

Comment Id	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
23765	0				Chapter 17 proposes a discussion of the factors that have the potential to accelerate transition, but recent developments in accounting theory are completely absent of the chapter. However, there are some serious issues regarding the future development of accounting practices for private sector, notably regarding the extra-financial reporting associated to CSR and carbon reduction strategies for business. (Rambaud, A. & Richard, J. (2015). The “Triple Depreciation Line” instead of the “Triple Bottom Line”: towards a genuine integrated reporting. Crit Perspect Account, 33, 92-116)	Rejected. Our discussions are not related to CSR issues	Government of France	Ministère de la Transition écologique et solidaire	France
23767	0				The table page 55 appears problematic. Most rating regarding nuclear energy are impossible to understand. For example, for the nuclear energy, it seems disputable that a negative impact is reported on SGD9 (industry, innovation and infrastructure). It is surprising that Nuclear energy is the only mitigation option (among the 40 listed) with a negative impact on SDG10 (Reduce inequalities). What is the justification for solar and wind to be positive for SDG5 (Gender Equality), and not nuclear? The word "gender" is not present in Chapter 6. The evaluation of several SDG (for example: SDG13 Climate action) raises questions considering that only mitigation options are in this table but some are evaluated as "non applicable". Chapter 6 clearly states that nuclear generates more low carbon electricity than both wind and solar, and that the LCA CO2 emission of solar is significantly larger than that of nuclear. Comparing the energy sector options' ratings, there seem to be a lot of evaluation of SDG goals which seems rather objectively "non applicable" ; and raises questions why some SDG are "non applicable" for some mitigation options and not for others. Thus, we suggest that this table be revised and specifically documented for each case with link to the exact references used to justify the rating (the reference given here is to several chapters of hundreds of pages is insufficient, and could be further specified and targeted). This comment is all the most important since it is also in the TS and SPM.	The Table is substituted with Figure 7.1 and all values are updated based on consultations with the sectoral chapters. The assessment of nuclear power has been changed based on specific consultations with chapter 6	Government of France	Ministère de la Transition écologique et solidaire	France
31065	0				The role of military contributions to greenhouse gas emissions is missing from Chapter 17. Since global military emissions are so large, a detailed treatment ought to be included here. It's absence erodes trust in the ability of the report to do its work.	Rejected Chapter 17 is not providing data for all GHG emission sources	Daniel Helman	College of Micronesia-FSM	Micronesia, Federated States of
31073	0				A cogent treatment of deep well geothermal is missing from Chapter 17. This is significant, since the oil/gas sector could be hired to develop deep well geothermal wells and reservoirs on a very large scale, and that would provide a profit motive to encourage them to leave their current oil/gas assets in the ground, and transition to green energy. Moreover, the idea that the developed nations would fund the transition ought to have some profit built in to the negotiations for them to be successful. Deep well geothermal does not need native hydrological resources, but instead uses a closed loop system for heat transfer, and can be done in every country. The MIT study on the subject shows enough deep well energy resources to power civilization for several millennia. Including a cogent treatment would improve the chapter.	Noted. Geothermal energy is included in Figure 17.1, which mapping synergies and tradeoffs between SDG's and mitigation. We are not going into details on geothermal energy since it is not in the scope of the chapter to assess alle technologies in details. This is rater an issue for Chapter 6	Daniel Helman	College of Micronesia-FSM	Micronesia, Federated States of
31095	0				Chapter 17 is weak in presenting a coherent solution or family of solutions to the climate crisis in the nearterm. There ought to be a special section that presents a viable two year transition plan to zero anthropogenic carbon release, with several alternatives. It is unreasonable for the authors to assume that governments will be able to put this together themselves without a roadmap.	Rejected, we will here refer to discussion in other chapters as e.g. chapter 4	Daniel Helman	College of Micronesia-FSM	Micronesia, Federated States of
31117	0				Consider adding a special section to Chapter 17, 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.	Noted. Some of these issues are addressed in the sub section about Just Transitions	Daniel Helman	College of Micronesia-FSM	Micronesia, Federated States of
61893	0				The chapter refers to “renewable energy” throughout in regards to climate mitigation, even though it would be much more accurate and scientifically correct to use “low carbon”. Renewable energy includes unsustainable and problematic – even high climate impact – energy sources while it also excludes one of our most potential low-carbon energy source nuclear energy. See more on the problems of the term “Renewable energy” and why “low carbon” should be used instead from Harjanne and Korhonen, 2018, <a href="https://doi.org/10.1016/j.enpol.2018.12.029">https://doi.org/10.1016/j.enpol.2018.12.029</a>	Noted. WE are using the term renewable energy in relation to a specific discussion about issues related to substitution with coal, oil and gas. Nuclear energy is part of our mapping of synergies and tradeoffs between SDG's and mitigation in figure 7.1.u	Rauli Partanen	Think Atom	Finland

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65937	0				The evaluations given for nuclear energy with respect to the SDGs are incorrect. the United Nations Economic Commission for Europe (UNECE) has evaluated nuclear in achieving the SDGs via the United Nations Framework Classification for Resources and the United Nations Resource Management System. The report, available at <a href="https://unece.org/sustainable-energy/publications/nuclear-entry-pathways">https://unece.org/sustainable-energy/publications/nuclear-entry-pathways</a> , includes explicit examples of the nuclear applications supporting every single one of the SDGs (see sections 2.2.1-2.2.17 and Figure 2.6). The authors ought to read the UNECE report and adjust the evaluation of nuclear accordingly. The Table 17.7 and Figure SPM.11 must be changed as well. Please see also my detailed comments regarding each SDG individually.	Accepted. Figure 7.1 replaces table 17.7 and the assessment for nuclear energy has been changed	Eero Hirvijoki	Aalto University	Finland
84261	0				Very interesting chapter. Two aspects that are not covered are 1) the specific role of science in accelerating the transition and 2) the need to counter the deliberate disinformation efforts by those who have interest in the statu quo. For 1), it would be good to quote Peter Messerli, Eun Mee Kim, Wolfgang Lutz, Jean-Paul Moatti, Katherine Richardson, Muhammad Saidam, David Smith, Parfait Eloundou-Enyegue, Ernest Foli, Amanda Glassman, Gonzalo Hernandez Licona, Endah Murniningtyas, Jurgis Kazimieras Staniškis, Jean-Pascal van Ypersele and Eeva Furman (2019), Expansion of sustainability science needed for the SDGs, Nature Sustainability, Vol 2   October 2019   892–894, <a href="https://www.nature.com/articles/s41893-019-0394-z">https://www.nature.com/articles/s41893-019-0394-z</a> and to use use better the GSDR 2019 report, which is present in the reference list of the chapter, but not quoted or used in the chapter; for 2) there are many references. One is Dunlap, Riley E., and Aaron M. McCright. Organized climate change denial. In The Oxford Handbook of Climate Change and Society, John S. Dryzek and Richard B. Norgaard, eds. New York: Oxford University Press, 2011.	Noted. We are covering issues related to enabling of the transition in section 17.4, but our approach has not explicitly addressed the role of science. We have here used a standard categorization of enabling agreed with other chapters. I hope that Chapters 13 and 14 have dealt with the important issues in their extensive discussion about enabling , which you address	Jean-Pascal van Ypersele	Université catholique de Louvain	Belgium
71047	0		0		General comment on Ch17 (sustainable development chapter). Sustainable development is addressed throughout this report, including lengthy dedicated sections in several chapters. This chapter could serve as a 'one-stop shop' to guide the reader through this maze. Other chapters have included a map near the start and dedicated paragraphs explaining interlinkages. This is particularly important for this chapter given the multi-faceted nature of sustainable development and the substantial coverage given to it in Ch1-16. The contribution of the chapter, in the context of the whole report's coverage of sustainable development, should also be explained near the start of the ES.	Accepted, we have updated with a roadmap and more references to other chapters	Philippe Tulkens	European Union (EU) - DG Research & Innovation	Belgium
5167	1	1	1	1	The absence of any distinction between rich and poorer nations, and huge emitters and tiny emitters, and linked to this the absence of any discussion of power, for example: the non-recognition of the power of brown business and denial groups to block mitigation efforts and the power of advertisers and business product development to encourage unsustainable consumption (eg the exponential growth of SUVs). The absence of almost any references to the luxury-necessity distinction and its link to the A-S-I framework in Chapter 5. The role of public regulations and bans is underplayed compared with all other policy mechanisms. The absence of a policy follow-up to the generally good analysis of inequality and differential need-satisfaction in Chapter 5.	Noted. We are addressing issues in relation to equity throughout the chapter e.g. in our subsection on stranded assets. Policies and regulation are not in the particular scope of chapter 17	Ian Gough	CASE, LSE	United Kingdom (of Great Britain and Northern Ireland)
61895	1	1	92	1	In general, this whole chapter 17 needs major revision regarding nuclear energy in respect to the SDG's. The IAEA discusses nuclear and SDGs in <a href="https://www.iaea.org/bulletin/57-3">https://www.iaea.org/bulletin/57-3</a> and specifically in the file <a href="https://www.iaea.org/sites/default/files/bull573sept2016.pdf">https://www.iaea.org/sites/default/files/bull573sept2016.pdf</a> . It includes explicit examples of the nuclear applications supporting several of the SDGs. Further, UNECE discusses nuclear in regard to each of the SDGs, explaining how it contributes towards each one of them in UNECE 2021, "Use of Nuclear Fuel Resources for Sustainable Development – Entry Pathways" ( <a href="https://unece.org/sustainable-energy/publications/nuclear-entry-pathways">https://unece.org/sustainable-energy/publications/nuclear-entry-pathways</a> pages 21-26).	Accepted. We have updated our assessment of synergies and tradeoffs between SDG's and mitigation including the mapping of nuclear power. This is now included in Figure 7.1	Rauli Partanen	Think Atom	Finland
5627	1	1	92	15	In this whole chapter dedicated to "accelerating the transition (toward low carbon energies), the word "Nuclear does not appear once. Amazing, no? Don't you think that nuclear is a low carbon source? Authors are very good promoters of renewable, but forget some other possibilities, with better economic and environmental performances.	Accepted. We have updated our assessment of synergies and tradeoffs between SDG's and mitigation including the mapping of nuclear power. This is now included in Figure 7.1. A more detailed discussion of nuclear energy is left to Chapter 4	Michel SIMON	Retraité/ Pdt d'association	France
12251	1	1	999	1	This chapter suffers from being partly an unstructured depositary of general statements and ideas rather than an analytic review of the literature. This leads to a fair number of unwarranted repetitions and overlapping. Inexactitudes and messy formulations are frequent. The choice of references appears random at places. Quantitative information on magnitudes and timings are missing to an extent that cannot be entirely justified by a lack of relevant data. All this reduces the value of the document as information for policymakers.	Noted. The chapter has been revised in order to reflect your point and many other issues	Christophe Deissenberg	Institute for Non-Linear Dynamic Inference	Luxembourg

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17807	1				(Ch 17) the framing of “future design” to look at pathways to sustainability may be useful. Among other things this makes people imagine they are living in the future to encourage them to come up with innovative ideas for future generations. It is discussed in the paper Future Design: Bequeathing Sustainable Natural Environments and Sustainable Societies to Future Generations <a href="https://www.mdpi.com/2071-1050/12/16/6467">https://www.mdpi.com/2071-1050/12/16/6467</a> <a href="https://doi.org/10.3390/su12166467">https://doi.org/10.3390/su12166467</a> in Sustainability 2020 12 (16), whose author Tatsuyoshi Saijo was an LA on AR4 WGIII Ch 13 Policies, Instruments and Co-operative Arrangements (sorry not sure whether this comment belong in Ch 17 or e.g. Chs 3/4/14)	Noted. We have been asked not to go too far into different methodological approach since this is more a topic of chapter 1	Jonathan Lynn	IPCC	Switzerland
7503	1		92		The opportunity of the urban transformation which is described in prior chapters and the Cross Working Group Box should be called out as a distinct ES statement in Chapter 17	Noted. We are addressing the issues in section 17.3 in relation to Figure 7.1 on SDG synergies and tradeoffs, and we are here particularly referring to chapter 8	Debra Roberts	EThekweni Municipality	South Africa
75027	1		92		WG III of upcoming IPCC-AR6 focuses on the climate change mitigation, assessing methods for reducing greenhouse gas emissions, and removing greenhouse gases from the atmosphere. Its Chapter 17 talks about “Accelerating the transition in the context of sustainable development” The three pillars of sustainable development i.e social, environmental, and economic are very much linked to climate change. The present scientific evidence shows that mankind has already overexploited many natural resources which accelerated the present climate change. For example the deforestation of Amazon forest. Due to the industrial revolution particularly since second half of last century, today mankind is facing many natural disasters. No technological power can stop or prevent natural disaster. However, the studies show many of the natural disasters and extreme events such as extreme rainfall, enhance frequency of hurricane, frequency of heat wave etc are directly linked to anthropogenic climate change. Today most of the government projects focuses on economic growth to reduce the poverty in developing and under developed country and to enhance the quality of life in developed countries. There is urgent need to form a co-ordination committee consisting the representatives of three pillars i.e social, environmental and economic fields before any projects or industry to launch by all the governments and policymakers. From social aspect the representatives could be from a fisher man community or farmer’s community, for the environment it may be environmental activists and from economics aspect representatives from industry. One of the biggest draw backs in the present IPCC recommendations is that it does not give much detail about how to communicate to the common man. There is an urgent need for an outreach program from IPCC in co-ordination with the governments to educate the common man particularly to the school and college students for the consequences of climate change to our future generations. In the present chapter its very well documented about different aspects of economic and accelerated technological mitigation plans to adopt the future climate change including the sustainable development and deep decarbonisation to involve people and communities to be connected locally through various means, including globally via the internet and digital technologies, but at the same time it needs to be also planned how to reach millions of people leaving in third world who don’t have access of internet or modern day digital technology. As it has been emphasized in this chapter	Noted	Hasibur Rahaman	Indian National Centre for Ocean Information Services(INCOIS), Ministry of Earth Sciences, Govt. of India	India
12253	2	8	2	8	Since you previously speak of desirability, writing “as difficult as it is desirable” would be better.	Noted. The text has been changed	Christophe Deissenberg	Institute for Non-Linear Dynamic Inference	Luxembourg
9089	2	13			Suggest use “rapid decarbonisation” in section title. Need a sense of urgency.	Rejected. We are in the ES referring to the chapter text and our definition of acceleration in section 17.1	Brendan Barrett	Osaka University	Japan
9257	2	13	2	15	It says “Since the US, China and the EU produce the majority of global GHG emissions their climate policies have a strong influence on the global GHG inventory and other countries’ policies (Averchenkova et al. 2016).” This argument involves China, the United States and Europe. It is not enough to quote one reference. It is recommended to add documentary evidence.	This is not related to this page	Yongxiang Zhang	National Climate Center	China
9091	2	19			Consumer behaviour may be a critical consideration for this section.	Noted Such issues are included in the ES, in 17.2 and also in the other sections	Brendan Barrett	Osaka University	Japan
9093	2	21			More discussion on how subsidies function (especially for fossil fuels) and also emphasis on job creation potential of rapid decarbonisation scenarios.	Rejected. It is not in our scope to include detailed discussion about instruments	Brendan Barrett	Osaka University	Japan
3089	3	1	5	31	This is an exemplary executive summary to the chapter. It’s fabulous. Congratulations to the authors.	Thanks	Beth Edmondson	Federation University	Australia
4581	3	1	5	32	The executive summary is hard to digest. It reads a bit like a laundry list. It would be extremely helpful if some form of minimal organizing narrative could be used that at least occasionally connects the different findings. Maybe they could also be grouped and structured more strongly.	Noted. The ES has been edited to make it more clear	Adrian Brügger	University of Bern, Dept. of Consumer Behavior	Switzerland
59579	3	2			Change to: “... and the transition to just energy are ...”	Rejected. We are referring to just transitions in a more general way	Government of United States of America	U.S. Department of State	United States of America

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6915	3	2	5	31	The executive summary is highly conceptual and is largely devoid of practical policy-relevant messages. It will benefit from the quantification of some of the key messages (e.g. where you discussed stranded assets, could specify its value in \$ under different mitigation pathways and timescales?).	Noted. We have edited the ES to make it more simple and strong in the policy messages, but numbers are only included in the chapter subsections	Debra Roberts	EThekwini Municipality	South Africa
6917	3	2	5	31	The executive summary lacks a coherent narrative and it is difficult to follow the arguments advanced by the authors. The authors could consider structuring the executive summary around the four systems transitions (noting that WGII included societal systems in section 18.3.1.5 of their SOD) advanced in SR 1.5. This could enable you to build a coherent storyline around each system noting the challenges, opportunities, co-benefits and trade-offs under different warming scenarios.	Noted The EX has been updated in order better to follow the storyline of the chapter	Debra Roberts	EThekwini Municipality	South Africa
59581	3	4	3	10	Reads as if they are "other sustainable priorities" but line 10 presents them as governance practices and patterns that are perhaps undesirable.	Accepted	Government of United States of America	U.S. Department of State	United States of America
10893	3	6	3	6	what is a sustainable transition? The basic notion for sustainability is ability to last throughout the time without that any degradation happens. On the other hand, a basic notion of a transition is that its duration is finite... Moreover, the next paragraph pleads that the quicker the better!	Accepted	Philippe Waldeufel	CNRS	France
9095	3	8			Mention could be made of the need to phase out unsustainable practices. See Geels, Sovacool, Schwanen, Sorrell (2017) Sociotechnical transitions for deep decarbonization, Science, Vol. 357, Issue 6537.	Noted. This is not relevant to the ES	Brendan Barrett	Osaka University	Japan
59585	3	8			"is as desirable" is normative. It isn't the place of the IPCC to say what is "desirable." Replace with "is expected to be difficult".	Accepted	Government of United States of America	U.S. Department of State	United States of America
18581	3	8	3	10	This summary is not as useful as the lines that follow it (lines 11-15), and a little more specificity about what changing the practices identified might mean would add greater clarity. Could the authors please consider re-ordering the paragraph?	Noted. More details are included in other part of 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)
59583	3	8	3	24	Edit to eliminate hortatory language. This is supposed to be a research assessment, not a political declaration. Whether something "must be" is opinion, not fact. Rewrite to state points insofar as robust evidence and analysis supports them. This is a problem with the underlying sections as well.	Accepted	Government of United States of America	U.S. Department of State	United States of America
71049	3	9	3	9	Land and sea use. Add the water realm.	Rejected. This is not reflecting our coverage in the chapter	Philippe Tulkens	European Union (EU) - DG Research & Innovation	Belgium
71051	3	10	3	10	robust with small letters	Noted	Philippe Tulkens	European Union (EU) - DG Research & Innovation	Belgium
9097	3	11			Reframing of climate change from an "environmental issue" to an "economic issue" and indicative of a malfunctioning economy.	Noted. This is covered by our reference to development and other issues	Brendan Barrett	Osaka University	Japan
59587	3	12	3	13	Don't use the word "just" twice here, especially since the meanings are different.	Accepted	Government of United States of America	U.S. Department of State	United States of America
49799	3	14	3	16	This paragraph absolves 'developed nations' of their significant role in GHG contribution by only describing the state of 'developing nations'. The summary of developing nations is patronizing. Include here a summary of developed nations: "Meanwhile, developed nations craft climate responses in decision-making environments heavily influenced by the oil and gas industry and with vested interests in maintaining the limited resources and social divisions of developing nations".	Rejected This is a very normative statement	Chloe Hartley	Tsleil-Waututh Nation	Canada
9099	3	15			Maybe include something on the need to mainstream climate change so that it is central to economic development, and drives economic development, rather than seen as an obstacle to development or something handled solely by the relevant ministry. Financial expenditure at all levels must align with climate goals.	Noted. We are however not addressing these issues in depth in the chapter	Brendan Barrett	Osaka University	Japan
28075	3	15	3	15	After "resources", add "and capacities".	Accepted	Eleni Kaditi	Organization of the Petroleum Exporting Countries, OPEC	Austria
6919	3	17	2	17	This sounds policy prescriptive	Accepted	Debra Roberts	EThekwini Municipality	South Africa
50087	3	17	3	17	Some readers will just read bold texts and "this reframing" is difficult to follow.	Accepted. The paragraph has been changed to be more concrete	Masahiro Sugiyama	University of Tokyo	Japan

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71053	3	18	3	18	response capacities - why the need for inverted commas?	Noted It is an editorial matter	Philippe Tulkens	European Union (EU) - DG Research & Innovation	Belgium
9101	3	20			Stakeholder interests are currently aligned with economic growth and wealth creation. Need to reframe climate in this context.	Noted	Brendan Barrett	Osaka University	Japan
59589	3	24	3	24	Grammar: Extraneous period in {17.1.1.1.}	Noted	Government of United States of America	U.S. Department of State	United States of America
59591	3	25			Most transformation work is not explicitly economic, and a transformation must involve all aspects of an SES.	Noted. These issues are covered in other parts of the ES	Government of United States of America	U.S. Department of State	United States of America
59593	3	25	3	31	There is an overemphasis on IAMs here and in the underlying section. IAMs are one kind of analytical tool for providing economic, systems, and policy analysis. Just eliminate "macroeconomic models and integrated assessment" and "or IAM". Rewrite the rest of this so as not to favor a particular analytical tool. There hasn't been any discussion of why IAMs would be better than other approaches, although the underlying section notes the limitations of IAMs (and other analytical tools). In lines 29-30, rewrite to say that "quantitative analytical approaches thus far have primarily examined aggregate indicators, such as costs, damages, or welfare, and most are not yet structured to look at distributive impacts below the national scale." Or something like that. Eliminate the specific references to IAMs and generalize it to economic simulation models.	Noted. The conclusions are simplified in the ES and also in 17.3	Government of United States of America	U.S. Department of State	United States of America
59595	3	25	3	31	Appreciate the honest criticisms of IAMs; however, in this summary, an alternative should be proposed or some actionable discussion of the viable options (at lower scales of analysis). There are meaningful models used by nation state-level analysis.	Noted. A more elaborate discussion about national level analysis is included in Chapter 4, and also in a short form in 17.3	Government of United States of America	U.S. Department of State	United States of America
59597	3	28	3	28	Define "SDGs" here at first use.	Noted This is an editorial issue	Government of United States of America	U.S. Department of State	United States of America
59599	3	32			Insert "climate", that is "... climate mitigation policies ..."	Noted	Government of United States of America	U.S. Department of State	United States of America
59601	3	32	3	43	AFOLU and FWEN are also connected. This point should be made explicitly and supply chains may be considered for inclusion explicitly.	Noted FWEN issues are addressed in a following paragraph	Government of United States of America	U.S. Department of State	United States of America
2759	3	39	3	42	In order to facilitate the transition towards sustainability and the achievement of SDG2 (food security), SDG6 (water), SDG7 (energy) and SDG13 (climate change), clean technology diffusion must be accelerated, in particular in developing and emerging economies. For this purpose, technology cooperation, transfer and adsorption must become more effective. This requires substantial knowledge transfer and exchange as well as regional and international cooperation.	Noted	Leonardo Barreto	Head of center "EU&International"	Austria
23699	3	39	3	42	Why is there no mention such as: (robust evidence, high agreement). This is done in all the other statements but not here.	Updated	Government of France	Ministère de la Transition écologique et solidaire	France
59603	3	39	3	43	Might be a good place to mention system resilience. These interconnected sectors are critical, but the more tightly linked they are, the more they're all subject to disruption.	Noted The interconnection between the sectors are emphasized	Government of United States of America	U.S. Department of State	United States of America
71055	3	39	3	43	Is SDG14 included? It does not seem so.	Noted. Some tradeoffs and synergies in relation to SDG 14 are included in Figure 7.1	Philippe Tulkens	European Union (EU) - DG Research & Innovation	Belgium
76461	3	39	5	31	The industrial transformation mentioned in line 44 page 3 needs to have nuclear energy listed as having synergies. Nuclear energy has a very low environmental footprint and low consumption of non-renewable resources. It is the strongest tool we have for meeting economic and social development goals as well as reducing emissions. Nuclear energy needs to be included on line 8 of page 4 for its ability to provide synergies between mitigation and adaptation On page 5 lines 12 to 23, nuclear energy needs to be included for its ability to foster development with far greater sustainability than renewable energy. Its use of non-renewable resources is less than 10% of a renewable system. Its energy generation cost on a system wide basis is less than half that of an exclusively renewable system in deep decarbonisation scenarios.	Rejected We are not having covering all mitigation options in the ES, but are rather mentioning some examples	Robert Parker	Nuclear for Climate Australia	Australia

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30619	3	42	3	43	As "subsidized fertilisers ..." is not a direct cause of unsustainable levels of water usage..., a phrase such as "a lack of coherent policies for sustainable water usage and fertilisers, energy and crops..." is desirable.	Noted The text referring to fertilizers are not included in the updated ES	Government of Japan	Climate Change Division - Ministry of Foreign Affairs	Japan
31623	3	42	32	1	While using SDGs, sometimes it is written as SD targets. Goals and targets are different. <a href="https://unstats.un.org/sdgs/indicators/indicators-list/">https://unstats.un.org/sdgs/indicators/indicators-list/</a>  P12L44: "sustainable development agenda also calls for policy coherence (targets 17 and 14)" Suggested change: sustainable development goal also calls for policy coherence (SDG 17 targets 17. 13 and 17.14)  P3L42: ES: targets or just SDGs? P19L14-16: "Paris Agreement also emphasised that climate-change policies should be integrated into sustainable development agendas"- will agenda be goals? as per <a href="https://sdgs.un.org/2030agenda">https://sdgs.un.org/2030agenda</a> ; agenda is the 2030 agenda that includes the 17 SDGs plus 91 declarations; SD targets are within the goals  P19L16-17: "As the UN 2030 agenda for sustainable development includes a specific SDG target on climate actions (target 13)"- will this be Goal 13, targets are different  P22L24: "SDG 3.9" Suggested change – SDG 3 target 3.9  P32L1: "SDG 2 (zero hunger, biomass for energy)" - Not mentioned in the targets/ indicators of SDG 2. May fit in 7.b better	Noted. We are referring to mapping of studies in relation to SDG's	Shreya Some	Ahmedabad University	India
9103	3	44			Wondering why there is not emphasis in this chapter on mobility? For instance, rapid industrial transformation could support the roll out of EVs, and the switch away from ICE vehicles, thus speeding up the transition and influencing consumer behaviour.	Noted. This is more an issue of the transportation chapter	Brendan Barrett	Osaka University	Japan
53417	3	44	4	6	You claim that "industrial transformation" is key to achieving sustainable development, but the narrative and examples you offer here (efficiency improvements, waste management, circular economy), and throughout this chapter (below p41 section 17.3.3.3. with a strong focus on "greening industry" and "green growth"), are, in fact, not about systemic transformations, but remain in a rather narrow narrative of "greening" existing sectors, including finance, rather than challenging their underpinning logic and structure (e.g. why they are not green in the first place). Asking/addressing more fundamental questions would allow to open the doors to exploring different forms of provisioning in lign with social and environmental goals.	Noted WE will here refer to the sectoral chapter on industry	Elke Pirgmaier	University of Lausanne	Switzerland
3121	3		65		Overall this chapter is really lovely. It is clearly structured and well written. It takes care to examine specific issues and endeavours to set them in broader contexts. It effectively locates itself within the report as a whole. The authors have created an important contribution to knowledge and problem solving in drafting this chapter.	Thank you	Beth Edmondson	Federation University	Australia
6921	4	1	1	70	Transition is central concept of this chapter. Nowhere in the chapter is the term defined. It is also not in the glossary.	Noted It is defined in section 17.1	Debra Roberts	EThekwini Municipality	South Africa
59605	4	1	4	6	Fine as stated; however, redundancy can be important as a means of balanced addition, not just efficiency. This should be noted within the chapter at some point.	Noted	Government of United States of America	U.S. Department of State	United States of America
59607	4	2			Regarding mitigation, yes, as long as efficiency gains don't yield reductions in resilience. Economics does not deal with trade-offs, or resilience, well. Might an Adaptive Management approach to policy be useful?	Noted Issues related to this are addressed in section 17.3 on adaptation and mitigation links	Government of United States of America	U.S. Department of State	United States of America
9105	4	5			Can you give some examples? Are you considering for instance landscape, ecological and critical rare metals and minerals?	Noted. This is too detailed for the ES, but details are included in 17.3	Brendan Barrett	Osaka University	Japan
6161	4	7	4	11	Nuclear energy is also considered as one of the mitigation options together with renewable energy although the synergies and tradeoffs against SDGs are different. Please refer to <a href="http://dx.doi.org/10.1016/j.ecolecon.2010.06.014">http://dx.doi.org/10.1016/j.ecolecon.2010.06.014</a> for a comparative analysis.	Noted We are not addressing all mitigation options in the ES	Görkem Güngör	Middle East Technical University	Turkey
71057	4	11	4	11	trade-offs. (medium evidence - delete full stop.	Noted	Philippe Tulkens	European Union (EU) - DG Research & Innovation	Belgium
2761	4	11	4	13	mitigation options that minimize trade-offs with SDG 1, no poverty, need to be strongly encouraged	Noted We are emphasizing such aspects	Leonardo Barreto	Head of center "EU&International"	Austria

Comment Id	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
4689	4	12	4	12	Need to be much more careful here: not all macro-economic costs increase poverty. Many of them in fact are necessary to alleviate poverty, such as *investment* in public infrastructure. Many climate mitigation efforts can be seen as such investments. See Lamb et al 2020 for a systematic review of social implications of mitigation measures, where design plays a key role.	The reference is pointing to a wrong place	Julia Steinberger	University of Lausanne	Switzerland
63451	4	13			Paragraph 1 of page 17 mentions Just Transition but does not expand on the idea. There is an opportunity here to mention Just Transition, by indicating that a trade off of mitigation is the transition away from coal leading to unemployment. This is a tradeoff work SDG7: Decent Work.	Noted The new ES goes more into details about these issues	Government of Canada	Environment and Climate Change Canada	Canada
71059	4	13	4	13	SDG1 no poverty - SDG1- No Poverty	Noted	Philippe Tulkens	European Union (EU) - DG Research & Innovation	Belgium
48075	4	13	4	14	<p>There is evidence in the literature indicating synergies between bioenergy and SDGs 2 (food) and 6 (water). This is recognized in other Chapters of the report, e.g.:</p> <p>"Some bioenergy options can simultaneously contribute to adaptation and combatting desertification and land degradation, enhance food security through increases in yields, and improve resilience through maintenance of the productivity of the land resource base" (Technical Summary, p. 88, l. 29-31); "[...] agriculture and forestry sectors can devise management approaches that enable biomass production and use for energy in conjunction with supply of food [...]" (Chapter 7, p. 96, line 19); moreover, Chapter 3 mentions a number of measures that promote synergies and positive outcomes between bioenergy as a land-based mitigation option and food security, such as agricultural technological innovation, improved management of crops, grazing intensification (Chapter 3, p. 93, l. 45-47 and p. 94, l 1-7).</p> <p>Regarding SDG 6 (water), as described in Chapter 3, "increased use of bioenergy could have positive or negative effects on water quality depending on the feedstock, management practice and prior land use" (Chapter 3, p. 97, l. 27-29).</p> <p>Moreover, double-cropping (or sequential cropping), has been suggested as a way to conciliate energy and food security goals (Langeveld et al, 2014) and is emerging as important solution for agricultural sectors, as well as for bioenergy systems (Moreira et al 2020). The contribution of bioenergy coproducts as feed is another important factor that has been widely documented since 2010 (Taheripour et al, 2010). The combination of double cropping and production of DDG has also been documented (Moreira et al 2020) and is an important contribution to synergistic effects between biofuels, local rural income and the food system. Studies dedicated to Africa and Latin America countries shows that well planned modern bioenergy can help to improve food security and other development goals (Langeveld et al, 2014; Lee et al, 2015; Leite et al, 2016; Trindade et al 2019; IRENA, 2019). The authors may find the complete reference to the aforementioned papers below:</p> <p>Taheripour et al. (2010) "Biofuels and their By-Products: Global Economic and Environmental</p>	Noted These issues are addressed in Figure 7.1 based on consultancy with sectoral chapters	Marcelo Moreira	UNICAMP - Agroicone	Brazil
50995	4	13	4	14	<p>There is evidence in the literature indicating synergies between bioenergy and SDGs 2 (food) and 6 (water). This is recognized in other Chapters of the report, e.g.:</p> <p>"Some bioenergy options can simultaneously contribute to adaptation and combatting desertification and land degradation, enhance food security through increases in yields, and improve resilience through maintenance of the productivity of the land resource base" (Technical Summary, p. 88, l. 29-31); "[...] agriculture and forestry sectors can devise management approaches that enable biomass production and use for energy in conjunction with supply of food [...]" (Chapter 7, p. 96, line 19); moreover, Chapter 3 mentions a number of measures that promote synergies and positive outcomes between bioenergy as a land-based mitigation option and food security, such as agricultural technological innovation, improved management of crops, grazing intensification (Chapter 3, p. 93, l. 45-47 and p. 94, l 1-7).</p> <p>Regarding SDG 6 (water), as described in Chapter 3, "increased use of bioenergy could have positive or negative effects on water quality depending on the feedstock, management practice and prior land use" (Chapter 3, p. 97, l. 27-29).</p> <p>Moreover, double-cropping (or sequential cropping), has been suggested as a way to conciliate energy and food security goals (Langeveld et al, 2014) and is emerging as important solution for agricultural sectors, as well as for bioenergy systems (Moreira et al 2020). The contribution of bioenergy coproducts as feed is another important factor that has been widely documented since 2010 (Taheripour et al, 2010). The combination of double cropping and production of DDG has also been documented (Moreira et al 2020) and is an important contribution to synergistic effects between biofuels, local rural income and the food system. Studies dedicated to Africa and Latin America countries shows that well planned modern bioenergy can help to improve food security and other development goals (Langeveld et al, 2014; Lee et al, 2015; Leite et al, 2016; Trindade et al 2019; IRENA, 2019). The authors may find the complete reference to the aforementioned papers below:</p> <p>Taheripour et al. (2010) "Biofuels and their By-Products: Global Economic and Environmental Implications," Biomass and Bioenergy, 2010, 34(3): 278-289.</p> <p>Moreira, M. M., Seabra, J. E., Lynd, L. R., Arantes, S. M., Cunha, M. P., &amp; Guilhoto, J. J. (2020). Socio-environmental and land-use impacts of double-cropped maize ethanol in Brazil. Nature Sustainability, 3(3), 209-216.</p> <p>Langeveld, J. W., Dixon, J., van Keulen, H., &amp; Quist-Wessel, P. F. (2014). Analyzing the effect of biofuel expansion on land use in major producing countries: evidence of increased multiple cropping. Biofuels, Bioproducts and Biorefining, 8(1), 49-58.</p>	Noted These issues are addressed in Figure 7.1 based on consultancy with sectoral chapters	Government of Brazil	Ministry of Foreign Affairs of Brazil	Brazil

Comment Id	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
50995	4	13	4	14	(continued) IRENA, Sugarcane bioenergy in southern Africa: Economic potential for sustainable scale-up, no. May 2019. 2019. L. R. Lynd et al., "Bioenergy and African transformation." Biotechnol. Biofuels, vol. 8, no. 1, pp. 1–18, 2015, doi: 10.1186/s13068-014-0188-5. Leite et al., "Sugarcane: a way out of energy poverty," Biofuels, Bioprod. Biorefining, 2016, doi: 10.1002/bbb. S. C. Trindade, L. A. H. Nogueira, and G. M. Souza, "Relevance of LCAf biofuels for global sustainability," Biofuels, vol. 0, no. 0, pp. 1–11, 2019, doi: 10.1080/17597269.2019.1679566.  Therefore, the excerpt should be updated as follows: "Several trade-offs have also been identified in relation to land-use, bioenergy production and access to food in SDG 2 and water in SDG 6, while recent literature also reveal that a number of production practices and land-management approaches can result in synergistic outcomes between bioenergy systems and food security and water."				
31631	4	13	64	26	As this chapter is on SD so it is worth mentioning SDG number wherever appropriate: e.g., P4L13-14: "land-use, bioenergy production"- suggest mentioning SDG 15 and 7 P4L20-21: "reduced employment, increasing energy demand and increasing demand for services"- suggest mentioning SDG 8 P10L22: "can hamper the efforts to reduce hunger and poverty"- suggest mentioning SDG 2 and 1 P20L12: "could also support food and energy security and water conservation"- suggest mentioning SDG 2, 7 and 6 P23L38-39: "increasing the index regarding multiple SDGs like hunger, health, energy access, and land-use"- suggest mentioning SDG 2, 3, 7 and 15 P36L22: "guaranteeing the basic livelihoods of the global population"- mention SDG 1? P64L24-26-FAQ2: "no poverty, energy-, water-, and food access etc, which could in turn, slow down the transition process. Nonetheless, many climate change mitigation policies could generate incomes, new jobs, and other benefit"- suggest mentioning SD Goal number	Noted Will be included in the final editing	Shreya Some	Ahmedabad University	India
23701	4	16	4	17	It should be noted that the digital transition goes hand in hand with immense progress in the field of neuro-sciences, cognitive sciences and artificial intelligence, as well as the increasing deployment of "good for the planet" algorithms. Ethical dimensions and psycho-social aspects must however remain mobilized so that the learning machine does not ultimately supplant human decision-making capacity. It is a new form of humanity that can thus take shape for the better, what some people call "transhumanity" for the worse.	Noted This goes beyond the appropriate level of detail in the ES	Government of France	Ministère de la Transition écologique et solidaire	France
2763	4	16	4	22	Digitalisation can increase the effectiveness of clean technologies in the energy, water and agriculture sectors and make technologies more flexible and tailored to local needs and conditions. Digital solutions can also support knowledge transfer to increase the capacity of developing and emerging countries to deploy clean technology in the energy, water and agriculture domains	Noted Is included in the new ES	Leonardo Barreto	Head of center "EU&International"	Austria
30621	4	17	4	21	The basis for describing this sentence as "low evidence" is not clear, as this is widely argued. If this has little evidence, this does not need to be mentioned in the executive summary.	We are following the guidelines	Government of Japan	Climate Change Division - Ministry of Foreign Affairs	Japan
12255	4	18	4	18	"contribute to" è consist in	Wrong reference	Christophe Deissenberg	Institute for Non-Linear Dynamic Inference	Luxembourg
9107	4	19			Are you taking into consideration the disruptive and potential positive impacts of Artificial Intelligence and automation?	Noted This is included in a separate subsection in 17.3	Brendan Barrett	Osaka University	Japan
59609	4	22	4	26	These lines seem more general than the digitization mentioned in the first line of this paragraph. Should reconcile.	Noted	Government of United States of America	U.S. Department of State	United States of America
6923	4	25	4	25	Institutional resources? Developing countries certainly do not suffer from a lack of all resources.	Noted	Debra Roberts	EThekwni Municipality	South Africa
2765	4	25	4	26	Technology absorption capacity in developing countries is a critical element and can be strengthened, among others, through targeted access to information and training about technologies and improvement in the capacities to build, install and maintain clean energy and climate technologies	Noted	Leonardo Barreto	Head of center "EU&International"	Austria
59613	4	27	4	27	Landscape might be clearer as "options" or "pathways"	Rejected Landscape has a broader meaning	Government of United States of America	U.S. Department of State	United States of America
2767	4	27	4	31	Just transition mechanisms focusing on people, regions and sectors most affected by the energy and climate transitions can help create new jobs and new economic activities through a combination of worker education and retraining, social support, local economic development tools for communities and support to the creation of new businesses, among others	Accepted	Leonardo Barreto	Head of center "EU&International"	Austria



Comment Id	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
59611	4	27	4	47	Key message about transitions, citing Section 17.3.2.3, could include climate justice aspects described in Section 17.4.5. The text on 'manage these transitions' could be based on the three aspects of climate justice identified on page 62, lines 9-11. See U.S. comments regarding Sections 17.3.2.3 and 17.4.5.	Noted Justice is emphasized in the new version of the ES	Government of United States of America	U.S. Department of State	United States of America
59615	4	28			The meaning is unclear of "This creates the room ..." What creates the room? Also the statement is normative even though explicitly so, implying that everyone agrees about prioritizing the need for workers. Delete: "This creates the room to manage" and replace with "Some argue that fairness dictates management of" and delete "will".	Rejected This is referring to first sentence about the changes and transformations happening	Government of United States of America	U.S. Department of State	United States of America
28077	4	29	4	29	In addition to land and energy sectors, workers in other relevant sectors may also be affected. The sentence should be rephrased.	Accepted	Eleni Kaditi	Organization of the Petroleum Exporting Countries, OPEC	Austria
59617	4	29	4	29	Don't like the word "nexus" here referring to something other than the WEFN that was introduced earlier. Confusing to have too many nexuses (nexi?).	Rejected - the word nexus is relevant to describe the interrelationship between water, food and energy.	Government of United States of America	U.S. Department of State	United States of America
59619	4	31			Replace "The notion of 'just transition incorporates" with "While there are a variety of notions of what would constitute a 'just' transition, some incorporate such diverse" and delete ", such".	Accepted	Government of United States of America	U.S. Department of State	United States of America
64305	4	32	4	35	Adaptation finance: what is the definition of adaptation finance and how to distinguish adaptation finance from conventional finance is still under discussion (page 24). should be introduced for avowing conception gap. Discussing the magnitude of the numbers without clear methodology seems to have a risk of misperceptions	Noted Adaptation finance is not part of the new ES	Takashi Hongo	Mitsui & Co. Global Strategic Studies Institute	Japan
28079	4	33	4	33	Replace "fairness in" with "universal" energy access.	Rejected - there is an ethical implication in fairness that is not in universal	Eleni Kaditi	Organization of the Petroleum Exporting Countries, OPEC	Austria
59621	4	36	4	39	The later section does not provide analytical evidence that "the implications of the transition will be felt especially by developing countries." This is asserted, and it is unclear what the measure of this may be. Moreover, the second clause of the sentence asserts that "developing countries" are dependent on hydrocarbon revenue streams, which is not a general fact; indeed many are dependent on importing fossil fuels with adverse impacts on balance and terms of trade, and energy insecurity. Also, the effects of COVID-19 are a short-term phenomenon and it is unclear how they may influence the transition that is the subject of this chapter over 10-30 years or longer. Edit out the COVID pandemic phrase.	Rejected. The transition will necessitate specific transitional 'levers' which many developing do not have - these levers include capacity, resources, infrastructure, not to mention time.	Government of United States of America	U.S. Department of State	United States of America
17875	4	36	4	42	Reads as if developing countries as a whole are dependent on fossil fuel revenue. Many are at least as vulnerable because of fossil fuel imports	Accepted - but those who are dependent will face massive revenue loss, even though we know that fossil fuel dependency may increase their vulnerability.	Robert Brecha	Climate Analytics	Germany
63453	4	37			will be	Noted	Government of Canada	Environment and Climate Change Canada	Canada
53035	4	37	4	37	correct to 'as they will be exposed to'	Accepted	Government of Saudi Arabia	Sustainability Advisor to the Minister Ministry of Petroleum and Mineral Resources	Saudi Arabia
9111	4	38			Not sure about low demand for oil. Perhaps should use lower demand for fossil fuels. Coal is decline rapidly. Demand for gas likely to continue for some time since viewed as a bridging fuel. Oil demand will remain tied into petro-chemical industry, but not as a form of energy or fuel.	Rejected - many of the hydro-carbon rich countries in Africa have asserted their right to development, and therefore continued extraction of oil and gas. Oil demand will plummet but internal markets could mean continued demand.	Brendan Barrett	Osaka University	Japan
28081	4	38	4	38	After "oil prices", add ", deterioration of their terms of trade and".	rejected - it is not so much the terms of trade but the economic downturn from COVID	Eleni Kaditi	Organization of the Petroleum Exporting Countries, OPEC	Austria
63455	4	39			The mention of COVID-19 here is abrupt and a potentially unnecessary.	Rejected. COVID has been mentioned before. The economic implications fo COVID can present transitional challenges.	Government of Canada	Environment and Climate Change Canada	Canada
59623	4	39	4	42	The issue of stranded assets is important especially for industrialized countries, not just developing countries as suggested by the placement in this paragraph. Indeed, developing countries may have important opportunities to avoid assets that may be stranded in the future by economic transition, and therefore have an opportunity that countries with older patterns of development and investments may not have. Delete "developing" countries, and replace "their" with "a", and delete the rest of the sentence from "given the low ..." This seems to be confusing current COVID- related factors with the longer term transition that is subject of the chapter.	Partially accepted. COVID implications might endure - and therefore affect the speed of the transition.	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
59625	4	42			What "race to achieve carbon neutrality by 2050"? Delete that phrase. It is difficult to see a race, and the large majority of governments and other entities have not committed to that.	Partially accepted. Speed implies 'race' and there is concern that the transition is not happening fast enough, hence the necessity for speed.	Government of United States of America	U.S. Department of State	United States of America
6925	4	42	4	44	This point is mute since the just transition framework (and as defined in the WGIII glossary) advanced in this Chapter is not about 'mitigation at all costs'. Please consider revising this statement.	Partially accepted - the sentence is making reference to the fact that the transition is both about adaptation and mitigation.	Debra Roberts	EThekweni Municipality	South Africa
28083	4	42	4	44	Adaptation is critical for all developing countries. This sentence should be revised substantially or deleted.	Accepted.	Eleni Kaditi	Organization of the Petroleum Exporting Countries, OPEC	Austria
78037	4	42	4	47	Suggested edit: Remove period at the end of the sentence in line 42 and add: ", though new technologies for carbon negative fossil fuel based electric power generation may help with this.", and change reference to "{17.3.2., 17.4.5}" at end of line 47. Rationale: see reference. Reference: Chichilnisky, Graciela and Peter Bal. 2019. Reversing Climate Change. Singapore: World Scientific Publishing Co. Pte. Ltd.	Partially accepted	Ron Baiman	Benedictine University	United States of America
59627	4	43	4	44	Does the underlying report support the statement "... given the urgency of achieving mitigation at all costs." This seems to be policy prescriptive and pre-judge possible options countries take in response -- including both adaptation and mitigation. Moreover, the tone of this sentence seems to almost suggest mitigation is outstripping adaptation (with its "vulnerabilities").	Rejected. Funds going to mitigation are disproportionately more than funds earmarked for adaptation	Government of United States of America	U.S. Department of State	United States of America
59629	4	43	4	45	There is nothing "given the urgency of achieving mitigation at all costs" and that is not supported by objective research literature. Many people would dispute that that is an accepted goal. Delete this phrase. The sentence "Consequently ... adapt" is not supported by the underlying chapter and it is arguably untrue. Delete the sentence.	Rejected - the sentence does not refer to mitigation as a goal - it simply makes the point that mitigation efforts should not outweigh adaptation.	Government of United States of America	U.S. Department of State	United States of America
59631	4	46			Delete "just". The phrasing assumes that 'everyone' has agreed to a "just transition." It's unclear whether a directed transition (or to what) is universally desired as well.	Rejected. The justice aspect of the transition is at the heart of the debate, and the subsequent climate action to get the transition on track.	Government of United States of America	U.S. Department of State	United States of America
59633	4	47			At the end of the summary, there should be at least a paragraph, preferably more, that summarizes the options for actions that policymakers, private entities, individuals, etc., may take to induce a transition. Overall, the heading of the chapter "Accelerating" implies that some actions would be described, but the chapter devotes little analysis to that promise. How do transitions occur and what might people do to achieve the transitions that they choose? Summarizing what appears in the chapter would help to redress that lack of emphasis.	Partially accepted. The section has been substantively revised.	Government of United States of America	U.S. Department of State	United States of America
18583	5	1	5	3	I would move this whole paragraph to earlier on p3; it contains points which are essential for policymakers to see, and gives good detail	Partially accepted. The section has been 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)
30623	5	5	5	11	Generally, conditions such as "impede the transition", "strong shocks such as climate-change impacts", and "economic crises and political change" are not preferable ones, but in this description they are treated as the desirable ones that may accelerate sustainable development. Revised expression may be better, such as "these conditions may create opportunity for accelerating sustainable development".	Accepted.	Government of Japan	Climate Change Division - Ministry of Foreign Affairs	Japan
6927	5	8	5	11	The opposite may also be true.	Accepted.	Debra Roberts	EThekweni Municipality	South Africa
9113	5	8	5	11	Could not find support for this assertion (i.e. regarding strong shocks) in the main body of the chapter, but perhaps I missed it. Two possible references include: Solecki, W.; Grimm, N.; Marcotullio, P.; Boone, C.; Bruns, A.; Lobo, J.; Luque, A.; Romero-Lankao, P.; Young, A.; Zimmerman, R.; Breitzer, R.; Griffith, C.; Aylett, A., Extreme events and climate adaptation-mitigation linkages: Understanding low-carbon transitions in the era of global urbanization. Wiley Interdisciplinary Reviews: Climate Change 2019, 10, (6), e616. and Ko, Y.; Barrett, B.F.D.; Copping, A.E.; Sharifi, A.; Yarime, M.; Wang, X. Energy Transitions Towards Low Carbon Resilience: Evaluation of Disaster-Triggered Local and Regional Cases. Sustainability 2019, 11, 6801. <a href="https://doi.org/10.3390/su11236801">https://doi.org/10.3390/su11236801</a>	Edited. The section has been revised.	Brendan Barrett	Osaka University	Japan
28085	5	8	5	8	Provision of facts and evidence or examples is necessary to state this conclusion in this sentence.	Noted We are in other paragraphs pointing to obstacles	Eleni Kaditi	Organization of the Petroleum Exporting Countries, OPEC	Austria

