (Jeuland, M., Fetter, T. R., Li, Y., Pattanayak, S. K., Usmani, F., Bluffstone, R. A., ... & Toman, M. (2021). Is energy the golden thread? A systematic review of the impacts of modern and traditional energy use in low- and middle-income countries. Renewable and Sustainable Energy Reviews, 135, 110406.)	Accepted. Done	Mani Nepal	International Center for Integrated Mountain	Nepal
1517	199	9	199	9	Please add this latest reference at the end of current list of reference (LaFave, D., Beyene, A. D., Bluffstone, R., Dissanayake, S. T., Gebreegziabher, Z., Mekonnen, A., & Toman, M. (2021). Impacts of improved biomass cookstoves on child and adult health: Experimental evidence from rural Ethiopia. World Development, 140, 105332.)	Accepted. Done	Mani Nepal	International Center for Integrated Mountain	Nepal
20213	199	22	199	23	Also: - Van de Ven, D. J., Sampedro, J., Johnson, F. X., Bailis, R., Forouli, A., Nikas, A., ... & Doukas, H. (2019). Integrated policy assessment and optimisation over multiple sustainable development goals in Eastern Africa. Environmental Research Letters, 14(9), 094001. - Taylor, R., Wanjiru, H., Johnson, O. W., & Johnson, F. X. (2019). Modelling stakeholder agency to investigate sustainable charcoal markets in Kenya. Environmental Innovation and Societal Transitions 35. - Silaen, M., Taylor, R., Bößner, S., Anger-Kraavi, A., Chewprecha, U., Badinotti, A., & Takama, T. (2019). Lessons from Bali for small-scale biogas development in Indonesia. Environmental Innovation and Societal Transitions 35. - Forouli, A., Nikas, A., Van de Ven, D. J., Sampedro, J., & Doukas, H. (2020). A multiple-uncertainty analysis framework for integrated assessment modelling of several sustainable development goals. Environmental Modelling & Software, 131, 104795.	Accepted. Done	Nikas Alexandros	National Technical University of Athens	Greece
37499	199	13	199	13	Do the figures refer to the years 2001 and 2011, or do they refer to the period 2001-2011.	The figurees compare 2011 and 2001	Government of India	Ministry of Environment,	India
24975	202	25	202	40	I am glad to see a 'social science primer' included as supplementary material for Chapter 5, as the social sciences have key contributions on the political and behavioural sides of climate mitigation and adaptation. One emerging area of social science I would urge the authors to include in the case study of mobility in Kolkata is the literature on mobility justice, stemming from the mobilities paradigm in sociology. The concluding paragraph mentions the complexity of governance and the risk of increasing inequalities. The work of Sheller (2018, https://doi.org/10.11606/0103-2070.ts.2018.142763) and Nikolaeva et al. (2019, https://doi.org/10.1111/tran.12287) can provide useful lenses to bring out more explicitly the justice dimensions of this case, as well as suggest a new approaches ('communing mobility') for collective governance and accessibility in the mobility transition.	Accepted. Inserted the references and also the conclusion.	Emil Beemer	Dutch Research Institute For Transitions, Erasmus University Rotterdam	Netherlands
52127	202	39	202	40	In the concluding sentence of the case study on India, the author makes a claim that government policy is directed towards the middle class which is the case with one of the initiatives mentioned in the study, but it appears that this is the case always -- more details needed to support claim. The sentence further ends with a reference to figure SM5.19b which does not appear to be directly connected to this strong claim but to the case study as a whole.	Noted. Revised the text to specifically connect the concluding sentence to the policies mentioned in this case study alone without any generalisation. The figure is an illustrative one to show the varying starting points for Annex I and Non annex I countries in mobility sector and not just the casestudy per se.	Government of Saudi Arabia	Sustainability Advisor to the Minister Ministry of Petroleum and	Saudi Arabia
10627	203	8	203	9	In my view, this way of commenting figure 5.20 is biased to say the least. On the long term (50 years), this figure unambiguously shows a decrease in consumption of both beef and mutton, which is overcompensated by an increase in poultry consumption, leading to an overall increase of meat consumption. Linear least square fits will confirm this. Now, superimposed on these trends, are fluctuations over the 10-15 years time scale; indeed such a fluctuation over 2003-2019 exhibits a decrease. Is not this a correct way of commenting this figure? When coming to interpretations, I do hope the influence of the cost of various meats is not ignored...	Rejected. The section clearly acknowledges that levels of meat consumption in the UK have varied over time, and that the recent trend since 2006 has been an overall decline. This is reflected in the figure and the text. In addition, the text already takes a view of the multiple causes of these fluctuations in consumption - in particular the overall decline since 2006 - including cost.	Philippe Waldteufel	CNRS	France

Comment Id	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