Comment Id	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
59635	5	8	5	9	This sentence sounds as if it may be advocating strong shocks to systems. Not only does this not seem supported by the underlying text, but the opposite is possibly as likely -- that strong shocks to systems damage institutions or use resources, either of which may impede transitions or may redirect them to less sustainable systems. Shocks in themselves do not predict the type or direction of change that follows. In lines 9-10, delete "provide crucial openings for" and replace it with "may be followed by" and, at the end of the sentence, add "or may strain institutions and resources and impede such a transition."	Partially accepted	Government of United States of America	U.S. Department of State	United States of America
6929	5	12	5	23	The headline in this bullet is about how connecting local communities could lead to a shift in thinking that could enable a shift in behaviour towards the 1.5 temperature goal. The supporting text seems disconnected from this point.	Partially accepted.	Debra Roberts	EThekweni Municipality	South Africa
59637	5	15			Delete "consistent with the 1.5°C goal". There is no evidence to date to predict that such a shift has occurred or will occur. Nor is there an agreed 1.5°C goal, as a close reading of the Paris Agreement language would reveal. That is aspirational. Arguably, it may not be possible, so the sense of prediction in this paragraph is inappropriate.	Partially accepted. There is a goal as per the Paris Agreement to keep global temperature at 1.5.	Government of United States of America	U.S. Department of State	United States of America
59639	5	17			"Collective action" is not defined, and could mean different things to different people, and is likely not a universally accepted objective. Delete "collective".	Accepted	Government of United States of America	U.S. Department of State	United States of America
59641	5	20	5	21	What does it mean to "take advantage of widespread decarbonisation"? Perhaps replace "take advantage of" with "to progress toward".	Rejected The text is clear enough in our mind	Government of United States of America	U.S. Department of State	United States of America
59643	5	21	5	23	Seems like decentralization of energy would be very useful. Define "transition" and "transformation" up front in the introduction.	Accepted	Government of United States of America	U.S. Department of State	United States of America
5607	5	22	5	23	What are the "renewable carbon-negative technologies"? I am not aware of such technologies, except CCUS.	Partially	Michel SIMON	Retraité/ Pdt d'association	France
30625	5	22	5	23	For those countries with less potentials for material resources and carbon storage sites, such as Japan, international policy cooperation for NETs or CCS is also important. It would be better to mention the international cooperation in policies towards NETs.	Noted	Government of Japan	Climate Change Division - Ministry of Foreign Affairs	Japan
31637	5	23	5	23	PSL23: "greater policy coherence between these three sectors" -- which three sectors, please mention if possible.	Noted	Shreya Some	Ahmedabad University	India
59649	5	24			As the "low evidence" says, there is not evidence to support this statement. Replace "will" with "could".	Noted	Government of United States of America	U.S. Department of State	United States of America
10895	5	24	5	31	While section 17.4.6 does develop the nexus concept, it says nothing about the specific initial statement which concerns the principles of justice, equality and fairness. It would be useful to indicate the place where these 3 sectors are discussed in the chapter. Dear authors, please keep in mind that a summary is not an independent text: it is a summary.	Noted	Philippe Waldteufel	CNRS	France
59645	5	24	5	31	This is good to see; however, this point ideally should be earlier in the list (here and in the underlying narrative). There is a lot of discussion of "just" actions/transitions without this clarification/definition-specific. Mention of THREE sectors in this point is unclear -- to which sectors are the authors referring? Justice, equality, and fairness? If so, wording is not correct.	Partially accepted - the section has been revised.	Government of United States of America	U.S. Department of State	United States of America
59647	5	24	5	31	The Executive Summary does not include a key message on risk management, the challenge of decisionmaking in the face of uncertainty. Iterative risk management can be incorporated within this key message from Section 17.4.6 (see U.S. comments on this section). This type of decision framework, which addresses uncertainty, would be complementary to a systems-based nexus approach.	Noted	Government of United States of America	U.S. Department of State	United States of America
59651	5	26			What does it mean to "integrate local spaces into the whole development process"? What evidence is there that this is "necessary"? And how does that relate to a "just" transition, even though there is not a single definition of what a "just transition" would be. Clarify the first issue about "integrate local spaces" and change "in creating local a just transition process" to "achieve transformative transition".	Noted.	Government of United States of America	U.S. Department of State	United States of America
49801	5	27	5	47	The just transition must include long term funding streams for the restoration of landscapes disturbed by oil and gas industry infrastructure particularly in nations where corporations have less oversight and accountability. Funded restoration work can help bridge the transition away from extractive economies. Indigenous Peoples are well placed to lead this work using IK and Indigenous law.	Noted	Chloe Hartley	Tsleil-Waututh Nation	Canada
6931	5	28	5	28	By 'three sectors', are you referring to justice, equality and fairness? Can these be described as sectors?	Noted- the section has been revised.	Debra Roberts	EThekweni Municipality	South Africa

Comment Id	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
28087	5	28	5	28	What are the three sectors that need coherence?	Noted it is water, energy and food sectors in the new ES	Eleni Kaditi	Organization of the Petroleum Exporting Countries, OPEC	Austria
18585	5	29	5	29	what is the 'nexus approach'? The explanation given isn't that clear; how does the nexus approach offer solutions? How does it strengthen coordination and help to avoid maladaptation? E.g. in what ways? A sentence of two would be helpful if possible.	Partially accepted. The word 'nexus' has been introduced earlier in the chapter.	Government of United Kingdom (of Great Britain and Northern Ireland)	Department for Business, Energy &amp; Industrial Strategy	United Kingdom (of Great Britain and Northern Ireland)
9109	5	31			Two full stops.	Editorial	Brendan Barrett	Osaka University	Japan
78551	5	32	5	32	Consider the role of social movements in initiating change as outlined in 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, and Otto et al., Social tipping dynamics for stabilizing Earth's climate by 2050. Proc. Natl. Acad. Sci. U.S.A. 117, 2354–2365 (2020).	Noted.	Steven R Smith	CES, University of Surrey	United Kingdom (of Great Britain and Northern Ireland)
4577	6	1	13	9	VERY IMPORTANT: As a reader, it is extremely difficult to grasp the overall structure of this chapter as well as how different sections and even sentences are connected. It would be helpful to strengthen the organisation and facilitate orientation by: (1) More clearly separating the different topics, (2) avoiding repetition and overlap, (3) more clearly stating what comes where, (4) organizing the chapter in a more straightforward / linear logic (e.g., broad / general -> specific), using topic sentences and transition words / phrases to (5) communicate the function / goal of specific sections and to (6) indicate the connections between different sections, paragraphs, and sentences.	taken into account - text will be revised	Adrian Brügger	University of Bern, Dep of Consumer Behavior	Switzerland
4579	6	1	13	9	Make sure definitions of key terms and goal statements appear in places that are helpful to readers. This will often be at the beginning of sections. Currently, there are several sections in which definitions appear too late (e.g., because terms were already used and should have been explained earlier) or appear a bit coerced.	taken into account - text will be revised	Adrian Brügger	University of Bern, Dep of Consumer Behavior	Switzerland
4593	6	1	13	9	I wonder how much historical background about research on sustainability and links between sustainability and climate change is necessary. Too much to cite Brundtland report? Also important to carefully think about where to mention historical background. At the moment references to past development appear in various places and it is not clear how these references are logically structured. Maybe just do it chronologically early in the chapter, mentioning only those things that are of immediate interest to understand what follows later in this chapter.	taken into account -section 17.1 is shorthand	Adrian Brügger	University of Bern, Dep of Consumer Behavior	Switzerland
47867	6	1	13	9	The introduction part of this chapter discussed several key factors for driving the transition. I would like to suggest that the pathways or patterns of transition could be considered as well, because they may reveal the mechanisms underpinning the transformative processes, which is conducive to exploring policy support to accelerate these changes. There are a large number of various technology, policy, and social innovations that may potentially bring up sustainability outcomes, which are theorized as sustainability experiments (Bai et al., 2010). The sustainability experiments may follow four different pathways (Bai et al., 2010): a) the experiment may fail and die out; b) it may stay as an individual experiment without being diffused; c) it may be "multiplied" and adopted in other contexts, and d) it may be "upscaled" with systems change, e.g., policy change at a higher government level. From this point of view, the enabling factors for duplicating and upscaling the innovations might be essential to accelerate the transition. The recent research (Peng et al., 2019) explores how these experiments travel to and are contextualized in other contexts. The findings show that post experiment adoption and contextualization requires mobilization and realignments of actors, resources, and institutional arrangements within the process of learning, which involves much more than simple duplication and often with distinctive outcomes, thus in many ways is an innovation in itself. The findings may have empirical implications for policymaking. Upscaling/diffusing sustainability innovations for transition is not to simply copy them in quantity, but to embed them in a new socio-economic and institutional context, which requires the consideration of localized conditions and tailored policy support. Bai, X., Roberts, B., Chen, J., 2010. Urban sustainability experiments in Asia: patterns and pathways. environmental science & policy 13(4), 312-325. Peng, Y., Wei, Y., Bai, X., 2019. Scaling urban sustainability experiments: contextualization as an innovation. Journal of Cleaner Production 210, 1178-1187.	taken into account - to be addressed in 17.2	Yuan Peng	The Australian National University	Australia
4583	6	1	6	13	It would be helpful to organize this more strongly and to be more explicit about the goals of this chapter. Also, from reading this paragraph, it is hard to tell what the difference of the sub-chapters are. Would it be possible to separate them more clearly?	taken into account - we will reorganize this part of the chapter	Adrian Brügger	University of Bern, Dep of Consumer Behavior	Switzerland
59653	6	1	6	8	Note that there are many lessons that can (should) be learned from these transitions in developing country contexts. This should be reflected appropriately throughout the chapter.	taken into account - we have many examples from developing countries	Government of United States of America	U.S. Department of State	United States of America
59655	6	1	6	8	Acceleration is ideal; however, there is no clear discussion or much allusion to the fact that benchmarking during and after an intervention needs to be done. How is benchmarking during the transition going to work? One example is to ensure minimal stranded assets. In many places this reads as an all or nothing.	Accepted - goals should be set, but this is a broader issue than benchmarking	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
19101	6	2	6	16	Green transition is a complex subject that must be framed as phenomenon of physics. Transition entails moving parts (effects), linkages, and excitations (forces). So, to gain insight, the next report should frame the transition as a dynamical system. Then, analyse the abstract energy of the space. After, cast the insight on a platform of common parlance – say, as a socio-political challenge. The physics can then be relegated to the annex	Noted but to specific for our short section 17.2 on methodologies	Fred Amonya	Lyciar	United Kingdom (of Great Britain and Northern Ireland)
71061	6	2	6	8	For consistency with the SPM section E: Strengthening the response, referring to 'Accelerated system transitions consistent with sustainable development' focusing on mitigation, low-carbon and deep decarbonisation transition consistent with 1.5 degree pathways, Ch. 17 needs to explain, what kind of transition the chapter is focused on. As is in Ch. 17, 'transition' is used as generic, loose term. It seems like, the authors talk about any kind of sustainability transition. For consistency with the SPM the term 'transition' should be explained.	taken into account - definitions will be added and coordinated with other chapters	Philippe Tulkens	European Union (EU) - DG Research & Innovation	Belgium
31633	6	4	13	3	Meaning of terms not clear: P6L4: "inter-relativity"- suggest changing P6L5, P13L3: players- are not actors and players same? Suggest using actors only else it confuses readers.	accepted - to be updated	Shreya Some	Ahmedabad University	India
59659	6	4	6	12	Maybe remind the reader that "It" refers to "This chapter" (don't start all sentences with "It").	editorial	Government of United States of America	U.S. Department of State	United States of America
59657	6	4	6	4	Some of the terms "interdependence, inter-relativity, connectivity" are probably redundant. Consider reducing.	accepted - text to be revised	Government of United States of America	U.S. Department of State	United States of America
4585	6	4	6	5	These terms sound nice but at the same time they appear also repetitive and very vague. Would it be possible to say this more accurately with fewer words? " interdependence, inter-relativity, connectivity, complexity, and multi-directional and multi-faceted "	accepted - text to be revised	Adrian Brügger	University of Bern, Dep. of Consumer Behavior	Switzerland
6933	6	5	6	5	Why describe 'equality and poverty issues' as players? Player does not seem to be the right choice of word here.	accepted - text to be revised	Debra Roberts	EThekwni Municipality	South Africa
9115	6	10			Emphasis on the sustainable development may deflect attention away from the problems with contemporary patterns of economic development and how we measure it.	rejected - economic development is considered as also being a part of sustainable development	Brendan Barrett	Osaka University	Japan
59661	6	16			"Climate targets" is vague. Maybe add to the end of the sentence "set by governments or private entities".	accepted - text will be revised	Government of United States of America	U.S. Department of State	United States of America
53419	6	17			You suggest "sustainable development" as key framework to address climate change as it reconciles social, environmental and economic dimensions. This framing downplays the role in which the current "economy" severely destroys the other two dimensions. I agree that integral solutions are needed, and that this can be achieved by broad alliances & collaborations, but I much doubt this can be achieved by failing to confront the current totally unsustainable structure and intentions of capitalism. The "old" story that economic growth, exports, competitiveness, environmental protection etc. can go together has enabled to sustain the status quo, rather than fundamentally break with it. I wonder how aware you are how closely the whole reports remains in this old economic narrative that has empirically proven wrong.	rejected - economic development is considered also part of sustainable development	Elke Pirgmaier	University of Lausanne	Switzerland
49803	6	17	7	49	The listing of unsustainable practices must include the history of infringement upon the rights of Indigenous Peoples. Much resource extraction has occurred without permission from the affected Indigenous Peoples and often over their strong and sustained objections. A description of a "Just" sustainable development that neglects to refer to UNDRIP is flawed. Sustainable development will not be achieved without recognition of the rights, title, and interests of Indigenous Peoples. This report and this chapter in particular must include language around adopting UNDRIP principles in all relevant sections to support a just transition.	rejected -interesting viewpoint but not scientific reference included, claims not yet supported by the peer-reviewed published literature	Chloe Hartley	Tsleil-Waututh Nation	Canada
16777	6	17	9	35	Well explains the relationship and link between climate policy and sustainable development in terms of the previous assessment report, UN SDGs framework, the recent green deal policy, OECD, G20.	noted It is included	Government of Republic of Korea	Korea Meteorological Administration (KMA)	Republic of Korea
59663	6	17	9	35	The purpose of Section 17.1.1 should be re-evaluated. It is not very cohesive and the organization does not set the reader up with greater understanding about what acceleration is, potential relationships between climate change and sustainable development, etc. There are some nice pieces of information but they are muddled together with points that are not very relevant -- for example, telling the reader that prior documents have posited a relationship between CC and SD is not as interesting as telling us the relationship. There are some sentences that don't add value, such as "The key to successful acceleration are so-called acceleration effects ...". Things improve after page 7, line 26.	taken into account - structure of the section will be revised	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
60521	6	17	9	35	Well explains the relationship and link between climate policy and sustainable development in terms of the previous assessment report, UN SDGs framework, the recent green deal policy, OECD, G20.	copy of previous comment	HWANIL PARK	STEPI	Republic of Korea
84267	6	17	9	35	The GSDR 2019 report, which is present in the reference list of the chapter, could usefully be used in this section.	Noted but already included in section 17.3	Jean-Pascal van Ypersele	Université catholique de Louvain	Belgium
17877	6	27	6	37	IPCC Special Report on Renewable Energy (2011) should also be cited	accepted - text will be revised	Robert Brecha	Climate Analytics	Germany
59667	6	38			The chapter launches straight into discussing how to accelerate a transition, but there has not been any clear explanation of either what the current state is or what the transition is to. What does it mean to transition to "sustainable development"? How would one measure where populations are now and what they intend to transition to? Without a notion of what a transition means, the discussion seems like directionless process and actions. A minimum of a paragraph up front would be important to clarify what "the transition" is in concrete terms. (This also probably needs to recognize that there is not unanimity among countries or populations as to what this means or what they they view their "transitions" might be.)	accepted - transition definition will be added in the chapter	Government of United States of America	U.S. Department of State	United States of America
59665	6	38	7	9	The tone of this paragraph, and much of the chapter, is hortatory, rather than the analytical approach that an IPCC assessment of the research is tasked to provide. For example, the sentence citing Hoyer (2020) would be better phrased as saying that "one research concludes that certain actions" ... rather than stating what one researcher said as accepted fact. What do others? Are there counterarguments or refinements? Rephrasing throughout the chapter would help it conform to the concept of a scientific assessment report. Read the language carefully throughout the chapter and removed normative language (or implied recommendations) and replace it to describe what research has found, with reference to the sources.	taken into account - tone will be revised	Government of United States of America	U.S. Department of State	United States of America
6935	6	39	6	40	Please delete "future" as it plays down the urgency of transformation.	accepted	Debra Roberts	EThekwini Municipality	South Africa
53063	6	43	6	44	Just transitions can also act as an accelerator to climate change	accepted	Government of Saudi Arabia	Sustainability Advisor to the Minister Ministry of Petroleum and Mineral Resources	Saudi Arabia
59669	6	43	6	45	This is normative language, and doesn't explain why accelerating action is "essential", especially given that accelerating action may entail more costs which also may pose risks to human security, health, food, etc. Under what conditions would "accelerating" bring aggregate benefits, and under what conditions would that be "just"? Note that there is not a universal definition of "just transition" (not discussed here) and, where used by advocates or governments, they use different notions and scopes.	taken into account - text will be revised	Government of United States of America	U.S. Department of State	United States of America
59671	6	45			What does "collective action" mean? It may imply different things to different people. Does it mean in collectives? How is collective action different from the aggregate and diversity of actions taken individually in response to incentives or norms by governments, businesses, individuals, etc.? This term is used frequently in the chapter, typically implying that "collective action" is desirable. That normative sense needs either to be bolstered that it is more effective than noncollective action, and state what the evidence is, or make clear that it is one possibility among others.	taken into account -To be addressed in 17.2 and 17.4	Government of United States of America	U.S. Department of State	United States of America
59673	6	46	6	47	Why in particular supply chains?	accepted - text will be revised	Government of United States of America	U.S. Department of State	United States of America
59675	6	47			The meaning of the sentence after the comma is obscure. To what "impacts" is the sentence referring, and "advocacy" to do what? Couldn't advocacy take policies in a multitude of different directions, not necessarily toward sustainability? Are there practical constraints today in some countries on the "public policy advocacy" that this language appears to be advocating?	accepted - text will be revised	Government of United States of America	U.S. Department of State	United States of America
9127	6	47	7	4	Markard et al (2020) have another way of understanding transformations - new phase, whole systems change, interaction between multiple systems, decline and resistance, consumers and social practice, and governance. Markard, J., Geels, G.W. and Raven, R. (2020) Challenges in the acceleration of sustainability transitions, Environmental Research Letters 15, 081001.	taken into account -considered in 17.2	Brendan Barrett	Osaka University	Japan
59677	7	1			With the wealth of literature on transformations, it is hard to imagine that there is only one reference that should be used here (to Sumaila). There must be many different descriptions or ways or envisioning this. In general, it is hard to understand why there are only single references to many of the points made in this chapter, whether there are many analyses and views in the literature. It creates discomfort that the authors may have chosen the view or position that they like rather than assessed and striven to characterize the set of relevant literature.	taken into account - coordinated with 17.2	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
59679	7	1			Throughout, lots of inconsistency in citations. Here, it should be R. Sumaila et al. (1979). Errors include listing first names, parens in wrong spots, listing multiple authors instead of et al., etc.	editorial	Government of United States of America	U.S. Department of State	United States of America
31657	7	1	45	24	In-text citation incorrect format: P7L1, P7L12, P8L23-24, P10L2, P10L3, P10L11-12, P15L32-33 (Fuhr et al....), P17L34-35, P33L34, P45L24	editorial	Shreya Some	Ahmedabad University	India
31635	7	4	20	45	Sentences/ Phrases not clear P7L4-5: "Further, these amplification processes are described as stabilising, speeding up, growing, replicating, transferring, spreading, scaling up, and scaling deep"  P7L6-9: "The key to successful acceleration are the so-called acceleration effects that describe the maximum compressed time-gaps between investment and desired outcomes by approaching structural constraints (UNDP, UNEP 2020; Roberts et al. 2018) conclude that opportunities for and obstacles to transitions are closely interconnected."  P9L41-42: "Conservation practices, like using crop residues to increase nutrient cycling and thus contribute to carbon sequestration"  P9L44: "co-benefits in different sectors, such energy, transportation, or forest management"- will be such as?  P10L10: "Enhanced sustainable adaption"- will be adaptation?	accepted - text will be revised	Shreya Some	Ahmedabad University	India
59681	7	5	7	9	What is this sentence saying? It is not comprehensible without going back to the reference. In any case, what is the practical value of it? Consider deleting the sentence if it can't be clarified.	taken into account - text will be revised	Government of United States of America	U.S. Department of State	United States of America
9117	7	10	7	16	Missing the role of the power generation sector which, sadly, seems to be moving very slowly and indeed delaying the pace of the energy transition. See Alova, G. A global analysis of the progress and failure of electric utilities to adapt their portfolios of power-generation assets to the energy transition. Nat Energy 5, 920–927 (2020). <a href="https://doi.org/10.1038/s41560-020-00686-5">https://doi.org/10.1038/s41560-020-00686-5</a> . Also the complexity of local energy transitions is not sufficiently analyzed to date. See Mattes, Jannika & Huber, Andreas & Koehrsen, Jens, 2015. "Energy transitions in small-scale regions – What we can learn from a regional innovation systems perspective," Energy Policy, Elsevier, vol. 78(C), pages 255-264.	rejected - interesting papers but outside the scope of this section	Brendan Barrett	Osaka University	Japan
59683	7	10	7	16	It is important to recognize that communities or collectives may also not be spatially co-located. These can still be very effective for mitigation activities in particular.	accepted - text will be revised	Government of United States of America	U.S. Department of State	United States of America
59685	7	11			Case not really made for several disciplines.	accepted - text will be revised	Government of United States of America	U.S. Department of State	United States of America
59687	7	12	7	12	(den Elzen et al. 2019) is all in parentheses, whereas elsewhere in the document, citations that start sentences only have the year in parentheses.	editorial	Government of United States of America	U.S. Department of State	United States of America
59689	7	17	7	18	This sentence is hortatory and is therefore inappropriate. There is no reference here or analysis of what the alternatives may be and the likely implications of the alternatives. Change the sentence to read: "In practice, there are options to enable stakeholders to engage in climate action."	taken into account - text will be revised	Government of United States of America	U.S. Department of State	United States of America
59691	7	18			Delete "For instance"	editorial	Government of United States of America	U.S. Department of State	United States of America
59693	7	21	7	21	Business could also likely suffer because of more responsible climate practices. This should be addressed too -- and properly incentivized.	accepted - text will be revised	Government of United States of America	U.S. Department of State	United States of America
59695	7	23			Delete "in sum"	editorial	Government of United States of America	U.S. Department of State	United States of America
53065	7	23	7	25	Accelerating the transition is much needed, yet the common but differentiated responsibilities with respective capabilities as mentioned by the Paris Agreement must be taken into consideration.	taken into account - text will be revised	Government of Saudi Arabia	Sustainability Advisor to the Minister Ministry of Petroleum and Mineral Resources	Saudi Arabia

Comment Id	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
59697	7	23	7	25	Says who? Why is IPCC stating this as the goal? This sentence is hortatory. Change it to: "Should societies desire a more profound and sustainable systemic transformation, some observers indicate that xxx could..."	taken into account - text will be revised	Government of United States of America	U.S. Department of State	United States of America
59699	7	26	7	28	A "portrayal" is not a definition.	accepted - text will be revised	Government of United States of America	U.S. Department of State	United States of America
59701	7	26	7	41	Consider moving this material to right after Section 17.1.1. This is more introductory, and provides more background for the reader.	taken into account - structure of the section will be revised	Government of United States of America	U.S. Department of State	United States of America
4587	7	28	7	37	Providing a definition of climate change and causes seems a bit odd here.	taken into account - text will be revised	Adrian Brügger	University of Bern, Dep of Consumer Behavior	Switzerland
59703	7	30			Delete "today"	editorial	Government of United States of America	U.S. Department of State	United States of America
59705	7	30			Citing one source does not indicate that the view in this sentence is "widely recognised". Change the sentence around to say that those authors advocate that. It is doubtful that a poll of people would necessarily agree to that sentence, and many might see addressing climate change as a risk to their interests. The wording in this chapter needs to be more objective and precise about whose views are being presented.	taken into account - text will be revised	Government of United States of America	U.S. Department of State	United States of America
53067	7	31	7	35	There also natural reasons for climate change other than human practices.	accepted - text will be added	Government of Saudi Arabia	Sustainability Advisor to the Minister Ministry of Petroleum and Mineral Resources	Saudi Arabia
11679	7	31	7	41	Policy mechanisms for land-use and land-use changes at scale require proactive engagement with development and planning controls at national (master-planning) and local authority/ municipal level. This requires regulation, licensing and permitting (including any associated codes of practice, technical standards, standard operating procedures and working plans) to be based on clear sustainability principles. For land use these are the combined principles of reducing carbon intensity and increasing sequestration. These principles can be applied across all sectors AFOLU, Industry, Infrastructure with each urban or rural development needing to provide a contribution to both of these combined principles. For restoration of peatlands and wetlands in the UK where 78% of these lands (about 12% of UK land surface) are degraded representing a significant emission source, rather than a carbon store (Evans et al 2017). Reference: Evans C, Artz R, Moxley J, Smyth MA, Taylor E, Archer N, Burden A, Williamson J, Donnelly D, Thomson A, Buys G, Malcolm H, Wilson D, Renou-Wilson F, Potts J (2017). Implementation of an emissions inventory for UK Peatlands, A report to the Department for Business, Energy & Industrial Strategy, Accessed 7/3/2021 at <a href="https://uk-air.defra.gov.uk/assets/documents/reports/cat07/1904111135_UK_peatland_GHG_emissions.pdf">https://uk-air.defra.gov.uk/assets/documents/reports/cat07/1904111135_UK_peatland_GHG_emissions.pdf</a>	taken into account -addressed in 17.3	Paul Dumble	Paul's Environment Ltd	United Kingdom (of Great Britain and Northern Ireland)
28089	7	33	7	33	After "energy production", add "and consumption".	editorial	Eleni Kaditi	Organization of the Petroleum Exporting Countries, OPEC	Austria
6937	7	34	7	35	Please delete "both within and across several disciplines" as it confuses the point you are making.	editorial	Debra Roberts	EThekweni Municipality	South Africa
59707	7	39			State who "perceives" this. Is this universally held?	accepted- text will be referred to UN 2030 agenda	Government of United States of America	U.S. Department of State	United States of America
59709	7	40	7	41	A section later in the chapter aptly discusses that there may be trade-offs across elements of sustainable development, and specifically with certain approaches to addressing climate change. Delete the rest of the sentence after "approach" and add "conceptual" before "approach". Making the elements coherent, well-integrated, and overarching in practice is at best very challenging.	taken into account - text will be revised	Government of United States of America	U.S. Department of State	United States of America
4589	7	42	7	48	Why is it relevant that 2015 was a turning point?	accepted - reference to year of signature of Paris agreement will be added	Adrian Brügger	University of Bern, Dep of Consumer Behavior	Switzerland
49805	7	42	7	49	Insert: "The year 2007, with the adoption of UNDRIP, was also a noticeable turning point in increasing the dynamics of global governance, climate change and environmental policy needed to set the globe on a path towards sustainable development." (Indigenous rights are invisible in this report)	rejected - considered too specific in this context	Chloe Hartley	Tsleil-Waututh Nation	Canada



Comment Id	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
59711	7	47			"Global governance" means different things to different people and, arguably, the SDGs do not constitute "global governance" as the choices about what and how to seek them is set at the national or lower levels of decisionmaking. Replace "global governance" with "development" and replace "universal" with "broadly accepted". This is another instance where the chapter is citing really only one source where there must be dozens of views in the literature.	taken into account - text will be revised	Government of United States of America	U.S. Department of State	United States of America
59713	8	3	8	6	The language here is inaccurate. It is the Paris Agreement that mandates NDCs, not the Paris Package, which contains a set of decisions to implement some of the provisions in the Paris Agreement. Replace "As part of the Paris Package" with "The Paris Agreement requires of its Parties the communication of" and delete "were introduced".	taken into account - text will be revised and aligned with Chapter 14	Government of United States of America	U.S. Department of State	United States of America
59715	8	5			After "NDCs" add "must"; after "and" include "may include"; and add "intended" before "efforts".	taken into account - text will be revised and aligned with Chapter 14	Government of United States of America	U.S. Department of State	United States of America
59717	8	9			Submit to whom?	taken into account - text will be revised and aligned with Chapter 14	Government of United States of America	U.S. Department of State	United States of America
59719	8	9			Replace "In the Paris Package" through "years" with "The Paris Agreement requires that Parties must submit their NDCs at least every 5 years, or less, ..." The language should be more precisely correct.	taken into account - text will be revised and aligned with Chapter 14	Government of United States of America	U.S. Department of State	United States of America
53069	8	9	8	11	there are also 10 year timeframes as mentioned in article 4 of the Paris Agreement	Here it talks about the submission time which is 5 years as in Paris Agreement, not about what timeframe of the target within the NDC. Therefore this is true about every 5 years submission	Government of Saudi Arabia	Sustainability Advisor to the Minister Ministry of Petroleum and Mineral Resources	Saudi Arabia
17879	8	9	8	12	awkward use of "them" and "themselves" - unclear antecedents	accepted and changed to "submit the NDCs"	Robert Brecha	Climate Analytics	Germany
59721	8	10			"... an opportunity FOR assessMENT [delete rest] ..."	Rejected. The suggested change also implies what is already written.	Government of United States of America	U.S. Department of State	United States of America
9119	8	14	8	14	See also Liu, P.R., Raftery, A.E. Country-based rate of emissions reductions should increase by 80% beyond nationally determined contributions to meet the 2°C target. Commun Earth Environ 2, 29 (2021). <a href="https://doi.org/10.1038/s43247-021-00097-8">https://doi.org/10.1038/s43247-021-00097-8</a>	Considered but not relevant in the context of what this line says as this paper is more referring to probabilistic achievement of the targets	Brendan Barrett	Osaka University	Japan
6939	8	14	8	16	The evidence here should be updated to 2020 to increase confidence in the argument. A lot would have changed between 2017 and 2020. It can also be argued that some of the evidence is a rather premature assessment of countries' commitment to delivering the Paris goals since they were published in the same year or within a year of signing the Paris Agreement. It must be recognised that several steps have to be taken at the national level before countries can take practical action towards the attainment of the Paris goals.	Reference to Chapter 4 and the latest synthesis report from UNFCCC in 2021	Debra Roberts	EThekwini Municipality	South Africa
59723	8	16			The language here is nonsensical, although maybe that is a problem with the source. The Paris Agreement's temperature targets are not specified in a timeframe, but would likely take decades to achieve; the carbon balance aim is for the second half of this century. It is not possible to judge in 2021 whether or not a Party's current efforts, or the Parties in aggregate, are "falling short". The analyses done indicate that the policies in place are not sufficient to put emissions on a modeled estimate of an optimal path toward the temperature targets. One would not expect that a few years into a decades-long process that Parties would be "delivering the Paris goals". Delete "declared that they are falling short of delivering the Paris goals" and replace it with language that is more precise and makes more sense.	taken into account - Language revised	Government of United States of America	U.S. Department of State	United States of America
59725	8	16			Delete "very urgent". The Paris Agreement does not use those words.	The inference there is not coming from the language in the Paris Agreement. However it more based on the notion of what is specified in the agreement	Government of United States of America	U.S. Department of State	United States of America
53037	8	16	8	16	May include a reference that reflect the developing countries stance and perspective in climate negotiations: "A Clash of Climate Change Paradigms: Negotiations and Outcomes at the UN Climate Convention" by Martin Khor and Meenakshi Raman. Published by Third World Network, 2020.	accepted - text will be added	Government of Saudi Arabia	Sustainability Advisor to the Minister Ministry of Petroleum and Mineral Resources	Saudi Arabia
4591	8	17	8	20	Talking about goals of Paris Agreement seems not be the right place.	taken into account - Fixed with restructure of section	Adrian Brügger	University of Bern, Dep. of Consumer Behavior	Switzerland
59727	8	19			Delete "fell short" and replace with "are only the first submissions toward implementing the Paris Agreement". The existing language is judgmental and inappropriate for the IPCC.	Rejected as this is what the assessments and literature says and consistent with other chapters. But the language has been revised	Government of United States of America	U.S. Department of State	United States of America
6941	8	19	8	20	Fell short by what %? This statement requires supporting evidence.	Language revised and made consistent with other chapters	Debra Roberts	EThekwini Municipality	South Africa

Comment Id	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
75683	8	21			There are information about the several assessments done in past concerning implementation of climate policies, but the general overview of the fulfillment of accepted goal and paths how to fulfill accepted goals by individual countries is missing. And this is more than important, because people must see how goals and the paths to their reaching are followed (progress of implementation), because only these information can demonstrate that those were not only proclamation without real measures.	taken into account - text will be revised in restructuring	Jiri Duspiva	Czech Nuclear Society	Czech Republic
6943	8	21	8	22	This paragraph is quite confusing. The intended message is not clear. Please revise.	taken into account - text will be revised in restructuring	Debra Roberts	EThekweni Municipality	South Africa
59729	8	24			Substitute "the optimal" with "their estimates of optimal"	taken into account - text will be revised in restructuring	Government of United States of America	U.S. Department of State	United States of America
59731	8	24			Delete "well below"	taken into account - text will be revised in restructuring	Government of United States of America	U.S. Department of State	United States of America
59733	8	26	8	28	Lists 6 meeting, 8 needing action, then lists U.S., China and EU. It's not clear who is in which group.	taken into account - text will be revised in restructuring	Government of United States of America	U.S. Department of State	United States of America
18587	8	27	8	30	When discussing the small number of countries that are on track to meet their NDCs, and then highlighting the importance of what the EU, US and China do, it would be helpful to clarify whether these three are on track or not.	taken into account - text will be revised in restructuring	Government of United Kingdom (of Great Britain and Northern Ireland)	Department for Business, Energy & Industrial Strategy	United Kingdom (of Great Britain and Northern Ireland)
59735	8	28			Why are the authors naming only the U.S., China, and the EU when many countries contribute important amounts of GHG emissions? Why isn't India on this list, or Indonesia, Brazil, South Africa, or others. Delete the sentence as it is unnecessary, and seems to be arbitrarily pointing the finger at a select group of Parties.	taken into account - text will be revised in restructuring	Government of United States of America	U.S. Department of State	United States of America
59737	8	35	8	35	Add "and impacts" to "extremes"	accepted - text will be added	Government of United States of America	U.S. Department of State	United States of America
18589	8	35	8	36	I think it is important to acknowledge the potential for climate change activities to have both positive and negative impacts on achieving the SDGs, but we should be careful about giving the impression that these are equally balanced - while there are some potential negative interactions between to two agendas that we need to be aware of, it should be stressed that for the most part they are in synergy and mutually reinforcing.	accepted - text will be 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)
59739	8	36	8	36	Current 'positive and negative' wording is neither clear nor precise regarding co-benefits/co-costs, positive/negative externalities, trade-off/synergies.	taken into account - text will be revised	Government of United States of America	U.S. Department of State	United States of America
59741	8	37	8	40	Substitute this sentence for an exact quote from the 1.5°C report. The current sentence is not quite what that report said and the authors should stick to the carefully crafted language.	considered	Government of United States of America	U.S. Department of State	United States of America
53421	8	45			"Natural capital" is a mainstream economics concept which assumes that "capital" is a rather neutral factor of production, rather than a dynamic of power. On page 11 line 34 you acknowledge that "power relations [reflect] how certain sorts of knowledge frame an issue" - but it seems to me that you fail to see how the mainstream economics ideas you use in your framing serve powerful interests to maintain the status quo, rather than fundamentally transform it. Here, in this line/sentence you could make the same statement by not tapping into a mainstream concept/narrative, e.g. by saying "climate change reveals the dependence of all systems on the natural environment" (or similar).	taken into account -To be addressed in 17.2	Elke Pirgmaier	University of Lausanne	Switzerland
31653	8		13		Suggested references to add P8L47: Refer Gender CCB in WGII Chapter 18 P11L3: cross refer Chapter 13 P34L12: Cross ref SR 1.5	taken into account - references will be considered	Shreya Some	Ahmedabad University	India
59743	9	1			Delete "Moreover"	editorial	Government of United States of America	U.S. Department of State	United States of America
75685	9	1			Drivers of Climate change – it is correctly pointed out energy production and consumption. On other hand it is related to the sustainable development and here the real goals – specific for energy production and consumption have to be repeated. The repetition is necessary instead of many references included in the documents (of their content is hidden of normal people). But they must also follow conclusion and accept the impact to them – if they will not be counted in the text instead of only reference, no one will take it seriously.	Deleted to remove ambiguity	Jiri Duspiva	Czech Nuclear Society	Czech Republic

Comment Id	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
59745	9	3			Delete "proper". It is judgmental. If desired, add at the end of the sentence "... although some actions may conflict with other goals of sustainable development".	Rejected. Proper implementation is key which gives the notion of careful consideration must be given.	Government of United States of America	U.S. Department of State	United States of America
59747	9	5	9	6	The phrase "through ... reports" is unclear. How is there sustainable development in reports? Clarify.	Rejected. Sentence says interventions of sustainable development is reported via reports	Government of United States of America	U.S. Department of State	United States of America
64299	9	6	9	12	Policy signals alone is limited for investment by industry. There is a risk of policy change. Specific regulations are needed. FIT is an incentive and difference of policy effect between regulation and incentive should be carefully reviewed.	wrong reference to line	Takashi Hongo	Mitsui & Co. Global Strategic Studies Institute	Japan
46423	9	7	9	7	Please specify "SDG report" as there exist several SDG reports. If you refer to the GSDR write "Global Sustainable Development Report" (The reference is not clear as the cited resolution is not specified).	accepted - reference will be revised	Government of Germany	Federal Ministry for the Environment, Nature Conservation and Nuclear Safety International Climate Policy	Germany
59749	9	8			"National urban plans" seems like an oxymoron. Have those countries supported urban plans across their territories? The meaning is unclear.	accepted - text will be revised	Government of United States of America	U.S. Department of State	United States of America
59751	9	11			Be specific about which countries and what they are doing. Name some. Give a number. In what ways are they "reconsidering"? Is "reconsideration" meaningful, or are they demonstrating a change in actions? If there is evidence for this, it would be more convincing to state what it is.	Rejected. Reconsidering meaning the changing the usual way the countries have been and considering more sustainable practices	Government of United States of America	U.S. Department of State	United States of America
64301	9	14	10	8	Figure of Macro Trend and Climate Finance Flow are interesting analyses, but seem conceptual: the definition of climate finance and the evidence of a linear increase is not clear. Market seems to feel that climate finance and similar financing has increased rapidly since the Paris Agreement. It is risky to apply macroeconomic cyclical trends to the future too. It should be deleted or a careful explanation should be given that this is a hypothesis and conceptual.	taken into account -reference to Finance chapter to be added	Takashi Hongo	Mitsui & Co. Global Strategic Studies Institute	Japan
59755	9	18			This statement about the EU needs explanation. How is the EU going to achieve a CE? How does it relate to climate change policy or mitigating GHG, or to achieving SD?	accepted - para restructured	Government of United States of America	U.S. Department of State	United States of America
9743	9	18	18	35	Please add "circular carbon economy" framework adopted by G20 (2020 cycle) as a recent international policy development to promote circularity and sustainability in the context of JT (see, Box 12.2)	accepted - reference will be added	Mustafa Babiker	Saudi Aramco	Saudi Arabia
2769	9	18	9	19	Establishing a circular economy is a key priority to keep products and materials in use, thereby reducing waste and pollution and enabling the regeneration of natural systems. For example, energy systems should become more integrated to deliver low-carbon and resource-efficient energy services and reuse waste streams such as industrial waste heat and bio-waste for energy purposes, with energy efficiency as a top priority	taken into account - text will be revised	Leonardo Barreto	Head of center "EU&International"	Austria
59753	9	18	9	28	This paragraph is very high level and specificity is truly lacking. The first half of the paragraph doesn't lead well to the second.	accepted - para restructured	Government of United States of America	U.S. Department of State	United States of America
59757	9	19			Delete "in the deal"	accepted - para restructured	Government of United States of America	U.S. Department of State	United States of America
59759	9	19			This is referring to what? The circular economy?	accepted - para restructured	Government of United States of America	U.S. Department of State	United States of America
23703	9	22	9	22	It could be relevant to mention ' food systems (Rosenzweig et al. 2020).' rather than "agricultural systems" In this paper Rosenzweig et al. 2020 clearly stated that unless we consider food demand and farm production together there is high risk that 'climate change mitigation and adaptation strategies associated with the food system are likely to be inefficient and possibly counterproductive'  Rosenzweig, C., Mbow, C., Barioni, L.G., Benton, T.G., Herrero, M., Krishnapillai, M., Liwenga, E.T., Pradhan, P., Rivera-Ferre, M.G., Sapkota, T., Tubiello, F.N., Xu, Y., Mencos Contreras, E., Portugal-Pereira, J., 2020. Climate change responses benefit from a global food system approach. Nat Food 1, 94–97. <a href="https://doi.org/10.1038/s43016-020-0031-z">https://doi.org/10.1038/s43016-020-0031-z</a>	taken into account -to be adressed in 17.3	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
72523	9	26	9	28	<p>Please consider adding to the indicated line: To meet the demand of various climate information users and tailor climate products to their needs, climate services should facilitate opportunities for co-production of knowledge (Kirchhoff, Lemos and Dessai, 2013) that enables users to actively participate with valid expertise of the particularities of their decision-making context (Vaughan and Dessai, 2014). Multi- inter- and transdisciplinary collaborations are essential to address complex challenges such as climate adaptation or climate risk reduction, and stakeholders need to be properly prepared and trained for effective cross-sector collaborations (Gálos and Lehoczky, 2020; Lehoczky, 2017).</p> <p>References</p> <p>Gálos B., Lehoczky A. (2020): Copernicus Climate Data Store: ready for application in adaptation case studies? – experiences of the training workshop in Hungary. EGU General Assembly, Vienna, Austria. 3 – 8 May 2020. Session CL5.7. Climate Services - Underpinning Science. EGU2020-7417. Geophysical Research Abstracts, EGU General Assembly 2020.</p> <p>Kirchhoff, C. J., Lemos, M. C. and Dessai, S. (2013) 'Actionable Knowledge for Environmental Decision Making: Broadening the Usability of Climate Science', Annual Review of Environment and Resources. 38(1), pp. 393–414. doi: 10.1146/annurev-environ-022112-112828.</p> <p>Lehoczky A. (2017): Changing horizon of Climate Science: from scientific knowledge towards demand based, integrated Climate Services. Universitat Rovira i Virgili, Doctoral Dissertation. (<a href="http://www.tdx.cat/handle/10803/461522">http://www.tdx.cat/handle/10803/461522</a>)</p> <p>Vaughan, C. and Dessai, S. (2014) 'Climate services for society: origins, institutional arrangements and design elements for an evaluation framework', Wiley Interdisciplinary Reviews: Climate Change. John Wiley &amp; Sons, Inc., 5(5), pp. 587–603. doi: 10.1002/wcc.290.</p>	taken into account - to be addressed in 17.2	Annamária Lehoczky	Fauna and Flora International	United Kingdom (of Great Britain and Northern Ireland)
59761	9	27			Remove the hortatory "needs to be" and instead state what the benefit of this would be.	taken into account - text will be updated	Government of United States of America	U.S. Department of State	United States of America
59763	9	29	9	35	These initiatives are all good. Worth noting the ways they fit together or not. Sustainable development is a broad topic and framing, so having that in common does not guarantee mutual support across such projects/frameworks.	accepted	Government of United States of America	U.S. Department of State	United States of America
53041	9	32	9	32	The G20 countries have endorsed the Circular Carbon Economy (CCE) approach in the 2020 G20 Leaders' Summit. They have acknowledged the CCE approach is a holistic, integrated, inclusive, and pragmatic approach to managing emissions that aims to provide new pathways toward economic growth. The CCE framework includes a 4th R demonstrated in 'Remove' to compliment the 3Rs of Circular Economy.	updated and referenced	Government of Saudi Arabia	Sustainability Advisor to the Minister Ministry of Petroleum and Mineral Resources	Saudi Arabia
59765	9	34			Which "country-group"?	taken into account - sentence will be revised	Government of United States of America	U.S. Department of State	United States of America
59767	9	35			The chapter still hasn't stated what "the transition" is.	taken into account - text will be revised and definitions added in the chapter	Government of United States of America	U.S. Department of State	United States of America
16779	9	36	11	5	Showed some examples of synergies and trade-off between sustainable development, adaptation and mitigation. Introduced a concept of response capacity as a key to accelerate the transition to sustainable development, adaptation and mitigation.	taken into account -details are given in 17.3	Government of Republic of Korea	Korea Meteorological Administration (KMA)	Republic of Korea
60523	9	36	11	5	Showed some examples of synergies and trade-off between sustainable development, adaptation and mitigation. Introduced a concept of response capacity as a key to accelerate the transition to sustainable development, adaptation and mitigation.	taken into account -details are given in 17.3	HWANIL PARK	STEPI	Republic of Korea
17881	9	37	11	5	This section should also mention countries such as SIDS that need adaptation measures that may or may not be tied to mitigation	taken into account - text will be revised and text added	Robert Brecha	Climate Analytics	Germany
59769	9	37	9	45	This paragraph is not a strong opening for a section about the relationship between these objectives. Can authors open with something more decisive and not characterized by examples? Examples are useful but not as the definition. The relationship may be complicated but it can be parsed out better.	taken into account - text will be revised	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
1497	9	41	9	41	Add Kongsager et al. 2016 and Kongsager 2018 to the cited references "and landscape management (Locatelli et al. 2015; Kongsager et al. 2016; Kongsager 2018). Conservation practices" •Kongsager, R., Locatelli, B. & Chazarin, F. (2016). Addressing climate change mitigation and adaptation together: a global assessment of agriculture and forestry projects. Journal: Environmental Management 57 (2), pp 271-282. <a href="http://dx.doi.org/10.1007/s00267-015-0605-y">http://dx.doi.org/10.1007/s00267-015-0605-y</a> • Kongsager, R. (2018). Linking Climate Change Adaptation and Mitigation: A Review with Evidence from the Land-Use Sectors. Journal: Land (7)4, 158. <a href="https://doi.org/10.3390/land7040159">https://doi.org/10.3390/land7040159</a>	taken into account -References partially included	RICO KONGSAGER	University College Copenhagen	Denmark
23705	9	41	9	43	Rather than taking the example of conservation practices, it might be good to refer here more broadly to climate smart agriculture as "an approach for developing actions needed to transform and reorient agricultural systems to effectively support development and ensure food security under climate change." FAO. Climate Smart Agriculture Sourcebook   Food and Agriculture Organization of the United Nations. Available online: <a href="http://www.fao.org/climate-smart-agriculture-sourcebook/concept/modulea1-introducing-csa/chapter-a1-2/en/">http://www.fao.org/climate-smart-agriculture-sourcebook/concept/modulea1-introducing-csa/chapter-a1-2/en/</a>	taken into account - comment included	Government of France	Ministère de la Transition écologique et solidaire	France
59771	10	1			S is unlikely an actual last name.	editorial	Government of United States of America	U.S. Department of State	United States of America
23709	10	1	10	1	"The creation of synergies can increase people's long-term engagement with and acceptance of projects". Perhaps integrate the willingness to change. Speaking of acceptance implies a top-down approach, which opposes those experts who know about good practices and non-experts. It should also be stressed that poor development often prevents individuals and communities from implementing good practice. Finally, overarching political, social and economic contexts can constrain individuals and communities from alternatives and prevent the implementation of sustainable practices.	taken into account - text will be revised	Government of France	Ministère de la Transition écologique et solidaire	France
59773	10	1	10	1	"synergies" is a term being thrown around very casually. Here, suggest "synergies between / amongst objectives".	taken into account - text will be revised	Government of United States of America	U.S. Department of State	United States of America
23707	10	1	10	2	We suggest to clarify what kind of project are referred to	taken into account - text will be revised	Government of France	Ministère de la Transition écologique et solidaire	France
59775	10	1	10	3	Revise to: "Progress toward multiple objectives and potential for conflict ..."	taken into account - text will be revised	Government of United States of America	U.S. Department of State	United States of America
46993	10	2	10	3	There has been some research that tried to investigate the potential contributors to the synergies and trade-offs, research by Spaiser et al. (2017) for instance suggested that the focus on economic growth and consumption as a driver for development is among others responsible for the trade-offs, while the focus on human well-being (health etc.), public investment (e.g. in education) and renewable energy product can help to avoid these trade-offs. (see Spaiser et al. 2017, The Sustainable Development Oxymoron: Quantifying and Modelling the Incompatibility of Sustainable Development Goals, International Journal of Sustainable Development & World Ecology, 24(6), 457-470, <a href="https://www.tandfonline.com/doi/full/10.1080/13504509.2016.1235624">https://www.tandfonline.com/doi/full/10.1080/13504509.2016.1235624</a> )	taken into account -To be adressed in 17.3	Viktoria Spaiser	University of Leeds	United Kingdom (of Great Britain and Northern Ireland)
31619	10	3	10	21	Usage of terms: synergies and trade-offs- P10L3-Introduction uses "negative synergies" as trade-offs. As per SR 1.5 synergies are positive interaction with SDG and trade-offs are negative interactions. P10L22: "Positive synergies and negative trade-offs"- synergies are positive and tradeoffs are negative. Can this just be "sunergies and tradeoffs"	accepted - text will be revised	Shreya Some	Ahmedabad University	India
71063	10	3	10	3	possible conflicts, trade-offs, or negative synergies are also possible - these are well known and existing, revise 'are also possible'.	noted but text is included in the reference indicated and cited accordingly	Philippe Tulkens	European Union (EU) - DG Research & Innovation	Belgium
59777	10	4	10	4	Capitalize "2020 Agenda for Sustainable Development" (proper noun).	editorial	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
71065	10	4	10	4	2030 Agenda for sustainable development - 2030 Agenda for Sustainable Development	editorial	Philippe Tulkens	European Union (EU) - DG Research & Innovation	Belgium
4595	10	4	10	6	Sudden shift back to very broad topic. These changes between specific and broad are confusing. Would it be possible to organize this differently, start broadly and becoming more specific?	taken into account - this section will be restructured	Adrian Brügger	University of Bern, Dep. of Consumer Behavior	Switzerland
23711	10	5	10	5	"In overall terms, the 2030 Agenda for sustainable development is linked to climate change through its statement that "climate change is one of the greatest challenges of our time, and its adverse impacts undermine the ability of all countries to achieve sustainable development"." Perhaps recall the demonstrated causality between vulnerability and maldevelopment, all emphasising that vulnerability does not reduce individuals and communities to passive victims condemned to suffer. On the other hand, show that development, when it increases capabilities, restores the agency, and with it, coping capacity and resilience	accepted - text will be revised and connected with commentary 59791	Government of France	Ministère de la Transition écologique et solidaire	France
59779	10	9	10	10	"Advances in sustainable development need balanced actions to accommodate the impacts of both mitigation and adaptation." Like this sentence ably conveys, paying attention to the idea of longer term stressors and shocks that both exacerbate climate change impacts is critical. There are many other places in this chapter where this should be woven in.	accepted - text will be revised	Government of United States of America	U.S. Department of State	United States of America
59781	10	9	10	11	The first of these sentences is not supported by evidence. Scrub the chapter for claims that are either not substantiated or where it is not clear that the stated things are obviously true. Another further down is "In accelerating the transition to sustainable development, adaptation, and mitigation, the development of a 'response capacity' enabling populations to mitigate, adapt, and react is key." Why is that true? What is "enhanced sustainable adaptation"? Sustainable development and adaptation have been treated as separate terms so far.	taken into account, more references will be added in this regard	Government of United States of America	U.S. Department of State	United States of America
59783	10	12	10	15	Cite paper that discusses trade-offs.	rejected - this part of the section is not aimed at discussing trade-offs	Government of United States of America	U.S. Department of State	United States of America
59785	10	15			What is "virtuous collaboration"? Replace this language with something more intelligible, like "collaboration that can bring benefits to [XXX]"?	accepted - text will be revised	Government of United States of America	U.S. Department of State	United States of America
23713	10	16	10	16	Concerning the term "other" please clarify which other, there is not reference to any specific SDG before.	accepted - text will be revised	Government of France	Ministère de la Transition écologique et solidaire	France
53071	10	16	10	16	A circular economy including the circular carbon economy framework, could limit the implication of climate change action affecting other SDGs specially that the CCE framework includes a 4th R deomonstrated in 'Remove' to compliment the 3Rs of Circular Economy.	noted	Government of Saudi Arabia	Sustainability Advisor to the Minister Ministry of Petroleum and Mineral Resources	Saudi Arabia
59787	10	16	10	22	This discussion is not nuanced enough. The local vs global net impacts are critical in consideration of transitions.	taken into account - text will be revised and references added	Government of United States of America	U.S. Department of State	United States of America
3091	10	16	10	27	It's important to include recognition that trying to meet SDGs without attention to climate change can increase climate change impacts and consequences alongside the points made in this paragraph.	accepted - text will be added	Beth Edmondson	Federation University	Australia
59789	10	17			Eiiminate use of the word "fighting".	editorial	Government of United States of America	U.S. Department of State	United States of America
31625	10	18	10	18	P10L18: "SDG 1" is no poverty and not "zero hunger". Appologies if interpreted incorrectly P36L4: "chemical fertilisers (SDG 9)"- Will fit in SDG 8 or 12 but not 9	editorial - correct typo	Shreya Some	Ahmedabad University	India
59791	10	25	10	27	This seems to be the main message of this section -- that climate change mitigation and adaptation can be pursued in tandem with sustainable development, with one potentially as an avenue to the other. The word of caution is also important but isn't really expanded. How would one look for possible conflict or unintended consequences? How can one do a closer examination at the project level to ensure that efforts to achieve do not undermine the other? This seems similar to discussions that have been had in the resilience vs sustainability realm (see, e.g., Marchese et al., 2018, doi:10.1016/j.scitotenv.2017.09.086 and Chambers et al., 2019, https://doi.org/10.21079/11681%2F32407). Resilience has yet to be raised in this chapter but it is inherent throughout. Enhancing resilience is not necessarily an endeavor that is resource efficient or sustainable, but it is a central idea about coping with climate change impacts (i.e., adapt).	taken into account - text will be revised and references added	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
59793	10	28	10	29	Nuance is needed. The net impact of mitigation of CO2 is global, while adaptation fundamentally tends to be local in nature.	accepted - text will be revised	Government of United States of America	U.S. Department of State	United States of America
9121	10	28	10	31	Very worrying that many sub-national entities are lacking climate targets. See US example. PLEDGES AND PROGRESS Steps toward greenhouse gas emissions reductions in the 100 largest cities across the United States. <a href="https://www.brookings.edu/research/pledges-and-progress-steps-toward-greenhouse-gas-emissions-reductions-in-the-100-largest-cities-across-the-united-states/">https://www.brookings.edu/research/pledges-and-progress-steps-toward-greenhouse-gas-emissions-reductions-in-the-100-largest-cities-across-the-united-states/</a>	taken into account - references will be added	Brendan Barrett	Osaka University	Japan
7505	10	28	10	36	This section should be further developed using the new version of the Cross Working Group Box on Urban Areas to call out the significance and scale of the urban opportunity.	taken into account	Debra Roberts	EThekweni Municipality	South Africa
59795	10	30	10	30	"preparations" seems like a typo or a word is missing.	editorial - change to adaptation	Government of United States of America	U.S. Department of State	United States of America
59797	10	41			Replace "Initially seen" with "Some countries and commentators advocated". Replace the ", " with ";" and insert "broadly" before "acknowledged". Many Annex 1 countries did not agree with that view and the sentence should not suggest that this was a broadly held view.	taken into account - text will be revised	Government of United States of America	U.S. Department of State	United States of America
59799	10	45	10	45	Reference is a bit dated.	noted - there is high agreement on this statement in recent literature	Government of United States of America	U.S. Department of State	United States of America
59801	11	6			"transition" should be well defined up front. A similar term with a deep theoretical basis is "transformation". These two things should be compared and contrasted, and both should be considered. This is especially true given the reference to transformative change in line 15.	taken into account - a series of definitions will be added	Government of United States of America	U.S. Department of State	United States of America
6945	11	6	11	6	What is a transition process?	taken into account - a series of definitions will be added	Debra Roberts	EThekweni Municipality	South Africa
16781	11	6	12	18	Significant amount of attention should be paid to the transition process. It should be holistic and systematic approach. Knowledge acts as motor in the process and equity and justice are also important.	taken into account - to be addressed in 17.2	Government of Republic of Korea	Korea Meteorological Administration (KMA)	Republic of Korea
60525	11	6	12	18	Significant amount of attention should be paid to the transition process. It should be holistic and systematic approach. Knowledge acts as motor in the process and equity and justice are also important.	taken into account - to be addressed in 17.2	HWANIL PARK	STEP1	Republic of Korea
59803	11	7			This section on transition processes needs to include some discussion of past transitions and what has effected them. For example, where is the nature of economies and the rules and institutions by which they operate? Why have GHG emissions been rising over many decades and why have they not stabilized once scientific assessments increased confidence that GHG were driving climate change? How do the more sociological discussions here relate to what has driven GHG emissions or vulnerability to climate events? Important references in the literature include Karl Polanyi in The Great Transformation, Douglass North, Joseph Stiglitz, Hayek, and many others.	taken into account - to be addressed in 17.2	Government of United States of America	U.S. Department of State	United States of America
59805	11	8			This sounds like opinion and very normative. Are there not other views in the literature? Where do they agree and disagree?	taken into account - to be addressed in 17.2	Government of United States of America	U.S. Department of State	United States of America
59807	11	9	11	10	Transition is referred to in a fairly ambiguous way. Transition from what to what? Is there a threshold one can cross to gauge whether you have transitioned? If not, how does one know where one currently stands? These are rhetorical questions, but serve to highlight that transition is described vaguely.	taken into account - to be addressed in 17.2	Government of United States of America	U.S. Department of State	United States of America
59809	11	11			Delete "stage"	editorial	Government of United States of America	U.S. Department of State	United States of America
59811	11	16	11	22	It is not clear why the "approaches" discussed here would lead to, for example, reaching net zero GHG emissions, if that's what the transition is assumed to be (although above there was a statement that the transition would differ in different contexts). This discussion seems more philosophical than addressing how concrete change on the ground would occur. The section needs to provide the foundation for understanding how economies and societies change over time, and how that relates to institutions, social structures, culture, resources, etc. The discussion in this section seems to be on the margin of what drives transformation, and is philosophical or even wishful thinking. The whole section needs rewriting to explain how these philosophical conceptions have practical value, backed by evidence, in effecting a transition.	taken into account - to be addressed in 17.2	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
59813	11	17			Need to define "social transition". One aspect of transition/transformation that is not addressed is that undesirable systems may be highly resilient; changing them takes purposeful erosion of resilience through agency and then transformative action to foster reorganization to a more desired state. Adaptive governance is helpful (Chaffin et al., 2016, Transformative environmental governance).	taken into account - to be addressed in 17.2	Government of United States of America	U.S. Department of State	United States of America
59815	11	17	11	18	Transition and transformation are both used in this section, somewhat interchangeably. The ingredients for incremental transition vs transformational transition are different. What is the role of disasters in the process? Transitions (incremental and transformational) often come after disasters. How was O'Brien (2018) selected to highlight as a framework here over others that might exist. Seems a little arbitrary.	taken into account - to be addressed in 17.2	Government of United States of America	U.S. Department of State	United States of America
4597	11	23	11	27	The idea of spheres comes a bit as a surprise. Would be good to introduce this, maybe with a topic sentence or another organising element.	taken into account - to be addressed in 17.2	Adrian Brügger	University of Bern, Dep. of Consumer Behavior	Switzerland
12257	11	28	11	28	"This implies paying less attention to the attempt". It is impossible to understand how the preceding paragraph implies paying less attention. Please check the use of "paying less attention to the attempt", you likely mean "focussing less on changing the behaviour but instead working ..."	taken into account - to be addressed in 17.2	Christophe Deissenberg	Institute for Non-Linear Dynamic Inference	Luxembourg
9123	11	28	11	32	This may really about changing the social fabric as pointed out by Shove E. Beyond the ABC: Climate Change Policy and Theories of Social Change. Environment and Planning A: Economy and Space. 2010;42(6):1273-1285. doi:10.1068/a42282	taken into account - to be addressed in 17.2	Brendan Barrett	Osaka University	Japan
9125	11	36	11	39	It is important to learn from past rapid transitions and transformations and to apply those lessons to the challenge in front of us. See Rockoff, H. (2016) The US Economy in WWII as a Model for Coping with Climate Change, National Bureau of Economic Research, Working Paper 22590. Accessible Online: <a href="http://www.nber.org/papers/w22590">http://www.nber.org/papers/w22590</a> . Also, Benjamin K. Sovacool, How long will it take? Conceptualizing the temporal dynamics of energy transitions, Energy Research & Social Science, Volume 13, 2016, Pages 202-215, ISSN 2214-6296, <a href="https://doi.org/10.1016/j.erss.2015.12.020">https://doi.org/10.1016/j.erss.2015.12.020</a> . And Peter Newell & Andrew Simms (2020): How Did We Do That? Histories and Political Economies of Rapid and Just Transitions, New Political Economy, DOI: 10.1080/13563467.2020.1810216	taken into account - to be addressed in 17.2	Brendan Barrett	Osaka University	Japan
59817	11	40	11	40	Encourage authors to attend to the trade-offs relevant to issues of equity and justice. In practical terms, some of these trade-offs are the most stark in nature but also most readily under human control.	taken into account - to be addressed in 17.2	Government of United States of America	U.S. Department of State	United States of America
46425	11	42	11	42	As LNOB is the fundamental principle of the 2030 Agenda, please write "stresses" instead of "acknowledges" to strengthen your point (see e.g., p.3 UN, General Assembly, A/RES/70/1, <a href="https://www.un.org/ga/search/view_doc.asp?symbol=A/RES/70/1&amp;Lang=E">https://www.un.org/ga/search/view_doc.asp?symbol=A/RES/70/1&amp;Lang=E</a> ).	taken into account - to be addressed in 17.2	Government of Germany	Federal Ministry for the Environment, Nature Conservation and Nuclear Safety International Climate Policy	Germany
59823	12	4	12	18	Could these two paragraphs be merged? Seems like they are discussing a common thread/theme.	taken into account - to be addressed in 17.2	Government of United States of America	U.S. Department of State	United States of America
59819	12	4	12	4	Is present tense appropriate here? Suggest re-writing as "However, in AR5, it became clear that climate change impacts on disadvantaged communities ... "	taken into account - to be addressed in 17.2	Government of United States of America	U.S. Department of State	United States of America
23761	12	4	12	9	On these issues of inequalities and equity, research on environmental justice in sociology prove to be of interest. We recomand that inequalities be addressed not only through the revenue but also at least by household structure, housing and access to resources.	taken into account - to be addressed in 17.2	Government of France	Ministère de la Transition écologique et solidaire	France
59821	12	4	12	9	Delete "However" as sentence lead, and combine with next paragraph. This is a one-sentence paragraph.	taken into account - to be addressed in 17.2	Government of United States of America	U.S. Department of State	United States of America
59825	12	5	12	8	Delete the "should be" language and state that these are opinions, or describe the evidence about what the benefits would be. The IPCC should not be hortatory.	taken into account - to be addressed in 17.2	Government of United States of America	U.S. Department of State	United States of America
59827	12	10			Which trade-offs?	taken into account - to be addressed in 17.2	Government of United States of America	U.S. Department of State	United States of America
59829	12	10	12	10	What is "this" that the beginning of the sentence refers to?	taken into account - to be addressed in 17.2	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
59831	12	10	12	11	This statement is not self-evident, and a little hard to understand anyway.	taken into account - to be addressed in 17.2	Government of United States of America	U.S. Department of State	United States of America
59833	12	10	12	12	Shouldn't equity aid collective actions? Does sentence 2 follow sentence 1?	taken into account - to be addressed in 17.2	Government of United States of America	U.S. Department of State	United States of America
59835	12	11	12	13	This claim is debatable: Giving people more money does not necessarily make them better stewards of the environment. There are also more fruitful angles to explore under the subject of equity. For example, in the U.S., the Green New Deal is a Congressional resolution that seeks to address racial injustice and economic inequity as a vehicle in the pursuit of a massive energy transition. Generally, this section should talk more about who will take action and who will benefit.	taken into account - to be addressed in 17.2	Government of United States of America	U.S. Department of State	United States of America
64303	12	14	12	16	Is there carbon cost on coal power in the US and China? It seems that carbon intensity is the not reason for the decline in thermal power generation. This may apply to the case of EU, where ETS provides carbon cost on coal and gas power generation.	taken into account - to be addressed in 17.2	Takashi Hongo	Mitsui & Co. Global Strategic Studies Institute	Japan
16783	12	20	13	9	Technology and policy coherence and integration are essential for the sustainable development and transition. The title of this part shows "relevant policy issues in different time frames(2025, 2030, 2050). But there are no contents relating with the title.	taken into account - a new structure of this section will be prepared	Government of Republic of Korea	Korea Meteorological Administration (KMA)	Republic of Korea
60527	12	20	13	9	Technology and policy coherence and integration are essential for the sustainable development and transition. The title of this part shows "relevant policy issues in different time frames(2025, 2030, 2050). But there are no contents relating with the title.	taken into account - a new structure of this section will be prepared	HWANIL PARK	STEPI	Republic of Korea
3577	12	23			The reference to 'stringent regulation' on line 28 is welcome, but far too rare. The regulatory role of government has been long studied but is consistently under played in this report	Taken into account -text will be revised	Ian Gough	CASE, LSE	United Kingdom (of Great Britain and Northern Ireland)
3093	12	23	12	35	This paragraph over homogenises governments - and other stakeholders too but to a lesser degree. Governments do not all play the same roles, hold the same interests, seek the same social goods etc Fuller recognition needs to be given to noting that all governments play different roles, constitute diverse actors even within designated settings, with roles that change (both individually and collectively) over time, in specific contexts (according to other broader issues, electoral cycles,etc) and the complexities of influences between them and other agents.	Accepted - text will be revised	Beth Edmondson	Federation University	Australia
9129	12	23	12	35	Seems to rely heavily on Ashford and Hall 2018.	Accepted - text will be revised	Brendan Barrett	Osaka University	Japan
59837	12	24	12	35	It is unclear why the only references in this paragraph should be to Ashford or what standing it has. The language reads like philosophy and not based on empirical analysis. Moreover, it is hortatory and does not belong in an objective analysis. The normative stance of this paragraph needs to be removed and, if the paragraph is retained, needs to include other references that support or have different views than these references. (It looks as if Ashford must have submitted his papers and said they should be included; that is not a sufficient basis for inclusion in a major assessment representative of all of the relevant literature.)	Accepted - text will be revised	Government of United States of America	U.S. Department of State	United States of America
23715	12	30	12	30	concerning "disruptive innovations and diffusions of technology" Restricting innovation to technology might be too simplistic. Why not talk about structural systemic changes in economic, political and social structures? These transformations partly overlap with structural factors of vulnerability that have been identified in disaster risk reduction research since the 1990s. Technical innovation is a lever, but there is also a need to talk about social innovation. Also we suggest to put technology back in its right place, because otherwise the text may give the impression that technology can dispense with structural change and transformational adaptatiopn. Technology may simply mitigate the costs.	taken into account - to be addressed in 17.2	Government of France	Ministère de la Transition écologique et solidaire	France
59839	12	35			"Other stakeholders are MOST critical ..." This would be a good spot to discuss transformative governance approaches.	taken into account - text will be deleted	Government of United States of America	U.S. Department of State	United States of America
59841	12	36	12	40	Developing countries also stand to gain large return-on-investment (ROI) and social ROI. Acknowledgment of this fact and examples would be welcome.	Taken into account -text will be revised	Government of United States of America	U.S. Department of State	United States of America
28091	12	42	12	43	Change to "insufficient financing for the implementation of conditional NDCs could hinder the efforts of developing countries to enhance their ambitions for climate actions and should be considered a bottleneck".	Taken into account -text will be revised	Eleni Kaditi	Organization of the Petroleum Exporting Countries, OPEC	Austria
17883	12	44			should be "goals 17 and 14"	editorial	Robert Brecha	Climate Analytics	Germany
59843	12	44	12	44	Why is "sustainable development agenda" not capitalized here, but is capitalized earlier? It is a proper noun.	editorial	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
59845	13	3	13	3	""actors, players, elements, frameworks, and concepts that will play a part in the transition"": Lots of buzzwords here. Need to be sure that precision is maintained as much as possible.	taken into account- to be updated	Government of United States of America	U.S. Department of State	United States of America
71067	13	3	13	9	Section 17.1 set out to assess how climate actions could be accelerated in a sustainable development context. Yet, the section concludes with a vague statement 'If acceleration is needed, with no concrete actions or conclusions identified, as to how climate actions can be accelerated to achieve transformational system change in line with 1.5 - 2 degree mitigation pathways.	taken into account - a series of definitions will be added and conclusions updated	Philippe Tulkens	European Union (EU) - DG Research & Innovation	Belgium
59847	13	4			If a transition is non-linear is it a transition? This is one reason definitions are needed. A non-linear situation requires transformation and resilience language.	taken into account - a series of definitions will be added	Government of United States of America	U.S. Department of State	United States of America
3095	13	5	13	9	Worth adding 1-2 sentences to explain how this might happen - ie how might a coherent approach be established, which policy-coherent integrated approaches should lead the way and why.	Taken into account -text will be revised	Beth Edmondson	Federation University	Australia
59849	13	6			A rich discussion of scaling is needed here. The need for transformation at all or many scales (depending situation) is critical. Understanding how change at one scale affects change at other scales is key to efficiently addressing change. A change limited to a single scale is probably a failure when it comes to climate.	taken into account - a series of definitions will be added	Government of United States of America	U.S. Department of State	United States of America
59847	13	4			If a transition is non-linear is it a transition? This is one reason definitions are needed. A non-linear situation requires transformation and resilience language.	Partially accepted: we aim to define transitions both at the beginning of this section and at the start of the chapter	Government of United States of America	U.S. Department of State	United States of America
3095	13	5	13	9	Worth adding 1-2 sentences to explain how this might happen - ie how might a coherent approach be established, which policy-coherent integrated approaches should lead the way and why.	Partially accepted: this issue is covered in much greater detail in 17.3	Beth Edmondson	Federation University	Australia
59849	13	6			A rich discussion of scaling is needed here. The need for transformation at all or many scales (depending situation) is critical. Understanding how change at one scale affects change at other scales is key to efficiently addressing change. A change limited to a single scale is probably a failure when it comes to climate.	Partially accepted: there is a discussion of scaling in the governance section	Government of United States of America	U.S. Department of State	United States of America
59851	13	11			Section 17.2 does not meet the promise of its title, Explaining Transitions. No such explanation has been proffered in the chapter, but should definitely be added. There is a wealth of theory and empirical analysis from the economics, anthropological, institutional, and other literature that do explain transitions -- with important differences and discussions in the debate. What options might be effective in "accelerating the transition" and their effectiveness needs to be built on that foundation of the existing, vast literature. Section 17.2.1 may be interesting, but it provides little insight into how transitions occur or what would precipitate "transitions in social consciousness". It seems almost whimsical and wishful, and lacks practical value -- at least as written -- to the question of the chapter: how to accelerate a transition. Moreover, much of the content is opinion not analysis. It takes stances on what reads as normative toward "eastern world-views" or "de-growth" or "an inner transition". There is no analysis of counter-views or whether it is the role of governments or some other entities to be prescribing the processes described in the section. Little would be lost by deleting this section. Generally, it undermines the mandate of the IPCC to produce scientific assessment.	Accepted. We reformulated it.	Government of United States of America	U.S. Department of State	United States of America
16785	13	11	13	26	Integrating climate mitigation and sustainable development can increase the speed, scale, and quality of transitions. Individual beliefs, collective action, policymaking institutions, governance, economic markets, sociotechnical and ecological system can affect the transition.	Accepted. A similar point is made throughout this section.	Government of Republic of Korea	Korea Meteorological Administration (KMA)	Republic of Korea
60529	13	11	13	26	Integrating climate mitigation and sustainable development can increase the speed, scale, and quality of transitions. Individual beliefs, collective action, policymaking institutions, governance, economic markets, sociotechnical and ecological system can affect the transition.	Accepted. A similar point is made throughout this section.	HWANIL PARK	STEPI	Republic of Korea
4603	13	11	18	32	17.2 is much easier to read and follow than 17.1. However, it is striking that while chapter 17 seems to focus very strongly on transition within the context of sustainable development, 17.2 is more general. This makes 17.2 stand out. I don't think it is necessary to change that. I like this chapter and I think it is a well organized overview of different perspectives. However, I wonder whether it would make sense to move this more general chapter in front and only later focus on transition within the context of sustainable development as a more special case.	Partially accepted. We sharpened and strengthened the link between 17.1 and 17.2	Adrian Brügger	University of Bern, Dept of Consumer Behavior	Switzerland
59853	13	13			"... quality of transitions ...": transitions to what?	Partially accepted. We note that it implies transitions to a more sustainable world including climate action and justice.	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
9131	13	27			Suggest change title of this section to "Values, Worldviews, Beliefs and Social Innovation." Main concern with this section, however, is potentially how slowly values, etc. change. You may also want to tap into the work Schwartz and his colleague on values. Schwartz, S. H. (2006). Basic human values: Theory, measurement, and applications]. <i>Revue Francaise de Sociologie</i> , 47, 249–288. Schwartz, S. H., Cieciuch, J., Vecchione, M., Davidov, E., Fischer, R., Beierlein, C., Ramos, A., Verkasalo, M., Lönnqvist, J.-E., Demirutku, K., Dirilen-Gumus, O., & Konty, M.(2012) Refining the Theory of Individual Basic Values, <i>Journal of Personality and Social Psychology</i> , 103, 4, 663–688. <a href="https://doi.org/10.1037/a0029393">https://doi.org/10.1037/a0029393</a> . This is supported by the work of the Common Cause Foundation in the UK and exploration of the roles of intrinsic versus extrinsic values. See. Chilton, P., Crompton, T., Kasser, T., Maio, G. and Nolan, A. (2012) Communicating bigger-than-self problems to extrinsically-oriented audiences, Common Cause Foundation. <a href="https://valuesandframes.org/resources/CCF_report_extrinsically_oriented_audiences.pdf">https://valuesandframes.org/resources/CCF_report_extrinsically_oriented_audiences.pdf</a>	Partially accepted. The values are not seen as individually, but as world values, see e.g. <a href="https://www.weltethos.org/">https://www.weltethos.org/</a>	Brendan Barrett	Osaka University	Japan
23717	13	27	13	27	This section is rather short and should probably be developed further. It mixes the individual and collective levels, the psychological, cognitive and social dimensions. The argument is less clear than in the previous ones and reference accumulation tends to substitute for the expression of the main ideas.	Accepted. We further developed it and made more clear what is the difference and the interplay between individual and collective levels in a complex system.	Government of France	Ministère de la Transition écologique et solidaire	France
12259	13	27	14	34	You speak about some idealised Eden. What about Psychology, Beliefs and Social Regressions? QAnon? Etc. Wouldn't it be worth at least mentioning?	Accepted. There is some brief discussion of climate denialism and the implied dangers of groupthink (such as Qanon)	Christophe Deissenberg	Institute for Non-Linear Dynamic Inference	Luxembourg
29617	13	27	14	34	This section would benefit from a few additional comments in order to nuance the text. Here it seemed like anyone embracing these values are automatically acting and behaving "climate-positive". One could argue that lifestyle choices matters less than the systems and consumption patterns in the country one lives in. The section also comes across as somewhat Western-centered. It describes the spread of "Eastern" and "Aboriginal" ideas (to the west, it is implied), rather than talking about stewardship of nature as values and lifestyles that may be found in all parts of the world.	Accepted. Reframing human relationships with nature as planetary stewardship may reinforce existing tendencies to focus on eco-technological or managerial approaches  There exists a broad literature about the relationship between human nature-relationship and that it results in a deeper stewardship for nature.	Government of Norway	Norwegian Environment Agency	Norway
59855	13	28			This section needs a broader introduction, scaling down to individuals.	Accepted. The intro has been revised. Our systemic view includes individuals in social systems and as part of nature. We therein follow an Eco- and Sustainability-Psychology that does not separate the parts from the whole.	Government of United States of America	U.S. Department of State	United States of America
4601	13	28	18	34	It is interesting that this section is organized very top-down in the sense that a broad inner change has downstream effects on various behaviours. In the literature that I know, psychologists typically have a more narrow view and focus on how specific psychological concepts influence behaviours. wonder whether this section could be complemented to also include things such as attitudes, values connectedness with nature, personality traits, risk perceptions, trust, political orientation, emotions, identification with other people (e.g., social identity theory), etc. I think this would provide a more complete picture of the literature in this field.	Partially accepted. Some revisions reflect these suggestions. We included some not all aspects mentioned and often investigated; especially sustainability science suggest to have a more holistic few on humans and nature to overcome the separational science, looking at parts instead of the whole. "Connectedness with nature", "emotions" and "identification with other people" is included.	Adrian Brügger	University of Bern, Dept of Consumer Behavior	Switzerland
59857	13	36	13	40	It is good to see a section focused on "Psychology, Beliefs, and Social Innovations"; however, there are some difficulties in the framing of this section. It is a departure from the other sections and largely needs to come back to the fact that individual and communal beliefs and subsequent actions are linked in both directions. It's one of the weakest sections in the chapter, and is in need of more practical examples.	Accepted. This was revised in line with the suggestion. It was taken care that the individual and communal beliefs and subsequent actions are linked in both directions as the systemic approach asks for.	Government of United States of America	U.S. Department of State	United States of America
59859	14	1			There is no mention of social contagion, which seems highly relevant.	Accepted and revised. Research on social contagion processes such as opinion formation or the adoption of novelties, where complex mechanisms of influence and reinforcement are at work can explain why critical masses are required to initiate social changes and contribute to the understanding of higher-order interactions in complex systems (see e.g. Lacopini, Petri, Barrat et al. 2019).	Government of United States of America	U.S. Department of State	United States of America
4599	14	14	14	15	This sounds a bit strange because there is no "first channel": "Another channel through which these values and beliefs are disseminated "	Accepted. The text is revised.	Adrian Brügger	University of Bern, Dept of Consumer Behavior	Switzerland
71069	14	20	14	20	.. - delete one comma	Accepted.	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
59861	14	26	14	34	There is a role for decision science here. There are a number of factors overlooked that are as critical as those mentioned (e.g., advent of digital, agency, self-efficacy).	Rejected. This is a non-exhaustive survey.	Government of United States of America	U.S. Department of State	United States of America
23719	14	32	14	34	In addition to this work in psychology on beliefs and values, there is a body of work in sociology that explains the adoption of environmentally friendly practices that is worth mentioning here (only the last sentence of the section which mentions Shove's work refers to it).	Rejected. This is a non-exhaustive survey.	Government of France	Ministère de la Transition écologique et solidaire	France
53425	14	35			This section places a strong emphasis on <b>collaboration</b> . The sentence in line 38/39 is representative for much of the narrative of this chapter, which assumes that <b>aligning climate change with economic and political interests is the desirable way forward</b> . But I ask you: how is this possible if the current structure of the political economy is fundamentally at odds with climate mitigation? If large profits can be made and competitiveness be sustained based on overexploiting fossil fuels and other natural resources, and people, how do you envisage this alignment and collaboration? Have you thought through what you propose here? And have you taken into consideration the bulk of very good heterodox economics literature that shows how the mainstream narrative of "let's align economic, social and environmental interests" has until now justified business as usual at the expense of environment and large fractions of vulnerable populations? Also there are various (opposing) strands of Political Economy; the political economy you tap in here follows a mainstream economics narrative and logic. On p15, lines 46-48 you mention how fossil fuel industries use their power and resources to impede effective climate action, almost as a side-sentence (followed by one that emphasises collaborations/coalitions for transition again); in your use of Political Economy there is no critical investigation of profit, competitiveness, finance etc. and very little on vested interests (bottom of p15)	Accepted. Thank you for this. The political economy literature has been given more emphasis in this section.	Elke Pirgmaier	University of Lausanne	Switzerland
59863	14	35				Partially accepted. The chapter has been reorganized and the text on collective action has been revised.	Government of United States of America	U.S. Department of State	United States of America
9259	14	35	16	10	This chapter discusses institutional and governance changes. The literature on governance at the national and sub-national levels <b>focuses on Western countries</b> and suggests appropriate supplements to the progress of developing countries such as China. Supporting documents include: Jiang B, Bai Y, Wong C P, et al. China's ecological civilization program—Implementing ecological redline policy[J]. Land Use Policy, 2019, 81: 111-114. Gu Y, Wu Y, Liu J, et al. Ecological civilization and government administrative system reform in China[J]. Resources, Conservation and Recycling, 2020, 155: 104654. Hansen M H, Li H, Svarverud R. Ecological civilization: Interpreting the Chinese past, projecting the global future[J]. Global Environmental Change, 2018, 53: 195-203)	Partially accepted. Will add a little more reference to non-western countries.	Yongxiang Zhang	National Climate Center	China
59865	14	36			Delete unnecessary first sentence.	accepted	Government of United States of America	U.S. Department of State	United States of America
59867	14	36	14	41	Provide citations for the points made in this paragraph. There should be multiple ones for each point.	Accepted; note that this section has also been revised.	Government of United States of America	U.S. Department of State	United States of America
59869	14	43			Delete "concerns"	Accepted. Deleted.	Government of United States of America	U.S. Department of State	United States of America
2773	15	12	15	16	Improving local governance and the coordination between local governments and national governments is necessary to enable financial flows into pandemic-resilient and low-carbon infrastructure projects in cities.	Accepted. Adding in text reflecting this point.	Leonardo Barreto	Head of center "EU&International"	Austria
53043	15	13	15	13	missing citation: Geels (2011)	Accepted. Added.	Government of Saudi Arabia	Sustainability Advisor to the Minister Ministry of Petroleum and Mineral Resources	Saudi Arabia
2771	15	16	15	19	Coordination between local authorities and national governments regarding the way that taxes are spent is necessary to allow cities develop low-carbon, climate-resilient city infrastructure and systems. If only national governments determine how taxes are spent, this could undermine the ability of local governments to implement green infrastructure. Thus, also in this area, governance must be improved.	Partially accepted. Will mention fiscal policy.	Leonardo Barreto	Head of center "EU&International"	Austria

Comment Id	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
2775	15	34	15	35	Multiple forms of citizen's engagement exist, among others participative budget, engagement in development of sustainable energy and climate plans, living labs, energy communities etc. They can help improving local governance and facilitating the transition.	Partially accepted. This is mentioned in the psychology and social change section.	Leonardo Barreto	Head of center "EU&International"	Austria
9133	15	34	15	43	Overlooks the role of climate emergency declarations, action plans and targets in stimulating innovations. Kathryn Davidson, Jessie Briggs, Elanna Nolan, Judy Bush, Irene Håkansson, Susie Moloney, The making of a climate emergency response: Examining the attributes of climate emergency plans, Urban Climate, Volume 33, 2020, 100666, ISSN 2212-0955, <a href="https://doi.org/10.1016/j.uclim.2020.100666">https://doi.org/10.1016/j.uclim.2020.100666</a> , ( <a href="https://www.sciencedirect.com/science/article/pii/S2212095520300171">https://www.sciencedirect.com/science/article/pii/S2212095520300171</a> )	Accepted.	Brendan Barrett	Osaka University	Japan
353	15	36	15	37	such as forms of air pollution known as short-lived	Accepted	Sandro Fuzzi	ISAC CNR	Italy
355	15	36	15	37	"... such as forms of air pollution known as short lived air pollutants..." is an awkward and incorrect sentence for different reasons: 1) IPCC has adopted the IPCC has adopted the term short-lived climate forcers (SLCF) instead of short-lived climate pollutants (SLCP) throughout AR6; 2) the sentence could therefore sound as "...such as air pollutants that are at the same time short-lived climate forcers..."	Accepted	Sandro Fuzzi	ISAC CNR	Italy
49749	15	37	15	38	The official name is "SLOCAT Partnership on Sustainable, Low Carbon Transport".	Accepted	Nikola Medimorec	SLOCAT Partnership on Sustainable, Low Carbon Transport	Republic of Korea
59871	15	40			The regime serves a framework? Reword.	Accepted.	Government of United States of America	U.S. Department of State	United States of America
19845	15	42	15	42	Replace "its" by "their".  Reason: Michaelowa and Michaelowa (2017) assess only the non-state and subnational initiatives, not the multilateral climate regime.	Accepted	Axel Michaelowa	University of Zurich	Switzerland
3579	15	44	16	10	This paragraph is the sole place where the role of obstruction by 'brown' business and other interest groups, and their impact on governments is discussed!	Partially accepted. This subsection has been expanded.	Ian Gough	CASE, LSE	United Kingdom (of Great Britain and Northern Ireland)
59873	15	44	16	2	This is an extremely important point and maybe deserves more attention. How many of these interest groups overlap with the very groups holding power in different countries? Authors bring this up on page 65, but it's not really addressed there either.	Partially accepted. This discussion has been expanded.	Government of United States of America	U.S. Department of State	United States of America
53073	15	46	15	47	date of source is quite old given the fact that many industries are transitioning into cleaner technologies	Partially accepted. We supplemented this with a discussion of how industry can be a driver as well as impediment to transitions.	Government of Saudi Arabia	Sustainability Advisor to the Minister Ministry of Petroleum and Mineral Resources	Saudi Arabia
59875	16	1			By not really addressing panarchy, and adaptive cycles, the opportunity is missed to discuss managing change, cross scale change, creative destruction, importance of novelty generation, etc.	Rejected. While we appreciate this point, the discussion is beyond the scope of this section.	Government of United States of America	U.S. Department of State	United States of America
19563	16	2	16	2	Insert after "... Madden 2014": "In the past, the action of interest groups has led to distortions of mitigation policy instruments that reduced their effectiveness. Under favourable lobbying constellations strong subsidy schemes for mitigation can emerge. Renewable feed-in tariffs in Europe persisted for over two decades and were crucial for the breakthrough of wind and solar power technologies. But once competition from China led to the demise of European technology providers and the European population started to feel the pinch from the surcharges on their electricity bills, feed-in tariffs were abolished. Historically, rapid transformations of the nature required to reach 1.5°C built on either lavish public investment into the underlying infrastructure or a general notion of national emergency (Michaelowa et al. 2018)".  Reason: The empirical, historical evidence for the design of mitigation policy instruments is important and not yet covered in the chapter.  New reference: Michaelowa, Axel; Allen, Myles; Fu Sha (2018): Policy instruments for limiting global temperature rise to 1.5°C – can humanity rise to the challenge?, in: Climate Policy, 18, p. 275-286	Partially accepted. This integrated into a slightly different part of the section.	Matthias Honegger	Utrecht University, Perspectives climate research, IASS-Potsdam	Germany
2777	16	9	16	10	There is a need to incorporate women into energy policy-making processes and implement policy measures to overcome barriers to the full participation of women in the sustainable energy sector.	Partially accepted. This point will be touched upon but is elaborated more in section 17.4.	Leonardo Barreto	Head of center "EU&International"	Austria