84473	203	2	203	3	Figure SM5.19 is valuable for indicating improvements in air quality, accessibility and nutritious diet while representing the transition dynamics. The figure may be considered for inclusion within the main content of the chapter that may also support linkages with shifting development pathways towards sustainability (Chapter 4).	Thanks. It can be crossed referenced by Ch 4.	Sir KILKIS	The Scientific and Technological Research Council of	Turkey
84563	214	31	214	32	Please insert the following reference: "Edvardsson Björnberg, K. and Karlsson, M. (2019) Stewardship or Enrichment? Swedish Evangelical Denominations on Global Warming. Full paper to the 14th Nordic Environmental Social Science Conference, Luleå, Sweden, 10-12 June 2019."	Reject. It is nota peer reviewed literature and no reason provided how it fits into the refered part of the bibliographic content .	Mikael Karlsson	KTH Royal Institute of Technology	Sweden
82345	222	2			it should be: "Lovelock, James, 2007: (...) [and not "James Lovelock"]	Accepted.	Amin Hasanein	Islamic Relief	Germany
4883	236	17	236	18	The Reference should be: Saunders, H., Roy, J., Azevedo, I. Chakravarty, D. Dasgupta, S., de la rue du Can, S., Druckman, A., Fouquet, R., Grubb, M., Lin, B.Q., Lowe, R., Madliener, R., McCoy, D., Mundaca, L., Oreszczyn, T., Sorrell, S., Stern, D., Tanaka, K., Wei, T., 2021: Energy Efficiency: What has it Delivered in the Last 40 years? Ann. Rev. Environment and Resources (submitted), Working paper: https://www.fcen.eonerc.rwth-aachen.de/cms/E-ON-ERC-FCN/Forschung/~emv/Arbeitspapiere/lidx/1/	Noted. Correct latest version included.	Harry Saunders	Carnegie Inisution for Science, Global Ecology Group, Stanford, USA	United States of America
15237	244	14	244	16	The reference here incorrectly put Taiwan in parallel with China. Taiwan is a province of China, not an independent country. The current statement is seriously wrong. This reference must be deleted.	Accepted. The reference is deleted.	Government of China	China Meteorological	China
30517	244	14	244	16	Reference : Wu, CY, and JA Mathews, 2012: Knowledge flows in the solar photovoltaic industry: Insights from 15patenting by Taiwan, Korea and China. Res. Policy, 41, 524–540, https://doi.org/10.1016/j.respol.2011.10.007 . In this reference, Taiwan and China appear at the same time. It is better avoid such kind of statement.	Accepted. The reference is deleted.	Lingna Liu	China University of Geosciences (Beijing)	China
82841	246		246		Section Food in table SM5.1. Home food production potential to lower GHG emissions from food (Vávra et al. 2018) - see comment to p. 36, l. 2-9. Vávra, J., Daněš, P., Jehlička, P. (2018a). What is the contribution of food self-provisioning towards environmental sustainability? A case study of active gardeners. Journal of Cleaner Production 185: 1015–1023. DOI: 10.1016/j.jclepro.2018.02.261.	Noted. In this chapter we are considering demand side potential and not supply side potnetial.	Jan Vávra	University of South Bohemia	Czech Republic
37555	612	5	612	8	(page numbering may be off - this is 81/395). "Poorest category" is unlikely to contribute to 63% of emissions. First of all, what is "poorest category"? The other chapter uses quartiles. Second, the poorest consume the least, both in terms of electricity as well as transportation services. LULC and methane cannot account for the rest, even with corrected for GHG or CO2e.	As page does not match. Took the essence of the comment. Noted. References added and clear categories mentioned	Government of India	Ministry of Environment, Forests and Climate	India
17823					The chapter does a good job of pointing out that social science research is lacking with regards to climate change. And I understand the limits on only being able to include what has been empirically shown. But I think its important to note that there are lots of concepts or areas of thought that have great potential to add to this body of evidence. They often sit within their own disciplines, and have not (yet) been sufficiently applied to the specific question of climate change mitigation. However, they do tell us a lot about how the social world works, and such understandings can be applied to thinking about climate change mitigation. Highlighting such leads is important in adding weight to the justification of why they should be funded in CC-focused research. I would suggest they could be flagged as leads within specific report sections, and then drawn into the knowledge gaps section. I have outlined these leads in the following comments.	Noted. Given the page limits in this new chapter we could not do any comprehensive assessment of the social science approaches in the literature in this first attempt in the IPCC report.	Julia Leventon	Global Change Institute of the Czech Academy of Sciences CzechGlobe	Czech Republic
20741		8		8	chapter 5, in executive summary, page 9, line 8, the proposal "regulation can avoid" should be reformulated : without regulation undesired effects couldn't be avoided	Accepted.	Government of France	Ministère de la Transition	France