Comment Id	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
2779	16	9	16	10	Initiatives to develop skills and create jobs targeting the youth must be pursued more vigorously, which increase collaboration between the private sector and educational institutions and improve the quality and accessibility of training, among others through digital knowledge transfer platforms	Partially accepted. This point will be touched upon but is elaborated more in section 17.4.	Leonardo Barreto	Head of center "EU&International"	Austria
59877	16	18	16	27	Under this definition, resilience is an emergent property of complex adaptive systems.	Rejected: this is a non-exhaustive survey of these theories.	Government of United States of America	U.S. Department of State	United States of America
71071	16	18	16	27	The sub-section on socio-ecological systems theory includes a brief reference to the 'planetary boundaries approach' by Johan Rockström et. al. (2009). However, what this approach means for a change to absolute, quantitative sustainability impact assessment, particularly for climate change regarding ethical approaches to downscale the global carbon budget to multiple levels (individual, industry, sector etc.) is not explained. This approach is influential in Science Based Targets as the basis for many corporate contributions to the 'Race to zero campaign' launched in context of the UNFCCC Climate Dialogues 2020. Additional literature on the topic is for instance 'Hjalsted A.W., Laurent A., Andersen M.M., Olsen K.H. Ryberg M. and I Hauschild (2020) 'Sharing the safe operating space. Exploring ethical allocation principles to operationalize the planetary boundaries and assess absolute sustainability at individual and industrial sector levels'. Journal of Industrial Ecology, 1-14, DOI: 10.1111/jiec.13050'. Also the concept of the 'doughnut economy' by Raworth, K. (2013). Defining a safe and just space for humanity. In Worldwatch Institute (Ed.), State of the World 2013 (pp. 28–38). Washington, DC: Island Press. <a href="https://doi.org/10.5822/978-1-61091-458-1_3">https://doi.org/10.5822/978-1-61091-458-1_3</a> is absent from the literature assessed in spite of its profound impact on accelerating sustainability transitions.	Rejected: this point is appreciated but this is meant to be a non-exhaustive survey of different perspectives on transitions	Philippe Tulkens	European Union (EU) - DG Research & Innovation	Belgium
59879	16	20			The cross scale aspects of resilience theory really come in under Panarchy, not the citations provided (Gunderson and Holling, 2001; Gunderson et al., 2021). Adaptive capacity is very much part of panarchy theory.	Rejected: this point is appreciated but this is meant to be a non-exhaustive survey of different perspectives on transitions	Government of United States of America	U.S. Department of State	United States of America
59881	16	23			Why call out urban resilience? There's a huge body of literature on SES resilience.	Rejected; we decided to use the example of urban resilience but appreciate this point.	Government of United States of America	U.S. Department of State	United States of America
59883	16	28	16	31	One-sentence paragraph. Combine with others.	Accepted	Government of United States of America	U.S. Department of State	United States of America
59885	16	28	16	31	There is a need to consider exacerbation by shocks and stresses -- resilience, not just mitigation and adaptation.	Rejected: this point is appreciated but this is meant to be a non-exhaustive survey of different perspectives on transitions	Government of United States of America	U.S. Department of State	United States of America
23721	16	30	16	31	We recommend to add this reference : Systems thinking, systems doing. Nat Food 1, 659 (2020). <a href="https://doi.org/10.1038/s43016-020-00190-9">https://doi.org/10.1038/s43016-020-00190-9</a>  where it's mentioned that : "It is noteworthy that several statistical and computational models now look at a much larger set of variables, as is the fact that these models have been increasingly used to explore development pathways in food production and consumption under a range of scenarios and in a more holistic way."	Rejected: this point is appreciated but this is meant to be a non-exhaustive survey of different perspectives on transitions	Government of France	Ministère de la Transition écologique et solidaire	France
59887	16	32			Define "transition theory". Not sure what this is, and there's no citation.	Rejected. This refers to socioeconomic systems theories.	Government of United States of America	U.S. Department of State	United States of America
59889	16	39	16	40	This discussion is extremely one-sided and needs revision. Arguably, these fundamental systems have spurred technological change, systems of production that could support the rapid population growth of the past century, improved health care, and many other aspects of development. "Calling into question the usefulness of current systems" is an extremely strong statement to be making and the counter-analysis needs to be provided. At a minimum, replace "may reinforce or call into question the usefulness of" with "that may be useful in consideration of transitions that may alter".	Rejected: The point is that the current systems have not led to significant reductions in climate change and other sustainable development objectives	Government of United States of America	U.S. Department of State	United States of America
59891	17	1			The first few paragraphs are sparsely cited.	Rejected. This is synthesis and conclusion of the section.	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
59893	17	1			Section 17.2.4 should go after a section that explains how societies/economies/technologies change. This one is more focused on the logic of management of change using economic tools. The options for managing or incentivizing change would best be consolidated with those in other sections in a section entitled something like "Options for Incentivizing or Directing Transition".	Accepted. The subsections have been reordered.	Government of United States of America	U.S. Department of State	United States of America
23723	17	1	17	1	The silo approach is a bit confusing, especially since the text mentions several times the need for holistic and systemic approaches. This statement also applies to disciplinary approaches. The contributions of each research field overlap, are complementary, provide nuance, and show that what is relevant on one scale is not necessarily relevant on another. More explicit links should be formulated to overcome the silo effect.	Accepted. We aimed to demonstrate how silos can be broken down.	Government of France	Ministère de la Transition écologique et solidaire	France
18591	17	1	17	47	Now that it has been published, it would be worth updating this section to take into account the new Dasgupta Review of the Economics of Biodiversity, which also links closely to climate issues	Rejected. This is beyond the scope of this section.	Government of United Kingdom (of Great Britain and Northern Ireland)	Department for Business, Energy &amp; Industrial Strategy	United Kingdom (of Great Britain and Northern Ireland)
12261	17	1	18	12	Section 17.2.4 suffers from many inexactitudes, sometimes serious, and from a poor formulation. I suggest a reformulation that I kept as close to the original text as possible. // indicates a new paragraph.	Accepted. Much of this section has been reformulated along these lines.	Christophe Deissenberg	Institute for Non-Linear Dynamic Inference	Luxembourg
12263	17	1	18	12	This section concentrates on economic theories. Economic thought figures prominently in studies using analytical models such as macroeconomic and sectoral models and integrated assessment models (IAM). The dominating economic wisdom suggests that a market economy suffices to insure adequate technological innovation and climate change mitigation, provided economic policies are implemented that adequately counteract market failures. However, in part because of their reliance on highly stylized analytical models, mainstream economic approaches are typically unable to capture trade-offs between the climate and other goals that are difficult to model or quantify. Arguably, economic thought may lend itself best to increasing the speed of transitions. //A core tenet of economic theory is that, in the absence of governmental interventions, a market economy will not reduce emissions to the socially optimal level. Corrective measures such as CO2 taxes or quotas are required to induce the firms to internalise climate and other externalities (Arrow et al. 2004; Chichilnisky and Heal 1998). A fundamental recommendation from this strand of literature is that the socially optimal level of climate mitigation lies where the marginal cost of mitigation is equal to its marginal social benefit. This equality defines the socially optimal cost of carbon, see e.g. Nordhaus, 2008; Chapter 1, Section 1.6.2 on cost-benefit analysis based on aggregated global IAMs. (NOTE: I WOULD SUGGEST A MORE GENERAL REFERENCE SUCH AS E.G. C.D. Kolstad Intermediate Environmental Economics, Oxford University Press.) A similar logic applies to public investments in low or zero emissions technologies and to research, which will not be sufficiently developed without public intervention. Furthermore, a redirection of investments to renewable energy technologies and other low-emission technologies may be needed. //These economic arguments and their underlying assumptions are important, as they underpin the integrated assessments models and the macroeconomic and sectoral model research that informs many climate policy decisions (see Chapters 3 and 4). Yet, this analysis is very stylized and conducted only at a very aggregate level, using the maximization of GDP as sole criteria for social desirability. It excludes catastrophic climate events and other adverse impacts on sustainable development that are difficult to model. (Weitzman, 2009; also see Chapter 1, Section 1.5.2). Other key issues lie in the underlying assumptions about market adjustment instruments and innovation policies./IAMs and macroeconomic models typically use the assumption that carbon prices can be used to internalise externalities like GHG emissions (IEA, 2017; 2019; Terry Barker & Eva Alexandri & Jean-Francois Mercure & Yuki Ogawa & Hector Pollitt, 2016. "GDP and employment effects of policies to close the 2020 emissions gap." Climate Policy, Taylor & Francis Journals, vol. 16(4), pages 393-414, May. DOI:	Accepted. Much of this section has been reformulated along these lines.	Christophe Deissenberg	Institute for Non-Linear Dynamic Inference	Luxembourg
12263	17	1	18	12	(continued) THE SECOND REFERENCE SEEMS QUITE ARBITRARY IN THE CONTEXT OF THIS SECTION The use of carbon pricing (GHG emissions taxes ) as an effective instrument based on modelling results has implications for public policies and private-sector investments. Yet, it is legitimate to question whether carbon pricing will be efficient if markets are inefficient (WB, 2017), particularly since IAMs and macroeconomic models typically do not capture market inefficiencies. How carbon pricing would work in practice is quite uncertain (Barker et al., 2016; Fontana and Sawyer, 2016; Meyer et al., 2018). BUT THERE ARE MANY PRACTICAL EXPERIENCES WITH CARBON PRICING, you might want to mention e.g. e.g. JENNY SUMNER, LORI BIRD & HILLARY DOBOS (2011) Carbon taxes: a review of experience and policy design considerations, Climate Policy, 11:2, 922-943, DOI:10.3763/cpol.2010.0093. // Efforts have been made to expand the scope of IAMs, for example, by incorporating air quality and public health (IEA, 2019; 2020; literature). However, the existing IAMs still do not insure a sufficiently broad coverage of impacts on sustainable development. There is a need to move beyond simple cost-benefit analyses and to incorporate issues and enablers featured in this and other chapters, including a wider range of non-climate risks, the cost-effective delivery of multiple objectives, varying forms of innovation, and possibilities for behavioural, social change, and alternative policies (Chapter 1, Executive Summary). Noteworthy is that some recent models factor in the impacts of promoting green finance (Dafermos, Y. et al., 2017). Grübler et al. (2018) have developed a climate-friendly, low energy demand (LED) scenario which assumes information technology innovations (such as the internet of things or IOT) and induced social changes (such as the sharing economy) can achieve many SDGs with low marginal abatement costs compared with other scenarios (IPCC SR15, 2018). But there are still important limits on the degree to which the models can integrate ethics, equity, and several other kinds of factors that determine well-being or happiness (Easterlin et al., 2010; Koch, 2020; Chapter 1, Section 11.1.5.3). // Despite their shortcomings, conventional economic thoughts and models have the potential for addressing climate and other sustainable development concerns if improved. For instance, basic models tend to suggest that climate-change mitigation may limit investments in sustainability because it reduces the productivity of capital by increasing the prices of energy and of the products in which energy is embodied. A more sophisticated analysis may suggest that it can stimulate innovation, leading to increases in efficiency and substitution effects with positive impacts on the accumulation of capital and productivity. This appears to be occurring in the case of innovations in end-use energy applications, generating emissions reductions and delivering other				

Comment Id	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
53427	17	1	18	32	The section on "economic theories" is severely misleading. You start the section by claiming that "this section concentrates on economics theories" but the entire section focuses on one theory: mainstream economics. You justify economic theory and instruments as important because they underpin IAMs. You offer a rather brief mentioning of critique (lines 37-42), before you continue defending the mainstream by stating that "despite the shortcomings of conventional economic thoughts... there is potential... in improved models". I suggest you either extend/adapt this section by including different schools of thought in economics on climate, or be honest and rename into "this section deals with mainstream economics"	Accepted	Elke Pirgmaier	University of Lausanne	Switzerland
59895	17	2			Delete first sentence.	Accepted	Government of United States of America	U.S. Department of State	United States of America
59897	17	2	17	32	There is a misconception in this section that models are the theories, or that they are the only or principal way of understanding how markets work. They are a broad set of possibly helpful analytical tools that provide a simplified representation of how analysts believe that the economic system works, usually based on some historical data. IAMs are just one type of tool for analysis, and may not be the primary tool for decisionmakers. The pertinent question is: What are the tools that societies can use in order to achieve the kind of change they want -- particularly toward avoiding dangerous climate change (UNFCCC, 1992) and achieving sustainable development? Theories provide conceptual models, ideally based on and tested with empirical evidence, for how options may affect the transition. Models are just an imperfect simplification of the world and how it works. This section needs rewriting to take out the emphasis on IAMs, which are just one (or two) classes of analytical tools to test theories of economics. In most cases, authors can just omit "IAMs" and replace it with "economic simulation models".	Accepted	Government of United States of America	U.S. Department of State	United States of America
59899	17	2	17	33	This section should at least identify the major lines of economic theory underlying how current economies may move toward being more sustainable. Included in this should be "free market" theories (Mills, Ricardo, Hayek, et al.) and criticisms of these theories, particularly by Polanyi, Keynes, and their successors; alternative models, such as Elinor Ostrom on polycentric decisionmaking; and others. It should include some institutional economists and political economy particularly about how private interests and governments may interact to set the rules for the economy. In the past, arguably the success of certain private interests may explain a lot about the starting point (now) of a transition to something more climate-benign and sustainable. Only if one tries to identify and understand the system one is dealing with can one begin to analyze the changes in the institutions.	Accepted	Government of United States of America	U.S. Department of State	United States of America
59901	17	7	17	8	The last sentence of this paragraph probably should be deleted because it seems without foundation (and there are not citations for this statement). Economic thought also explains (rightly or wrongly) the nature and direction of social, economic, and technological change, and therefore their influences on the climate and character of development.	Accepted	Government of United States of America	U.S. Department of State	United States of America
53075	17	9	17	11	argument limits the options into two fields , where in fact there are multiple incentives for firms to reduce emissions that the regulators represented in the local government can give.	Partially accepted.	Government of Saudi Arabia	Sustainability Advisor to the Minister Ministry of Petroleum and Mineral Resources	Saudi Arabia
59903	17	9	17	11	There is also applied evidence (not just economic theory), e.g., look at early carbon markets and uptake of electric vehicles.	Rejected. Some of these issues are mentioned but we do not do an exhaustive survey of applied evidence in this section.	Government of United States of America	U.S. Department of State	United States of America
59905	17	9	17	11	Positive incentives are definitely viable and used.	Accepted	Government of United States of America	U.S. Department of State	United States of America
59911	17	12			Pigou should be cited as the key economist proposing internalizing externalities through pricing.	Rejected; while true, we determined that the citation was rather outdated and did not make clear linkages to sustainability	Government of United States of America	U.S. Department of State	United States of America
59909	17	12	17	14	The logic for public investments or subsidies is very different than for internalizing externalities. It is based on public goods theory, for government subsidies. Government subsidies for R&D are due to a different market failure, which is that because of spillover effects and the nonexclusivity of public benefits resulting from private R&D, private entities would undervalue, and therefore underinvest, in R&D. Therefore, the argument is that public entities should invest for optimal total investment in R&D. The language here should be clarified by an economist, with appropriate academic references.	Accepted. This distinction is made.	Government of United States of America	U.S. Department of State	United States of America



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59913	17	13	17	14	The sentence beginning "furthermore" needs clarification. Who says "there is a need" and why? An economist expert in market failures and public choice theory should make that sentence accurate, with appropriate citations.	Partially accepted. The section has undergone major revisions.	Government of United States of America	U.S. Department of State	United States of America
59915	17	15	17	16	This section seems to reflect a misunderstanding of the role of models. Rewrite to say: "Analysis of market failures and inefficiencies, and other assumptions about when and why markets may provide efficient means to reduce GHG emissions or promote adaptation can be a useful platform for analyzing appropriate public interventions or supplements to markets. Development of projections of transition, and of options for steering transition, necessarily entail assumptions about how markets do or do not work well, and about the effectiveness of various policy instruments, and critical evaluation of these can be helpful in interpreting model results for decisionmaking."	Partially accepted. The section has undergone major revisions.	Government of United States of America	U.S. Department of State	United States of America
17885	17	17	17	24	The needs of developing countries are undervalued in this aggregate measures. Example - value of assets may be low in dollar terms, but existentially important. Example - aggregation of Africa, or even Sub-Saharan Africa will come to different conclusions if South Africa is included, or somewhat wealthier Northern African countries	Partially accepted: we have aimed to highlight the needs of developing countries	Robert Brecha	Climate Analytics	Germany
59917	17	17	17	45	The emphasis on modeling should reflect that models are just one class of tool for developing and assessing alternative projections of the future and the effects of public and private actions and options. The way models may be deployed reflects economic theories, and this section should be focusing on the theories (as its title says) and not the models themselves. For example, in line 32, instead of "IAMs and macroeconomic models typically calculate", the text should cite the theory based on Pareto that markets can create optimally efficient outcomes with the marginal costs of an action equal the marginal benefits (Pareto optimum), subject to a number of conditions being true (which they often are not). Based on that, Pigou theorized that taxes could be levied at the value of marginal benefits in order to get an efficient adjustment to correct for externalities. Many economic simulation models consider policy options, such as GHG emission fees, based on these theories. In line 38, delete "Making this more problematic" through "macroeconomic" and replace with "Economic research has demonstrated that real economies often depart from the assumptions on this theories rest, on such issues as actual economic behavior of decisionmakers, asymmetric information, the fairness of the starting distribution of resources, ceteris paribus (all other things being equal), and other assumptions underlying economic theories. Hence, models that depend on the simplifying assumptions of theory may not reflect real world outcomes but may nonetheless provide useful insights for decisionmakers. Economic researchers are also improving understanding of actual market and human behavior and some of the research is being incorporated into simulation models."	Partially accepted. The section has undergone major revisions.	Government of United States of America	U.S. Department of State	United States of America
28925	17	19	17	22	The cost of carbon is not the same over time. The cost of the last ton emitted is higher than the previous ones. The SCC is used in benefit-cost analysis to quantify the dollar-value of a policy's effect on climate change due to changes in greenhouse gas emissions. For policies that increase emissions, the expected increase in emissions (in tons) is multiplied by the SCC, and the result is included as part of the total estimated costs of the policy. For policies that decrease emissions, the change in emissions is multiplied by the SCC, and the result is added to the expected benefits of the policy. This is very important for decision-makers. The purpose of putting a price on a ton of emitted CO2 is to aid policymakers or other legislators in evaluating whether a policy designed to curb climate change is justified. The cost of inaction or delayed action is far more important than an urgent action. The benefits of urgent action will be higher than inaction or delayed action.	Rejected  While the comment raises an important point about the social costs of carbon, we decided not to discuss this issue as it gets into a sizable literature on pricing emissions that would be beyond the scope of this chapter.	Nathalie Hilmi	Centre Scientifique de Monaco	France
84591	17	20	17	21	Please insert the following reference after "Krausse": "Karlsson, M., Alfredsson E. & Westling N. (2020) Climate policy co-benefits: a review, Climate Policy 20, 292-316. DOI: 10.1080/14693062.2020.1724070".	Partially accepted. The section has undergone major revisions.	Mikael Karlsson	KTH Royal Institute of Technology	Sweden
78029	17	24	17	24	Suggested edit: At the end of the sentence add: "The methodological assumptions and data used for these estimates have also been called into question (Keen 2020)." Rationale: See reference. Reference: I33 Steve Keen (2020): The appallingly bad neoclassical economics of climate change, Globalizations, DOI:10.1080/14747731.2020.1807856	Partially accepted. The section has undergone major revisions.	Ron Baiman	Benedictine University	United States of America
59919	17	32	17	35	Note options for local decisions. There are many outside of IAMs.	Partially accepted. The section has undergone major revisions.	Government of United States of America	U.S. Department of State	United States of America
28927	17	36	17	36	Are fiscal policies included in public policies? Maybe be more specific? And please add a reference to support the statement here.	Partially accepted. The section has undergone major revisions.	Nathalie Hilmi	Centre Scientifique de Monaco	France

Comment Id	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
59921	17	39	17	42	Should have the typical mention of discounting and associated issues. Issues of discounting across spatial (equity) dimensions should also be mentioned.	Partially accepted. The section has undergone major revisions.	Government of United States of America	U.S. Department of State	United States of America
59923	17	43	17	45	Delete "conventional" in both places. Authors might use "existing" in line 43 instead. Replace "a" with "one" in line 45. Provide citations for the sentence beginning line 45 as well.	Partially accepted. The section has undergone major revisions.	Government of United States of America	U.S. Department of State	United States of America
17887	18	5	18	10	LED scenario also distinguishes between the global North and South as aggregated regions. It would be good to raise the distinctions here.	Partially accepted. The section has undergone major revisions.	Robert Brecha	Climate Analytics	Germany
59927	18	5	18	11	This section seems determined to criticize models (and theory) without explaining the alternatives. It also fails to discuss the benefits of using simulation models to assist analysis of issues and to provide insights into potential outcomes of alternative actions. That needs to be corrected throughout the section. A better study by Grubler to cite can be found here: <a href="https://www.sciencedirect.com/science/article/abs/pii/S0301421512002054">https://www.sciencedirect.com/science/article/abs/pii/S0301421512002054</a> . Look at the studies that cited the Grubler a study as well. It is unclear why a reference to this particular scenario would be included, in a section mostly criticizing models. The study is good but should appear with other discussions of what transitions might entail.	Partially accepted. The section has undergone major revisions.	Government of United States of America	U.S. Department of State	United States of America
59925	18	5	18	5	This is not a common acronym for "low energy demand". Suggest not including the "LED" acronym since not used elsewhere in the chapter anyway.	Accepted; Revised.	Government of United States of America	U.S. Department of State	United States of America
4695	18	5	18	6	Please see the Decent Living Energy scenario of Millward-Hopkins et al 2020.	Rejected: this is a non-exhaustive survey	Julia Steinberger	University of Lausanne	Switzerland
4693	18	8	18	11	There is by now a large literature on well-being, energy use and climate mitigation that this section ignores. Please see Lamb & Steinberger 2017, Rao & Min 2018, "Four agendas for research and policy on emissions mitigation and well-being" by Roberts et al 2020 for a start.	Rejected: this is a non-exhaustive survey	Julia Steinberger	University of Lausanne	Switzerland
59929	18	8	18	11	Delete from ""Nonetheless"" to ""integrate"". Replace with a more positive and practical statement ""Many decisions entail considerations beyond the monetary or physical relationships, such as ..."" And at the end of the sentence add ""There is a large body of theory and research on nonmonetary values and factors in decisionmaking that has not usually been included in formal evaluation of policy options. Nonetheless, some modelers have begun to incorporate methods, such as equity-weightings, into their analyses."" Then reference studies such as: <a href="https://ideas.repec.org/p/sgc/wpaper/121.html">https://ideas.repec.org/p/sgc/wpaper/121.html</a> ; <a href="https://www.sciencedirect.com/science/article/pii/S0140988306001459">https://www.sciencedirect.com/science/article/pii/S0140988306001459</a> ; <a href="https://link.springer.com/article/10.1007/s11069-018-3408-7">https://link.springer.com/article/10.1007/s11069-018-3408-7</a>	Partially accepted. The section has undergone major revisions.	Government of United States of America	U.S. Department of State	United States of America
3581	18	13			Flabby conclusion	Partially accepted. The section has undergone major revisions.	Ian Gough	CASE, LSE	United Kingdom (of Great Britain and Northern Ireland)
9135	18	13			Suggest change "psychological" to "behavioural"	Rejected. We decided to keep the term psychology though understand the suggestion.	Brendan Barrett	Osaka University	Japan
59931	18	13			This section really hasn't described contrasting theories, their predictions or their assumptions regarding climate change, or evidence.	Accepted. The section has been revised with an emphasis on these points.	Government of United States of America	U.S. Department of State	United States of America
23725	18	13	18	13	"This section has surveyed psychological, governance, economic, and systems theories." Approaches from sociology, anthropology, geography and political science are missing.	Rejected. We determined that we could not include every discipline in this non-exhaustive survey.	Government of France	Ministère de la Transition écologique et solidaire	France
59933	18	13	18	20	Not enough mention of group levels (organizations/collectives) in relationship to individual levels, though it is touched upon in the subsection conclusion.	Rejected. This is mentioned to some extent in the governance section.	Government of United States of America	U.S. Department of State	United States of America
12265	18	14	18	14	"several" è important	Partially accepted. The section has undergone major revisions.	Christophe Deissenberg	Institute for Non-Linear Dynamic Inference	Luxembourg
12267	18	14	18	15	« Whether ... distinction ». Isn't that trivial? Delete?	Partially accepted. The section has undergone major revisions.	Christophe Deissenberg	Institute for Non-Linear Dynamic Inference	Luxembourg
12269	18	15	18	20	I am unable to understand what you precisely mean.	Partially accepted. The section has undergone major revisions.	Christophe Deissenberg	Institute for Non-Linear Dynamic Inference	Luxembourg
59935	18	19	18	20	This sentence is incorrect. It reflects lack of expertise on economic theories, identification of policy options to correct for market failures and inefficiencies, public choice theory, and the premises and uses of simulation models. The easiest fix is to delete it.	Partially accepted. The section has undergone major revisions.	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
59937	18	19	18	20	Replace the last sentence with "Economic theories establish concepts of how the economy and society function and, consequently, provide the framework for considering options to alter the direction or character of economic development, and for analyzing how identified options may work."	Partially accepted. The section has undergone major revisions.	Government of United States of America	U.S. Department of State	United States of America
12271	18	22	18	22	"Such .... Co-benefits" Consider deleting as it obscures rather than enlightens.	Accepted. Add climate and sustainable development linkages.	Christophe Deissenberg	Institute for Non-Linear Dynamic Inference	Luxembourg
12273	18	23	18	25	"Similarly, ... thought." è Similarly, most of these theories pay only limited attention to alternative paradigms.	Rejected. Do not think that paradigms is the right word here.	Christophe Deissenberg	Institute for Non-Linear Dynamic Inference	Luxembourg
59939	18	24			Which theories are being referenced?	Accepted. Revised.	Government of United States of America	U.S. Department of State	United States of America
12275	18	25	18	26	"The arguably sole exception are systems theories, which consider many different aspects instead of restricting themselves on any single one."	Accepted: this section has been revised	Christophe Deissenberg	Institute for Non-Linear Dynamic Inference	Luxembourg
12277	18	26	18	29	Please check the formulation as the meaning is neither clear nor univocal.	Accepted: this section has been revised	Christophe Deissenberg	Institute for Non-Linear Dynamic Inference	Luxembourg
59941	18	27			Good theory should be system level, and most are (and most involve SES).	Partially accepted. The text has been revised but note that not all theories focus on the entire system/	Government of United States of America	U.S. Department of State	United States of America
12279	18	29	18	32	(Consider deleting "Hence" since there is no causality here). è Facilitating a transition will often require drawing upon insights from multiple schools of thought. While it is unlikely that a one-size-fits-all set of factors will be sufficient drive a transition, there is a growing body of empirical evidence that can shed light on the factors matter for this transition.	Accepted.	Christophe Deissenberg	Institute for Non-Linear Dynamic Inference	Luxembourg
23727	18	34	18	34	The link between decarbonisation transitions and sustainable transitions could be further formalised. The word transition often appears, sometimes alone, sometimes qualified, sometimes in the singular, sometimes in the plural. A diagram or a box could make it clearer and remove certain ambiguities.	Accepted. We aimed to provide clearer definitions at the beginning of this section and elsewhere in the chapter.	Government of France	Ministère de la Transition écologique et solidaire	France
59907	19	9	17	16	Another aspect of this, at least in the U.S., is that many "disruptive" companies have made their profits by capitalizing on assets that society offers for free. Uber is a great example -- using the streets are free, so they can make huge profits by clogging them up with Uber cars, to everyone's detriment. In New York city, Uber has offered helicopter rides to the airport, despite negative impacts of noise pollution (but it costs nothing to pollute). Companies are actively exploiting the things that are not priced or regulated, and it has climate implications.	Rejected: this is a non-exhaustive survey	Government of United States of America	U.S. Department of State	United States of America
23729	19	9	19	9	In this section, the possible contradictions between short-term and long-term could be made more explicit.	Rejected. While a valid critique, this is beyond the scope of this section.	Government of France	Ministère de la Transition écologique et solidaire	France
59943	19	9	19	9	There needs to be a connection back to other chapters. What constitutes a transition? It is important to think about this throughout Chapter 17. Transitions continue to be very ambiguous.	Accepted. We aimed to provide clearer definitions at the beginning of this section and elsewhere in the chapter.	Government of United States of America	U.S. Department of State	United States of America
59947	19	10			Section 17.3.2 does not discuss what makes transitions happen (or not) and remains in a very ephemeral space of discussing political statements and plans; it is more philosophical than elucidating what short- or long-term transitions may look like or what might give them direction and impetus. For example, country ""plans"" on paper have only a marginal effect on the nature of economic growth. It is the way they may (or may not) be implemented that may have effect, but this is not discussed in this chapter -- a serious omission. Consider renaming the section to reflect what is actually in it, perhaps ""Political statements and plans related to addressing climate change and sustainable development"".	Partially accepted: we aimed to revise this section and also highlighted implementation more in the governance section	Government of United States of America	U.S. Department of State	United States of America
3097	19	27	19	29	This is an important point. It warrants more up-front attention earlier in the chapter too.	Accepted	Beth Edmondson	Federation University	Australia
28093	20	3	20	4	There is no clarity on how this conclusion could be reached in the near-term. The sentence should be revised substantially.	Noted These issues are addressed by other chapters	Eleni Kaditi	Organization of the Petroleum Exporting Countries, OPEC	Austria
59951	20	3	20	4	Here and other places a transition is implied to be an end state (or end goal). Transitions need to be clearly not an end point or total end goal. When is a "transition" complete? The framing needs to be much clearer throughout.	Noted Definitions are added in 17.1 and 17.2	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
59953	20	5			It is incorrect that there has been "lack of progress" and that phrase should be removed. There is much evidence of progress, including GHG emissions below baselines, lower GHG technologies becoming available at lower costs, changes in financing to value lower climate change risks, etc. Some analysts conclude that the progress achieved to date would not result in meeting the purposes of the Paris Agreement, as expressed in avoiding temperature increases. This is to be expected as NDCs are no more than 4.5 years old as the first steps in a multi-decadal process. Those analytical conclusions are based on a number of assumptions and entail a lot of assumptions and uncertainties and, while useful as a guide, do not represent some basic "truth". The language here is very normative and judgmental and needs revision. Quote Sachs exactly in what he says, not the paraphrasing here.	Noted We are saying lack of progress and not no progress	Government of United States of America	U.S. Department of State	United States of America
46429	20	6	20	7	Please refer directly to the UN Report that is the source for the given information, not Sachs et al. citing the report. We suppose in this context you refer to the GSDR and not to the UN Secretary-General's annual progress reports. If so, please write "Global Sustainable Development Report" not "UN Sustainable Development Report 2019". Please note that the GSDR also states a lack of goal achievement for further SDGs that are relevant in the context of climate change, especially SDG 10 and SDG 12 (p. 10, Independent Group of Scientists appointed by the Secretary-General, Global Sustainable Development Report 2019: The Future is Now – Science for Achieving Sustainable Development, (United Nations, New York, 2019) <a href="https://sustainabledevelopment.un.org/content/documents/24797GSDR_report_2019.pdf">https://sustainabledevelopment.un.org/content/documents/24797GSDR_report_2019.pdf</a> ). We suggest to add further information.	Noted The UN report is mentioned	Government of Germany	Federal Ministry for the Environment, Nature Conservation and Nuclear Safety International Climate Policy	Germany
28095	20	15	20	16	Lack of finance is a major challenge for both achieving the SDGs and addressing climate change.	Accepted - finance issues were added.	Eleni Kaditi	Organization of the Petroleum Exporting Countries, OPEC	Austria
9137	20	15	20	18	This is a false narrative. The reality is more a lack of prioritization of finances for climate actions. We can easily afford to solve the climate challenge. We just choose not to and spend of other priorities. So many studies have shown how we only need to expend a small part of our GDP to address climate change - starting with the 2006 Stern Review. <a href="https://www.lse.ac.uk/granthaminstitute/publication/the-economics-of-climate-change-the-stern-review/">https://www.lse.ac.uk/granthaminstitute/publication/the-economics-of-climate-change-the-stern-review/</a> . Maybe the argument here should be that climate change spending should be mainstreamed and central to all expenditure. Also that spending undermining climate goals needs to be curtailed.	Noted Details are added and a reference to Chapter 15 on finance	Brendan Barrett	Osaka University	Japan
78031	20	18	20	18	Suggested edit: At the end of the sentence add: "(Chichilnisky and Bal 2019, p. 262-271) note that the mandatory global ETS mechanisms of the Kyoto Protocol generated orders of magnitude larger levels of funding and technology transfer from rich to poor countries than the Paris Agreement NDCs, and propose implementing a revised global ETS regime that would be conditional on profitable DAC in the rich countries, and funding transfers from rich to poor countries for joint production electric power generation and DAC plants that could (in the short term) run on fossil fuel." Rationale: See reference. Reference: Chichilnisky, Graciela and Peter Bal. 2019. Reversing Climate Change. Singapore: World Scientific Publishing Co. Pte. Ltd.	Rejected This is too specific about policy mechanisms for our chapter	Ron Baiman	Benedictine University	United States of America
59955	20	19	20	23	Include relevant discussion of adaptive governance.	Rejected This is not directly relevant to the issues addressed here	Government of United States of America	U.S. Department of State	United States of America
12281	20	24	20	25	Include a sentence or two on the state of affairs? See also lines 33-35	Accepted - revised.	Christophe Deissenberg	Institute for Non-Linear Dynamic Inference	Luxembourg
71073	20	33	20	35	The paragraph states that only a few countries have submitted their long-term low emission development strategies (LT-LEDS) to the UNFCCC. By January 2021 29 countries incl. the US, EU and several developing countries had submitted LT-LEDS to the UNFCCC. This qualifies as more than 'only a few'. Hence, good to update this paragraph with the latest status of countries LT-LEDS submissions.	Accepted - the texts were deleted.	Philippe Tulkens	European Union (EU) - DG Research & Innovation	Belgium
28097	20	34	20	35	Provision of facts and evidence or examples is necessary to state this conclusion.	Accepted - revised.	Eleni Kaditi	Organization of the Petroleum Exporting Countries, OPEC	Austria

Comment Id	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
78033	20	42	20	42	Suggested edit: At the end of the sentence add: "Both the rapid decline of the cost of solar energy and new technologies that allow for net carbon-negative retrofitting of existing (and new) fossil fuel (or renewable energy) based electric power plants so that growth of energy use and carbon removal can be simultaneously pursued, may be a key to a short term and long term just economic transition that restores our planets climate (Chichilinky and Bal 2019, p. 262-271)." Rationale: see reference. Reference: Chichilnisky, Graciela and Peter Bal. 2019. Reversing Climate Change. Singapore: World Scientific Publishing Co. Pte. Ltd.	Rejected This is not relevant in the context	Ron Baiman	Benedictine University	United States of America
12283	20	45	22	1	The logical link between the first and the second part of the sentence is unclear.	Noted	Christophe Deissenberg	Institute for Non-Linear Dynamic Inference	Luxembourg
4605	21	7	21	12	It is again striking that there is a lot of repetition. General statements about the links between sustainable development and climate change do not need to be repeated so many times. Why not say this someone early very clearly and then assume that readers got it?	Noted - revised	Adrian Brügger	University of Bern, Dept of Consumer Behavior	Switzerland
59957	21	7	21	12	Include health as an area of focal modeling.	Noted Health issues are included in the modelling review	Government of United States of America	U.S. Department of State	United States of America
28099	21	10	21	10	Sustainable development is an agreed concept, delete "broader".	Rejected - broader means compared with only climate change issues	Eleni Kaditi	Organization of the Petroleum Exporting Countries, OPEC	Austria
31621	21	13	21	14	Usage of terms: synergies and trade-offs- P21L13: "synergistic benefits and trade-offs"- can this just be synergies and trade-offs	Accepted - accordingly	Shreya Some	Ahmedabad University	India
12285	21	23	21	23	Please check the use of "and"	Accepted - editorial	Christophe Deissenberg	Institute for Non-Linear Dynamic Inference	Luxembourg
12287	21	27	21	28	Please check whether the sentence belongs here.	Accepted - the sentence was deleted.	Christophe Deissenberg	Institute for Non-Linear Dynamic Inference	Luxembourg
59959	21	35			Combine this paragraph with the following.	Rejected - this paragraph introduces the overview of DDPP scenarios.	Government of United States of America	U.S. Department of State	United States of America
59961	21	36			To what Chinese "deep decarbonization" is this referring? China's emissions continue to rise in most years, and it continues to invest in new coal-fired electricity generation. Perhaps change "deep decarbonization" with "efforts to reduce the carbon intensity of production have". "Resulted" is not a correct word here. The wording in this section is confusing. The authors are writing about modeling scenarios, not about actual actions or emissions reductions.	Accepted - "scenarios" were added.	Government of United States of America	U.S. Department of State	United States of America
71075	21	37	21	38	air pollutants (e.g. SO <sub>2</sub> , NO <sub>x</sub> , particulate matter (PM <sub>2.5</sub> ), volatile organic compounds (VOCs), and NH <sub>3</sub> ) - ir pollutants (e.g. SO <sub>2</sub> , NO <sub>x</sub> , particulate matter (PM <sub>2.5</sub> ), volatile organic compounds (VOCs), and (NH <sub>3</sub> ))	Rejected	Philippe Tulkens	European Union (EU) - DG Research & Innovation	Belgium
12289	21	38	21	38	"this2 or "thus"?"	Accepted - revised accordingly	Christophe Deissenberg	Institute for Non-Linear Dynamic Inference	Luxembourg
5609	22	3	22	3	Replace "Renewable" by low carbon sources	Accepted - revised accordingly	Michel SIMON	Retraité/ Pdt d'association	France
12291	22	6	22	6	Which carbon price? The market equilibrium price? The socially optimal price ????	Accepted - revised	Christophe Deissenberg	Institute for Non-Linear Dynamic Inference	Luxembourg
59963	22	22	22	25	There is no discussion of uncertainties, values, and depth of impact. These can be easily included.	Rejected - This section refers to several studies, and these treatments discuss uncertainties etc. indirectly.	Government of United States of America	U.S. Department of State	United States of America
20243	22	22	22	31	Similar considerations: - 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. - 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.	Noted	Nikas Alexandros	National Technical University of Athens	Greece

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23731	22	43	22	45	Adam et al. 2020 and Falconnier et al 2020 showed, respectively, the relatively low impact of climate change (from 5 to 15%) on sorghum yield and maize yield in the current production systems in Sub-Saharan Africa. However, they also highlighted the importance of intensification of systems to increase food productivity (more than double productivity), while stating that "impact of climate change in sub-Saharan Africa will increase with the amount of applied nitrogen fertilizer" to reach an impact of about 25%  Adam, M., MacCarthy, D.S., Traoré, P.C.S., Nenkam, A., Freduah, B.S., Ly, M., Adiku, S.G.K., 2020. Which is more important to sorghum production systems in the Sudano-Sahelian zone of West Africa: Climate change or improved management practices? Agricultural Systems 185, 102920. <a href="https://doi.org/10.1016/j.agsy.2020.102920">https://doi.org/10.1016/j.agsy.2020.102920</a> Falconnier, G., Corbeels, M., Boote, K., Affholder, F., Adam, M., MacCarthy, D., Ruane, A., Nendel, C., Whitbread, A., Justes, E., Ahuja, L., Akinseye, F.M., Alou, I., Amouzou, K., Anapalli, S.S., Baron, C., Basso, B., Baudron, F., Bertuzzi, P., Challinor, A., Chen, Y., Deryng, D., Elsayed, M., Faye, B., Gaiser, T., Galdos, M., Gayler, S., Gerardeaux, E., Giner, M., Grant, B., Hoogenboom, G., Ibrahim, E., Kamali, B., Kersebaum, K., Kim, S., van der Laan, M., Leroux, L., Lizaso, J., Maestrini, B., Meier, E., Mequanint, F., Ndoli, A., Porter, C., Priesack, E., Ripoche, D., Sida, T., Singh, U., Smith, W., Srivastava, A., Sinha, S., Tao, F., Thorburn, P., Timlin, D., Traore, B., Twine, T., Webber, H., 2020. Modelling climate change impacts on maize yields under low nitrogen input conditions in sub-Saharan Africa. Glob Change Biol gcb.15261. <a href="https://doi.org/10.1111/gcb.15261">https://doi.org/10.1111/gcb.15261</a>	rejected These references are particularly relevant to the agricultural sector	Government of France	Ministère de la Transition écologique et solidaire	France
12115	22	43	23	5	In addition to BECCS and afforestation, other CDR approaches may also have negative implications for food production, DACCS water resource demands, for example, may negatively affect food security e.g., Honegger, M., Derwent, H., et al., 2018. Carbon Removal and Solar Geoengineering: Potential implications for delivery of the Sustainable Development Goals. Carnegie Climate Geoengineering Governance Initiative, May 2018, New York, U.S. <a href="https://www.c2g2.net/wp-content/uploads/C2G2-Geoeng-SDGs_20180521.pdf">https://www.c2g2.net/wp-content/uploads/C2G2-Geoeng-SDGs_20180521.pdf</a>	Noted This is more an issue for Chapter 12	Paul Rouse	Carnegie Climate Governance Initiative (C2G) - The Carnegie Council for Ethics and International Affairs	United Kingdom (of Great Britain and Northern Ireland)
59965	23	1			Afforestation has been invoked as a substantial solution to climate change. However, in places such as the Great Plains of North America, afforestation would be economically devastating to ranching livelihoods, cultures, wildlife, etc. Additionally, afforestation in the Great Plains would be via Red Cedar. Red cedar regularly burns, and carbon held in them is very s compared to carbon held in grasslands.	Rejected. This is more an issue for Chapter 7	Government of United States of America	U.S. Department of State	United States of America
8179	23	1	23	5	Please check and correct: "... increases between 2010 and 2100 ..." - 2010 is past, so either the increase should have been realised already, or 2010 should be replaced by a date not earlier than 2021.	Rejected.	Joachim Rock	Thuener-Institute of Forest Ecosystems	Germany
31645	23	1	23	5	The numbers are not in Chapter 7 ES. Please check	Noted	Shreya Some	Ahmedabad University	India
86245	23	18	23	32	The benefit in term of population exposure is investigated in WG1 chapter 6 (section 6.7.3) for different SSP3 scenario. The effect of mitigation on air pollution as discussed in the literature is also summarized in section 6.6.3 and are shown in results for SSP scenario are shown in 6.7.1. If it's clear that mitigation of GHG leads to strong benefits in term of air pollution, its can be interesting to add that, however, it's not sufficient even with strong decarbonization to reach WHO guidelines in several areas (see WG1 chapter 6 executive summary).	Noted	Sophie Szopa	LSCE	France
357	23	22	23	22	"... health co-benefit of air pollution..." is a nonsense.	Accepted - editorial	Sandro Fuzzi	ISAC CNR	Italy
9261	23	27	23	28	The original text is "In India, the co-health benefits were valued at USD 3.28–8.4 trillion and those in China USD 0.27–2.31 trillion. These positive results were not seen in the other regions." This paragraph takes India and China as examples. And achieving the 2 degree or 1.5 degree temperature control goal will reduce air pollution and the health synergistic effect of the number of premature deaths. It is recommended to delete "These positive results were not seen in the other regions" and restate the value estimation of the health co-benefits.	Accepted - slightly modified.	Yongxiang Zhang	National Climate Center	China
4697	23	33	23	38	Please see the Decent Living Energy scenario of Millward-Hopkins et al 2020.	Accepted - the literatue was referred to.	Julia Steinberger	University of Lausanne	Switzerland
18593	23	40	23	43	This paragraph refers to a figure in Chapter 3 (I think this is now figure 3.39 rather than 3.43), and in both the suggestion seems to be that more ambitious climate change mitigation will have higher costs for biodiversity. Looking at the figure in Chapter 3, it seems to suggest that the best option for biodiversity would be the lowest amount of climate change mitigation, which feels very counter intuitive. I am concerned that the conclusion presented in this paragraph concentrates too much on potential trade-offs between conserving habitats or growing biofuels, rather than broader options for climate strategies. It also seems contradictory to the messaging in the biodiversity chapters in the WG2 papers, which emphasised the importance of climate change mitigation to support biodiversity conservation.	Accepted - The texts were revised according to the revised Chapter 3.	Government of United Kingdom (of Great Britain and Northern Ireland)	Department for Business, Energy & Industrial Strategy	United Kingdom (of Great Britain and Northern Ireland)

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53423	24	9			I suggest to incorporate more recent degrowth references by key degrowth researchers, e.g. Kallis, Paulsen, D'Alisa, Demaria 2020. The case for Degrowth. Polity, London.	Rejected. - no peer-reviewed paper	Elke Pirgmaier	University of Lausanne	Switzerland
31639	24	14	24	14	P24L14: "The IAMs assess climate-change mitigation and SDGs with a stylised manner, but many of the SDGs are closely related to distribution issues not only between but also within countries"- suggest mentioning which goals?	Rejected.	Shreya Some	Ahmedabad University	India
76463	24	24	24	46	Chapter 6 contains serious flaws in not stressing the use of nuclear energy as a primary energy source for emissions reductions. Historically it has the following main advantages: 1.It is faster to implement on a fleet basis than renewables and this has been outlined in data from the World Bank and B.P. Statistical review gathered by Carl Hellesen from Uppsala University. Nuclear energy programmes in Sweden, France, Finland, Belgium all exceeded the rate of implementation required, on a per capita basis, to meet a 2 degree C target. Not one nation has achieved such as target with wind + solar + geothermal +biofuels. The vast majority of nations have implemented their effective low carbon generation with nuclear energy on a per capita basis at two or three times the collective rate of all renewables. 2.This should not come as a surprise. Renewables use at least ten times and likely 20 times the non-renewable materials that are deployed with nuclear energy. By any measure, nuclear energy is more sustainable than systems deploying renewables. 3.Transmission grids distributing electricity from nuclear power plants are smaller and more consolidated. They are faster to build and given their lower materials consumption are more sustainable. 4.Nuclear energy powered grids require fewer ancillary services or redundant backup power supplies. All parts of the system from generation, transmission through to substations operate at higher capacity factors and are thereby less materials hungry and are more sustainable. 5.The benefits listed above flow through into the research outcomes from MIT and our Australian research which has demonstrated that at deep carbon reductions, a system that includes nuclear energy will supply electricity at less than half the cost of one that excludes it. While wind and solar have lower levelised costs of energy than nuclear power plants, on a system levelised cost of energy basis they are more expensive. In the laboratory of real life this is evident when one compares power prices in: •Germany and Denmark vs France and Sweden •California vs the rest of the USA •South Australia vs the rest of the eastern states of Australia.	Noted	Robert Parker	Nuclear for Climate Australia	Australia
59967	24	25			Delete "As pointed out in Chapter 6"	Accepted	Government of United States of America	U.S. Department of State	United States of America
5611	24	25	24	26	Replace "Renewable" by low carbon sources on lines 26 and 29. The whole chapter 17.3.2.2 is confusing as the author consider that low carbon source means necessarily Renewable energy, which is not correct. Nuclear is emitting about 8 times less than solar for example. IEA confirms that nuclear development will be more effective with regard to mitigation of GHG emissions that wind and solar, and I am embarrassed to look IPCC promoting only renewables, forgetting the major factor of CO2 emissions reduction in the next decades.	Rejected We are not reviewing all low carbon sources but are here specifically here focussing on renewable energy	Michel SIMON	Retraité/ Pdt d'association	France
43403	24	36	24	37	Delete "Phasing out fossil fuels from energy systems is technically possible and is estimated to be relatively low in cost (Chapter 6)." This sentence is not correct. As it is mentioned in Chapter 6 (section 6.7) phasing out fossil fuels has many economic and social costs as well as technical problems for many countries.	Noted. We have a very extensive section subsequently to the session on renewable energy, which discuss social and economic issues related to phasing out fossil fuels	sadegh zeyaeyan	Head of national center for forecasting and weather hazards management of Islamic Republic of Iran Meteorological Organization (IRIMO)	Iran
50309	24	36	24	37	Delete "Phasing out fossil fuels from energy systems is technically possible and is estimated to be relatively low in cost (Chapter 6)." This sentence is not correct. As it is mentioned in Chapter 6 (section 6.7) phasing out fossil fuels has many economic and social costs as well as technical problems for many countries.	Similar to previous comment	Government of Iran	Islamic Republic of Iran Meteorological Organization (IRIMO)	Iran
5613	24	45	24	45	Replace "Renewable" by low carbon sources	Rejected The section is specifically focussing on renewables	Michel SIMON	Retraité/ Pdt d'association	France
76465	25	1	25	8	Renewable have co-benefits over coal and gas however, compared to nuclear energy this claim cannot be sustained. Nuclear energy has a lower environmental foot print, a lower LCA for carbon emissions and creates more well educated and stabilised communities. This section needs to be re-drafted	Rejected We are here not compared with nuclear energy	Robert Parker	Nuclear for Climate Australia	Australia
17889	25	9	25	28	Coal is mentioned primarily here in the discussion of stranded assets. Natural gas should also be mentioned; net-zero emissions by mid-century will lead to stranded NG assets if these are built from now going forward, given lifetimes on the scale of 30-40 years for power plants and longer for pipelines.	Noted. Coal is only mentioned here as an example	Robert Brecha	Climate Analytics	Germany

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76467	25	20	25	28	Nuclear energy can be implemented for more quickly and with less disruption to the existing asset base. Nuclear power plants, especially the new generation of small reactors can replace coal and gas plants at existing brownfield sites. This results in far less grid expansion and infrastructure upgrading.	Noted. We are referring to a study where various examples of bottom up policy making are mentioned	Robert Parker	Nuclear for Climate Australia	Australia
59969	25	29	25	30	Need a better description of bottom-up policymaking.	Noted	Government of United States of America	U.S. Department of State	United States of America
2781	25	29	25	35	A number of energy transition processes in cities and towns promote the involvement of multiple stakeholders from different societal domains in decision-making, including citizens, through democratic approaches to learn from each other, discuss, and provide recommendations on how to address key issues.	Noted	Leonardo Barreto	Head of center "EU&International"	Austria
2783	25	29	25	35	Participatory policy and decision-making processes involving citizens increase the transparency and accountability of municipal activities	Noted	Leonardo Barreto	Head of center "EU&International"	Austria
3099	25	37	27	2	This is a fabulous case study. Fantastic work.	Noted	Beth Edmondson	Federation University	Australia
12293	25	42	25	42	Please consider deleting "also".	Accepted	Christophe Deissenberg	Institute for Non-Linear Dynamic Inference	Luxembourg
12221	25	43	25	46	Transitioning away from coal and also reducing the competition and strand put on water and land resources due to the increase deployment of renewables can be facilitated by nuclear power. The land required to produce electricity from nuclear is significantly lower than other energy sources (for a 1.800 MW plant, nuclear requires 4 square km, wind 437 square km and solar 56 square km – land which can be used for agriculture or urban development). This paragraph should also make reference to other low carbon energy sources such as nuclear as appropriate transition sources.	Noted	Lavinia Rizea	SN Nuclearelectrica SA	Romania
9263	26	16	26	30	The original text is "Coal has hitherto been the dominant energy source in China and has accounted for more than 70% of its total energy consumption for the past twenty years, falling to 64% in 2015 (NBS, 2018). In the 13th Five Year Plan (2016-2020), for the first time China included the target of a national coal consumption cap of 4.1 billion tons for 2020, and a goal of reducing the primary energy share of coal to 58% by 2020 from the level of 64% in According to the "Statistical Communiqué of the People's Republic of China on National Economic and Social Development in 2019", China's coal consumption accounted for 57.7% of total energy consumption in 2019, and the 2020 target stated in the text has been achieved ahead of schedule. It is recommended to update accordingly. To objectively demonstrate the latest achievements of China's energy transition.	Accepted	Yongxiang Zhang	National Climate Center	China
37519	26	31	26	35	The IEA 2 degree scenario can at best provide an assessment of the possibility of likely stranded capacities of coal based generation. However, it does not follow that relatively new capacities should necessarily face early retirement in India.	Noted	Government of India	Ministry of Environment, Forests and Climate Change	India
71077	26	36	26	47	Use justify for text layout	Accepted	Philippe Tulkens	European Union (EU) - DG Research & Innovation	Belgium
74291	26	36	27	2	Germany made a decision to shut down its carbon-free nuclear generation, but maintains significant coal generation utilizing lignite, the most polluting of coal technologies. Germany's carbon reduction achievement efforts would have made significantly more progress if it had taken an opposite approach and shut down coal units and maintained its nuclear fleet. The fact that the report justifies this approach due to the employment of coal miners, but makes no comment about the highly compensated and skilled workers in the nuclear industry whose positions were eliminated is a significant gap. Frankly, the German policy regarding coal and nuclear makes no sense from a carbon reduction standpoint.	Noted	Jeffrey Merrifield	Pillsbury Law Firm	United States of America
5617	26	42	26	43	Author writes : "economic problems resulting from the growing use of renewables". What is the basis for that assertion? Since 2010, electricity production from fossil fuels in Germany has decreased from 297TWh to 222 TWh. On the same period of time Wind+solar have increased from 16 TWh to 183TWh. This means that the major part of renewable has replaced a carbon free electricity produced so far by nuclear reactors. Coal mines encounter now local opposition, but not strong enough to create economic problems.	The reference seems to be misplaced	Michel SIMON	Retraité/ Pdt d'association	France



Comment Id	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
9139	27	4	27	8	Actually we are finally starting to get very detailed studies on the technical, environmental and socio-economic impacts of rapid decarbonisation and the energy transition. For instance, see most recent report from Princeton University Net Zero America Project. <a href="https://acee.princeton.edu/rapidswitch/projects/net-zero-america-project/">https://acee.princeton.edu/rapidswitch/projects/net-zero-america-project/</a> . Also see report on Rewiring America - <a href="https://www.rewiringamerica.org">https://www.rewiringamerica.org</a> . Finally, another good example is The Goldman School of Public Policy at UC Berkeley 2025 The Report. <a href="https://www.2035report.com">https://www.2035report.com</a>	Noted The references are to more general issues that the focus of the sub-section	Brendan Barrett	Osaka University	Japan
18595	27	43	27	45	If the information is available, it would be helpful to elaborate a little on the relative extent of environmental damage from lithium mining, as it is not clear here to what extent the sustainable energy use of lithium compares against the damage caused by its extraction.	Noted We are referring to Chapter 10 on more details on the issues	Government of United Kingdom (of Great Britain and Northern Ireland)	Department for Business, Energy & Industrial Strategy	United Kingdom (of Great Britain and Northern Ireland)
31641	27	46	27	47	P27L46-47: "Will lithium mining replace the economic value of oil and coal extraction in resource-rich countries in Africa?"- ending a section with question? Can this be in Knowledge gaps?	Noted This sentence is deleted	Shreya Some	Ahmedabad University	India
59971	27	46	27	47	Why this particular question? Suggest deletion.	Noted This sentence is deleted	Government of United States of America	U.S. Department of State	United States of America
59973	28	1			Discussion of stranded assets actually began pages earlier, not here.	Noted	Government of United States of America	U.S. Department of State	United States of America
17287	28	1	31	33	There are increasing calls that a 'just transition' must recognise the role of care and care work and that this has been a huge gap in policy and initiatives on a just transition so far. Care jobs are green jobs, but so far any move towards a green economy and a just transition fails to account for the role of care work. Cohen and MacGregor (2020) highlight this, particularly in light of COVID-19, and argue that any just transition must reduce and redistribute the care work that is overwhelming performed by women and often for free. Lines 33-39 of this section gestures to the gendered implications of mitigation, but should also mention the gendered implications of a just transition. If a just transition through mitigation pursues technological advance and market-fixes this will disproportionately benefit male dominated STEM jobs as green jobs (see Alaimo, 2009; Seager, 2009; Nelson, 2012), while still relying on un- or under-paid care work dominated by women. Again, ecofeminists have been making these arguments for decades and, arguably, there are even more relevant now in light of the care work performed disproportionately by women in response to COVID-19. Attention to care work must be at the foundation of any and all discussions of a covid-recovery and a just transition. Citations: Cohen, M., & MacGregor, S. (2020). Towards a feminist green new deal for the UK: A PAPER FOR THE WBG COMMISSION ON A GENDER-EQUAL ECONOMY. Women's Budget Group. Alaimo, S., (2009). 'Insurgent Vulnerability and the Carbon Footprint of Gender', Kvinder, Køn og Forskning (Women, Gender and Research), 3-4, pp. 22-35. Seager, J., (2009). 'Death by Degrees: Taking a Feminist Hard Look at the 2° Climate Policy', Women, Gender and Research (Kvinder, Køn & Forskning), 3-4, pp. 11-21. Nelson, J., (2012). 'Is Dismissing the Precautionary Principle the Manly Thing to Do? Gender and the Economics of Climate Change', IDEAS Working Paper Series, 12(04), pp. 1-21.	Noted	Joanna Flavell	University of Manchester	United Kingdom (of Great Britain and Northern Ireland)
59975	28	1	31	33	Section 17.3.2.3 provides insights into "just transitions". Stranded assets are part of it, but the authors clearly show how extensive the vulnerabilities are for people and countries that are currently dependent on fossil fuels for their livelihoods. Climate change mitigation needs to explicitly include planning for fossil-fuel dependent countries and populations, and this planning needs to incorporate climate justice concerns articulated in Section 17.4.5.	Noted	Government of United States of America	U.S. Department of State	United States of America
59977	28	2	28	3	Make sure that this is critically defined: "sunk cost fallacy for stranded assets".	Noted	Government of United States of America	U.S. Department of State	United States of America
59979	28	12	28	15	Use caution when talking about this. Lots of disposables are being used during the COVID-19 pandemic. Consider the life cycle, not just a single point in time.	Noted	Government of United States of America	U.S. Department of State	United States of America
71079	28	22	28	22	Paris agreement - Paris Agreement	Noted	Philippe Tulkens	European Union (EU) - DG Research & Innovation	Belgium
23733	28	26	28	26	Concerning the reference to "fossil fuel dependent countries" in this sentence, these remarks are also true at the level of communities, places and individuals. This would help to show that the co-benefits of transition are also valid in developed countries for poor and/or excluded populations or marginalised regions.	Noted	Government of France	Ministère de la Transition écologique et solidaire	France
71081	28	34	28	35	Global investments in energy are expected to shrink by 20% 'this year'. However, the year is not specified. If it is 2020 and the decline in investments is due to Covid-19, the text should explain this.	Noted	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
23735	29	15	29	15	"The 'Just Transition' concept has evolved over the years" The link between intersectional inequalities and vulnerability should be further deepened in relation to just transition. It helps to connect the issues of development and justice (environmental, social, political, economic, spatial) and the mitigation/adaptation continuum in the perspective of a transition that requires structural changes.	Noted	Government of France	Ministère de la Transition écologique et solidaire	France
53077	29	25	29	34	Terms of reference should be broader than the Paris agreement.	Noted	Government of Saudi Arabia	Sustainability Advisor to the Minister Ministry of Petroleum and Mineral Resources	Saudi Arabia
23737	29	27	29	27	We suggest to add "along with the creation of decent work and quality jobs"	Noted	Government of France	Ministère de la Transition écologique et solidaire	France
23739	29	35	29	35	"The economic implications of the transition will be felt by developing countries with high degrees of dependence on hydrocarbon products as a revenue stream, as they are exposed to reduced fiscal incomes, given the low demand for oil and low oil prices and the associated economic fallout of the pandemic." this is also true in developed countries, especially in a post-covid context.	Noted	Government of France	Ministère de la Transition écologique et solidaire	France
59981	29	35	29	35	Inequality within a given country also should be highlighted; extremes (e.g., Gini coefficient type argument) is really important.	Noted	Government of United States of America	U.S. Department of State	United States of America
12223	29	41	29	43	We understand the pressure to achieve carbon neutrality by 2050, but we believe that mitigation at all costs is not the sole solution to achieve the targets. Energy systems need to focus on resilience as well, given the increasing impact of climate drivers on the energy systems. Please refer to the Sustainable Economic Relaunch Plan issued by the International Energy Agency and the International Monetary Fund which addresses 3 main pillars: economic increase, creation of jobs and the resilience and sustainability of the energy system. This plan provides a clear role for nuclear power both through current projects and life extension as well as through nuclear innovative projects such as SMRs, nuclear energy being considered as irreplaceable in reaching an economic growth of 1,1% post crisis, the creation of 9 million jobs per year and the reduction of emissions by 4,5 billion tones until 2023. <a href="https://www.iea.org/reports/sustainable-recovery">https://www.iea.org/reports/sustainable-recovery</a>	Noted	Lavinia Rizea	SN Nuclearelectrica SA	Romania
28101	29	41	29	43	Adaptation is critical for all developing countries and cannot become muted. This sentence should be revised substantially or be deleted.	Noted	Eleni Kaditi	Organization of the Petroleum Exporting Countries, OPEC	Austria
71083	29	41	29	43	Include also SDG14 and SDG15 - maintenance of the integrity of the natural capital. The sustainable transition to carbon neutrality cannot be done at the detriment of the natural capital.	Noted	Philippe Tulkens	European Union (EU) - DG Research & Innovation	Belgium
23741	29	44	29	44	"Consequently, the transition imperative reduces the scope for local priority setting and ignores the additional risks faced by countries with the least capacity to adapt" this is also true for communities, individuals or places, especially in a post-covid context	Noted	Government of France	Ministère de la Transition écologique et solidaire	France
3583	30	1			The reference to different points of departures in different countries is critical but immediately dropped. There is no recognition, let alone discussion, of the huge role of the US, EU and China in global emissions. I understand this is partly addressed in Chapter 13 - so cannot their conclusions be fed in here?	Noted	Ian Gough	CASE, LSE	United Kingdom (of Great Britain and Northern Ireland)
12225	30	5	30	7	The consideration that the economic transition will create winners and losers is in contradiction to the statement in the executive summary of this chapter which says that the transition will be fair for all and leave no one behind. We consider that "winners and losers" is not the appropriate wording even more so since the paragraph seems to blame the losers for their poor decisions in the transition.	Noted	Lavinia Rizea	SN Nuclearelectrica SA	Romania
71085	30	8	30	20	Given the multiple claims to define what a 'Just transition' is about (e.g. climate, environmental, energy or justice and regarding distributive, procedural and recognition aspects), it seems unbalanced with a long paragraph that only references one source, Forsyth (2014).	Noted	Philippe Tulkens	European Union (EU) - DG Research & Innovation	Belgium
59983	30	16	30	17	Delete this sentence.	Noted	Government of United States of America	U.S. Department of State	United States of America
59985	30	21	30	21	Provide examples.	Noted	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
12227	30	29	30	30	Text says that emphasis should be placed on the management of the transition, not the speed, which is in contradiction to the above reference (page 29, 41 to 43) which states that there is time pressure and speedy process is necessary no matter the cost.	Noted	Lavinia Rizea	SN Nuclearelectrica SA	Romania
23743	30	29	30	32	"Emphasis should be placed on the management of the transition rather than the speed – for instance, if in the rush to build new hydropower energy sources implies that populations find themselves displaced, then this constitutes human rights violations (Piggot et al, 2019; Castro et al, 2016)." This absolutely essential point should be included in the executive summary.	Noted	Government of France	Ministère de la Transition écologique et solidaire	France
4147	30	31			should say 'this may violate a number of human rights'.	Noted	Jane McAdam	University of New South Wales	Australia
59987	30	38			Use the term "people".	Noted	Government of United States of America	U.S. Department of State	United States of America
59989	31	9			There needs to be a segue to these definitions.	Noted	Government of United States of America	U.S. Department of State	United States of America
59991	31	24	31	24	Supply and demand issues are important as well.	Noted	Government of United States of America	U.S. Department of State	United States of America
14841	31	24	31	27	The water crisis and the COVID-19 crisis are two very different societal challenges, but both have some key characteristics in common. This offers room for solutions. 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.	Noted	Tom van der Voorn	Institute of Environmental Systems Research	Netherlands
14843	31	24	31	27	Agency also requires visions of the future and vision champions see e.g., Van der Voorn T, Quist J. Analysing the Role of Visions, Agency, and Niches in Historical Transitions in Watershed Management in the Lower Mississippi River. Water. 2018; 10(12):1845. <a href="https://doi.org/10.3390/w10121845">https://doi.org/10.3390/w10121845</a>	Noted	Tom van der Voorn	Institute of Environmental Systems Research	Netherlands
19965	31	24	31	27	The water crisis and the COVID-19 crisis are two very different societal challenges, but both have some key characteristics in common. This offers room for solutions. 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. <a href="https://doi.org/10.1021/acsestwater.0c00041">https://doi.org/10.1021/acsestwater.0c00041</a>	Noted	Tom van der Voorn	Institute of Environmental Systems Research	Netherlands
9745	31	35	31	40	Cite section 12.6.2 which deals with cross-sectoral mitigation policies.	Noted. We are referring to the sectoral chapters in the sub sections.	Mustafa Babiker	Saudi Aramco	Saudi Arabia
12117	31	41	21		The broader implications of land base Carbon Removal technologies for delivering sustainable development are not currently reflected in the text. The literature suggests that many CDR techniques could have significant adverse effects on delivery of the SDGs. However, positive effects for non-climate related SDG delivery beyond climate action are also possible, under specific conditions (e.g., remediating ecosystems, providing energy and decent work and enhancing food production). Refs: Dooley, K. & Kartha, S. (2018). Land-based negative emissions: risks for climate mitigation and impacts on sustainable development. Int Environ Agreements, 18(1), 79–98. Humpenöder, F., Popp, A., Bodirsky, B. L., Weindl, I., Biewald, A., Lotze-Campen, H., ... & Rolinski, S. (2018). Large-scale bioenergy production: How to resolve sustainability trade-offs?. Environmental Research Letters, 13, 1-16. Bonsch, M., Humpenöder, F., Popp, A., Bodirsky, B., Dietrich, J. P., Rolinski, S., ... & Stevanovic, M. (2016). Trade-offs between land and water requirements for large-scale bioenergy production. GCB Bioenergy, 8, 11-24. 81. Heck, V., Gerten, D., Lucht, W., & Boysen, L. R. (2016). Is extensive terrestrial carbon dioxide removal a 'green' form of geoengineering? A global modelling study. Global and Planetary Change, 137, 123-130.	Accepted.A more elaborated discussion has been included in the subsection and more references has been added, however land based mitigation in details is in chapter 12.	Paul Rouse	Carnegie Climate Governance Initiative (C2G) - The Carnegie Council for Ethics and International Affairs	United Kingdom (of Great Britain and Northern Ireland)
71087	31	41	32	2	Agriculture is deeply connected to SDG14 as well (eutrophication among other).	Noted. Chapters 7 and 12 have mapped this in Figure 71.	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
80701	32	7	32	15	BECCS is not carbon neutral in the near-term—with a carbon deficit for many years, generally several decades to a century—that is crucial for mitigating emissions and avoiding hitting the 1.5°C mark. Danielle Venton, Core Concept: Can bioenergy with carbon capture and storage make an impact?. PNAS (2016); Letuq, P. (2020) GHG Displacement Factors of Harvested Wood Products: the Myth of Substitution, Nature Scientific Reports 10:1-9; Mary S. Booth, Not carbon neutral: Assessing the net emissions impact of residues burned for bioenergy, Environ. Res. Lett. 13 (21 February 2018); Sterman J. D., et al. (2018) Does replacing coal with wood lower CO2 emissions? Dynamic lifecycle analysis of wood bioenergy, Environ. Res. Lett. 13(015007):1-10, 1 (“We simulate substitution of wood for coal in power generation, estimating the parameters governing NPP and other fluxes using data for forests in the eastern US and using published estimates for supply chain emissions. Because combustion and processing efficiencies for wood are less than coal, the immediate impact of substituting wood for coal is an increase in atmospheric CO2 relative to coal. The payback time for this carbon debt ranges from 44–104 years after clear-cut, depending on forest type—assuming the land remains forest. Surprisingly, replanting hardwood forests with fast-growing pine plantations raises the CO2 impact of wood because the equilibrium carbon density of plantations is lower than natural forests. Further, projected growth in wood harvest for bioenergy would increase atmospheric CO2 for at least a century because new carbon debt continuously exceeds NPP. Assuming biofuels are carbon neutral may worsen irreversible impacts of climate change before benefits accrue. Instead, explicit dynamic models should be used to assess the climate impacts of biofuels.”). Furthermore, even if BECCS were net zero or negative in the relevant next couple of decades, which it is not, large-scale biodiversity development requires vast land-use changes, which may have significant implications for food security and biodiversity. National Academies of Sciences, Engineering, and Medicine, Negative Emissions Technologies and Reliable Sequestration: A Research Agenda,10 (2019) (“Because food demand is expected to double by mid-century, repurposing a significant amount of current agricultural land to produce feedstocks for BECCS or for afforestation/reforestation might have a significant effect on food availability and food prices, with far-reaching effects on national security and biodiversity.”). The IPCC Special Report on Climate Change and Land warns that high implementation of BECCS (11.3 GtCO2 yr-1 in 2050) could increase the population at risk of hunger by up to 150 million people and could have significant impacts on desertification and land degradation. IPCC, Summary for Policymakers, In: Climate Change and Land, an IPCC Special Report on Climate Change, Desertification, Land Degradation, Sustainable Land Management, Food Security, and Greenhouse Gas Fluxes in Terrestrial Ecosystems, 27 (2019) (“Impacts on adaptation, desertification, land degradation and food security are maximum potential impacts, assuming carbon dioxide removal by BECCS at a scale of 11.3 GtCO2 yr-1 in 2050, and noting that bioenergy without CCS can also achieve emissions reductions of up to several GtCO2 yr-1 when it is a low carbon energy source (2.6.1; 6.3.1).	More literatures has been added. The details on BECCS is mentioned in chapter 12.	Durwood Zaelke	Institute for Governance & Sustainable Development	United States of America
80701	32	7	32	15	(continued) Studies linking bioenergy to food security estimate an increase in the population at risk of hunger to up to 150 million people at this level of implementation (6.3.5). The red hatched cells for desertification and land degradation indicate that while up to 15 million km2 of additional land is required in 2100 in 2°C scenarios which will increase pressure for desertification and land degradation, the actual area affected by this additional pressure is not easily quantified (6.3.3; 6.3.4).”). Using BECCS to draw down between 2 and 10 Gt CO2 annually would require the dedication of land equivalent to the size of India, and possibly even double this amount, to support biomass production, introducing daunting logistical issues. Anderson K. & Peters G., The Trouble with Negative Emissions, Science 354:182–183 (2016) (“Moreover, the scale of biomass assumed in IAMs—typically, one to two times the area of India—raises profound questions about carbon neutrality, land availability, competition with food production, and competing demands for bioenergy from the transport, heating, and industrial sectors. The logistics of collating and transporting vast quantities of bioenergy—equivalent to up to half of the total global primary energy consumption—is seldom addressed. Some studies suggest that BECCS pathways are feasible, at least locally, but globally there are substantial limitations. BECCS thus remains a highly speculative technology.”). BECCS also faces infrastructure-based limits from the lack of suitable long-distance biomass and CO2 transport. Baik E. et al., Geospatial Analysis of Near-term Potential for Carbon-negative Bioenergy in the United States, Proc. Nat’l. Acad. Sci. 115(13):3290–3295 (2018) (“Previous BECCS deployment assessments have largely overlooked the potential lack of spatial colocation of suitable storage basins and biomass availability, in the absence of long-distance biomass and CO2 transport. These conditions could constrain the near-term technical deployment potential of BECCS due to social and economic barriers that exist for biomass and CO2 transport...If the total biomass resource available in the United States was mobilized for BECCS, an estimated 370 Mt CO2-y-1 of negative emissions could be supplied in 2020. However, the absence of long-distance biomass and CO2 transport, as well as limitations imposed by unsuitable regional storage and injection capacities, collectively decrease the technical potential of negative emissions to 100 Mt CO2-y-1.”). Moreover, large-scale BECCS could put significant strains on global freshwater use, biosphere integrity, and biogeochemical flows. Heck V. et al., Biomass-based Negative Emissions Difficult to Reconcile with Planetary Boundaries, Nature Climate Change 8:151–155 (2018) (“[W]hile large-scale BECCS is intended to lower the pressure on the [planetary boundaries (PB)] for climate change, it would most likely steer the Earth system closer to the PB for freshwater use and lead to further transgression of the PBs for land-system change, biosphere integrity and biogeochemical flows.”).				
80701	32	7	32	15	(continued) Because of its many adverse consequences, bioenergy raises environmental justice issues. Wood pellet production facilities are often located in communities of color and environmental justice communities, Purifoy D., How Europe’s Wood Pellet Appetite Worsens Environmental Racism in the South (5 October 2020) (“From Northampton County to Alabama’s Black Belt, residents and activists say companies such as Enviva exploit mostly communities of color with promises to build up busted local economies with a “green energy” industry. Instead, communities hosting wood pellet facilities are not only further burdened by pollution and other local dangers, they are also entangled in yet another climate damaging trend—the destruction of biodiverse hardwood forests and the rise of monoculture tree plantations to produce energy that appears to pose climate threats similar to coal.”). The production process releases harmful pollutants into the air and increases noise pollution, while the harvesting decreases biodiversity in the surrounding areas. Danielle Purifoy, How Europe’s Wood Pellet Appetite Worsens Environmental Racism in the South (5 October 2020) (“Northampton County residents such as Joyner are more immediately concerned about the acute impacts of wood pellet manufacturing, from local clear cutting of privately owned forests to the 24/7 production process. [...] In addition to the noise from grinding trees and truck traffic, Alston and others complain about a constant cloud of dust flowing from the plant onto their homes, cars, gardens and into their lungs.”). Environmental Integrity Project (26 April 2018), Dirty Deception: How the Wood Biomass Industry Skirts the Clean Air Act, 4-5 (“[Environmental Integrity Project’s] survey reveals that these facilities emit dangerous amounts of air pollution, and further finds that state agencies consistently fall well short of their duty to ensure that these facilities control their pollution to the levels required by law, frequently due to misleading information supplied by the industry. As a result, many large pellet mills have been allowed to emit air pollution, especially volatile organic compounds (VOCs) and hazardous air pollutants at levels well above legal limits for years at a time.”). These harms occur while the industry is falling short of its proposed climate and job goals. Note the environmental movement backlash against BECCS. See Anderson K. & Peters G. (2016) The trouble with negative emissions, SCIENCE 354:182–183.				

Comment Id	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
80701	32	7	32	15	(continued) Even if BECCS were net zero or negative in the relevant next couple of decades, which it is not, CCS has not been perfected at scale nor has it received social acceptability. Governance gaps also exist. See Climate Geoengineering Governance Initiative (C2G2), Governing large-scale carbon dioxide removal: are we ready? (2018); Gregory Nemet et al., Negative emissions—Part 3: Innovation and upscaling, Environ. Res. Lett. (May 2018); European Academies Science Advisory Council, Negative emission technologies: What role in meeting Paris Agreement targets? (Feb 2018) (“CCS plans in Europe have been shelved so that whatever experience is being gained globally is outside Europe. The loss in momentum in implementing CCS technologies not only has serious implications for mitigation pathways, but also one of the most commonly cited NETs [negative emissions technologies] (BECCS) assumes the availability of cost effective ‘off-the shelf’ CCS, while another (direct air capture) relies on the widespread availability of CO2 storage. At present, economic incentives for deploying CCS are inadequate (whether through the very low carbon price or targeted government support), while those for NET development are lacking.”); Andersen & Peters, The Trouble with Negative Emissions, Science (Oct 2016). One study estimates that current rate of increase in CCS is 100 times lower than needed to meet the 2C target. See Haszeldine et al. (April 2018), Negative emissions technologies and carbon capture and storage to achieve the Paris Agreement commitments, Philosophical Transactions of the Royal Society.				
80845	32	7	32	15	BECCS is not carbon neutral in the near-term—with a carbon deficit for many years, generally several decades to a century—that is crucial for mitigating emissions and avoiding hitting the 1.5°C mark. Danielle Venton, Core Concept: Can bioenergy with carbon capture and storage make an impact?, PNAS (2016); Letuq, P. (2020) GHG Displacement Factors of Harvested Wood Products: the Myth of Substitution, Nature Scientific Reports 10:1-9; Mary S. Booth, Not carbon neutral: Assessing the net emissions impact of residues burned for bioenergy, Environ. Res. Lett. 13 (21 February 2018); Sterman J. D., et al. (2018) Does replacing coal with wood lower CO2 emissions? Dynamic lifecycle analysis of wood bioenergy, Emtv. Research Letters 13(015007):1-10, 1 (“We simulate substitution of wood for coal in power generation, estimating the parameters governing NPP and other fluxes using data for forests in the eastern US and using published estimates for supply chain emissions. Because combustion and processing efficiencies for wood are less than coal, the immediate impact of substituting wood for coal is an increase in atmospheric CO2 relative to coal. The payback time for this carbon debt ranges from 44–104 years after clear-cut, depending on forest type—assuming the land remains forest. Surprisingly, replanting hardwood forests with fast-growing pine plantations raises the CO2 impact of wood because the equilibrium carbon density of plantations is lower than natural forests. Further, projected growth in wood harvest for bioenergy would increase atmospheric CO2 for at least a century because new carbon debt continuously exceeds NPP. Assuming biofuels are carbon neutral may worsen irreversible impacts of climate change before benefits accrue. Instead, explicit dynamic models should be used to assess the climate impacts of biofuels.”). Furthermore, even if BECCS were net zero or negative in the relevant next couple of decades, which it is not, large-scale biodiversity development requires vast land-use changes, which may have significant implications for food security and biodiversity. National Academies of Sciences, Engineering, and Medicine, Negative Emissions Technologies and Reliable Sequestration: A Research Agenda,10 (2019) (“Because food demand is expected to double by mid-century, repurposing a significant amount of current agricultural land to produce feedstocks for BECCS or for afforestation/reforestation might have a significant effect on food availability and food prices, with far-reaching effects on national security and biodiversity.”). The IPCC Special Report on Climate Change and Land warns that high implementation of BECCS (11.3 GtCO2 yr-1 in 2050) could increase the population at risk of hunger by up to 150 million people and could have significant impacts on desertification and land degradation. IPCC, Summary for Policymakers, In: Climate Change and Land: an IPCC Special Report on Climate Change, Desertification, Land Degradation, Sustainable Land Management, Food Security, and Greenhouse Gas Fluxes in Terrestrial Ecosystems, 27 (2019) (“Impacts on adaptation, desertification, land degradation and food security are maximum potential impacts, assuming carbon dioxide removal by BECCS at a scale of 11.3 GtCO2 yr-1 in 2050, and noting that bioenergy without CCS can also achieve emissions reductions of up to several GtCO2 yr-1 when it is a low carbon energy source {2.6.1; 6.3.1}. Studies linking bioenergy to food security estimate an increase in the population at risk of hunger to up to 150 million people at this level of implementation {6.3.5}. The red hatched cells for desertification and land degradation indicate that while up to 15 million km2 of additional land is required in 2100 in 2°C scenarios which will increase pressure for desertification and land degradation, the actual area affected by this additional pressure is not easily quantified {6.3.3; 6.3.4}.”). Using BECCS to draw down between 2 and 10 Gt CO2 annually would require the dedication of land equivalent to the size of India, and possibly even double this amount, to support biomass production, introducing daunting logistical issues. Anderson K. & Peters G., The Trouble with Negative Emissions, Science 354:182–182 (2016). <a href="#">CMA Measure the scale of biomass assumed in IAMs, particularly on the</a>	Similar to the preceding comment.	Gabrielle Dreyfus	Institute for Governance & Sustainable Development	United States of America
71089	32	17	32	19	And SDG14.	Noted, but we are here only citing the conclusions of the IPBES	Philippe Tulkens	European Union (EU) - DG Research & Innovation	Belgium
31627	32	20	64	24	P32L20, P52L12, P64L24, table 17.1: “SDG’s” Suggested change– SDGs (without an apostrophe)	Noted	Shreya Some	Ahmedabad University	India

Comment Id	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
48077	32	34	32	36	<p>This paragraph and its conclusions regarding are solely based on results of theoretical equilibrium models that are criticized precisely for their inadequacy to address empirical evidence and local and regional circumstances. The impact of bioenergy crops expansion over food prices should be reevaluated taking into account growing literature documenting that:</p> <p>(i) empirical evidence (as opposed to prospective equilibrium models) demonstrates that food prices are mainly driven by oil prices, and biofuels have no significant statistical influence on them (Shrestha et al. 2019; Chi et al; 2019);</p> <p>(ii) food prices projected by prognostic models are a poor indicator of food security or malnutrition, which should be understood at local scale (Kline et al 2017; Bureau et al, 2018);</p> <p>(iii) there is significant opportunities for promoting synergies between bioenergy systems and agricultural food/feed systems, particularly in developing and least developed countries (Langeveld et al, 2014; Lee et al, 2015; Leite et al, 2016; Trindade et al 2019; IRENA, 2019; Moreira et al, 2020; Raoul Herrmann et al, 2017).</p> <p>As summarized by Kleine et al (2017):</p> <p>“because these data can be easily plugged into existing market equilibrium models, they have been widely used to estimate the effects of biofuels on food security. Yet, as discussed below, there is little evidence that price indices can tell us much about who actually suffers from malnutrition due to food insecurity or its primary causes. Despite correlations, changes in global commodity prices are distinct from changes in consumer food price indices.” (Kleine et al, 2017).</p> <p>Food prices are mainly driven by oil prices: “Globally, it was found that the food price index (FPI) had the highest correlation with crude oil price and 96% of the variability could be explained from the crude oil price and world population.” (Shrestha et al. Biofuel impact on food prices index and land use change, Biomass and Bioenergy 124 (2019) 43–53). <a href="https://doi.org/10.1016/j.biombioe.2019.03.003">https://doi.org/10.1016/j.biombioe.2019.03.003</a>.</p> <p>Looking at the appropriate scale and detail, it is expected that bioenergy brings more benefits to food security than eventual modeled threats indicated by IAM models.</p> <p>Therefore, we strong recommend the authors to reevaluate this and other sections of Chapter 17 that address the issue, taking into</p>	Noted. More discussion about limitations in the results are added	Marcelo moreira	UNICAMP - Agroicone	Brazil
48077	32	34	32	36	<p>(continued) Taberipour et al. (2010) “Biofuels and their By-Products: Global Economic and Environmental Implications,” Biomass and Bioenergy, 2010, 34(3): 278-289.</p> <p>Moreira, M. M., Seabra, J. E., Lynd, L. R., Arantes, S. M., Cunha, M. P., &amp; Guilhoto, J. J. (2020). Socio-environmental and land-use impacts of double-cropped maize ethanol in Brazil. <i>Nature Sustainability</i>, 3(3), 209-216.</p> <p>Ness, Jan &amp; Cavalett, Otavio &amp; Cherubini, Francesco. (2021). The land–energy–water nexus of global bioenergy potentials from abandoned cropland. <i>Nature Sustainability</i>. 10.1038/s41893-020-00680-5.</p> <p>Langeveld, J. W., Dixon, J., van Keulen, H., &amp; Quist-Wessel, P. F. (2014). Analyzing the effect of biofuel expansion on land use in major producing countries: evidence of increased multiple cropping. <i>Biofuels, Bioproducts and Biorefining</i>, 8(1), 49-58.</p> <p>IRENA, Sugarcane bioenergy in southern Africa: Economic potential for sustainable scale-up, no. May 2019. 2019.</p> <p>L. R. Lynd et al., “Bioenergy and African transformation,” <i>Biotechnol. Biofuels</i>, vol. 8, no. 1, pp. 1–18, 2015, doi: 10.1186/s13068-014-0188-5.</p> <p>Leite et al., “Sugarcane: a way out of energy poverty,” <i>Biofuels, Bioprod. Biorefining</i>, 2016, doi: 10.1002/bbb.</p> <p>S. C. Trindade, L. A. H. Nogueira, and G. M. Souza, “Relevance of LACAf biofuels for global sustainability,” <i>Biofuels</i>, vol. 0, no. 0, pp. 1–11, 2019, doi: 10.1080/17597269.2019.1679566</p> <p>Kline, K. L., Msangi, S., Dale, V. H., Woods, J., Souza, G. M., Osseweijer, P., ... &amp; Muger, H. K. (2017). Reconciling food security and bioenergy: priorities for action. <i>Geb Bioenergy</i>, 9(3), 557-576.</p> <p>Souza, G. M., Ballester, M. V. R., de Brito Cruz, C. H., Chum, H., Dale, B., Dale, V. H., ... &amp; Van der Wielen, L. (2017). The role of bioenergy in a climate-changing world. <i>Environmental development</i>, 23, 57-64.</p> <p>Chi Wei Su, Xiao-Qing Wang, Ran Tao, Lobont Oana-Ramona, Do oil prices drive agricultural commodity prices? Further evidence in a global bio-energy context. <i>Energy</i>, Volume 172, 2019, Pages 691-701, ISSN 0360-5442, <a href="https://doi.org/10.1016/j.energy.2019.02.028">https://doi.org/10.1016/j.energy.2019.02.028</a>.</p> <p>Jean-Christophe Bureau, Johan Swinnen, EU policies and global food security, <i>Global Food Security</i>, Volume 16, 2018, Pages 106-115, ISSN 2211-9124, <a href="https://doi.org/10.1016/j.gfs.2017.12.001">https://doi.org/10.1016/j.gfs.2017.12.001</a>.</p> <p>Raoul Herrmann, Charles Jumbo, Michael Bruentrup, Evans Okaushien, Competition between biofuel feedstock and food production: Empirical evidence from sugarcane outgrower settings in Malawi, <i>Biomass and Bioenergy</i>, Volume 114, 2018, Pages 100-111, ISSN 0961-9534, <a href="https://doi.org/10.1016/j.biombioe.2017.09.002">https://doi.org/10.1016/j.biombioe.2017.09.002</a>.</p>				
48077	32	34	32	36	<p>(continued) Shrestha et al. Biofuel impact on food prices index and land use change, Biomass and Bioenergy 124 (2019) 43–53). <a href="https://doi.org/10.1016/j.biombioe.2019.03.003">https://doi.org/10.1016/j.biombioe.2019.03.003</a></p> <p>Therefore, additional text must be included in one or two new paragraphs, as follows:</p> <p>However, there is weak empirical evidence that global food prices are influenced by bioenergy production. A growing body of literature indicates that the projection of food prices by prognostic equilibrium models is a poor indicator of food security and malnutrition, which can be better understood at local scale and in light of political design (Kline et al 2017; Bureau et al, 2018).</p> <p>While there is evidence that food prices are influenced by oil prices (Shrestha et al. 2019; Chi et al; 2019), there exists significant opportunities for synergies between bioenergy systems and agricultural food/feed systems, which have already been observed and documented. Double-cropping (or sequential cropping), has been suggested as a way to conciliate energy and food security goals (Langeveld et al, 2014) and is emerging as important solution for agricultural sectors, as well as for bioenergy systems (Moreira et al 2020). The contribution of bioenergy coproducts as feed is another important factor that has been widely documented (Taberipour et al, 2010). The combination of double cropping and production of DDG has also been documented (Moreira et al 2020) and is an important contribution to synergistic effects between biofuels, local rural income and the food system. Studies dedicated to Africa and Latin American countries conclude that bioenergy can play an important role in generating income for the rural sector and well-designed energy policies. With adequate participation of local communities, bioenergy can play and important role in improving food security and other sustainable development goals, including in health, energy access and others (Langeveld et al, 2014; Lee et al, 2015; Leite et al, 2016; Trindade et al 2019; IRENA, 2019; Moreira et al, 2020; Raoul</p>				

Comment Id	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
50997	32	34	32	36	<p>This paragraph and its conclusions regarding are solely based on results of theoretical equilibrium models that are criticized precisely for their inadequacy to address empirical evidence and local and regional circumstances. The impact of bioenergy crops expansion over food prices should be reevaluated taking into account growing literature documenting that:</p> <p>(i) empirical evidence (as opposed to prospective equilibrium models) demonstrates that food prices are mainly driven by oil prices, and biofuels have no significant statistical influence on them (Shrestha et al. 2019; Chi et al; 2019);</p> <p>(ii) food prices projected by prognostic models are a poor indicator of food security or malnutrition, which should be understood at local scale (Kline et al 2017; Bureau et al, 2018);</p> <p>(iii) there is significant opportunities for promoting synergies between bioenergy systems and agricultural food/feed systems, particularly in developing and least developed countries (Langeveld et al, 2014; Lee et al, 2015; Leite et al, 2016; Trindade et al 2019; IRENA, 2019; Moreira et al, 2020; Raoul Herrmann et al, 2017).</p> <p>As summarized by Kleine et al (2017):</p> <p>“because these data can be easily plugged into existing market equilibrium models, they have been widely used to estimate the effects of biofuels on food security. Yet, as discussed below, there is little evidence that price indices can tell us much about who actually suffers from malnutrition due to food insecurity or its primary causes. Despite correlations, changes in global commodity prices are distinct from changes in consumer food price indices.” (Kleine et al, 2017).</p> <p>Food prices are mainly driven by oil prices: “Globally, it was found that the food price index (FPI) had the highest correlation with crude oil price and 96% of the variability could be explained from the crude oil price and world population.” (Shrestha et al. 2019). Biofuel impact on food prices index and land use change, <i>Biomass and Bioenergy</i> 124 (2019) 43–55). <a href="https://doi.org/10.1016/j.biombioe.2019.03.003">https://doi.org/10.1016/j.biombioe.2019.03.003</a>.</p> <p>Looking at the appropriate scale and detail, it is expected that bioenergy brings more benefits to food security than eventual modeled threats indicated by IAM models.</p> <p>Therefore, we strongly recommend the authors to reevaluate this and other sections of Chapter 17 that address the issue, taking into account additional literature on the subject. Complete references are presented below:</p> <p>Taheripour et al. (2010) “Biofuels and their By-Products: Global Economic and Environmental Implications,” <i>Biomass and Bioenergy</i>, 2010, 34(3): 278-289.</p> <p>Moreira, M. M., Seabra, J. E., Lynd, L. R., Arantes, S. M., Cunha, M. P., &amp; Guilhoto, J. J. (2020). Socio-environmental and land-use impacts of double-cropped maize ethanol in Brazil. <i>Nature Sustainability</i>, 3(3), 209-216.</p> <p>Nass, Jan &amp; Cavalett, Otavio &amp; Cherubini, Francesco. (2021). The land–energy–water nexus of global bioenergy potentials from abandoned cropland. <i>Nature Sustainability</i>. 10.1038/s41893-020-00680-5.</p> <p>Langeveld, J. W., Dixon, J., van Keulen, H., &amp; Quist-Wessel, P. F. (2014). Analyzing the effect of biofuel expansion on land use in major producing countries: evidence of increased multiple cropping. <i>Biofuels, Bioproducts and Biorefining</i>, 8(1), 49-58. <a href="https://doi.org/10.1007/s11894-013-9411-1">https://doi.org/10.1007/s11894-013-9411-1</a></p>	Similar to previous comment	Government of Brazil	Ministry of Foreign Affairs of Brazil	Brazil
28103	32	37	32	37	Agricultural subsidies are major issues in trade negotiations and there are divergent views on this matter among countries. The sentence should be revised.	Noted, but we are here referring to the conclusions of the authors	Eleni Kaditi	Organization of the Petroleum Exporting Countries, OPEC	Austria
3101	32	40	32	43	This is a noticeably awkward sentence. Convoluted expression muddies its meaning.	Noted	Beth Edmondson	Federation University	Australia
11681	32	40	33	8	<p>In the future there will be many dichotomies that will face professionals advising decision makers, particularly to reduce soil degradation through deintensifying of agricultural practices that could for example</p> <ul style="list-style-type: none"> <li>•through the adoption of natural methods reduce crop yields or</li> <li>•through change of land-use to biomass production as a threat to food production (SocEnv 2021, ETI 2011).</li> </ul> <p>References: SocEnv (2021). Soil and Stones Report. The Society for the Environment – Soil and Stones Task Group, Published 10th March 2011. Accessed 10 March 2021 at <a href="https://socenv.org.uk/page/soilandstones">https://socenv.org.uk/page/soilandstones</a> (there is no need to sign in) ETI (2020). Delivering greenhouse gas emission savings through UK bioenergy value chains, Accessed online on 13/8/2020 at <a href="https://www.eti.co.uk/library/delivering-greenhouse-gas-emission-savings-through-uk-bioenergy-value-chains">https://www.eti.co.uk/library/delivering-greenhouse-gas-emission-savings-through-uk-bioenergy-value-chains</a></p>	Accepted	Paul Dumble	Paul's Environment Ltd	United Kingdom (of Great Britain and Northern Ireland)
71091	33	11	33	11	coastal areas better than coastal land as it can be on land and in the water	Accepted	Philippe Tulkens	European Union (EU) - DG Research & Innovation	Belgium
8181	33	15	3	15	Please delete "(e.g. afforestation, reforestation)", forest conservation concerns existing forests, afforestation and reforestation both establish new forests.	Rejected The terms can be used in this way	Joachim Rock	Thuener-Institute of Forest Ecosystems	Germany
12295	33	27	33	30	“Various governance.... (Meijaard et al., 2020; Andrianto, 2020).” would advantageously be placed after line 34, as an independent paragraph	Accepted	Christophe Deissenberg	Institute for Non-Linear Dynamic Inference	Luxembourg
59993	33	31	33	34	One-sentence paragraph; combine with others.	Noted	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
49807	33	35	34	8	The palm oil industry is also displacing Indigenous Peoples from their land, from their existing sustainable land management practices. The Rights of Indigenous peoples and the need to respect UNDRIP must be referred to in this section. Further, the palm oil industry is also known for atrocious labour practices including child labour, indentured and other forced labour practices condemned by the UN and also unsafe working conditions and mis-use of pesticides. These factors should be included in the description of the palm oil industry.	Accepted. Tradeoffs have been made more clear	Chloe Hartley	Tsleil-Waututh Nation	Canada
11683	34	9	34	12	International best practice in irrigation management has been established in drought ridden California (Lehner et al. 2018; Williams et al. 2020; NIDIS 2020), with online tools to select the most suitable crops for cultivation. Water demand is controlled in an online service to farmers, based on ongoing daily monitoring data (from 2008) of potential evapotranspiration (ETo) rates across the state at microclimate level (See: California Irrigation Management Information System. Viewed 14/7/2020 at <a href="https://cimis.water.ca.gov/">https://cimis.water.ca.gov/</a> ). References: Lehner, F., Deser, C., Simpson, I.R., and Terray, L. (2018): Attributing the U.S. Southwest's Recent Shift Into Drier Conditions. Geophys. Res. Lett. doi:10.1029/2018GL078312; Williams, A.P., Cook, E.R., Smerdon, J.E., Cook, B.I., Abatzoglou, J.T. and Bolles, K. (2020). Large contribution from anthropogenic warming to an emerging North American megadrought, Science, 17 Apr 2020: Vol. 368, Issue 6488, pp. 314-318, DOI: 10.1126/science.aaz9600; NIDIS (2020). Drought in California. Viewed 7/6/2020 at <a href="https://www.drought.gov/drought/states/california">https://www.drought.gov/drought/states/california</a> .	Accepted	Paul Dumble	Paul's Environment Ltd	United Kingdom (of Great Britain and Northern Ireland)
59995	34	18	34	18	Connect demand-side to incentives and informational schemes, e.g., food labeling with carbon footprint information in the UK.	Accepted	Government of United States of America	U.S. Department of State	United States of America
55117	34	19	34	33	The definition of healthy diets should consider the current WHO and should be consistent throughout this AR6 report. WHO, healthy diets definitions consider international nutrition recommendations; and the adaptability to local social, cultural and economic contexts. They consider healthy diets as balanced and diversified diets. .. Regarding GHG Emissions and the impact on climate change, the emphasis should be on productions systems, rather than on the final product, as it has more influence in the final GHG balance. There are ways to produce both plants and animals that can be either high in emissions or can control and neutralize the emissions. There for, plant-based diets do not for themselves, guarantee the reduction or control of related emissions. And, on the other hand, livestock systems, when considering conservationist and integrated agricultural strategies, can neutralize emissions, and promote a balanced and diversified, hence resilient, production system. Focusing on productions systems, integrated, diversified, and sustainable, adapted to local landscapes, the outcomes are not only related to GHG emissions and resilience, but also, diversification of food sources, nutrient value, and, of course, income and accessibility.	Noted. The definition is coordinated across the report	Government of Brazil	Ministry of Foreign Affairs of Brazil	Brazil
51777	34	38	34	39	It should also be noted that reaching a 'zero food waste' scenario is considered completely impossible by experts in the field.	Noted, but we are only referring to a study and references to experts are not suggested here	Florin Vladu	UNFCCC Secretariat	Germany