31231					The chapter is very interesting and it isn't an easy chapter to write. Especially how best to make reducing consumption policy relevant. Congratulations to the authors! However at some instances it does appear to be slightly unbalanced, and seems to present a one-sided judgemental view. For example referring 'Avoid options as those which reduce wasteful energy consumption'. In the example provided above, teleworking is an avoid option that can help avoid emissions associated with travel. However, would you say travelling to work is 'wasteful'? Other instances that refer to 'overconsumption', DLS, etc appear prescriptive. Please make sure these present a balanced assessment of underlying literature.	Partially accepted. Changed to wastes in consumption and production systems in social science primer. Overconsumption is used in many literature including GEA to show consumption going beyond healthy dietary norms. DLS is like benchmark for a living standard. For poverty also there is a norm. For nutrition there is a prescribed norm. So, we are adopting these terms from the existing literature which either refer to helth, hygiene and similar norms. We made this clear in the chapter what are these norms/benchmarks.	Minal Pathak	WGIII TSU, Ahmedabad University	India
55549					It might be worth discussing the racial, ethnic, demographic, and socioeconomic makeup of people who study climate change. The ability to think about and study these issues is a luxury of the educated elite, whether in government or in academia who typically come from certain socioeconomic backgrounds that intersect with racial and ethnic ones.	Noted. But no particular literature has been suggested.	Government of United States of America	U.S. Department of State	United States of America
55551					This chapter and the examples featured focus mostly on demand-side approaches to mitigating emissions from the energy sector. However, many of the same demand-side approaches described throughout are also very relevant to mitigating emissions from the AFOLU sector (as described in Chapter 7). The connection between demand-side solutions and AFOLU could be strengthened in this chapter, although connections in the discussion of diets and cookstoves and deforestation are noted. A suggestion to strengthen this connection is to expand the discussion throughout the chapter from diets to commodity consumption more broadly. A commodity lens covers the major drivers of deforestation and AFOLU emissions that are relevant to diet switches, as well as products used for human well-being beyond nutrition, e.g., palm oil, timber, and rubber. It also allows for the consideration of shifts to improved practices in commodity production that reduce emissions by eliminating deforestation or promoting restoration. 27% of global forest loss (a major component of AFOLU emissions) is attributed to deforestation through permanent land use change for commodity production (e.g., palm oil, soy, cattle, timber, cocoa, coffee, rubber), and demand-side ASI approaches to reduce consumption of deforestation commodities, or shifts to consumption of more sustainably produced commodities can reduce such deforestation emissions (Curtis et al., 2018, Science 361, 1108-1111; Lambin et al., 2018, Nature Climate Change, 8: 109-116). Further demand-side approaches for improved practices can also be applied to reduce land-use driven emissions from shifting agriculture (24% of global forest loss) and forestry (26% of forest loss) (Curtis et al., 2018). Particular sections where these additions could be made include 5.3.1.1, 5.5.1 (which may present particular opportunities to connect to Chapter 7), and 5.6.2.	Noted. The coordination between chapter 5 and AFOLU is reflected in Figure 5.7 by considering land use pattern changes.	Government of United States of America	U.S. Department of State	United States of America
55553					The writing quality varies throughout the chapter, and it needs a thorough edit to make sure all ideas are conveyed clearly (awkward or excessively long phrases reworded) and flow logically from one section to the next. Copyediting is also strongly needed throughout.	Editorial changes will be done in the final version	Government of United States of America	U.S. Department of State	United States of America
55555					Chapter 5 is well done, and represents a major advance over AR5 in the treatment of demand in its socio-economic context. The decision to include a separate 75-page social science primer also deserves applause.	Thanks you.	Government of United States of America	U.S. Department of State	United States of America
55557					The chapter deploys a number of important social science concepts and theories, but in several cases does not provide much theoretical grounding. As a result, the non-specialist reader does not get an adequate sense of why these ideas are important in the quest for climate change mitigation.	Noted. Page limits do not allow to include more explanations. So the primer is limited to provide some additional supporting explanation of the concepts used in the chapter going beyond the glossaries. It is now added "This Social Science Primer provides frameworks for understanding the challenges of systemic change, emergent transition phases and patterns, and the drivers of technological choice in light of some of the themes of AR6..."	Government of United States of America	U.S. Department of State	United States of America