Comment Id	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
48079	35	0	55	0	<p>References to BECCS (in Table 17.1), biomass power (Table 17.2) and large-scale bioenergy plantations (Table 17.5) all present a negative sign (-) for food security, but that is incorrect, contradicting conclusions of specific chapters of the SOD, for instance: "Some bioenergy options can simultaneously contribute to adaptation and combatting desertification and land degradation, enhance food security through increases in yields, and improve resilience through maintenance of the productivity of the land resource base" (Technical Summary, p. 88, l. 29-31); "[...] agriculture and forestry sectors can devise management approaches that enable biomass production and use for energy in conjunction with supply of food [...]" (Chapter 7, p. 96, line 19); moreover, Chapter 3 mentions a number of measures that promote synergies and positive outcomes between bioenergy as a land-based mitigation option and food security, such as agricultural technological innovation, improved management of crops, grazing intensification (Chapter 3, p. 93, l. 45-47 and p. 94, l. 1-7).</p> <p>Moreover, Chapter 17 arguments and conclusions regarding a potential negative impact of bioenergy on food security are solely based on results of theoretical equilibrium models that are criticized precisely for their inadequacy to address empirical evidence and local and regional circumstances. The impact of bioenergy crops expansion over food prices should be reevaluated taking into account growing literature documenting that:</p> <p>(1) empirical evidence (as opposed to prospective equilibrium models) demonstrates that food prices are mainly driven by oil prices, and biofuels have no significant statistical influence on them (Shrestha et al. 2019; Chi et al; 2019);</p> <p>(ii) food prices projected by prognostic models are a poor indicator of food security or malnutrition, which should be understood at local scale (Kline et al 2017; Bureau et al, 2018);</p> <p>(iii) there is significant opportunities for promoting synergies between bioenergy systems and agricultural food/feed systems, particularly in developing and least developed countries (Langeveld et al, 2014; Lee et al, 2015; Leite et al, 2016; Trindade et al 2019; IRENA, 2019; Moreira et al, 2020; Raoul Herrmann et al, 2017).</p> <p>As summarized by Kleine et al (2017)</p>	Noted. We have deleted table 7.1 and substituted the cross sectoral mapping tables with a comprehensive Figure 7.1, which will provide you with and overview of all descriptors based on inputs from sectoral chapters	Marcelo moreira	UNICAMP - Agroicone	Brazil
50999	35	0	55	0	<p>References to BECCS (in Table 17.1), biomass power (Table 17.2) and large-scale bioenergy plantations (Table 17.5) all present a negative sign (-) for food security, but that is incorrect, contradicting conclusions of specific chapters of the SOD, for instance: "Some bioenergy options can simultaneously contribute to adaptation and combatting desertification and land degradation, enhance food security through increases in yields, and improve resilience through maintenance of the productivity of the land resource base" (Technical Summary, p. 88, l. 29-31); "[...] agriculture and forestry sectors can devise management approaches that enable biomass production and use for energy in conjunction with supply of food [...]" (Chapter 7, p. 96, line 19); moreover, Chapter 3 mentions a number of measures that promote synergies and positive outcomes between bioenergy as a land-based mitigation option and food security, such as agricultural technological innovation, improved management of crops, grazing intensification (Chapter 3, p. 93, l. 45-47 and p. 94, l. 1-7).</p> <p>Moreover, Chapter 17 arguments and conclusions regarding a potential negative impact of bioenergy on food security are solely based on results of theoretical equilibrium models that are criticized precisely for their inadequacy to address empirical evidence and local and regional circumstances. The impact of bioenergy crops expansion over food prices should be reevaluated taking into account growing literature documenting that:</p> <p>(1) empirical evidence (as opposed to prospective equilibrium models) demonstrates that food prices are mainly driven by oil prices, and biofuels have no significant statistical influence on them (Shrestha et al. 2019; Chi et al; 2019);</p> <p>(ii) food prices projected by prognostic models are a poor indicator of food security or malnutrition, which should be understood at local scale (Kline et al 2017; Bureau et al, 2018);</p> <p>(iii) there is significant opportunities for promoting synergies between bioenergy systems and agricultural food/feed systems, particularly in developing and least developed countries (Langeveld et al, 2014; Lee et al, 2015; Leite et al, 2016; Trindade et al 2019; IRENA, 2019; Moreira et al, 2020; Raoul Herrmann et al, 2017).</p> <p>As summarized by Kleine et al (2017)</p>	Noted. The BECCS pros and cons has been addressed.	Government of Brazil	Ministry of Foreign Affairs of Brazil	Brazil
12297	35	13	35	14	The underlying mechanisms are not obvious. Please consider being more explicit	Noted. Further explanations are provided in the subsequent sections	Christophe Deissenberg	Institute for Non-Linear Dynamic Inference	Luxembourg
59997	35	23			Tables need more thorough headers so that they can be understood without reading the chapter.	The Table is substituted with Figure 7.1 and all values are updated based on consultations with the sectoral chapters.	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
80703	35	23	35	25	Table 17.1; BECCS is not an effective mitigation option, because it is not carbon neutral in the near term—with a carbon deficit for many years, generally several decades to a century—that is crucial for mitigating emissions and avoiding hitting the 1.5°C mark. Bioenergy substitution for fossil fuels is not an effective mitigation strategy because burning forest biomass for power generation emits more CO2 per unit of final energy than burning fossil fuels. Danielle Venton, Core Concept: Can bioenergy with carbon capture and storage make an impact?, PNAS (2016); Leturcq, P. (2020) GHG Displacement Factors of Harvested Wood Products: the Myth of Substitution, NATURE SCIENTIFIC REPORTS 10:1-9; Mary S. Booth, Not carbon neutral: Assessing the net emissions impact of residues burned for bioenergy, ENVIRON. RES. LETT. 13 (21 February 2018); Sterman J. D., et al. (2018) Does replacing coal with wood lower CO2 emissions? Dynamic lifecycle analysis of wood bioenergy, ENVTL. RESEARCH LETTERS 13(015007):1-10, 1 (“We simulate substitution of wood for coal in power generation, estimating the parameters governing NPP and other fluxes using data for forests in the eastern US and using published estimates for supply chain emissions. Because combustion and processing efficiencies for wood are less than coal, the immediate impact of substituting wood for coal is an increase in atmospheric CO2 relative to coal. The payback time for this carbon debt ranges from 44–104 years after clear-cut, depending on forest type—assuming the land remains forest. Surprisingly, replanting hardwood forests with fast-growing pine plantations raises the CO2 impact of wood because the equilibrium carbon density of plantations is lower than natural forests. Further, projected growth in wood harvest for bioenergy would increase atmospheric CO2 for at least a century because new carbon debt continuously exceeds NPP. Assuming biofuels are carbon neutral may worsen irreversible impacts of climate change before benefits accrue. Instead, explicit dynamic models should be used to assess the climate impacts of biofuels.”). Large-scale bioenergy development could have significant implications for food security and biodiversity because of the vast amounts of land needed. National Academies of Sciences, Engineering, and Medicine (2019) NEGATIVE EMISSIONS TECHNOLOGIES AND RELIABLE SEQUESTRATION: A RESEARCH AGENDA, 10 (“Because food demand is expected to double by mid-century, repurposing a significant amount of current agricultural land to	The Table is substituted with Figure 7.1 and all values are updated based on consultations with the sectoral chapters.	Durwood Zaelke	Institute for Governance & Sustainable Development	United States of America
80847	35	23	35	25	Table 17.1; BECCS is not an effective mitigation option, because it is not carbon neutral in the near term—with a carbon deficit for many years, generally several decades to a century—that is crucial for mitigating emissions and avoiding hitting the 1.5°C mark. Bioenergy substitution for fossil fuels is not an effective mitigation strategy because burning forest biomass for power generation emits more CO2 per unit of final energy than burning fossil fuels. Danielle Venton, Core Concept: Can bioenergy with carbon capture and storage make an impact?, PNAS (2016); Leturcq, P. (2020) GHG Displacement Factors of Harvested Wood Products: the Myth of Substitution, NATURE SCIENTIFIC REPORTS 10:1-9; Mary S. Booth, Not carbon neutral: Assessing the net emissions impact of residues burned for bioenergy, ENVIRON. RES. LETT. 13 (21 February 2018); Sterman J. D., et al. (2018) Does replacing coal with wood lower CO2 emissions? Dynamic lifecycle analysis of wood bioenergy, ENVTL. RESEARCH LETTERS 13(015007):1-10, 1 (“We simulate substitution of wood for coal in power generation, estimating the parameters governing NPP and other fluxes using data for forests in the eastern US and using published estimates for supply chain emissions. Because combustion and processing efficiencies for wood are less than coal, the immediate impact of substituting wood for coal is an increase in atmospheric CO2 relative to coal. The payback time for this carbon debt ranges from 44–104 years after clear-cut, depending on forest type—assuming the land remains forest. Surprisingly, replanting hardwood forests with fast-growing pine plantations raises the CO2 impact of wood because the equilibrium carbon density of plantations is lower than natural forests. Further, projected growth in wood harvest for bioenergy would increase atmospheric CO2 for at least a century because new carbon debt continuously exceeds NPP. Assuming biofuels are carbon neutral may worsen irreversible impacts of climate change before benefits accrue. Instead, explicit dynamic models should be used to assess the climate impacts of biofuels.”). Large-scale bioenergy development could have significant implications for food security and biodiversity because of the vast amounts of land needed. National Academies of Sciences, Engineering, and Medicine (2019) NEGATIVE EMISSIONS TECHNOLOGIES AND RELIABLE SEQUESTRATION: A RESEARCH AGENDA, 10 (“Because food demand is expected to double by mid-century, repurposing a significant amount of current agricultural land to	Noted. BECCS pros and cons has been addressed. More details is in chapter 12.	Gabrielle Dreyfus	Institute for Governance & Sustainable Development	United States of America
29621	35	23	51	23	Table 17.1-17.5: These tables are helpful - but the remarks seem unfinished: Some of them mention rather obvious synergies, while trade-offs are not explained. E.g. in 17.4 is it not explained why retrofitting buildings would have trade offs with water access or why lightweight building materials would have trade offs with economy. I 17.3 it should maybe be commented that the mitigation synergies depend on the energy use/energy efficiency of the products in the circular economy. In 17.5 "Urban areas, infrastructure and transportation" is missing from the table and the rows for "industry" seem incomplete.	The Tables are substituted with Figure 7.1 and all values are updated based on consultations with the sectoral chapters.	Government of Norway	Norwegian Environment Agency	Norway

Comment Id	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
29619	35	23	54	4	Table 17.1-table 17.6 currently demonstrate somewhat different impact categories. Please consider being more consistent and including biodiversity/nature in all tables. For instance, table 17.3 Industry would also have relevant impacts on nature.	Noted. The trade offs definition has been added.	Government of Norway	Norwegian Environment Agency	Norway
11687	35	29	36	5	The use of words such as "trade offs" suggests that this is bartering systems with winners and losers. Mitigation and adaptation action should not loose and needs to be based on sustainability principles, with the key elements of this being a combination of of "Reducing carbon intensity and increasing sequestration". For example, both are applied in the UKs 25 year Plan (Defra), but appear to be distinctly separate actions. Combining both brings into consideration carbon reduction and carbon storage for all urban and rural land-use change (SocEnv 2021). Reference: SocEnv (2021). Soil and Stones Report. The Society for the Environment – Soil and Stones Task Group. Accessed 10 March 2021 at <a href="https://socenv.org.uk/page/soilsandstones">https://socenv.org.uk/page/soilsandstones</a> (available as a prepublication draft, will be published in March 2021 - there is no need to sign in)	Noted. The trade offs definition has been added	Paul Dumble	Paul's Environment Ltd	United Kingdom (of Great Britain and Northern Ireland)
11695	35	32			Biochar is used also to improve water retention in soil (making it useful in countries prone to drought or infrequent precipitation (e.g. Estela et al 2018) and reduce contamination (E.g.Bianco et al 2021) References: Bianco F, Race M, Papirio S, Oleszczuk P, Esposito G (2021): The addition of biochar as a sustainable strategy for the remediation of PAH-contaminated sediments, Chemosphere, Volume 263, January 2021, 128274, <a href="https://doi.org/10.1016/j.chemosphere.2020.128274">https://doi.org/10.1016/j.chemosphere.2020.128274</a> Estela M. Batista CC, Shultz J, Matos TTS, Fornari MR, Ferreira TM, Szpoganiec B, de Freitas RA & Mangrich AS (2018). Effect of surface and porosity of biochar on water holding capacity aiming indirectly at preservation of the Amazon biome, Scientific Reports volume 8, Article number: 10677 (2018), <a href="https://www.nature.com/articles/s41598-018-28794-z">https://www.nature.com/articles/s41598-018-28794-z</a>	Rejected. The references suggest there is potential for carbon dioxide removal technologies such as BECCS, biochar, etc. to mitigate climate change. More details please refer to chapter 12.	Paul Dumble	Paul's Environment Ltd	United Kingdom (of Great Britain and Northern Ireland)
12299	35	33	35	33	Consider deleting "could contribute to climate change-mitigation".	Noted. BECCS pros and cons has been addressed. More details is in chapter 12.	Christophe Deissenberg	Institute for Non-Linear Dynamic Inference	Luxembourg
11685	35		35		Table 17.1: AFOLU mitigation options - BECC's, Remarks, "Could be high cost cost due to not yet massive scale" Change to: "Increased costs may occur where economies of scale have not been achieved"	Noted. BECCS pros and cons has been addressed. More details is in chapter 12.	Paul Dumble	Paul's Environment Ltd	United Kingdom (of Great Britain and Northern Ireland)
71093	36	6	36	12	Is SDG14 included? If so, on line 10, add impact on ecosystem services.	AcceptedImplemented accordingly	Philippe Tulkens	European Union (EU) - DG Research & Innovation	Belgium
16787	36	6	41	8	Explained the importance of nexus approach about water, energy and food. Water imbalance will severe according to regions and it will affect the energy system and food production system. Mitigation actions affect WEF both positively and negatively.	Noted We agree and believe that this message is expressed in the subchapter.	Government of Republic of Korea	Korea Meteorological Administration (KMA)	Republic of Korea
60531	36	6	41	8	Explained the importance of nexus approach about water, energy and food. Water imbalance will severe according to regions and it will affect the energy system and food production system. Mitigation actions affect WEF both positively and negatively.	As above	HWANIL PARK	STEP1	Republic of Korea
78753	36	6	41	8	for this section an important aspect may be of interest: the strong growth of renewable electricity with also implies very low-cost renewable electricity can improve the water-energy-food nexus in two fundamental ways: first, low-cost renewable electricity starts to phase-out thermal power plants, which leads to less water consumption and withdrawals in rivers all around the world which may have a positive impact on the water-energy-food nexus - see Lohrmann et al. ( <a href="https://www.nature.com/articles/s41560-019-0501-4">https://www.nature.com/articles/s41560-019-0501-4</a> ); second the low-cost renewable electricity phase-in leads to decline in seawater desalination cost, which also should have a positive impact on the water-energy-food nexus - see Caldera and Breyer ( <a href="https://www.sciencedirect.com/science/article/pii/S0360544220306149">https://www.sciencedirect.com/science/article/pii/S0360544220306149</a> ; <a href="https://www.sciencedirect.com/science/article/pii/S0048969719335235">https://www.sciencedirect.com/science/article/pii/S0048969719335235</a> ). The combination of fast cost decline of solar energy ( <a href="https://onlinelibrary.wiley.com/doi/full/10.1002/pip.3189">https://onlinelibrary.wiley.com/doi/full/10.1002/pip.3189</a> ) and the substantial learning rate of seawater desalination ( <a href="https://agupubs.onlinelibrary.wiley.com/doi/abs/10.1002/2017WR021402">https://agupubs.onlinelibrary.wiley.com/doi/abs/10.1002/2017WR021402</a> ) should start to relax the water-energy-food nexus.	Accepted The suggested references as well as adjoining text to backup both of these key points have been implemented.	Christian Breyer	LUT University	Finland
84263	36	6	41	8	The GSDR 2019, quoted in the chapter references but not quoted in the text, also discusses the WEFN extensively	Noted For this subchapter 17.3.3.2 the GSDR 2019 report uses mainly regional examples - we here employ other literature emphasizing the same points.	Jean-Pascal van Ypersele	Université catholique de Louvain	Belgium
3103	36	6	43	15	This section achieves highly effective integration of conceptual, theoretical and practical knowledge. It makes a substantive new contribution to knowledge regarding the WEFN.	That is good to hear - thanks.	Beth Edmondson	Federation University	Australia

Comment Id	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
71095	36	26	36	26	anthropogenic impacts as well like CO2 emissions, pollution, over exploitation of resources, poor management on land	Accepted Implemented, although CO2 emissions are already covered by "climate change" here.	Philippe Tulkens	European Union (EU) - DG Research & Innovation	Belgium
31629	36	29	36	30	P36L29-30: "Specifically, SDGs 2 (food), 6 (water), (7) energy, 11 (cities) and 12 (production and consumption) are considered essential to the WEFN"- the words in braces are incomplete- Please write the exact explanation of the goals for e.g, SDG 2 (Zero hunger) etc	Accepted Implemented accordingly	Shreya Some	Ahmedabad University	India
71097	36	29	36	30	How about SDG14?	Accepted Added	Philippe Tulkens	European Union (EU) - DG Research & Innovation	Belgium
23745	36	45	36	45	"Globally climate change has been shown to cause increases of 4%, 8% and 10% in the population being exposed to water scarcities under 1.5°C, 2°C and 3°C of global warming respectively (RCP8.5)" Map illustrations could be interesting. A clear distinction should be made between rainfall distribution, annual variability, water availability per state, water availability per capita, and indicate countries where political, economic, security and social conditions already hinder access to water and/or where water pressure is already high, regardless of availability.	Noted We absolutely agree that this sentence could be elaborated, as could most sentences throughout, whereas the main point, that increased warming causes increased water shortage as such - we provide the reference for specifics.	Government of France	Ministère de la Transition écologique et solidaire	France
12119	37	1	38	1	Suggest adding 'biodiversity' and 'albedo changes' in the Risk & Impacts/ Afforestation/Reforestation cell and 'albedo changes' to the Risk & Impacts cell for Biochar and Soil Sequestration.	The Tables are substituted with Figure 7.1 and all values are updated based on consultations with the sectoral chapters.	Paul Rouse	Carnegie Climate Governance Initiative (C2G) - The Carnegie Council for Ethics and International Affairs	United Kingdom (of Great Britain and Northern Ireland)
86247	37	11	37	11	Is it dust or particles? (dust is more often used for natural/mineral dusts)	Accepted It is generally spoken for deposited dust and particles. Rephrased now into "dust and particle deposition".	Sophie Szopa	LSCE	France
37305	37	16	37	20	There is no mention about the usage of water during the production of Solar PV.	Noted These four lines are treated as one as they address the same issue: Despite the stated 1-1600 gal/mwh span, the median water usage for PV water withdrawals is 94 gal/mwh and therefore PV is treated as a low-usage energy conversions source here.	Arun kumar Nayak	Bhabha Atomic Research Centre Trombay Mumbai	India
37307	37	16	37	20	Estimates of water withdrawal for PV's power plant equipment life cycle vary widely, from 1 to 1600 gal/MWh	Noted These four lines are treated as one as they address the same issue: Despite the stated 1-1600 gal/mwh span, the median water usage for PV water withdrawals is 94 gal/mwh and therefore PV is treated as a low-usage energy conversions source here.	Arun kumar Nayak	Bhabha Atomic Research Centre Trombay Mumbai	India
37309	37	16	37	20	"Ref: Meldrum, James, et al. "Life cycle water use for electricity generation: a review and harmonization of literature	Noted These four lines are treated as one as they address the same issue: Despite the stated 1-1600 gal/mwh span, the median water usage for PV water withdrawals is 94 gal/mwh and therefore PV is treated as a low-usage energy conversions source here.	Arun kumar Nayak	Bhabha Atomic Research Centre Trombay Mumbai	India
37311	37	16	37	20	estimates." Environmental Research Letters 8.1 (2013): 015031"	Noted These four lines are treated as one as they address the same issue: Despite the stated 1-1600 gal/mwh span, the median water usage for PV water withdrawals is 94 gal/mwh and therefore PV is treated as a low-usage energy conversions source here.	Arun kumar Nayak	Bhabha Atomic Research Centre Trombay Mumbai	India
5619	37	31	37	48	Replace "Renewable" by low carbon sources. This the important point, whether this sources are renewable or not.	Accepted Implemented	Michel SIMON	Retraité/ Pdt d'association	France
59999	37	37			Delete "found to be"	Accepted Implemented	Government of United States of America	U.S. Department of State	United States of America
12301	37	37	37	40	"In terms of the damage costs, ... for Europe in 21" I fail to understand the contribution of these sentences in the given context	Noted Both heatwaves and floods have been shown to impact power production. Sentence revised.	Christophe Deissenberg	Institute for Non-Linear Dynamic Inference	Luxembourg
74293	37	47	38	10	This section ignores the importance of nuclear energy in world clean energy production - currently producing 10% of the overall energy and 35% of non-carbon generation. <a href="https://www.iea.org/reports/nuclear-power-in-a-clean-energy-system">https://www.iea.org/reports/nuclear-power-in-a-clean-energy-system</a>	Noted This is not a major focus in a section of WEFN	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
28653	38	19	38	19	Water increase with CO2 capture is not necessarily so. The water use of CO2 capture can be managed to not increase, see references: Giannaris, S. et al (2020). "Implementing a second generation CCS facility on a coal fired power station", Greenhouse Gases: Science and Technology, 10(3), 506-518; Magneschi et al (2017) "The Impact of CO2 Capture on Water Requirements of Power Plants", GHGT-13, Energy Procedia 114 6333-6347 ; IEAGHG (2020) "Understanding the cost of reducing water usage in coal and gas fired power plants with CCS", IEAGHG 2020-09; IEAGHG (2011) "Evaluation and Analysis of Water Usage of Power Plants with CO2 Capture" IEAGHG 2010/05; IEAGHG (2020) "CCS and the Sustainable Development Goals", IEAGHG 2020-14; Mikunda et al (2020) "CCS and the Sustainable Development Goals", International Journal of Greenhouse Gas Control (submitted 17 Nov 2020); also IPCC (2018) SR1.5 Chap 5 p500 which cites Magneschi. The paper cited here in SOD Chp6 (Byers) whilst recent (2015?) have been checked and found to have chosen water use assumptions based only on papers from 2010,2011,2012 and so are out of date.	Accepted This point of view and references have been added accordingly.	Tim Dixon	IEAGHG	United Kingdom (of Great Britain and Northern Ireland)
60001	38	20	38	23	Combine with next paragraph.	Implemented	Government of United States of America	U.S. Department of State	United States of America
60003	39	41	39	42	What is within the work highlighted is never described, so it's not clear, e.g., "what the challenges involved in science and policy communicating ..." are.	Noted It is stated in the next sentence - rephrased in the revised version.	Government of United States of America	U.S. Department of State	United States of America
2785	39	45	39	46	for instance, in the energy sector, Citizen's engagement provides opportunities to harness the resources of citizens to achieving the energy transition	Accepted We have added "citizens" here yes.	Leonardo Barreto	Head of center "EU&International"	Austria
12303	40	15	40	16	Consider deleting "despite the general perception of a global groundwater crisis," as only loosely related and distracting.	Accepted Implemented	Christophe Deissenberg	Institute for Non-Linear Dynamic Inference	Luxembourg
12305	40	15	40	30	The logical link between lines 15-20 and 21-30 is unclear. Logical coherency could be obtained by moving l. 1-20 after l 21-30 as a distinct paragraph.	Accepted We see the point and have rephrased accordingly so the paragraph has a more logical flow and the distinction between all of Sub Saharan Africa and the more local cases are distinguished.	Christophe Deissenberg	Institute for Non-Linear Dynamic Inference	Luxembourg
60005	40	23			Increase? Vulnerable to?	Accepted Elaborated accordingly.	Government of United States of America	U.S. Department of State	United States of America
71099	40	31	40	32	How about SDG14 - Life under water?	The Tables are substituted with Figure 7.1 and all values are updated based on consultations with the sectoral chapters.	Philippe Tulkens	European Union (EU) - DG Research & Innovation	Belgium
74295	40	31	41	1	Table 17.2 does not include carbon free nuclear generation although hydro, biomass, solar and wind are included.	The Tables are substituted with Figure 7.1 and all values are updated based on consultations with the sectoral chapters.	Jeffrey Merrifield	Pillsbury Law Firm	United States of America
76469	40	31	41	3	The nexus between water,energy and food (WEFN) tabulation in Table 17.2 should have an additional row added to allow for increased nuclear power along with dark blue cells for each category of Mitigation, Food, Water, Energy, Economy and Life on Land. It ticks all the boxes.	The Tables are substituted with Figure 7.1 and all values are updated based on consultations with the sectoral chapters.	Robert Parker	Nuclear for Climate Australia	Australia
60007	40	32			Needs header for left column. Needs body explained. Spell out acronyms in titles.	Accepted Implemented	Government of United States of America	U.S. Department of State	United States of America
11689	40		40		Table 17.2: Comment for Increasing solar power and increasing wind power "Could be costly and only facilitate low supply in off-grid systems". Please remove this with the statement "Commercial viable at scale". The commercial viability of both these energy systems have been established for some time and with wind energy viability demonstrated in media and social network reports recently in the US Texas as resilient in the face of extreme weather conditions that were experienced State-wide (See: <a href="https://www.forbes.com/sites/joewalsh/2021/02/16/wind-power-isnt-to-blame-for-texas-electricity-crisis/">https://www.forbes.com/sites/joewalsh/2021/02/16/wind-power-isnt-to-blame-for-texas-electricity-crisis/</a> Viewed 7/3/2021) and some years ago in UAE also a fossil fuel producer. This is also shown by the widely reported global adoption these technologies at scale in the last decade (See: <a href="https://www.iea.org/reports/renewables-2020/solar-pv">https://www.iea.org/reports/renewables-2020/solar-pv</a> Viewed 7/3/2021).	The Tables are substituted with Figure 7.1 and all values are updated based on consultations with the sectoral chapters.	Paul Dumble	Paul's Environment Ltd	United Kingdom (of Great Britain and Northern Ireland)
60009	41	10	41	11	Note that this originates with supply, demand, policy response, etc.	Noted	Government of United States of America	U.S. Department of State	United States of America
60011	41	20	41	24	Combine with next paragraph.	Noted	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
71101	41	25	41	32	How about SDG14 - Life under water?	This is repetitive question. Its already answer above in comment no. 71099	Philippe Tulkens	European Union (EU) - DG Research & Innovation	Belgium
3105	42	9	42	16	It would be worth articulating how this provides a meaningful example of a government role to link with the point made earlier, such as on page 12.	Noted. The eco industry park is aim to boost industrial growth in the country, yet face challenges in term of environmental impact.	Beth Edmondson	Federation University	Australia
18597	42	9	43	16	This section would benefit from some clearer definitions of what is meant by 'eco industrial parks' and how they are distinct in their potential to contribute towards sustainability, in contrast to other industrial approaches. It would also be helpful to clarify in the Ghanaian example of 'One district One Factory' how this fits into the eco-industrial context, as it is not clear how this goes beyond an economic project into the realms of wider sustainability definitions.	Accepted A definition has been added and more discussion about the environmental impacts and the case are 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)
60013	42	22			Rephrase: "pollution heaven"	Accepted. Has been rephrased.	Government of United States of America	U.S. Department of State	United States of America
60015	42	36	42	36	Where have industrial parks worked well or not? Examples would be helpful.	Accepted. The industrial park work well in China and Ethiopia, and examples are added	Government of United States of America	U.S. Department of State	United States of America
76471	43	7	43	11	Table 17.3 needs to have a line included to cover Electrification and nuclear energy. With its much lower environmental footprint, lower cost in deep decarbonisation scenarios it will provide synergies for Mitigation, Food production, Energy and Povert/Economy. Depending on its location there may be tradeoffs with water rersources.	Noted The Table has been replaced with Figure 7.1 which provides an overview of all mitigation options based on inputs from the sectoral chapters	Robert Parker	Nuclear for Climate Australia	Australia
71103	43	7	43	9	How about SDG14 - Life under water?	This is repetitive question. Its already answer above in comment no. 71099	Philippe Tulkens	European Union (EU) - DG Research & Innovation	Belgium
18599	43	8	43	9	I think in this table it would be helpful to specify that industrial 'eco-parks' may have positive synergies across these themes, rather than leaving it open to interpretation that this could apply to any industrial park (without any specific eco-friendly practices), which is unlikely to be the case.	Noted The Table has been replaced with Figure 7.1 which provides an overview of all mitigation options based on inputs from the sectoral chapters	Government of United Kingdom (of Great Britain and Northern Ireland)	Department for Business, Energy & Industrial Strategy	United Kingdom (of Great Britain and Northern Ireland)
29049	43	8	43	9	Water for CCS can be rated +/- . Recent designs for post-combustion CCS power plants suggest additional water demand can be met by use of water that has been condensed from the flue gas prior to entering the absorber. References: Giannaris, S. et al (2020). "Implementing a second generation CCS facility on a coal fired power station", Greenhouse Gases: Science and Technology, 10(3) ; IEAGHG (2020) "Understanding the cost of reducing water usage in coal and gas fired power plants with CCS", IEAGHG 2020-09; IEAGHG (2011) "Evaluation and Analysis of Water Usage of Power Plants with CO2 Capture" IEAGHG 2010/05; IEAGHG (2020) "CCS and the Sustainable Development Goals", IEAGHG 2020-14; Mikunda et al (2020) "CCS and the Sustainable Development Goals", International Journal of Greenhouse Gas Control (submitted 17 Nov 2020).	Noted. Most of the CCS technology is still under pilot scale and expected to be in commercial stage in the future. It has been discussed in details on chapter 12.	Jasmin Kemper	IEAGHG	United Kingdom (of Great Britain and Northern Ireland)
29051	43	8	43	9	Energy for CCS can be rated +/- . CCS plays an enabling role in the provision of reliable, sustainable and modern energy and can support the decarbonisation of industry both through direct emissions reductions but also indirectly through the supply of low carbon power (SDG7). In a demand-driven scenario, the energy penalty of CCS means that it can be seen as a constraint on meeting energy efficiency targets (SDG7) but this is only if the assumption is that the additional electricity production due to the energy penalty will be supplied by fossil fuels with CCS. References: IEAGHG (2020) "CCS and the Sustainable Development Goals", IEAGHG 2020-14; Mikunda et al (2020) "CCS and the Sustainable Development Goals", International Journal of Greenhouse Gas Control (submitted 17 Nov 2020).	Noted. Most of the CCS technology is still under pilot scale and expected to be in commercial stage in the future. It has been discussed in details on chapter 12.	Jasmin Kemper	IEAGHG	United Kingdom (of Great Britain and Northern Ireland)
29053	43	8	43	9	Poverty/economy for circular economy could be rated +/- . CCU based/green products have a cost premium compared to their conventional/fossil counterfactuals.	Noted. Most of the CCS technology is still under pilot scale and expected to be in commercial stage in the future. It has been discussed in details on chapter 12.	Jasmin Kemper	IEAGHG	United Kingdom (of Great Britain and Northern Ireland)
29055	43	8	43	9	Should be rated as +/- . CCS can promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all and contribute to a decoupling of economic growth from environmental degradation, through the reduction of CO2 emissions (SDG8). References: IEAGHG (2020) "CCS and the Sustainable Development Goals", IEAGHG 2020-14; Mikunda et al (2020) "CCS and the Sustainable Development Goals", International Journal of Greenhouse Gas Control (submitted 17 Nov 2020).	Noted. Most of the CCS technology is still under pilot scale and expected to be in commercial stage in the future. It has been discussed in details in chapter 12.	Jasmin Kemper	IEAGHG	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
71105	43	15	43	15	Carbon capture and storage is claimed to be costly. In Table 17.3 it is described as the only mitigation option with a negative impact/trade-off for the economy. A reference is missing. Compared to an earlier statement p. 32 (line 7-9) that the AFOLU sector is the only one, in which large-scale carbon removal is feasible, it would be useful to understand the costs and other possible SD impacts of technology based carbon removals, such as CCS.	Noted. Most of the CCS technology is still under pilot scale and expected to be in commercial stage in the future. It has been discussed in details in chapter 12.	Philippe Tulkens	European Union (EU) - DG Research & Innovation	Belgium
7507	43	16			This section 17.3.3.4 should also draw on the material in the reworked Cross Working Group box on Urban Areas.	Noted. This chapter is discuss on city and sustainable development. The topic on urban sprawl has been discussed in detail in chapter 8. on cities.	Debra Roberts	EThekwini Municipality	South Africa
60017	43	17	43	19	In which case is there more space for urban sprawl? Planning literature should appear more prominently.	Noted. This sector was draw from chapter 8 on cities.	Government of United States of America	U.S. Department of State	United States of America
23747	43	19	43	19	"The challenge for many policymakers is to construct development paths that make cities clean, prosperous and liveable while mitigating climate change and building resilience to heatwaves, flooding and other climate risks." We suggest to add safe and resilient to shock and stress	Noted. We decided to put the shock and stress already in the "other climate risks".	Government of France	Ministère de la Transition écologique et solidaire	France
60019	43	26	43	28	Better examples of these co-benefits are needed.	Noted. The example of co benefit has been mentioned in detail in chapter 8.	Government of United States of America	U.S. Department of State	United States of America
23749	43	37	43	37	"There is increasing evidence that climate-mitigation measures can lower health risks that are related to energy poverty, especially in vulnerable groups, such as the elderly" Are there any studies on child and adolescent health?	Noted. The study on childhood and adolescent also has been included.	Government of France	Ministère de la Transition écologique et solidaire	France
17891	43				Table 17.3 (like many others that attempt to summarize a broad swath of information) are not very useful because the elements and their interactions will be so context-dependent	Noted The Table has been substituted with Figure 17.1, which is providing and overview of sectoral mitigation options based on inputs from the sectoral chapters	Robert Brecha	Climate Analytics	Germany
28105	44	3	44	6	It is important to provide more information on the regional distribution of these 53 towns and to indicate whether they are in the developed or developing countries.	Noted. More details have been added	Eleni Kaditi	Organization of the Petroleum Exporting Countries, OPEC	Austria
60021	44	4			Reword: "evidence the potential"	Agree. The sentence has been replaced becomes "shows the potential"	Government of United States of America	U.S. Department of State	United States of America
28107	45	12	45	13	It is necessary to have more evidence to understand whether renovation of buildings in developing countries could be sufficient to enhance transition to sustainable paths.	Noted. More details on retrofitting building should be available on chapter 9.	Eleni Kaditi	Organization of the Petroleum Exporting Countries, OPEC	Austria
3107	45	20	45	26	Warrants attention to issues of multi-scale and multi-sector. Infrastructural investments take, and will take, many different forms and directions, and their implications will differ etc. 1-2 sentences draw out these differences and the range of dilemmas arising from them would strengthen this section of the report.	Noted. This discussion on infrastructure is to specific for our chapter, chapter 15 provides details on the issues	Beth Edmondson	Federation University	Australia
48081	46	0	46	0	Table 17.4 indicates that low carbon transportation has negative (-) economic impacts. Although costs may be high in the case of innovative technologies that involve changes in infrastructure and substitution of vehicle fleet, in the case of biofuels for land transport costs are significantly lower.	Noted. All sectoral tables has been merged into one table which outline the synergies and tradeoffs with SDGs.	Marcelo moreira	UNICAMP - Agroicone	Brazil
51001	46	0	46	0	Table 17.4 indicates that low carbon transportation has negative (-) economic impacts. Although costs may be high in the case of innovative technologies that involve changes in infrastructure and substitution of vehicle fleet, in the case of biofuels for land transport costs are significantly lower.	Noted. All sectoral tables has been merged into one table which outline the synergies and tradeoffs with SDGs.	Government of Brazil	Ministry of Foreign Affairs of Brazil	Brazil
18601	46	1	46	1	This table is helpful for showing some examples, but perhaps it could be made clearer that these are dependent on several underlying assumptions (e.g. about the relative costs of materials), which may vary significantly between regions. Table 17.4.	Noted. All sectoral tables has been merged into one summary table which outline the synergies and tradeoffs with SDGs.	Government of United Kingdom (of Great Britain and Northern Ireland)	Department for Business, Energy & Industrial Strategy	United Kingdom (of Great Britain and Northern Ireland)
71107	46	7	46	7	How about SDG14 - Life under water?	This is repetitive question. Its already answer above in comment no. 71099	Philippe Tulkens	European Union (EU) - DG Research & Innovation	Belgium
12307	46	7	47	1	Several indicated synergies and trade-offs are questionable. Please check	Noted. All sectoral tables has been merged into one table which outline the synergies and tradeoffs with SDGs. The sinergies and trade offs has been improved	Christophe Deissenberg	Institute for Non-Linear Dynamic Inference	Luxembourg
60023	46	7	47	1	Citations and firm examples would strengthen this table significantly.	Noted. All sectoral tables has been merged into one summary table which outline the synergies and tradeoffs with SDGs.	Government of United States of America	U.S. Department of State	United States of America
3109	46	7	47	3	This is a highly effective table.	Noted. All sectoral tables has been merged into one summary table which outline the synergies and tradeoffs with SDGs.	Beth Edmondson	Federation University	Australia

Comment Id	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
64307	46	29	46	29	What does this “not accessible to” mean? I assume “not available” to all countries. What does market-based mechanism mean? Is this market-finance or insurance or other schemes?	Accepted. Not available means there is no available studies that mentioned the relation synergies and/or trade offs of the mitigation actions to the SDGs. Not accessible means that studie have not been available	Takashi Hongo	Mitsui & Co. Global Strategic Studies Institute	Japan
17893	46				Table 17.4 - it is hard to imagine how retrofitting old buildings will have negative energy impacts, or how using lighter-weight building materials will have negative economic impacts; that low-carbon transportation will have negative economic impact could be imagined, but then is a serious issue to be considered. Is that really how this is to be interpreted?	Accepted. All sectoral tables has been merged into one summary table which outline the synergies and tradeoffs with SDGs. The synergies and trade offs has been revised.	Robert Brecha	Climate Analytics	Germany
18603	47	2	47	3	The colours described under the table don't appear to match - there is only one shade of blue and it seems to represent a synergy, whereas it's not clear which colour represents both synergy and trade offs combined.	Noted All sectoral tables has been merged into one summary table which outline the synergies and tradeoffs with SDGs. The synergies and trade offs has been 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)
60025	47	6			Reword to: "This section considers the ..."	Accepted	Government of United States of America	U.S. Department of State	United States of America
53039	47	9	47	10	before highlighting specific issues related to enabling. Sentence ends abruptly withouth completion	Accepted	Government of Saudi Arabia	Sustainability Advisor to the Minister Ministry of Petroleum and Mineral Resources	Saudi Arabia
60027	47	12	47	15	Remove bullets and add to previous paragraph following a colon: agriculture, water, industry, and urban.	Accepted	Government of United States of America	U.S. Department of State	United States of America
60029	47	17			First sentence redundant with paragraph above, so delete it.	Accepted	Government of United States of America	U.S. Department of State	United States of America
53045	47	26	47	28	Citation needed	Noted Citations in the next sentences cover the issues	Government of Saudi Arabia	Sustainability Advisor to the Minister Ministry of Petroleum and Mineral Resources	Saudi Arabia
71109	48	2	48	5	A fundamental transformation of the service sectors (mostly energy and food) is stated to enable stringent mitigation pathways. However, no numbers or explanation is provided, how big this potential is and how to overcome lifestyle and behavioural change barriers to change away from e.g. a meat-based diet.	Accepted Text modified to provide more information about study conclusions	Philippe Tulkens	European Union (EU) - DG Research & Innovation	Belgium
3111	48	14	48	14	Add brief definition of conservation agriculture	Added	Beth Edmondson	Federation University	Australia
1503	48	19	48	19	Add Kongsager 2017 to the cited reference: "care (Kongsager 2017; Thornton et al. 2017; Soussana et al. 2019)." - (Kongsager, R. (2017). Barriers to the adoption of alley cropping as a climate-smart agriculture practice: lessons from maize cultivation among the Maya in southern Belize. Journal: Forests 8(7), 260. <a href="http://www.mdpi.com/1999-4907/8/7/260/pdf">http://www.mdpi.com/1999-4907/8/7/260/pdf</a>	Added	RICO KONGSAGER	University College Copenhagen	Denmark
3113	48	22	48	22	Add brief definition of agroforestry	Rejected since this is a very broad concept covering a lot of issues	Beth Edmondson	Federation University	Australia
60031	48	25	48	26	This is important, but covered only in passing. There is a very real trade-off between efficiency and resilience. Efficiency approaches are generally seeking to maximize output during (rarely realized) ideal conditions, whereas resilience seeks to guarantee output under a wide range of conditions. An example of these approaches is the Texas power grid (efficient) vs. the U.S. shared grid (resilient).	Accepted resiliency and efficiency issues are added	Government of United States of America	U.S. Department of State	United States of America
60033	48	31			Afforestation is very undesirable in many locations. Even from a purely carbon storage perspective	Reference to chapter 7 is added, and qualifications are added on indirect land use change and emissions	Government of United States of America	U.S. Department of State	United States of America
70023	48	31	48	33	In parenthesis, add the following reference: "Cordova et al. 2019"	Added	Markku Kanninen	University of Helsinki	Finland
11691	48	33	48	34	Is the statement "...could become carbon neutral by 2020-2040 realistic? Taking into account for example the prospect of the South American Amazon forest turning into a net carbon emitter due to the scale of deforestation. There should be a short assessment of how realistic this is and the scale of action required.	Accepted The sentence is modified to say that the sector is key in moving to carbon neutrality	Paul Dumble	Paul's Environment Ltd	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
48083	48	35	48	38	This excerpt may induce readers to conclude that bioenergy must necessarily expand on natural vegetation. That is absolutely not the case, as revealed in a growing body of literature. Expansion on abandoned or unused croplands and pastures present significant global potential, and will avoid sustainability risks of expansion over natural vegetation: Næss, Jan & Cavalett, Otavio & Cherubini, Francesco. (2021). The land–energy–water nexus of global bioenergy potentials from abandoned cropland. Nature Sustainability. 10.1038/s41893-020-00680-5. "However, the large scale deployment of intensive bioenergy plantations, including monocultures, replacing natural forests and subsistence farmlands are likely to have negative impacts on biodiversity and can threaten food and water security, as well as local livelihoods, including by intensifying social conflicts. The expansion of bioenergy in other areas, such as abandoned, unused or degraded croplands and pastures, on the other hand, avoid these impacts."	Reference added	Marcelo moreira	UNICAMP - Agroicone	Brazil
51003	48	35	48	38	This excerpt may induce readers to conclude that bioenergy must necessarily expand on natural vegetation. That is absolutely not the case, as revealed in a growing body of literature. Expansion on abandoned or unused croplands and pastures present significant global potential, and will avoid sustainability risks of expansion over natural vegetation: Næss, Jan & Cavalett, Otavio & Cherubini, Francesco. (2021). The land–energy–water nexus of global bioenergy potentials from abandoned cropland. Nature Sustainability. 10.1038/s41893-020-00680-5. "However, the large scale deployment of intensive bioenergy plantations, including monocultures, replacing natural forests and subsistence farmlands are likely to have negative impacts on biodiversity and can threaten food and water security, as well as local livelihoods, including by intensifying social conflicts. The expansion of bioenergy in other areas, such as abandoned, unused or degraded croplands and pastures, on the other hand, avoid these impacts."	Accepted References added	Government of Brazil	Ministry of Foreign Affairs of Brazil	Brazil
60035	48	35	48	38	Insert: "... and this reduces resilience as well"	Accepted	Government of United States of America	U.S. Department of State	United States of America
53047	49	5	49	6	Citation needed	Noted More details are given in the subsection on the water-energy-food nexus, where citations are included	Government of Saudi Arabia	Sustainability Advisor to the Minister Ministry of Petroleum and Mineral Resources	Saudi Arabia
29623	49	9	49	10	This sentence is unclear "There are several potentially strong links between climate-change adaptation in industry and climate change adaptation." Is there something missing?	Accepted Sentence is updated	Government of Norway	Norwegian Environment Agency	Norway
46431	49	17	49	17	Please add after last sentence of para: 'An early introduction use of non-halogenated, i.e. natural, refrigerants like hydrocarbons can next to increasing energy efficiency (Wang et al. 2020) also decrease the overall production and emission of F-gases and thus help to sustainably support the goals of Kigali Amendment.' (Wang, Xu, Purohi, P, Höglund-Isaksson, L., Zhang, S, and Fang, H.(2020): Co-benefits of Energy-Efficient Air Conditioners in the Residential Building Sector of China Environmental Science & Technology 2020 54 (20), 13217-13227, <a href="https://doi.org/10.1021/acs.est.0c01629">https://doi.org/10.1021/acs.est.0c01629</a> )	Rejected this is not relevant to adaptation-mitigation links	Government of Germany	Federal Ministry for the Environment, Nature Conservation and Nuclear Safety International Climate Policy	Germany
53049	49	30	49	32	The reason that politicians are not interested in long term SDG projects which will have a tangible impact on SDGs is because the goals are long term and electoral cycles are short. There is a mismatch of political incentives and as long as this persists, there will be very little interest from some politicians for meaningful long term SDG relevant projects.	Accepted Short term impacts on SDG's are emphasized	Government of Saudi Arabia	Sustainability Advisor to the Minister Ministry of Petroleum and Mineral Resources	Saudi Arabia
60037	49	38	49	40	This sentence is an example of conclusions that are so general as to not be useful. Why not describe the trade-offs and benefits, and what the broad range of recommendations were?	Noted More details are given in the section on cities	Government of United States of America	U.S. Department of State	United States of America
71111	50	1	50	1	How ablut blue jobs?	Accepted Green is deleted, so it is only jobs	Philippe Tulkens	European Union (EU) - DG Research & Innovation	Belgium
23751	50	8	50	8	"Rebuilding and refurbishment after climate hazards can increase energy consumption and" We recommend to cite the Sendai framework and the challenge of Build back better as an instrument for mitigation/adaptation (i.e. decartmentalising disaster risk reduction policies and climate transition)?	Accepted	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
23753	50	27	50	27	"In developing and least developed countries, there are many examples of climate policies in the NDCs that have been drawn up in the context of sustainable development and cover both mitigation and adaptation" The text could be clearer by showing that the developed/developing country opposition needs to be combined with the strong inequalities that exist within states and which are likely to increase in post covid times.	Noted This is however a very general statement, which is dealt with in other part of the chapter	Government of France	Ministère de la Transition écologique et solidaire	France
1499	50	31	50	32	Add Kongsager et al. 2016 to the cited reference: " (Di Gregorio et al. 2017; Kongsager et al. 2016; Shaw et al. 2014)." •Kongsager, R., Locatelli, B. & Chazarin, F. (2016). Addressing climate change mitigation and adaptation together: a global assessment of agriculture and forestry projects. Journal: Environmental Management 57 (2), pp 271-282. <a href="http://dx.doi.org/10.1007/s00267-015-0605-y">http://dx.doi.org/10.1007/s00267-015-0605-y</a>	Added	RICO KONGSAGER	University College Copenhagen	Denmark
53051	50	36	50	36	A&M needs to be explained	Accepted	Government of Saudi Arabia	Sustainability Advisor to the Minister Ministry of Petroleum and Mineral Resources	Saudi Arabia
28109	50	39	50	40	After "protect", add "developing countries including" LDCs.	Accepted	Eleni Kaditi	Organization of the Petroleum Exporting Countries, OPEC	Austria
1501	51	3	51	3	Add: "In an assessment of 201 projects in the forestry and agricultural sectors in the tropics Kongsager et al. (2016) found that a majority of the projects contributed to both adaptation and mitigation or at least had the potential to do so, despite of the separation between these two objectives by international and national institutions. " •Kongsager, R., Locatelli, B. & Chazarin, F. (2016). Addressing climate change mitigation and adaptation together: a global assessment of agriculture and forestry projects. Journal: Environmental Management 57 (2), pp 271-282. <a href="http://dx.doi.org/10.1007/s00267-015-0605-y">http://dx.doi.org/10.1007/s00267-015-0605-y</a>	Reference added	RICO KONGSAGER	University College Copenhagen	Denmark
71113	51	8	51	10	How about SDG14 - Life under water?	Noted The sectoral Tables are substituted with Figure 7.1, which provides an overview of sectoral mitigation options based on inputs from the sectoral chapters	Philippe Tulkens	European Union (EU) - DG Research & Innovation	Belgium
80705	51	8	51	10	Table 17.5; BECCS is not an effective mitigation option, because it is not carbon neutral in the near term—with a carbon deficit for many years, generally several decades to a century—that is crucial for mitigating emissions and avoiding hitting the 1.5°C mark. Bioenergy substitution for fossil fuels is not an effective mitigation strategy because burning forest biomass for power generation emits more CO2 per unit of final energy than burning fossil fuels. Danielle Venton, Core Concept: Can bioenergy with carbon capture and storage make an impact?, PNAS (2016); Leturcq, P. (2020) GHG Displacement Factors of Harvested Wood Products: the Myth of Substitution, NATURE SCIENTIFIC REPORTS 10:1-9; Mary S. Booth, Not carbon neutral: Assessing the net emissions impact of residues burned for bioenergy, ENVIRON. RES. LETT. 13 (21 February 2018); Sterman J. D., et al. (2018) Does replacing coal with wood lower CO2 emissions? Dynamic lifecycle analysis of wood bioenergy, ENVTL. RESEARCH LETTERS 13(015007):1-10, 1 ("We simulate substitution of wood for coal in power generation, estimating the parameters governing NPP and other fluxes using data for forests in the eastern US and using published estimates for supply chain emissions. Because combustion and processing efficiencies for wood are less than coal, the immediate impact of substituting wood for coal is an increase in atmospheric CO2 relative to coal. The payback time for this carbon debt ranges from 44–104 years after clear-cut, depending on forest type—assuming the land remains forest. Surprisingly, replanting hardwood forests with fast-growing pine plantations raises the CO2 impact of wood because the equilibrium carbon density of plantations is lower than natural forests. Further, projected growth in wood harvest for bioenergy would increase atmospheric CO2 for at least a century because new carbon debt continuously exceeds NPP. Assuming biofuels are carbon neutral may worsen irreversible impacts of climate change before benefits accrue. Instead, explicit dynamic models should be used to assess the climate impacts of biofuels.") Because of its many adverse consequences, bioenergy – including the wood pellet industry – raises environmental justice issues. Wood pellet production facilities are often located in communities of color and environmental justice communities. The production process releases harmful pollutants into the air and increases noise pollution, while the harvesting decreases biodiversity in the surrounding areas. D. Purifov (5 October 2020) How Europe's Wood Pellet	Noted We are not in the adaptation-mitigation section going into so much detail about this option	Durwood Zaelke	Institute for Governance & Sustainable Development	United States of America