Comment Id	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
55559					<p>The main explanation of social practice theory appears in the supplemental social science primer (pages 5-190 to 5-191), linking practices to cognition, sense-making, and adjustment of routines. While fine, this remains very abstract for a reader not already familiar with this literature. Defining the concept of social practice can help. Consider the following:</p> <p>""A social practice is a routinized form of action in which certain physical and mental activities, technologies (from simple to complex), and tacit knowledge coalesce (Reckwitz, 2002). For a household such practices may include commuting to work, sharing meals, ""saving time"" by using home appliances rather than doing tasks by hand, and overcoming environmental constraints through heating, cooling, and lighting (Shove, 2003). These practices reflect a set of intentions and understandings enacted in a particular social setting. In turn, by being enacted, these practices continually reproduce those social relationships and obligations. Sitting down to an evening meal together does not simply reflect a set of shared attitudes regarding family life. Rather, sharing a meal recreates and reinforces family social ties: this is the principle of structuration or the duality of agency and structure (Giddens, 1984).</p> <p>Giddens, Anthony. 1984. <i>The Constitution of Society: Outline of the Theory of Structuration</i>. Berkeley and Los Angeles: University of California Press.</p> <p>Reckwitz, Andreas. 2002. ""Toward a Theory of Social Practices: A Development in Culturalist Theorizing."" <i>European Journal of Social Theory</i> 5 (2): 243-63.</p> <p>Shove, Elizabeth. 2003. ""Converging Conventions of Comfort, Cleanliness and Convenience."" <i>Journal of Consumer Policy</i> 26 (4): 395-418.</p>	<p>Noted - however, the SSM also covers alternative integrative frameworks such as the Energy Cultures approach and Socio-technical transitions theory. As such, providing more detailed information about Social Practices would lead to an imbalance in the section, whose main contribution is to put forward the multiple approaches currently being proposed across the social sciences to understand transitions using integrative frameworks. References are clearly provided that allow readers to engage more deeply with specific approaches.</p>	Government of United States of America	U.S. Department of State	United States of America
55561					<p>""Culture"" is not adequately developed as a social science concept, appearing in Chapter 5 primarily as a substitute for norm. Examples include ""culture of cooperation"" (page 5-80), ""consumption culture"" (page 5-184), ""culture of climate awareness"" (page 5-185), and ""ride sharing culture"" (page 5-202). While now common in popular usage, it is theoretically vacuous. Authors should consider using norm, pattern, or value instead. The draft also refers to ""cultural meanings"" (page 5-68) and notes that culture shapes perceptions and expectations (page 5-186). These passages are inconsistent with the notion of culture as norm, but are consistent with a more rigorous anthropological sense of the term. From this perspective, culture is not a cause to which actions may be attributed (e.g., ""consumption culture""), but a context within which they become intelligible (Geertz, 1973). Cultures are systems of meaning that are socially transacted and evolving. Cultural knowledge is largely tacit, existing below the surface of language, invisible but supporting those elements (such as norms and rules) which can be made explicit (Sperber, 1975). Briefly acknowledging the social, transacted, and largely tacit character of cultural knowledge helps explain the power of cultural phenomena -- whether to restrain or encourage climate mitigation efforts. This way of framing culture also makes it consistent with practice theory and the use of social practices in the Chapter 5 draft.</p> <p>Geertz, Clifford. 1973. <i>The Interpretation of Cultures</i>. New York: Basic Books.</p> <p>Sperber, Dan. 1975. <i>Rethinking Symbolism</i>. Cambridge and New York: Cambridge University Press.</p>	<p>Partially Accepted. Liberal use of the term culture following popular usage has been avoided appropriate replacement terms. However, this primer does not try to resolve many nuanced details of causality and the conceptual debates and schools of thoughts. However, the approach used in this first ever chapter in IPCC is made clear so that in future further details can be included.</p>	Government of United States of America	U.S. Department of State	United States of America
55563					<p>The Chapter 5 draft leans heavily on the idea of carbon lock-in, and follows a familiar three-part scheme: infrastructural, institutional, and cultural. All of this is appropriate. What seems lacking is some attention to the phenomenon of lock-in as such: commonalities which underlie the infrastructural, institutional, and cultural dimensions of lock-in. The process of decarbonization has the characteristics of a complex system, involving discontinuous phenomena with attractors and tipping points (Bernstein and Hoffman, 2019; see also Presier et al., 2018). In the domain of infrastructure, for example, forces providing positive feedback (such as large fossil energy companies with increasing returns to scale) interfere with linear, incremental progress at decarbonizing the global economy. A practical consequence is that actions taken to advance decarbonization can often produce their own countervailing effects, as when a shift from coal to natural gas (a bridge fuel strategy) entrench industrial interests opposed to further decarbonization: ""things seem better ... and they are, but not better enough"" (Bernstein and Hoffman, 2019). A more rigorous way of discussing lock-in might provide the basis for clearer recommendations aimed at improving decarbonization policies. Treating decarbonization as a complex systems problem may provide greater clarity.</p> <p>Bernstein, Steven, and Matthew Hoffmann. 2019. ""Climate Politics, Metaphors and the Fractal Carbon Trap."" <i>Nature Climate Change</i> 9 (12): 919-25.</p> <p>Preiser, Rika, Reinette Biggs, Alta De Vos, and Carl Folke. 2018. ""Social-Ecological Systems as Complex Adaptive Systems."" <i>Ecology and Society</i> 23 (4).</p>	<p>Noted. However, detailed policy analysis both national and international are discussed in respective chapters</p>	Government of United States of America	U.S. Department of State	United States of America
55565					<p>The text in several places refers to ""homo economicus"". Because the phrase represents a (fictional) species, standard biological conventions should be followed: Genus capitalized, species lower-cased, both in italics: <i>Homo economicus</i> (imagine this in italics).</p>	<p>Accepted</p>	Government of United States of America	U.S. Department of State	United States of America
55567					<p>The addition of this chapter is commended. This is an important human-centric framing of the climate problem. As discussed in the chapter, it opens new pathways to understand drivers of emissions and mitigation options. Factors that drive human demands for services are at the center of emissions, and the demands and emissions are distributed unevenly across populations/socioeconomic groups.</p>	<p>Noted with Thanks</p>	Government of United States of America	U.S. Department of State	United States of America
55569					<p>This chapter addresses a number of issues involving changes to behavior that have strong implications for cultural practices and individual identity. These topics can be highly sensitive. It is critical that the presentation of the topics be handled carefully and delicately to avoid disparaging individuals, groups, or activities and practices with loyal adherents, and to ensure that the important messages of the report are received as broadly as possible. A few ill-chosen phrases can be used by some to tar the overall report. These issues are generally handled well in this chapter, but there are a number of cases in which the discussion could be read to include some implicit moral judgment of practices or groups. Examples include: (i) the use of ""winners"" and ""losers"" on page 88, line 46 to page 89, line 2; (ii) value-laden references to ""excessive consumption"" and ""responsible consumption"" on page 91, lines 8-10; and (iii) parts of Box 5-3 such as page 32, lines 21-31, where quantification of women's carbon footprints in comparison to men's appears to extrapolate from one or two case studies to a universal truth. It is highly recommended that the authors carefully review the full text of the report through this lens to ensure that the presentation is as neutral as possible and conveys sympathy and appreciation for the sacrifices that would be made to implement some of the more disruptive measures discussed.</p>	<p>Noted. Chapter has tried to present an assessment based on the literature. Some are directly from the literature so kept as they use winners/losers. Rest all appropriately changed. Box 5.3 in revised draft is renumbered as 5.4. Added clarification that results are from case studies.</p>	Government of United States of America	U.S. Department of State	United States of America
76525					<p>Overall, an excellent addition to the report. Well-researched, comprehensive and ambitious. Somewhere, there could be an acknowledgment that there has been much less research in developing countries and that such research is especially urgent given that the opportunities for smart solutions and 'leapfrogging' are so large. You already acknowledge context-dependency. The chapter would benefit from a better linking to the rest of the report, and more modest confidence statements.</p>	<p>Accepted. x-chapter link has been improved through all the sections and knowledge gaps also mention less developed country and issues in country contexts wherever applicable</p>	Edgar Hertwich	Norwegian University of Science and Technology	Norway