Comment Id	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
80849	51	8	51	10	Table 17.5; BECCS is not an effective mitigation option, because it is not carbon neutral in the near term—with a carbon deficit for many years, generally several decades to a century—that is crucial for mitigating emissions and avoiding hitting the 1.5°C mark. Bioenergy substitution for fossil fuels is not an effective mitigation strategy because burning forest biomass for power generation emits more CO2 per unit of final energy than burning fossil fuels. Danielle Venton, Core Concept: Can bioenergy with carbon capture and storage make an impact?, PNAS (2016); Leturcq, P. (2020) GHG Displacement Factors of Harvested Wood Products: the Myth of Substitution, NATURE SCIENTIFIC REPORTS 10:1-9; Mary S. Booth, Not carbon neutral: Assessing the net emissions impact of residues burned for bioenergy, ENVIRON. RES. LETT. 13 (21 February 2018); Sterman J. D., et al. (2018) Does replacing coal with wood lower CO2 emissions? Dynamic lifecycle analysis of wood bioenergy, ENVTL. RESEARCH LETTERS 13(015007):1-10, 1 (“We simulate substitution of wood for coal in power generation, estimating the parameters governing NPP and other fluxes using data for forests in the eastern US and using published estimates for supply chain emissions. Because combustion and processing efficiencies for wood are less than coal, the immediate impact of substituting wood for coal is an increase in atmospheric CO2 relative to coal. The payback time for this carbon debt ranges from 44–104 years after clear-cut, depending on forest type—assuming the land remains forest. Surprisingly, replanting hardwood forests with fast-growing pine plantations raises the CO2 impact of wood because the equilibrium carbon density of plantations is lower than natural forests. Further, projected growth in wood harvest for bioenergy would increase atmospheric CO2 for at least a century because new carbon debt continuously exceeds NPP. Assuming biofuels are carbon neutral may worsen irreversible impacts of climate change before benefits accrue. Instead, explicit dynamic models should be used to assess the climate impacts of biofuels.”). Because of its many adverse consequences, bioenergy – including the wood pellet industry – raises environmental justice issues. Wood pellet production facilities are often located in communities of color and environmental justice communities. The production process releases harmful pollutants into the air and increases noise pollution, while the harvesting decreases biodiversity in the surrounding areas. D. Purifoy (5 October 2020) How Europe’s Wood Pellet	Similar to previous comment	Gabrielle Dreyfus	Institute for Governance & Sustainable Development	United States of America
8183	51	8	51	12	Please revise table 17.5. Afforestation and efficient agriculture should be two separated rows.	We have deleted the Table and replaced it with Figure 1, which is mapping tradeoffs and synergies between sectoral options based on inputs from the sectoral chapters	Joachim Rock	Thuenen-Institute of Forest Ecosystems	Germany
46433	51	8	51	12	For a more complete picture of the trade-offs and synergies of the options presented in table 17.5, it would be useful to integrate a column on biodiversity. The main trade-offs are already assessed on page 33, line 9ff (chapter 17) and could be visualized in this table as well. Especially in the water-energy-food nexus and regarding options in the agricultural sector, biodiversity is - in the light of the current biodiversity crisis - an important topic which should be considered when examining potential transition pathways (see chapter 7).	We have deleted the Table and replaced it with Figure 1, which is mapping tradeoffs and synergies between sectoral options based on inputs from the sectoral chapters	Government of Germany	Federal Ministry for the Environment, Nature Conservation and Nuclear Safety International Climate Policy	Germany
29057	51	9	51	10	Afforestation should have the same/similar negative impacts in terms of land use than bioenergy.	Noted The sectoral Tables are substituted with Figure 7.1, which provides an overview of sectoral mitigation options based on inputs from the sectoral chapters	Jasmin Kemper	IEAGHG	United Kingdom (of Great Britain and Northern Ireland)
60039	51	14			Delete "as shown" and start with "There are several". Refer to Table 17.5 parenthetically.	Noted The sectoral Tables are substituted with Figure 7.1, which provides an overview of sectoral mitigation options based on inputs from the sectoral chapters	Government of United States of America	U.S. Department of State	United States of America
23755	51	24	51	24	This section 17.3.3.6 on digitalisation seems to look only at technological innovation. Is there any data on the social innovations it could bring? What would be the medium and long term maladaptation effects induced by digital technology? In particular, the link between digitalisation and energy and the link between digitalisation and vulnerability to other risks (natural risks, cybersecurity, etc.) should be mentioned.	Accepted. We have included the societal changes due to Covid 19 pandemic as an example of how societal issues interacts with the digitalization.	Government of France	Ministère de la Transition écologique et solidaire	France
53053	51	25	51	26	Citation needed	Accepted.	Government of Saudi Arabia	Sustainability Advisor to the Minister Ministry of Petroleum and Mineral Resources	Saudi Arabia
53055	52	19	52	19	Citation needed	Accepted.	Government of Saudi Arabia	Sustainability Advisor to the Minister Ministry of Petroleum and Mineral Resources	Saudi Arabia
12309	52	19	52	30	This paragraph would benefit of a thorough reformulation	Noted However we think it works well	Christophe Deissenberg	Institute for Non-Linear Dynamic Inference	Luxembourg

Comment Id	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
71115	52	26	52	27	Rebound effects are identified as a negative impact of digitalisation, whereby easier access to services increase demand for the services and thereby GHG emissions. It is not indicated, how significant the rebound effects are, which is important to understand the robustness of how digitalisation can enable efficiency gains and enable the sharing economy.	Noted. The digitalization and rebound effect as the impact of new innovation has also been discussed separately in a box in chapter 16	Philippe Tulkens	European Union (EU) - DG Research & Innovation	Belgium
12311	52	31	52	35	I cannot understand the precise meaning of this paragraph	Noted This is based on the reference	Christophe Deissenberg	Institute for Non-Linear Dynamic Inference	Luxembourg
5623	52	46	52	46	Replace "Renewable" by low carbon sources	Rejected. The renewable energy will become energy supply for autonomous vehicle not other low carbon sources in the case of this study	Michel SIMON	Retraité/ Pdt d'association	France
8929	53	1	53	5	There is not any word concerning nuclear technologies in this section recalling the findings in the chapter 6. We could add that nuclear technos are the only large dispatchable low carbon electric technologies with hydro. It is why these technologies have such a clear support by OECD/IEA. It is also clearly reported in the chapter 6.	Noted Nuclear technologies are included in our Synergy Figure 7.1	Jean-Guy DEVEZEAUX DE LAVERGNE	Université Paris-Dauphine & Société Française d'Énergie Nucléaire	France
74017	53	1	53	5	While there is great potential in utilizing digital technologies for contributing sustainable energy, we could also mention key challenges with regard to technological, economic, social, environmental, and institutional dimensions. In the case of blockchain-based peer-to-peer energy exchange systems there are numerous institutional challenges, including prosumer licenses, balancing obligations, grid interconnection codes, network congestion fees, smart meter measurement regulations, privacy protection, smart meter security, data traceability. References: Ahl, Amanda, Masaru Yarime, Mika Goto, Shauhrat Chopra, Manoj Kumar Nallapaneni, Kenji Tanaka, and Daishi Sagawa, "Exploring Blockchain for the Energy Transition: Opportunities and Challenges Based on a Case Study in Japan," Renewable and Sustainable Energy Reviews, 117, 109488 (2020). Ahl, Amanda, Masaru Yarime, Kenji Tanaka, and Daishi Sagawa, "Review of Blockchain-Based Distributed Energy: Implications for Institutional Development," Renewable and Sustainable Energy Reviews, 107, 200-211 (2019).	Rejected. Blockchain is not specifically discussed in this section. The focus on this section is digitalization sector as part of mitigation action towards sustainable development.	Masaru Yarime	Hong Kong University of Science and Technology	China
76473	53	37	54	4	Table 17.6 needs to have a line included to cover High shares of reliable stable nuclear energy. This will have positive impacts across all the digitalisation options. Stable reliable energy will provide great security to digitised networks than the intermittency of renewable energy'	Accepted	Robert Parker	Nuclear for Climate Australia	Australia
29059	53	38	53	39	On the remarks for integrated energy and transport systems: What about sustainability of the required energy storage infrastructure, e.g. minerals/rare earths needed?	Noted Issues on rare minerals are included in our section on renewable energy penetration and fossil fuel phase out	Jasmin Kemper	IEAGHG	United Kingdom (of Great Britain and Northern Ireland)
60041	54	14	54	15	This is an important section. Don't start it by saying Table 17.7 provides an overview. Provide the overview!	Noted The section has been completely changed with a new figure substituting the previous table. The changes are based on consultations with all sectoral chapters, and supplementary material is added providing details about context specific issues and scaling. Confidence statements are added	Government of United States of America	U.S. Department of State	United States of America
31733	55	0			CCS under Industries shows "n.a." for SDG 6 however in chapter 3 P97L6-9: "Limiting the use of CCS and instead relying on non-thermal renewable energy could decrease water withdrawals (Kyles et al. 2013; Fujimori et al. 2017). However, the effect of CCS on water use depends on the cooling technology and when capture occurs (Magneschi et al. 2017; Maïzi et al. 2017)"- so should not this be +/- instead of n.a. Also see page 495 SR 1.5 Chapter 5	Noted The section has been completely changed with a new figure substituting the previous table. The changes are based on consultations with all sectoral chapters, and supplementary material is added providing details about context specific issues and scaling. Confidence statements are added	Shreya Some	Ahmedabad University	India
31735	55	0			Reduce overconsumption under cross sectional has no impact on any of the SDGs? However in various chapters impacts are indicated- please consider rechecking Chapter 3 P105L30-32: "Synergies also come from the consumption side through managing demand. For example, reducing food waste leads to saving resources – less water, less land, less energy consumption and GHG emissions (Hasegawa et al. 2019)." Chapter 5: Figure 5.6 SR 1.5 Chapter 5: table 5.2	Noted The section has been completely changed with a new figure substituting the previous table. The changes are based on consultations with all sectoral chapters, and supplementary material is added providing details about context specific issues and scaling. Confidence statements are added	Shreya Some	Ahmedabad University	India
31739	55	0			Demand reduction under transport shows synergies with only SDG3 and SDG13. No tradeoffs? -However, in Figure 5.6 of chapter 5 "teleworking & online education system" shows links with many more wellbeing related SDGs. Also related to SDG 9 (P76L4-8) -Also SR 1.5 chapter 5 page 506 for links with SDG 7, 8 & 11 etc	Noted The section has been completely changed with a new figure substituting the previous table. The changes are based on consultations with all sectoral chapters, and supplementary material is added providing details about context specific issues and scaling. Confidence statements are added	Shreya Some	Ahmedabad University	India

Comment Id	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
31743	55	0			For energy 'efficient appliances' under buildings SDG table in chapter-17 says "n.a." but in chapter 9 Table 9.5 notes it says "Sufficiency and efficiency measures as well as fuel switching to RES and improvements in energy access would eliminate major sources (both direct and indirect) of poor air quality (indoor and outdoor). Helpful if in-situ production of RES combined with charging electric two, three and four wheelers at home. Buildings with high energy efficiency and/or green features are sold/rented at higher prices than conventional, low energy efficient houses" worth rechecking	Noted The section has been completely changed with a new figure substituting the previous table. The changes are based on consultations with all sectoral chapters, and supplementary material is added providing details about context specific issues and scaling. Confidence statements are added	Shreya Some	Ahmedabad University	India
31749	55	0			Under AFOLU: "Restoring forest and other ecosystem"- why SDG 8 (Decent work and economic growth) shows only tradeoff? Should this be +/-?	Noted The section has been completely changed with a new figure substituting the previous table. The changes are based on consultations with all sectoral chapters, and supplementary material is added providing details about context specific issues and scaling. Confidence statements are added	Shreya Some	Ahmedabad University	India
31751	55	0			Industry (please recheck) -Fig 11.5.3 shows co-benefits with SDG 3 for Material efficiency & demand reduction- in table 17.7 it shows n.a (explanation provided in section 11.5.3.1) -Fig 11.5.3 shows co-benefits with SDG 3, 6, 7, 8, 9, 11, 12, 13 & 15 for Circular Economy- in table 17.7 it does not show synergies for 9 (also see fig 5.6) and 13 -Fig 17.7: "Electrification & fuel switching": Shows n.a for SDG 4 but in chapter 11 P80L23 says "With energy being such an important cross-cutting issue to sustainable development, some SDGs, such as SDG 1, 3, 4, 5 (UNDP 2018) are co-beneficiaries to using electrification and fuel switching as a climate action mitigation option". -For CCU/CCS: P80L41 of chapter 11 says "Indeed, SDGs 7 to 11 have considerable significance for the sustainable implementation of CCU technologies." In table 17.7- SDG 10 and 11 are not shown. Please recheck - For Circular Economy; Material efficiency & demand reduction; Energy efficiency Fig 5.6 shows positive impact for SDG 2; 4 and 16, however no impact shown in table 17.7 with these SDGs	Noted The section has been completely changed with a new figure substituting the previous table. The changes are based on consultations with all sectoral chapters, and supplementary material is added providing details about context specific issues and scaling. Confidence statements are added	Shreya Some	Ahmedabad University	India
48311	55	0	55	0	This table is very clear and helpful, really nice example to highlight as others are significantly less clear and fuzzy.	Noted thanks	Susana Hancock	University of Oxford	United States of America
3585	55	1			This critical Table 17.7 surely deserves more commentary than that in the paragraph below. For example: demand side mitigation and healthy balanced diets each show 8 plus points, and 'flexible comfort requirements' (ie temperature limits in buildings etc) show 10 plus points. These robust findings could then be linked back to Chapter 5 on the ASI model and the benefits of demand-side mitigation.	Noted The section has been completely changed with a new figure substituting the previous table. The changes are based on consultations with all sectoral chapters, and supplementary material is added providing details about context specific issues and scaling. Confidence statements are added	Ian Gough	CASE, LSE	United Kingdom (of Great Britain and Northern Ireland)
60043	55	1			Removing the "n.a." throughout will make this Table 17.7 less busy and allow readers to focus on the message/content.	Noted The section has been completely changed with a new figure substituting the previous table. The changes are based on consultations with all sectoral chapters, and supplementary material is added providing details about context specific issues and scaling. Confidence statements are added	Government of United States of America	U.S. Department of State	United States of America
79719	55	1			Ratings with regards to nuclear and SDGs are unsubstantiated and not aligned on literature. See	Noted The section has been completely changed with a new figure substituting the previous table. The changes are based on consultations with all sectoral chapters, and supplementary material is added providing details about context specific issues and scaling. Confidence statements are added	valerie faudon	SFEN	France
79721	55	1			Synergies are expected for nuclear on SDG1 (poverty): nuclear contributes to universal access of electricity (IAEA), France (with 70% nuclear source RTE) has lower cost of retail electricity in Western Europe (source: Eurostats)	Noted The section has been completely changed with a new figure substituting the previous table. The changes are based on consultations with all sectoral chapters, and supplementary material is added providing details about context specific issues and scaling. Confidence statements are added	valerie faudon	SFEN	France
79723	55	1			Synergies are expected for nuclear on SDG2 (hunger);Several countries are improving food security and agriculture by using nuclear and isotopic techniques. (IAEA)	Noted The section has been completely changed with a new figure substituting the previous table. The changes are based on consultations with all sectoral chapters, and supplementary material is added providing details about context specific issues and scaling. Confidence statements are added	valerie faudon	SFEN	France
79725	55	1			Synergies are expected for nuclear on SDG3 ((Good health and well-being): Prof Anil Markandya, PhD • Paul Wilkinson, FRCP , The Lancet September 13, 2007 DOI:https://doi.org/10.1016/S0140-Clean air: nuclear has prevented deaths from small particles (Pushker A. Kharecha and James E. Hansen, Environmental Science & Technology, 2013 )	Noted The section has been completely changed with a new figure substituting the previous table. The changes are based on consultations with all sectoral chapters, and supplementary material is added providing details about context specific issues and scaling. Confidence statements are added	valerie faudon	SFEN	France

Comment Id	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
79727	55	1			Synergies are expected for nuclear on SDG6 (Clean water and sanitation): -Nuclear power is a very efficient source of energy for desalination. In the world they are 10 reactors devoted to that purpose (see the IAEA PRIS database). <a href="https://www.sciencedirect.com/science/article/abs/pii/S0011916418323531">https://www.sciencedirect.com/science/article/abs/pii/S0011916418323531</a> . In case of water scarcity, possibility to add cooling towers. Sea-shore plants have actually no impact on the sea. In addition, dry cooling is possible, with a very low water consumption.: <a href="https://reader.elsevier.com/reader/sd/pii/S1364032119305994?token=539F3CD6FAB8F5373D81F5799D8CB4F36236051A9E9D2D1EDC9AB89A3D99CFFE5B4BB68A18DF71A7FB6717CA32D478B3">https://reader.elsevier.com/reader/sd/pii/S1364032119305994?token=539F3CD6FAB8F5373D81F5799D8CB4F36236051A9E9D2D1EDC9AB89A3D99CFFE5B4BB68A18DF71A7FB6717CA32D478B3</a> .	Noted The section has been completely changed with a new figure substituting the previous table. The changes are based on consultations with all sectoral chapters, and supplementary material is added providing details about context specific issues and scaling. Confidence statements are added	valerie faudon	SFEN	France
79729	55	1			Synergies are expected on SDG 7 Affordable and clean energy: Long-term operation of nuclear plants is a very competitive means to produce electricity today <a href="https://www.iea.org/reports/projected-costs-of-generating-electricity-2020">https://www.iea.org/reports/projected-costs-of-generating-electricity-2020</a>	Noted The section has been completely changed with a new figure substituting the previous table. The changes are based on consultations with all sectoral chapters, and supplementary material is added providing details about context specific issues and scaling. Confidence statements are added	valerie faudon	SFEN	France
79731	55	1			Synergies are expected on SDG8 ( Decent work and economic growth): Nuclear is number 3 industrial sector in France with 2000 companies and 220000 direct and indirect employees (source CSFN- Ministry of Industry)	Noted The section has been completely changed with a new figure substituting the previous table. The changes are based on consultations with all sectoral chapters, and supplementary material is added providing details about context specific issues and scaling. Confidence statements are added	valerie faudon	SFEN	France
79733	55	1			Synergies are expected on SDG 13 (climate change and mitigation): IAEA 2018 Climate change and nuclear power 13395 report: <a href="https://www.iaea.org/publications/13395/climate-change-and-nuclear-power-2018">https://www.iaea.org/publications/13395/climate-change-and-nuclear-power-2018</a> . IPCC SR15 report 2018	Noted The section has been completely changed with a new figure substituting the previous table. The changes are based on consultations with all sectoral chapters, and supplementary material is added providing details about context specific issues and scaling. Confidence statements are added	valerie faudon	SFEN	France
79735	55	1			Synergies are expected SDG 16: Peace, justice and strong institutions . This is the whole purpose of life of IAEA and non proliferation treaties	Noted The section has been completely changed with a new figure substituting the previous table. The changes are based on consultations with all sectoral chapters, and supplementary material is added providing details about context specific issues and scaling. Confidence statements are added	valerie faudon	SFEN	France
12229	55	1	55	1	We do not agree with the assessment of nuclear against the SGDs. We consider that insufficient information is given in the report about the assessment of nuclear against the SGDs and that this assessment contradicts some of the information in Chapter 6 about the benefits of nuclear power. Nuclear is not mentioned once in Chapter 17 with the exception of this chart. Also, the assessment is not taking into consideration the recent UNECE report ( <a href="https://unece.org/fileadmin/DAM/energy/se/pdfs/UNFC/UNFC_The_Role_of_Nuclear_Energy_in_Sustainable_Development_Public_Comment/The_Role_of_Nuclear_Energy_in_Sustainable_Development.pdf">https://unece.org/fileadmin/DAM/energy/se/pdfs/UNFC/UNFC_The_Role_of_Nuclear_Energy_in_Sustainable_Development_Public_Comment/The_Role_of_Nuclear_Energy_in_Sustainable_Development.pdf</a> ) which states the nuclear power fulfills almost all the SDGs. Judging nuclear against the SDGs should take into consideration the following: SDG 1: No poverty (should be synergy not trade-off) Nuclear power currently ensures 1,1 million jobs and has an annual turnover of 102 billion Euros at EU level. Most of these are high paying jobs. Also, nuclear energy is affordable as compared to other sources thus reducing the pressure on consumers. SDG 2: Zero hunger (should be synergy instead of n/a) Non applications of nuclear power contribute to food safety and sustainable agriculture. Also nuclear power uses small amounts of land thus not infringing on farm land. SDG 3: Good health (should be synergy not trade-off) In the European Union, nuclear power avoided the emission of more than 20 Gt CO2 over the past 50 years which would have been otherwise produced if the same amount of electricity was produced using conventional fuel. Nuclear power contributes to emissions reduction. SDG 4: Quality education (should be synergy instead of n/a) Nuclear specialization in Universities ensures access to high level paying jobs. SDG 5: Gender equality (should be trade off instead of n/a) The nuclear sector tries to ensure equal gender representation and has set up organizations to promote women careers in science and technology (Women in Nuclear) SDG 6: Clean water and sanitation (should be synergy instead of trade off) Cooling water returned to the water sources is clean and does not affect biodiversity. Nuclear	Noted The section has been completely changed with a new figure substituting the previous table. The changes are based on consultations with all sectoral chapters, and supplementary material is added providing details about context specific issues and scaling. Confidence statements are added	Lavinia Rizea	SN Nuclearelectrica SA	Romania
17159	55	1	55	1	see comments in verse 17 above	Noted The section has been completely changed with a new figure substituting the previous table. The changes are based on consultations with all sectoral chapters, and supplementary material is added providing details about context specific issues and scaling. Confidence statements are added	Government of Poland	Ministry of Environment, Department of Air Protection and Climate	Poland

Comment Id	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
19645	55	1	55	1	<p>as we commented above, nuclear energy has positive impact on:</p> <p>SDG 1: nuclear energy provides a range of highly skilled, paid and sustainable jobs (unlike subsidised energy sources), over 1 million in Europe alone (source: FORATOM). See also: Measuring Employment Generated by the Nuclear Power Sector, NEA-OECD 2018.</p> <p>SDG 3: nuclear energy produce nonstop clean electricity and heat, thus avoiding air pollution which is a direct cause of respiratory diseases</p> <p>SDG 4: nuclear energy provides education and training not only for future nuclear industry employers but also for public (e.g. in information centers located in nuclear power plants) on basics of electricity, mechanics, geology and chemistry (related to the back-end of nuclear fuel cycle) and many others.</p> <p>SDG 5: nuclear energy offers variety of positions in nuclear industry with no restrictions and preferences related to gender.</p> <p>SDG 6: impact here is neutral or negligible, obviously not negative, since water circulated by cooling systems of nuclear power plants is returned back to water reservoirs or flows in closed circuits with just a small amount being evaporated (1-2%) but this goes back to the biosphere by rains).</p> <p>SDG 7: nuclear power plants are the source of the cheapest non-intermittent non-emission electricity with nonstop production, e.g. in Finland, France, Germany, Russia, USA and other nuclear countries, especially when full costs of electricity provision is taken into account (see: Projected Costs of Generating Electricity 2020 Edition, IEA-NEA 2020; The Costs of Decarbonisation: System Costs with High Shares of Nuclear and Renewables, NEA-OECD 2019; The Full Costs of Electricity Provision, NEA-OECD 2018.</p> <p>SDG 8 and SDG 9: nuclear industry has positive impact on economy, it was a subject of dozens of studies, e.g. in USA (see: Economic Impacts of the Millstone Power Station, NEI 2017), UK, France and in other nuclear countries. According to FORATOM study from September 2020 there is ca. 90 000 jobs in European non-nuclear countries maintained by European nuclear industry.</p> <p>SDG 10: nuclear energy does not have any relation or impact on SDG 10.</p>	<p>Noted The section has been completely changed with a new figure substituting the previous table. The changes are based on consultations with all sectoral chapters, and supplementary material is added providing details about context specific issues and scaling. Confidence statements are added</p>	Government of Slovakia	State Advisor, Climate Change Policy Department Ministry of the Environment	Slovakia
31509	55	1	55	1	<p>Table 17.7/Hydropower/ SDG 1 (No poverty). Hydropower is the only energy system to get a "-" . There is an special reason for that</p>	<p>Noted The section has been completely changed with a new figure substituting the previous table. The changes are based on consultations with all sectoral chapters, and supplementary material is added providing details about context specific issues and scaling. Confidence statements are added</p>	Carolina Ahnert	Universidad Politécnica de Madrid	Spain
31511	55	1	55	1	<p>Table 17.7/Energy systems/ SDG 5 (Gender equality) Why is "+" for solar and wind energies, and not for other energies.</p>	<p>Noted The section has been completely changed with a new figure substituting the previous table. The changes are based on consultations with all sectoral chapters, and supplementary material is added providing details about context specific issues and scaling. Confidence statements are added</p>	Carolina Ahnert	Universidad Politécnica de Madrid	Spain
31513	55	1	55	1	<p>"Table 17.7/Nuclear Energy/ SDG 6 (Clean Water and sanitation). The "-" mark is questionable.Nuclear plants located on the coast are cooled by seawater and so have no negative impact, do not exhibit a negative synergy with SDG 6. For plants not located on the seaside, freshwater cooling is an option. Also the cooling needs for solar thermal plants are similar</p>	<p>Noted The section has been completely changed with a new figure substituting the previous table. The changes are based on consultations with all sectoral chapters, and supplementary material is added providing details about context specific issues and scaling. Confidence statements are added</p>	Carolina Ahnert	Universidad Politécnica de Madrid	Spain
31515	55	1	55	1	<p>Table 17.7/Nuclear Energy/ SDG 9 (Industry, Innovation and Infrastructure). Nuclear is the only energy system to get a "-". Why is like that ?</p>	<p>Noted The section has been completely changed with a new figure substituting the previous table. The changes are based on consultations with all sectoral chapters, and supplementary material is added providing details about context specific issues and scaling. Confidence statements are added</p>	Carolina Ahnert	Universidad Politécnica de Madrid	Spain
31517	55	1	55	1	<p>Table 17.7/Nuclear/SDG 10 (Reduced inequalities). Once more, Nuclear is the only energy system to get a "-". Why is that ?</p>	<p>Noted The section has been completely changed with a new figure substituting the previous table. The changes are based on consultations with all sectoral chapters, and supplementary material is added providing details about context specific issues and scaling. Confidence statements are added</p>	Carolina Ahnert	Universidad Politécnica de Madrid	Spain
31519	55	1	55	1	<p>"Table 17.7/Nuclear/SDG 13 (Climate Action). How can the synergy between nuclear and SDG13 (climate action) be "N.A.". There are a lot of documents that demonstrate that Nuclear Power contributes to mitigate the climate change. Documents released by general Agencies as: European Commission, and International Energy Agency.</p>	<p>Noted The section has been completely changed with a new figure substituting the previous table. The changes are based on consultations with all sectoral chapters, and supplementary material is added providing details about context specific issues and scaling. Confidence statements are added</p>	Carolina Ahnert	Universidad Politécnica de Madrid	Spain

Comment Id	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
45459	55	1	55	1	UNECE recently have published the report summarizing nuclear energy role in fulfilling SDG's. It underlines positive role of nuclear in fulfilling virtually all of them. Please see: <a href="https://unece.org/sustainable-energy/publications/nuclear-entry-pathways">https://unece.org/sustainable-energy/publications/nuclear-entry-pathways</a>	Noted The section has been completely changed with a new figure substituting the previous table. The changes are based on consultations with all sectoral chapters, and supplementary material is added providing details about context specific issues and scaling. Confidence statements are added	Maciej Lipka	National Centre for Nuclear Research	Poland
45461	55	1	55	1	Nuclear power can directly help to fulfill SDG6. It has been proven to successfully provide drinking water by the process of desalination. Please see: <a href="https://doi.org/10.1016/B978-0-12-820021-6.09993-2">https://doi.org/10.1016/B978-0-12-820021-6.09993-2</a> In the same time it does not necessarily uses water for cooling purposes. Please see <a href="https://www.osti.gov/servlets/purl/1210198/">https://www.osti.gov/servlets/purl/1210198/</a>	Noted The section has been completely changed with a new figure substituting the previous table. The changes are based on consultations with all sectoral chapters, and supplementary material is added providing details about context specific issues and scaling. Confidence statements are added	Maciej Lipka	National Centre for Nuclear Research	Poland
51211	55	1	55	1	Table 17.7 "Trade-offs and synergies between sectoral mitigation options and the SDGs": 1/ It is indicated as an introduction of this table that it is based on the conclusions of the sectoral chapters of this report. However, as far as energy systems are concerned (I am not qualified to have an opinion on the other systems/sectors), I have difficulties to identify in other chapters the justifications for many of the surprising trends/indications given in this table 17.7. Other trends appear to have been "inferred" from Table 6.9, a table which contains a number of "surprising" indications (see my numerous comments about Table 6.9). Comments below list those indications I found the most surprising (one comment per SDG when relevant) and which are not supported by any explanation/justification in the text of the report or by one I can think of. Overall, many indications in the table seem to come out of a hat and to be arbitrary. Without proper explanations/justifications in the text, indications in this table lack credibility. 2/ Furthermore, the meaning of "+/-" should be clarified/explained or, preferably, another symbol used. Indeed, in some cases, I got the impression that its meaning here is "negative, but very negative" while the usual meaning is "good in some cases, bad in others". Also, the terminology "n.a" (not applicable?) is ill adapted: I understand its meaning here to mean "no impact". Needs to be clarified.	Noted The section has been completely changed with a new figure substituting the previous table. The changes are based on consultations with all sectoral chapters, and supplementary material is added providing details about context specific issues and scaling. Confidence statements are added	Eric PROUST	European Nuclear Society (ENS)	France
51213	55	1	55	1	Table 17.7/SDG 1 (No poverty). Here, among the least understandable indications are the "-" for hydropower and the "+" for demande side management.	Noted The section has been completely changed with a new figure substituting the previous table. The changes are based on consultations with all sectoral chapters, and supplementary material is added providing details about context specific issues and scaling. Confidence statements are added	Eric PROUST	European Nuclear Society (ENS)	France
51215	55	1	55	1	Table 17.7/ SDG 2 (Zero hunger). Here, I was expecting the trend/indication to be essentially correlated with land requirements / constraints on land use imposed by the various energy systems. Based on Figure 12.9, I was expecting a "-" for hydropower. Ok, hydro reservoirs can also be used for irrigation, but this is a marginal benefit compared to the detriment of their impact on land use.	Noted The section has been completely changed with a new figure substituting the previous table. The changes are based on consultations with all sectoral chapters, and supplementary material is added providing details about context specific issues and scaling. Confidence statements are added	Eric PROUST	European Nuclear Society (ENS)	France
51217	55	1	55	1	Table 17.7/ SDG 3 (Good health and well-being). 1/ Good health and well-being is closely correlated to the degree of access to clean/non-fossil energy. Therefore, one is expecting all energy producing systems to get a "+", thus all listest energy systems except energy storage, system integration and demand side management (fossil phaseout does not produce energy but contributes to good health by reducing air pollution). Why isn't it the case? Why a "+/-" and not a "+" for hydropower and nuclear? This appears inconsistent. Regarding nuclear energy, note that, as indicated in Chapter 6 page 36 lines 24-27, that "life cycle assessment (LCA) studies suggest that the overall impacts on human health (in terms of disability adjusted life years (DALYs) from nuclear power are substantially lower than those caused by fossil fuel technologies and are comparable to renewable energies (Treuer et al. 2014; Gibon et al. 2017)" 2/ Why a "+" and not an "n.a" for demand side management?	Noted The section has been completely changed with a new figure substituting the previous table. The changes are based on consultations with all sectoral chapters, and supplementary material is added providing details about context specific issues and scaling. Confidence statements are added	Eric PROUST	European Nuclear Society (ENS)	France
51219	55	1	55	1	Table 17.7/Energy systems/ SDG 5 (Gender equality) One is expecting an "n.a" for all energy systems. What can justify the "+" for solar and wind energies and only for these energies???	Noted The section has been completely changed with a new figure substituting the previous table. The changes are based on consultations with all sectoral chapters, and supplementary material is added providing details about context specific issues and scaling. Confidence statements are added	Eric PROUST	European Nuclear Society (ENS)	France



Comment Id	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
51221	55	1	55	1	Table 17.7/Nuclear Energy/ SDG 6 (Clean Water and sanitation). The "-" mark is questionable. Here, I guess this mark is inferred from the indication in Table 6.9 that nuclear energy "needs substantive amount of water for cooling purposes". As indicated in my specific comment above about this statement in Table 6.9, it is inaccurate and should be amended. Furthermore, what is of relevance for SDG 6 is the needs for freshwater, not for seawater. As a consequence of both considerations, a "+/-" mark would be much more appropriate as explained below. 1/ nuclear power plants located on the sea-side are cooled by not by freshwater but seawater and so have no negative impact on/ do not exhibit a negative synergy with SDG 6. In fact, they have a clear positive impact, the availability of electricity contributing to access to clean drinking water. This is all the more true when these nuclear plant located on the sseaside are used for desalination. Note that a number of countries are able to use once-through seawater cooling for all of their nuclear plants. Among these are the UK, Sweden, Finland, South Africa, Japan, Korea and China. 2/ Nuclear plants need substantive amount of (fresh or sea or waste) water for cooling purposes, "however, adaptation in power plant cooling technology can considerably reduce global freshwater withdrawals and thermal pollution" (excerpt from the abstract of [1], an reference already cited in Chapter 6 3/ For nuclear plants not located on the seaside, wasterwater, not just freshwater, can be used for cooling. Thus, the Palo Verde Nuclear plant in the US uses the water from the treated sewage from several nearby cities to provide the cooling of the waste steam it produces [2] 4/ The cooling needs solar thermal plants are comparable to the ones of nuclear power plants [1] Fricko, O., S. C. Parkinson, N. Johnson, M. Strubegger, M. T. H. van Vliet, and K. Riahi, 2016: Energy sector water use implications of a 2 degrees C climate policy. Environ. Res. Lett., 11, <a href="https://doi.org/10.1088/1748-9326/11/3/034011">https://doi.org/10.1088/1748-9326/11/3/034011</a>	Noted The section has been completely changed with a new figure substituting the previous table. The changes are based on consultations with all sectoral chapters, and supplementary material is added providing details about context specific issues and scaling. Confidence statements are added	Eric PROUST	European Nuclear Society (ENS)	France
51223	55	1	55	1	Table 17.7/ SDG 7 (Affordable and clean energy). How can energy storage for low-carbon grids exhibit positive synergies in terms of affordable energy? Indeed, it cannot be expected to be cost competitive before a long time.	Noted The section has been completely changed with a new figure substituting the previous table. The changes are based on consultations with all sectoral chapters, and supplementary material is added providing details about context specific issues and scaling. Confidence statements are added	Eric PROUST	European Nuclear Society (ENS)	France
51225	55	1	55	1	Table 17.7/SDG 8 (Decent work and economic growth). How can fossil phaseout not get a "-"? How can CO2 capture, utilization and storage not get a "+/-" ("negative but not so negative")? How can hydropower and nuclear not get a "+-?"	Noted The section has been completely changed with a new figure substituting the previous table. The changes are based on consultations with all sectoral chapters, and supplementary material is added providing details about context specific issues and scaling. Confidence statements are added	Eric PROUST	European Nuclear Society (ENS)	France
51227	55	1	55	1	Table 17.7/Nuclear Energy/ SDG 9 (Industry, Innovation and Infrastructure). What can be the reason nuclear is getting a "-" and is the only energy system to get such a mark???	Noted The section has been completely changed with a new figure substituting the previous table. The changes are based on consultations with all sectoral chapters, and supplementary material is added providing details about context specific issues and scaling. Confidence statements are added	Eric PROUST	European Nuclear Society (ENS)	France
51229	55	1	55	1	Table 17.7/Nuclear/SDG 10 (Reduced inequalities). Once more, Nuclear is the only energy system to get a "-". How could nuclear contribute to increasing inequalities? And how can bioenergy, wind and solar contribute to reducing inequalities?	Noted The section has been completely changed with a new figure substituting the previous table. The changes are based on consultations with all sectoral chapters, and supplementary material is added providing details about context specific issues and scaling. Confidence statements are added	Eric PROUST	European Nuclear Society (ENS)	France
51231	55	1	55	1	Table 17.7/Nuclear/SDG 13 (Climate Action). How can the synergy between nuclear and SDG13 be "n. a" (no impact)??? This needs to be revised: Its impact is clearly positive. Indeed, 1/ in its report "Nuclear Power in a Clean Energy System" issued in May 2019, the IEA points out that "Nuclear power and hydropower form the backbone of low-carbon electricity generation. Together, they provide three-quarters of global low-carbon generation. Over the past 50 years, the use of nuclear power has reduced carbon dioxide (CO2) emissions by over 60 gigatonnes – nearly two years' worth of global energy-related emissions". And that "Achieving the pace of CO2 emissions reductions in line with the Paris Agreement is already a huge challenge, as shown in the Sustainable Development Scenario. It requires large increases in efficiency and renewables investment, as well as an increase in nuclear power" 2/ The 2015 edition of the joint IEA / NEA "Technology Roadmap - Nuclear Power" anticipates the need for an installed nuclear power capacity of 930 GW by 2050 to comply with the 2 degrees scenario, that is more than doubling the current world -400 GWe. The IAEA (2018) also sees a possible doubling of nuclear capacities by 2050, as well as the IPCC in 1.5 °C scenarios compared to 2010. And in its 2020 edition of "Energy, Electricity and Nuclear Power Estimates for the Period up to 2050", the IAEA anticipates an installed nuclear power capacity of 715 GWe by 2050 in the high case scenario (and a decrease down to 363 GWe in the low case scenario) 3/ In its communication of November 2018 "A Clean Planet for all", the European Commission outlines its "strategic long-term vision for a prosperous, modern, competitive and climate-neutral economy" by 2050. This vision confirms that "Together with a nuclear power share of ca. 15%, this [renewable energy sources] will be the backbone of a carbon-free European power system"	Noted The section has been completely changed with a new figure substituting the previous table. The changes are based on consultations with all sectoral chapters, and supplementary material is added providing details about context specific issues and scaling. Confidence statements are added	Eric PROUST	European Nuclear Society (ENS)	France
71117	55	1	55	1	Transport (add/include shipping, waterborne transport) - has impacts on SDG14 - which currently read as n/a.	Noted The section has been completely changed with a new figure substituting the previous table. The changes are based on consultations with all sectoral chapters, and supplementary material is added providing details about context specific issues and scaling. Confidence statements are added	Philippe Tulkens	European Union (EU) - DG Research & Innovation	Belgium
71119	55	1	55	1	Circular economy has positive impact on SDG14 - currently reads n.a.	Noted The section has been completely changed with a new figure substituting the previous table. The changes are based on consultations with all sectoral chapters, and supplementary material is added providing details about context specific issues and scaling. Confidence statements are added	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
71121	55	1	55	1	CCU and CCS shown as positive on SDG14. Please see: <a href="https://www.frontiersin.org/articles/10.3389/feng.2020.00198/full">https://www.frontiersin.org/articles/10.3389/feng.2020.00198/full</a> For SDGs 14 and 15, as defined in their respective targets, the development and implementation of CCU technologies (based on current knowledge) is likely to have no specific direct effects, but rather to evoke impacts similar to industrial facilities in general. This means that, in general, the installation, expansion, and transformation of all industrial facilities may be harmful to terrestrial and aquatic biodiversity, if undertaken without due consideration. These effects can be reduced if the roll-out of industrial facilities is undertaken in line with regional and supranational sustainability goals and takes regard of environmental effects. At present, there are no known, specific environmental risks directly linked to the implementation of CCU technologies. An indirect positive effect for aquatic and terrestrial life can be assumed via CCU's possible general environmental contributions toward reducing reliance on fossil resources, facilitating recycling processes and the closing of an industrial carbon cycle (Global CO2 Initiative, 2019). Another indirect negative effect that all industrial facilities have in common is the possibility of land use conflicts. As with other facilities, these should be avoided when making decisions on locating industrial plants applying CCU. It is currently unknown whether those effects might occur at all, and if so, whether they might be compensated by possible positive effects of CCU in terms of preventing land degradation due to drilling and mining; by reducing the consumption of fossil fuels or, compared to the use of biomass, by not requiring the use of arable land (Carus et al., 2019). Consequently, local administrations and policy makers must apply the highest environmental standards to all proposed industrial facilities engaged in CCU processes, in order to avoid negative effects on biodiversity.	Noted The section has been completely changed with a new figure substituting the previous table. The changes are based on consultations with all sectoral chapters, and supplementary material is added providing details about context specific issues and scaling. Confidence statements are added	Philippe Tulkens	European Union (EU) - DG Research & Innovation	Belgium
71123	55	1	55	1	Enhanced weathering shown as positive for SDG14? This is simply not true! Please see GESAMP2019. SROCC chapter 5, <a href="https://earth.org/enhanced-weathering-for-carbon-capture/">https://earth.org/enhanced-weathering-for-carbon-capture/</a> , etc.	Noted The section has been completely changed with a new figure substituting the previous table. The changes are based on consultations with all sectoral chapters, and supplementary material is added providing details about context specific issues and scaling. Confidence statements are added	Philippe Tulkens	European Union (EU) - DG Research & Innovation	Belgium
71125	55	1	55	1	Reduce overconsumption is positive on SDG14 - currently shown as n.a.	Noted The section has been completely changed with a new figure substituting the previous table. The changes are based on consultations with all sectoral chapters, and supplementary material is added providing details about context specific issues and scaling. Confidence statements are added	Philippe Tulkens	European Union (EU) - DG Research & Innovation	Belgium
75757	55	1	55	1	The data presented for nuclear are not in compliance with available information: SDG1 - nuclear can contribute to universal access to zero CO2 electricity under affordable prices which directly influences and reduces poverty - the grade should be +	Noted The section has been completely changed with a new figure substituting the previous table. The changes are based on consultations with all sectoral chapters, and supplementary material is added providing details about context specific issues and scaling. Confidence statements are added	Krešimir Trontl	University of Zagreb, Faculty of Electrical Engineering and Computing	Croatia
75759	55	1	55	1	SDG 2 - nuclear has small land use with little or none competition with land use for agriculture - the grade should be +	Noted The section has been completely changed with a new figure substituting the previous table. The changes are based on consultations with all sectoral chapters, and supplementary material is added providing details about context specific issues and scaling. Confidence statements are added	Krešimir Trontl	University of Zagreb, Faculty of Electrical Engineering and Computing	Croatia
75761	55	1	55	1	SDG 3 - clean air: nuclear has prevented deaths from small particulates (Pushker A. Kharecha and James E. Hansen, Environmental Science & Technology, 2013 )	Noted The section has been completely changed with a new figure substituting the previous table. The changes are based on consultations with all sectoral chapters, and supplementary material is added providing details about context specific issues and scaling. Confidence statements are added	Krešimir Trontl	University of Zagreb, Faculty of Electrical Engineering and Computing	Croatia
75763	55	1	55	1	SDG 5 - IAEA: "Skłodowska-Curie Fellowship Program to Push for More Women in Nuclear" March 2020 - Women in Nuclear network: <a href="https://win-global.org/">https://win-global.org/</a> but in general, I could not find the reasons in chapters to support the claim that only solar and wind and gender progressive	Noted The section has been completely changed with a new figure substituting the previous table. The changes are based on consultations with all sectoral chapters, and supplementary material is added providing details about context specific issues and scaling. Confidence statements are added	Krešimir Trontl	University of Zagreb, Faculty of Electrical Engineering and Computing	Croatia
75765	55	1	55	1	SDG 6 - High regulation and control by safety authorities on water quality, Production of clean water from desalination techniques, Use of isotopic techniques to control water quality ( <a href="https://www.iaea.org/topics/water-quality">https://www.iaea.org/topics/water-quality</a> )	Noted The section has been completely changed with a new figure substituting the previous table. The changes are based on consultations with all sectoral chapters, and supplementary material is added providing details about context specific issues and scaling. Confidence statements are added	Krešimir Trontl	University of Zagreb, Faculty of Electrical Engineering and Computing	Croatia

Comment Id	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
75767	55	1	55	1	SDG 7 - nuclear can provide CO2 free electricity under affordable prices (previous comment 6)	Noted The section has been completely changed with a new figure substituting the previous table. The changes are based on consultations with all sectoral chapters, and supplementary material is added providing details about context specific issues and scaling. Confidence statements are added	Krešimir Trontl	University of Zagreb, Faculty of Electrical Engineering and Computing	Croatia
75769	55	1	55	1	SDG 9 - see figure 2, page 12 in the material Emsley, I. (WNA) "Employment in the Nuclear and Wind Electricity Generating Sectors", July 2020 - it is evident that nuclear does enable dynamic and competitive economic forces that generate employment	Noted The section has been completely changed with a new figure substituting the previous table. The changes are based on consultations with all sectoral chapters, and supplementary material is added providing details about context specific issues and scaling. Confidence statements are added	Krešimir Trontl	University of Zagreb, Faculty of Electrical Engineering and Computing	Croatia
75771	55	1	55	1	SDG 13 - this report indicates that nuclear is a viable option for CO2 reduction and climate improvement - the n/a grade in the table is therefore unjustified and in contradiction with chapter	Noted The section has been completely changed with a new figure substituting the previous table. The changes are based on consultations with all sectoral chapters, and supplementary material is added providing details about context specific issues and scaling. Confidence statements are added	Krešimir Trontl	University of Zagreb, Faculty of Electrical Engineering and Computing	Croatia
78257	55	1	55	1	Misrepresented fact - Impact of nuclear on SDG-9 and SDG -10 is shown as negative without any reference or scientific basis.	Noted The section has been completely changed with a new figure substituting the previous table. The changes are based on consultations with all sectoral chapters, and supplementary material is added providing details about context specific issues and scaling. Confidence statements are added	Reetesh Chaurasia	Department of Atomic Energy, Government of India	India
65059	55	1	55	17	This table seems to have been put together in a rushed way, with in many cases, very little justification on the way technologies are evaluated against SDGs (and these justifications cannot be found in the sectoral chapters as is quoted). This is particularly true for nuclear energy. Nuclear energy - more generally nuclear technologies (derived from the development of nuclear energy), contributes to many SDGs. See for instance: <a href="https://www.iaea.org/sites/default/files/bull573sept2016.pdf">https://www.iaea.org/sites/default/files/bull573sept2016.pdf</a> which describes how nuclear technologies contribute to SDG2 (zero hunger), SDG3 (good health and well-being), etc. Why for SDG 5 "gender equality" are solar and wind marked as "+" when all other technologies are marked as "NA"??? SDG 6 marked negative (??) when nuclear power is a contributor to clean electrification which is necessary to enable clean water treatment. Plus nuclear power enables desalination of sea water and thus provides a possibility to produce fresh water for areas of the world that are deprived. See for instance Amani Al-Othman, Noora N. Darwish, Muhammad Qasim, Mohammad Tawalbeh, Naif A. Darwish, Nidal Hilal, Nuclear desalination: A state-of-the-art review, Desalination, Volume 457, 2019, Pages 39-61, ISSN 0011-9164. On SDG 9 (industry, innovation and infrastructures), nuclear is marked as "-" when there is substantial evidence that investments in nuclear programmes contribute to affordable and stable electricity prices (that attract industry), have positive impacts on the economy, and is also a high tech area that generates innovation and spin offs. <a href="http://large.stanford.edu/courses/2018/ph241/may2/docs/nei-apr12.pdf">http://large.stanford.edu/courses/2018/ph241/may2/docs/nei-apr12.pdf</a> , <a href="https://www.oecd-nea.org/jcms/pl_14912">https://www.oecd-nea.org/jcms/pl_14912</a> .	Noted The section has been completely changed with a new figure substituting the previous table. The changes are based on consultations with all sectoral chapters, and supplementary material is added providing details about context specific issues and scaling. Confidence statements are added	HENRI PAILLERE	IAEA	Austria

Comment Id	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
76475	55	1	55	18	<p>17.3.3.7 Cross sectoral overview of synergies and trade-offs between climate change mitigation and the SDGs</p> <p>SDG 1 – No Poverty. The classification of nuclear energy in Table 17.7 needs to be changed to one which makes a positive contribution and certainly with less economic risk to low-income countries than wind and solar. Nuclear energy has had a traditional and ongoing role in lifting developing countries out of poverty. Historically it lifted South Korea and Japan out of economic poverty and provided low-cost energy for their industrial development and renewal. Now it is achieving the same goals in Bangladesh, India, Pakistan and Egypt where a third of the population experiences poverty</p> <p>Throughout the world, developing nations are investigating the use of nuclear energy. It has an elegant simplicity ensuring that the grid will be consolidated and the risks of variability and climatic changes are minimised.</p> <p>By way of example, in July 2015 an agreement was drafted by several countries for cooperation in the development of an integrated West African regional nuclear power programme, with a three-year action plan. The countries concerned at the Niger meeting were: Benin, Burkina Faso, Ghana, Mali, Niger, Nigeria, and Senegal, collectively the West African Integrated Nuclear Power Group (WAINPG).</p> <p>With a future in low-cost small nuclear power plants, poor nations on small grids can achieve low carbon low-cost electricity at less than half the cost of a system using VRE exclusively.</p> <p>SDG 2 (zero hunger). Currently rated as not applicable to nuclear. The classification of nuclear energy in Table 17.7 needs to be changed to one which makes a positive contribution</p> <p>Several countries are improving food security and agriculture by using nuclear isotopic techniques. (IAEA). In Thailand for example nuclear techniques contribute to Thailand's fight against malnutrition by helping scientists identify the best ways to increase nutrient levels in children. In South Africa nuclear techniques enabled that country to save its citrus fruit export industry by sterilising and releasing false codling moths into the environment. This saved their citrus industry from moth attack.</p> <p>Nuclear energy has massive potential to displace one of the most environmentally damaging energy sources in hydro power. Especially in Asia and Africa, hydro power destroys riverine environments and prevents fish breeding and harvesting – a major impact in the Mekong River system. Water is removed from crop growing to enable power production. Populations are displaced from living and growing food in fertile river flats such as the 28,000 people removed from the Da River in Vietnam to enable construction of Son La Dam. In warmer climates hydro power is accompanied by high levels of methane production from Reservoirs.</p> <p>Modern small nuclear power plants can be located in coastal regions and use once through seawater cooling. Alternatively, hybrid cooling using fresh water could be used which reduces thermal generator water demand by 70%. Where rivers are large, once through cooling can also be used with negligible water consumption.</p> <p>With the advent of smaller nuclear power plants, the option exists to desalinate water using the excess thermal energy. This desalinated water can provide food security for populations that are subjected to a frequent drought and flood cycle.</p> <p>SDG3 (Good health and well-being). Currently rated as having trade-offs. The classification of nuclear energy in Table 17.7 needs to be changed dark blue, namely to one which makes a positive contribution.</p> <p>Nuclear energy and technology makes a huge contribution to the health and welfare of people.</p>	<p>Noted The section has been completely changed with a new figure substituting the previous table. The changes are based on consultations with all sectoral chapters, and supplementary material is added providing details about context specific issues and scaling. Confidence statements are added</p>	Robert Parker	Nuclear for Climate Australia	Australia
17165	55	1	55	2	See comment no. 5	<p>Noted The section has been completely changed with a new figure substituting the previous table. The changes are based on consultations with all sectoral chapters, and supplementary material is added providing details about context specific issues and scaling. Confidence statements are added</p>	Government of Poland	Ministry of Environment, Department of Air Protection and Climate	Poland
18797	55	1	55	2	Please see the comment in line no. 1.	<p>Noted The section has been completely changed with a new figure substituting the previous table. The changes are based on consultations with all sectoral chapters, and supplementary material is added providing details about context specific issues and scaling. Confidence statements are added</p>	Tomáš Martanovič	Ministry of Industry and Trade	Czech Republic
29061	55	1	55	2	<p>Suggested changes for CCS in the energy sector (IEAGHG (2020) "CCS and the Sustainable Development Goals", IEAGHG 2020-14; Mikunda et al (2020) "CCS and the Sustainable Development Goals", International Journal of Greenhouse Gas Control (submitted 17 Nov 2020)):</p> <ul style="list-style-type: none"> <li>- SDG 1: CCS has only limited interactions, so questionable whether it should be rated</li> <li>- SDG 3 should be rated +/-</li> <li>- SDG 6 should be rated +/-, there are negative impacts on water but they can be managed through improved water management in plants</li> <li>- SDG 11: CCS interactions are less direct than for other SDGs but can be rated +/- due to cities benefitting from energy services provided but also being negatively affected by the environmental impacts</li> <li>- SDG 14 can be scored +/-, as mitigation through CCS will also help mitigate ocean acidification, on the other hand some capture processes used might affect marine ecotoxicity</li> <li>- SDG 15 can be scored +/-, as it also includes terrestrial and inland freshwater ecosystems, so negative impacts of CCS on water apply here too but again, those can be managed</li> <li>- SDG 17 has only limited interactions with CCS, so questionable whether it should be scored</li> </ul>	<p>Noted The section has been completely changed with a new figure substituting the previous table. The changes are based on consultations with all sectoral chapters, and supplementary material is added providing details about context specific issues and scaling. Confidence statements are added</p>	Jasmin Kemper	IEAGHG	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
29063	55	1	55	2	Suggested changes for CCS in industry (IEAGHG (2020) "CCS and the Sustainable Development Goals", IEAGHG 2020-14; Mikunda et al (2020) "CCS and the Sustainable Development Goals", International Journal of Greenhouse Gas Control (submitted 17 Nov 2020)): - SDG 3 should be rated +/- - SDG 6 should be rated +/-, there are negative impacts on water but they can be managed through improved water management in plants - SDG 7 should be rated +/-, some industrial processes can be affected by an energy penalty, similar as to CCS in the power sector - SDG 11: CCS interactions are less direct than for other SDG but can be rated +/- due to cities benefiting from products provided but also being negatively affected by the environmental impacts - SDG 12 can be scored the same as for the energy sector, i.e. +/- - SDG 14 can be scored +/-, as mitigation through CCS will also help mitigate ocean acidification, on the other hand some capture processes used might affect marine ecotoxicity - SDG 15 can be scored +/-, as it also includes terrestrial and inland freshwater ecosystems, so negative impacts of CCS on water apply here too but again, those can be managed	Noted The section has been completely changed with a new figure substituting the previous table. The changes are based on consultations with all sectoral chapters, and supplementary material is added providing details about context specific issues and scaling. Confidence statements are added	Jasmin Kemper	IEAGHG	United Kingdom (of Great Britain and Northern Ireland)
29065	55	1	55	2	In general CCUS for energy systems should be split up in CCS and CCU, just as has been done for industrial systems.	Noted The section has been completely changed with a new figure substituting the previous table. The changes are based on consultations with all sectoral chapters, and supplementary material is added providing details about context specific issues and scaling. Confidence statements are added	Jasmin Kemper	IEAGHG	United Kingdom (of Great Britain and Northern Ireland)
29625	55	1	55	2	Table 17.7: This table is very useful and interesting, but would be easier to grasp if it was supplemented by some more explanation than the brief paragraph that follows it, at least of the trade offs, as well as by more specific references to the parts of the sector chapters it is based on.	Noted The section has been completely changed with a new figure substituting the previous table. The changes are based on consultations with all sectoral chapters, and supplementary material is added providing details about context specific issues and scaling. Confidence statements are added	Government of Norway	Norwegian Environment Agency	Norway
49809	55	1	55	2	Table 17.7 there is risk of SGD 10 trade-offs in the Agriculture, Forestry, and Land use sector particularly for Indigenous Peoples in "protection" of forests and ecosystems. Conservation practices can result in reducing access for Indigenous peoples to these landscapes, integral for traditional use.	Noted The section has been completely changed with a new figure substituting the previous table. The changes are based on consultations with all sectoral chapters, and supplementary material is added providing details about context specific issues and scaling. Confidence statements are added	Chloe Hartley	Tsleil-Waututh Nation	Canada
74297	55	1	55	2	For the purpose of this comment, I am focusing on Table 17.7, specifically as it relates to nuclear. I believe this is a highly subjective chart and has no basis for the comparisons that are made. I note that Solar and Wind are placed first rather than in alphabetical order. As it relates to nuclear, It receives a +/- on SDG1 and a N/A for SDG2 while wind and solar received higher grades. I see no reason for the distinction. I am not going to comment on every SDG, but I would note that nuclear development requires significant training and nuclear units have a significant number of technical positions that are well paying and increase opportunities for women. For that reason, I believe that both SDG4 and 5 should be a + for nuclear. As for SDG6, nuclear contributes baseload power that provides a significant resource for water pollution control and sanitation, so for this reason it should also be a +. Like wind and solar, SDG 8 and 9 should be + for nuclear given the significant permanent jobs and infrastructure needed to produce nuclear energy. There is no basis for assigning a - to SDG10 as nuclear development is a positive contributor to economic growth and jobs. As nuclear currently provides 35% of the world's carbon free energy, to say that it is not applicable for SDG 13 (Climate Action) has no basis in fact. Overall, I believe this chart is flawed, based on subjective personal views relies on incorrect data carried over from other sections, and should be eliminated.	Noted The section has been completely changed with a new figure substituting the previous table. The changes are based on consultations with all sectoral chapters, and supplementary material is added providing details about context specific issues and scaling. Confidence statements are added	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
78539	55	1	55	2	<p>Assesment of how nuclear supports SDGs are wrong. Correct:</p> <p>SDG 1 (no poverty): synergies (today rated as not applicable- grey)</p> <p>Contribution of nuclear to universal access to electricity as well as affordable energy</p> <p>SDG 2 (zero hunger): synergies (today rated as not applicable-grey)</p> <p>-Several countries are improving food security and agriculture by using nuclear and isotopic techniques. (IAEA)</p> <p>-Small land use (little to no competition with land use from agriculture)</p> <p>SDG 9: Industry, Innovation and infrastructure (today rated as “trade-offs can be expected”) - correct to synergies, Nuclear is inovative technology</p> <p>-Information on jobs and investment in R&amp;D</p> <p>-Information on process for dismantling and waste management</p> <p>SDG10: Reduced inequalities (today rated as “trade-offs can be expected”) correct ot synergies - see SDG1</p> <p>SDG 13: Climate action (today rated as “not applicable” Grey) should be synergies</p> <p>-IPCC SR 15 report on nuclear being low carbon, and being included in pathways</p> <p>-IEA report on avoided emissions thanks to nuclear</p>	<p>Noted The section has been completely changed with a new figure substituting the previous table. The changes are based on consultations with all sectoral chapters, and supplementary material is added providing details about context specific issues and scaling. Confidence statements are added</p>	Tomaž Žagar	Faculty for Energy Technology, University of Maribor	Slovenia
82651	55	1	55	2	<p>Table 17-7 provides assessments based on subjective criteria. A more clear definition of the basis for the criteria would be needed.</p> <p>In particular, regarding to nuclear energy, very simplistic assessments have been made:</p> <p>SDG1: Nuclear energy positively supports the “No Poverty” SDG, thus the marker should be changed to “Dark Blue” as synergies are expected.</p> <p>From Application of the United Nations Framework Classification for Resources and the United Nations Resource Management System: Use of Nuclear Fuel Resources for Sustainable Development - Entry Pathways   UNECE Page 21  <a href="https://unece.org/sustainable-energy/publications/nuclear-entry-pathways">https://unece.org/sustainable-energy/publications/nuclear-entry-pathways</a></p> <p>2.2.1 SDG 1 – No Poverty</p> <p>Nuclear energy helps the economy by supporting direct, indirect and induced jobs during construction and operation of nuclear facilities. The cost-competitive and stable electricity supplied by nuclear power plants attracts energy-intensive industry, thus creating more jobs. Nuclear energy can power the development of local small and medium enterprises and support non-polluting e-connectivity for economic development. These enterprises also generate significant local economic activity in the form of jobs, revenues and local spending. As an energy technology that is almost entirely immune to fluctuations in the weather, nuclear also helps build climate resilience for the economy.</p>	<p>Noted The section has been completely changed with a new figure substituting the previous table. The changes are based on consultations with all sectoral chapters, and supplementary material is added providing details about context specific issues and scaling. Confidence statements are added</p>	Jonathan Cobb	World Nuclear Association	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
82653	55	1	55	2	<p>SDG2: Nuclear energy positively supports the “No Hunger” SDG, thus the marker should be changed to “Dark Blue” as synergies are expected.</p> <p>From Application of the United Nations Framework Classification for Resources and the United Nations Resource Management System: Use of Nuclear Fuel Resources for Sustainable Development - Entry Pathways   UNECE Page 22  <a href="https://unece.org/sustainable-energy/publications/nuclear-entry-pathways">https://unece.org/sustainable-energy/publications/nuclear-entry-pathways</a></p> <p>2.2.2 SDG 2 – Zero Hunger</p> <p>Nuclear energy helps to power sustainable food production. In addition, many countries use nuclear techniques to develop sustainable agricultural practices, establish and improve nutrition programmes and ensure stable supplies of quality food. The sterile insect technique (a method of pest control that uses radiation) for example, is providing a powerful line of defence against agriculture’s most damaging pests. Water desalination projects can also be nuclear powered and help to build climate resilience in agriculture.</p> <p>References to the positive contribution of nuclear energy to the Water Energy Food Nexus.                      References on nuclear desalination that has been used in several countries for decades:  <a href="https://www.iaea.org/publications/10732/new-technologies-for-seawater-desalination-using-nuclear-energy">https://www.iaea.org/publications/10732/new-technologies-for-seawater-desalination-using-nuclear-energy</a></p> <p>The feasibility of integrated nuclear desalination plants has been proven with over 150 reactor-years of experience, chiefly in Kazakhstan, India and Japan. Large-scale deployment of nuclear desalination on a commercial basis will depend primarily on economic factors. Indicative costs are 70-90 US cents per cubic metre, much the same as fossil-fuelled plants in the same areas.</p> <p>References on applications of nuclear technology to food security: food irradiation that has been used in many countries for decades.  <a href="https://www.iaea.org/publications/10801/manual-of-good-practice-in-food-irradiation">https://www.iaea.org/publications/10801/manual-of-good-practice-in-food-irradiation</a>  <a href="https://www.iaea.org/publications/3353/international-acceptance-of-irradiated-food-legal-aspects">https://www.iaea.org/publications/3353/international-acceptance-of-irradiated-food-legal-aspects</a>  <a href="https://www.iaea.org/newscenter/multimedia/videos/food-irradiation-and-the-changing-climate">https://www.iaea.org/newscenter/multimedia/videos/food-irradiation-and-the-changing-climate</a></p> <p>Some 25-30% of food harvested is lost as a result of spoilage before it can be consumed. This problem is particularly prevalent in hot, humid countries.</p> <p>Food irradiation is the process of exposing foodstuffs to gamma rays to kill bacteria that can cause food-borne disease, and to increase shelf-life. It has the same benefits as when food is heated, refrigerated, frozen, or treated with chemicals, but does not</p>	<p>Noted The section has been completely changed with a new figure substituting the previous table. The changes are based on consultations with all sectoral chapters, and supplementary material is added providing details about context specific issues and scaling. Confidence statements are added</p>	Jonathan Cobb	World Nuclear Association	United Kingdom (of Great Britain and Northern Ireland)
82655	55	1	55	2	<p>SDG3: Nuclear energy positively supports the “Good Health and Wellbeing” SDG, thus the marker should be changed to “Dark Blue” as synergies are expected.</p> <p>From Application of the United Nations Framework Classification for Resources and the United Nations Resource Management System: Use of Nuclear Fuel Resources for Sustainable Development - Entry Pathways   UNECE Page 22  <a href="https://unece.org/sustainable-energy/publications/nuclear-entry-pathways">https://unece.org/sustainable-energy/publications/nuclear-entry-pathways</a></p> <p>2.2.3 SDG 3 – Good Health and Wellbeing</p> <p>Nuclear contributes to a reliable and resilient energy supply that is needed to power modern health infrastructure. This is even more essential during a crisis such as the Covid-19 pandemic. Reliable energy also enables the automation of dangerous and unpleasant tasks. As a very low emissions technology, nuclear energy helps to ensure clean air, water and land thereby improving the health of communities. Nuclear techniques play an essential role in diagnosing and treating various health conditions, in particular, non-communicable diseases such as cancer and cardiovascular diseases. Irradiation technologies can also be used to sterilize medical equipment. A nuclear-derived technique known as real time reverse transcription–polymerase chain reaction (RT-PCR) is being used to identify cases of the Covid-19 virus accurately within hours.</p> <p>The health effects of nuclear radiation are well understood and heavily regulated. The vast majority of the radiation dose received by humans globally comes from natural sources (soil, cosmic rays, foodstuffs, etc.). Radiation exposure to the public from the normal operation of nuclear power plants and the nuclear fuel cycle infrastructure is negligible compared with naturally occurring background radiation.  <a href="http://www.unsccar.org/unsccar/en/publications/2006_1.html">http://www.unsccar.org/unsccar/en/publications/2006_1.html</a>                      See IRSN 2018 (bilan radiologique de l’environnement français 2015-2017) or IRSN 2015 (Report on the Radiological State of the Environment in France in 2010-2011) ref 14-(5)-1 &amp; 2                      Nuclear energy appears to be one of the least fatale technologies when compared against other mature / commercially viable electricity generation sources on a deaths per kWh of electricity basis.                      Ref: Electricity generation and health Markandya &amp; Wilkinson The Lancet 2007  <a href="https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(07)61253-7/fulltext">https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(07)61253-7/fulltext</a>                      And also Health benefits, ecological threats of low-carbon electricity Gibon &amp; al. 2017 in Enviro. Res. Lett  <a href="https://iopscience.iop.org/article/10.1088/1748-9326/aa6047/pdf">https://iopscience.iop.org/article/10.1088/1748-9326/aa6047/pdf</a>                      See also:                      IAEA 2016 report “Nuclear power and sustainable development”: The environmental dimension p 49                      OECD NEA 2018 report full costs of electricity provision <a href="https://www.oecd-nea.org/ndd/pubs/2018/7298-full-costs-2018.pdf">https://www.oecd-nea.org/ndd/pubs/2018/7298-full-costs-2018.pdf</a>                      Relevant metrics, as identified in the above report, include:                      •Air pollution (environment and health issue) P109                      •Health impacts (radiation health from accidents and emissions related to EPR) P116, Chapter 6 &amp; Table 6.1</p>	<p>Noted The section has been completely changed with a new figure substituting the previous table. The changes are based on consultations with all sectoral chapters, and supplementary material is added providing details about context specific issues and scaling. Confidence statements are added</p>	Jonathan Cobb	World Nuclear Association	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
82657	55	1	55	2	<p>SDG4: Nuclear energy positively supports the “Quality Education” SDG, thus the marker should be changed to “Dark Blue” as synergies are expected.</p> <p>From Application of the United Nations Framework Classification for Resources and the United Nations Resource Management System: Use of Nuclear Fuel Resources for Sustainable Development - Entry Pathways   UNECE Page 22  <a href="https://unece.org/sustainable-energy/publications/nuclear-entry-pathways">https://unece.org/sustainable-energy/publications/nuclear-entry-pathways</a></p> <p>2.2.4 SDG 4 – Quality Education</p> <p>Nuclear science and technology is used in many fields including energy, medicine and agriculture. The need for skilled technicians, engineers, physicists, radiation experts and nuclear medicine specialists creates many opportunities for national and international education and training efforts. Opportunities in the nuclear sector can help boost interest in science, technology, engineering and mathematics (STEM) subjects in younger students. Some countries also grant educational scholarships to individuals in energy and medicine to secure the provision of talent needed for their national programmes.</p> <p>Access to affordable clean 24/7 electricity is very important to allow access to education worldwide. Students and instructors need access to electricity at all times, including during the night. This access will also free them up from menial tasks, thus allowing them the opportunity to devote more time and effort to their education.</p>	<p>Noted The section has been completely changed with a new figure substituting the previous table. The changes are based on consultations with all sectoral chapters, and supplementary material is added providing details about context specific issues and scaling. Confidence statements are added</p>	Jonathan Cobb	World Nuclear Association	United Kingdom (of Great Britain and Northern Ireland)
82659	55	1	55	2	<p>SDG5: Nuclear energy positively supports the “Gender Equality” SDG, thus the marker should be changed to “Dark Blue” as synergies are expected.</p> <p>From Application of the United Nations Framework Classification for Resources and the United Nations Resource Management System: Use of Nuclear Fuel Resources for Sustainable Development - Entry Pathways   UNECE Page 22  <a href="https://unece.org/sustainable-energy/publications/nuclear-entry-pathways">https://unece.org/sustainable-energy/publications/nuclear-entry-pathways</a></p> <p>2.2.5 SDG 5 – Gender Equality</p> <p>In emerging countries increased access to cheap and reliable energy helps enhance labour emancipation and reduce jobs involving drudgery, which disproportionately affects women. The nuclear community, with the active participation of leading international agencies, is currently committed to attracting and retaining qualified women to the nuclear science and technology sector. As a traditional engineering field, men currently outnumber women in the nuclear industry, but many companies are now actively and publicly addressing the gender imbalance. As a result, the number of women in leadership and technical positions is increasing.</p>	<p>Noted The section has been completely changed with a new figure substituting the previous table. The changes are based on consultations with all sectoral chapters, and supplementary material is added providing details about context specific issues and scaling. Confidence statements are added</p>	Jonathan Cobb	World Nuclear Association	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
82661	55	1	55	2	<p>SDG6: Nuclear energy positively supports the “Clean Water and Sanitation” SDG, thus the marker should be changed to “Dark Blue” as synergies are expected.</p> <p>From Application of the United Nations Framework Classification for Resources and the United Nations Resource Management System: Use of Nuclear Fuel Resources for Sustainable Development - Entry Pathways   UNECE Page 23  <a href="https://unece.org/sustainable-energy/publications/nuclear-entry-pathways">https://unece.org/sustainable-energy/publications/nuclear-entry-pathways</a></p> <p>2.2.6 SDG 6 – Clean Water and Sanitation</p> <p>Nuclear energy can be used to power desalination facilities and provide clean water to communities helping to support energy-water-food nexus activities. Various nuclear techniques help scientists to study the quality and quantity of water resources. Naturally occurring isotopes in water can be used to determine the water’s origin, age, vulnerability to pollution, as well as how water resources move and interact with each other.</p> <p>On water usage:</p> <p>Nuclear power plants (NPPs) are not different from any other thermal power facility that uses a Rankine cycle, and thus they need an ultimate heat sink. The water needs are not any larger than for other such facilities, such as solar thermal towers or solar troughs that also use Rankine cycles... of course it is a matter of scale... solar facilities are rated at 10MW maybe, with capacity factors of 20% maybe, while NPPs have capacities of 1000MW and capacity factors of 90% or more).</p> <p>Clearly, the most cost-effective heat sink tends to be a large body of water (ocean, river, lake, reservoir) but NPPs can be and are often NOT sited near a body of water and use cooling towers as the ultimate heat sink.</p>	<p>Noted The section has been completely changed with a new figure substituting the previous table. The changes are based on consultations with all sectoral chapters, and supplementary material is added providing details about context specific issues and scaling. Confidence statements are added</p>	Jonathan Cobb	World Nuclear Association	United Kingdom (of Great Britain and Northern Ireland)
82663	55	1	55	2	<p>SDG7: Nuclear energy positively supports the “Affordable and Clean Energy” SDG, thus the marker should be changed to “Dark Blue” as synergies are expected.</p> <p>From <a href="https://www.oecd-nea.org/jcms/pl_51110/projected-costs-of-generating-electricity-2020-edition">https://www.oecd-nea.org/jcms/pl_51110/projected-costs-of-generating-electricity-2020-edition</a> Page 14</p> <p>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.</p> <p>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.</p> <p>From Application of the United Nations Framework Classification for Resources and the United Nations Resource Management System: Use of Nuclear Fuel Resources for Sustainable Development - Entry Pathways   UNECE Page 23  <a href="https://unece.org/sustainable-energy/publications/nuclear-entry-pathways">https://unece.org/sustainable-energy/publications/nuclear-entry-pathways</a></p>	<p>Noted The section has been completely changed with a new figure substituting the previous table. The changes are based on consultations with all sectoral chapters, and supplementary material is added providing details about context specific issues and scaling. Confidence statements are added</p>	Jonathan Cobb	World Nuclear Association	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
82665	55	1	55	2	<p>SDG8: Nuclear energy positively supports the “Decent Work and Economic Growth” SDG, thus the marker should be changed to “Dark Blue” as synergies are expected.</p> <p>From Application of the United Nations Framework Classification for Resources and the United Nations Resource Management System: Use of Nuclear Fuel Resources for Sustainable Development - Entry Pathways   UNECE Page 23  <a href="https://unece.org/sustainable-energy/publications/nuclear-entry-pathways">https://unece.org/sustainable-energy/publications/nuclear-entry-pathways</a></p> <p>2.2.8 SDG 8 – Decent Work and Economic Growth</p> <p>The nuclear industry supports a diverse range of jobs, including various engineering, technical, and other specialist roles. Sector pay tends to be higher than average, reflecting the specialist skills required. In addition, nuclear energy provides many developing countries with access to cheap, reliable and carbon-free electricity, which improves quality of life and productivity in those economies. These two effects combined act as a ‘job-multiplier’, greatly boosting regional employment. Nuclear energy projects also involve significant investment and regional infrastructure development, which contributes to economic growth and international exchange. In addition, the safety culture promoted throughout the global nuclear industry has resulted in one of the safest industrial workplaces.</p> <p>From <a href="https://www.oecd-nea.org/jcms/pl_34615/creating-high-value-jobs-in-the-post-covid-19-recovery-with-nuclear-energy-projects">https://www.oecd-nea.org/jcms/pl_34615/creating-high-value-jobs-in-the-post-covid-19-recovery-with-nuclear-energy-projects</a> Page 1</p> <p>The development of nuclear power has historically proven to be a catalyst for industrial and economic growth and prosperity across the world. Countries with limited domestic energy resources such as France, Japan or Korea are excellent examples of how nuclear energy not only delivers widespread growth along with energy independence and security of supply, but also build</p>	<p>Noted The section has been completely changed with a new figure substituting the previous table. The changes are based on consultations with all sectoral chapters, and supplementary material is added providing details about context specific issues and scaling. Confidence statements are added</p>	Jonathan Cobb	World Nuclear Association	United Kingdom (of Great Britain and Northern Ireland)
82667	55	1	55	2	<p>SDG9: Nuclear energy positively supports the “Industry, Innovation, and Infrastructure” SDG, thus the marker should be changed to “Dark Blue” as synergies are expected.</p> <p>From Application of the United Nations Framework Classification for Resources and the United Nations Resource Management System: Use of Nuclear Fuel Resources for Sustainable Development - Entry Pathways   UNECE Page 23  <a href="https://unece.org/sustainable-energy/publications/nuclear-entry-pathways">https://unece.org/sustainable-energy/publications/nuclear-entry-pathways</a></p> <p>2.2.9 SDG 9 – Industry, Innovation, and Infrastructure</p> <p>In simple terms, a nuclear power plant is major infrastructure development. With maintenance and periodic upgrades, a nuclear power plant can operate for 60 years or even longer, thereby reducing the volumes of new materials needed for energy production. Innovation is integral to achieving this longevity and enabling plants to operate at ever greater performance levels. Nuclear innovation is also resulting in spin-off technologies that can be used in other fields such as material research and structural mechanics. Nuclear energy is not yet widely deployed in the least developed countries and there is vast potential for increased international outreach to help introduce the technology in these countries. As a dispatchable and reliable low-carbon electricity source with low operating costs, nuclear is a perfect fit for data centres and other technology industries. Radioisotope techniques can help make products safer and improve their quality. These techniques can also make industrial processes more efficient, environmentally friendly, and cost-effective.</p> <p>From <a href="https://www.oecd-nea.org/jcms/pl_34615/creating-high-value-jobs-in-the-post-covid-19-recovery-with-nuclear-energy-projects">https://www.oecd-nea.org/jcms/pl_34615/creating-high-value-jobs-in-the-post-covid-19-recovery-with-nuclear-energy-projects</a> Page 1</p> <p>The development of nuclear power has historically proven to be a catalyst for industrial and economic growth and prosperity across the world. Countries with limited domestic energy</p>	<p>Noted The section has been completely changed with a new figure substituting the previous table. The changes are based on consultations with all sectoral chapters, and supplementary material is added providing details about context specific issues and scaling. Confidence statements are added</p>	Jonathan Cobb	World Nuclear Association	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
82669	55	1	55	2	<p>SDG10: Nuclear energy positively supports the “Reduced Inequalities” SDG, thus the marker should be changed to “Dark Blue” as synergies are expected.</p> <p>From Application of the United Nations Framework Classification for Resources and the United Nations Resource Management System: Use of Nuclear Fuel Resources for Sustainable Development - Entry Pathways   UNECE Page 24  <a href="https://unece.org/sustainable-energy/publications/nuclear-entry-pathways">https://unece.org/sustainable-energy/publications/nuclear-entry-pathways</a></p> <p>2.2.10 SDG 10 – Reduced Inequalities</p> <p>Nuclear project developers must typically engage stakeholders in extensive consultation before beginning construction, making sure that different voices get their say, including indigenous and marginalized groups. As a centralized form of electricity generation run by large companies with a culture of regulatory compliance, it should be easier to enforce anti-discrimination policies within a nuclear workforce than in some others. Universal access to low-cost clean electricity will help reduce socio-economic inequalities.</p> <p>Nuclear projects are notorious for resulting in socio-economic benefits at all levels of society. In fact, efforts are made towards the engagement of all stakeholders in the decision-making and in the fair distribution of the benefits of a nuclear project.</p> <p>From <a href="https://smrroadmap.ca/wp-content/uploads/2018/11/SMRroadmap_EN_nov6_Web-1.pdf">https://smrroadmap.ca/wp-content/uploads/2018/11/SMRroadmap_EN_nov6_Web-1.pdf</a>                      Page 5                      Over 10 months, more than 180 individuals representing 55 organizations across 10 sectors and subsectors were engaged in workshops and Indigenous engagement sessions. Five expert groups comprising 18 organizations looked at questions related to technology, economics and finance:</p>	<p>Noted The section has been completely changed with a new figure substituting the previous table. The changes are based on consultations with all sectoral chapters, and supplementary material is added providing details about context specific issues and scaling. Confidence statements are added</p>	Jonathan Cobb	World Nuclear Association	United Kingdom (of Great Britain and Northern Ireland)
82671	55	1	55	2	<p>SDG11: Nuclear energy positively supports the “Sustainable Cities and Communities” SDG, thus the marker should be changed to “Dark Blue” as synergies are expected.</p> <p>From Application of the United Nations Framework Classification for Resources and the United Nations Resource Management System: Use of Nuclear Fuel Resources for Sustainable Development - Entry Pathways   UNECE Page 24  <a href="https://unece.org/sustainable-energy/publications/nuclear-entry-pathways">https://unece.org/sustainable-energy/publications/nuclear-entry-pathways</a></p> <p>2.2.11 SDG 11 – Sustainable Cities and Communities</p> <p>Nuclear energy can support urban development. Nuclear plants provide affordable reliable electricity which is well-suited to supplying cities where there is constant energy demand. Nuclear energy assists in the electrification of public transport, and especially rail networks, without contributing to air pollution. It supports municipal waste management and recycling. Since nuclear facilities are mostly located in rural communities, but headquarters and governments are based in cities, the nuclear industry creates links to different regions within a country. In addition, nuclear projects will result in significant economic development for the rural communities in which they are sited. Small modular reactors (SMRs) and microreactors are promising potential sources of electricity, district heating or desalination for off-grid remote communities.</p> <p>Nuclear energy provides district heating to many communities in numerous countries, thus affording them with zero-carbon building conditioning.</p> <p>For example, in Switzerland, the NPP Beznau: The cooling water load on the Aar river is reduced by the district heating system Refuna, that provides eleven surrounding municipalities with up to 150 GW·h/y. Beside Döttingen, the connected municipalities are Bad Zurzach, Klingnau, Unterendingen, Endingen, Böttstein, Tegerfelden, and in the bordering Baden District, Würenlingen</p>	<p>Noted The section has been completely changed with a new figure substituting the previous table. The changes are based on consultations with all sectoral chapters, and supplementary material is added providing details about context specific issues and scaling. Confidence statements are added</p>	Jonathan Cobb	World Nuclear Association	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
82673	55	1	55	2	<p>SDG12: Nuclear energy positively supports the “Responsible Consumption and Production” SDG, thus the marker should be changed to “Dark Blue” as synergies are expected.</p> <p>From Application of the United Nations Framework Classification for Resources and the United Nations Resource Management System: Use of Nuclear Fuel Resources for Sustainable Development - Entry Pathways   UNECE Page 24  <a href="https://unece.org/sustainable-energy/publications/nuclear-entry-pathways">https://unece.org/sustainable-energy/publications/nuclear-entry-pathways</a></p> <p>2.2.12 SDG 12 – Responsible Consumption and Production</p> <p>Nuclear energy generally requires very little physical space and fewer mineral inputs than other energy sources, including critical raw materials. Its primary ongoing mineral input is uranium; however, there are no primary competing peaceful uses for this. The uranium resource is ample and distributed widely across the globe, and its mining and processing are subjected to high standards. Nuclear energy does produce waste – notably high-level radioactive waste – but the volumes are small. They need to be responsibly managed before final disposal. Most of the materials and components of a plant are suitable for release based on nuclear regulatory control and therefore available for reuse or recycling. Only a small percentage of the total mass of a plant needs to be disposed of. Innovations such as new fuel designs can increase the efficiency of nuclear power plants, reducing materials requirements even further.</p> <p>Nuclear energy is one the few energy technologies (actually, the only one) that has accounted for, carefully managed and isolated from the environment all the used fuel and radioactive waste that has been produced since the beginning of operation more than 40 years ago. The cost of managing this materials is included in the price of the electricity sold by nuclear facilities. In addition, the nuclear fuel cycle does foresee to recycle the used fuel to reduce the need for new uranium resources to be mined and to minimize the final amount of waste that is produced.</p>	<p>Noted The section has been completely changed with a new figure substituting the previous table. The changes are based on consultations with all sectoral chapters, and supplementary material is added providing details about context specific issues and scaling. Confidence statements are added</p>	Jonathan Cobb	World Nuclear Association	United Kingdom (of Great Britain and Northern Ireland)
82675	55	1	55	2	<p>SDG13: Nuclear energy positively supports the “Climate Action” SDG, thus the marker should be changed to “Dark Blue” as synergies are expected.</p> <p>From Application of the United Nations Framework Classification for Resources and the United Nations Resource Management System: Use of Nuclear Fuel Resources for Sustainable Development - Entry Pathways   UNECE Page 24  <a href="https://unece.org/sustainable-energy/publications/nuclear-entry-pathways">https://unece.org/sustainable-energy/publications/nuclear-entry-pathways</a></p> <p>SDG 13 – Climate Action</p> <p>Nuclear energy is the world’s second-largest source of low-carbon electricity behind hydropower and it displaces fossil fuel sources that would produce about two gigatonnes of carbon dioxide every year. Nuclear energy can be scaled up in a country quickly compared to other low-carbon technologies, and including it in future energy pathways will help to reduce the time, costs, and risks of decarbonization. Nuclear plants can be engineered with a high degree of climate resilience and are less prone to many climate/weather disruptions than other low-carbon energy forms. Future reactors will be able to supply industrial heat and assist the production of synthetic fuels for transport applications, thereby further reducing carbon emissions from these sectors.</p> <p>According to  <a href="https://ec.europa.eu/info/sites/info/files/business_economy_euro/banking_and_finance/documents/200309-sustainable-finance-teg-final-report-taxonomy-annexes_en.pdf">https://ec.europa.eu/info/sites/info/files/business_economy_euro/banking_and_finance/documents/200309-sustainable-finance-teg-final-report-taxonomy-annexes_en.pdf</a>                      Page 210</p> <p>Evidence on the potential substantial contribution of nuclear energy to climate mitigation objectives was extensive and clear. The potential role of nuclear energy in low carbon energy supply is well documented</p>	<p>Noted The section has been completely changed with a new figure substituting the previous table. The changes are based on consultations with all sectoral chapters, and supplementary material is added providing details about context specific issues and scaling. Confidence statements are added</p>	Jonathan Cobb	World Nuclear Association	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
82677	55	1	55	2	<p>SDG14: Nuclear energy positively supports the “– Life Below Water” SDG, thus the marker should be changed to “Dark Blue” as synergies are expected.</p> <p>From Application of the United Nations Framework Classification for Resources and the United Nations Resource Management System: Use of Nuclear Fuel Resources for Sustainable Development - Entry Pathways   UNECE Page 25  <a href="https://unece.org/sustainable-energy/publications/nuclear-entry-pathways">https://unece.org/sustainable-energy/publications/nuclear-entry-pathways</a></p> <p>2.2.14 SDG 14 – Life Below Water</p> <p>Nuclear energy does not produce carbon dioxide emissions which contribute to ocean acidification or other chemical emissions that pollute waterways. Scientists are using nuclear techniques to monitor and studying ocean acidification and understand how it affects marine life and ecosystems, and identify ways to protect the ocean and coastal communities.</p>	<p>Noted The section has been completely changed with a new figure substituting the previous table. The changes are based on consultations with all sectoral chapters, and supplementary material is added providing details about context specific issues and scaling. Confidence statements are added</p>	Jonathan Cobb	World Nuclear Association	United Kingdom (of Great Britain and Northern Ireland)
82679	55	1	55	2	<p>SDG16: Nuclear energy positively supports the “Peace Justice and Strong Institutions” SDG, thus the marker should be changed to “Dark Blue” as synergies are expected.</p> <p>From Application of the United Nations Framework Classification for Resources and the United Nations Resource Management System: Use of Nuclear Fuel Resources for Sustainable Development - Entry Pathways   UNECE Page 25  <a href="https://unece.org/sustainable-energy/publications/nuclear-entry-pathways">https://unece.org/sustainable-energy/publications/nuclear-entry-pathways</a></p> <p>2.2.16 SDG 16 – Peace Justice and Strong Institutions</p> <p>Civil nuclear programmes require the development of strong national institutions, while nuclear facilities are subject to robust regulation that is often backed by international conventions. Notable conventions include the Convention on Nuclear Safety, the Convention on Physical Protection of Nuclear Material as well as the Paris and Vienna conventions (which cover thirdparty liability).</p>	<p>Noted The section has been completely changed with a new figure substituting the previous table. The changes are based on consultations with all sectoral chapters, and supplementary material is added providing details about context specific issues and scaling. Confidence statements are added</p>	Jonathan Cobb	World Nuclear Association	United Kingdom (of Great Britain and Northern Ireland)
82681	55	1	55	2	<p>From Application of the United Nations Framework Classification for Resources and the United Nations Resource Management System: Use of Nuclear Fuel Resources for Sustainable Development - Entry Pathways   UNECE Page 25  <a href="https://unece.org/sustainable-energy/publications/nuclear-entry-pathways">https://unece.org/sustainable-energy/publications/nuclear-entry-pathways</a></p> <p>2.2.17 SDG 17 – Partnerships for the Goals</p> <p>The nuclear community has developed partnerships with governments, NGOs, educational institutions and many UN bodies, helping them to contribute their skills and resources to the sustainable development of nuclear technology. The IAEA promotes policy coherence by establishing safety standards, and providing security recommendations and technical guidance to its member states. The IAEA also develops partnerships through technical cooperation programmes. There is enormous potential to support newcomer governments in the development of sustainable nuclear energy entry pathways.</p>	<p>Noted The section has been completely changed with a new figure substituting the previous table. The changes are based on consultations with all sectoral chapters, and supplementary material is added providing details about context specific issues and scaling. Confidence statements are added</p>	Jonathan Cobb	World Nuclear Association	United Kingdom (of Great Britain and Northern Ireland)
61897	55	1	55	6	<p>Table 17.7, SDG1: Nuclear enables access to affordable and reliable energy, directly reducing and alleviating poverty. It also, according to UNECE 2021, “helps the economy by supporting direct, indirect and induced jobs during construction and operation of nuclear facilities. The cost-competitive and stable electricity supplied by nuclear power plants attracts energy-intensive industry, thus creating more jobs.” Further, UNECE 2021: “As an energy technology that is almost entirely immune to fluctuations in the weather, nuclear also helps build climate resilience for the economy.” See <a href="https://unece.org/sustainable-energy/publications/nuclear-entry-pathways">https://unece.org/sustainable-energy/publications/nuclear-entry-pathways</a> page 21</p>	<p>Noted The section has been completely changed with a new figure substituting the previous table. The changes are based on consultations with all sectoral chapters, and supplementary material is added providing details about context specific issues and scaling. Confidence statements are added</p>	Rauli Partanen	Think Atom	Finland
61899	55	1	55	6	<p>Table 17.7, SDG2: According to UNECE 2021: “Nuclear energy helps to power sustainable food production. In addition, many countries use nuclear techniques to develop sustainable agricultural practices, establish and improve nutrition programmes and ensure stable supplies of quality food. The sterile insect technique (a method of pest control that uses radiation) for example, is providing a powerful line of defence against agriculture’s most damaging pests. Water desalination projects can also be nuclear powered and help to build climate resilience in agriculture.” See <a href="https://unece.org/sustainable-energy/publications/nuclear-entry-pathways">https://unece.org/sustainable-energy/publications/nuclear-entry-pathways</a> page 22.</p>	<p>Noted The section has been completely changed with a new figure substituting the previous table. The changes are based on consultations with all sectoral chapters, and supplementary material is added providing details about context specific issues and scaling. Confidence statements are added</p>	Rauli Partanen	Think Atom	Finland

Comment Id	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
61901	55	1	55	6	Table 17.7, SDG3: According to UNECE 2021: “Nuclear contributes to a reliable and resilient energy supply that is needed to power modern health infrastructure. This is even more essential during a crisis such as the Covid-19 pandemic. Reliable energy also enables the automation of dangerous and unpleasant tasks. As a very low emissions technology, nuclear energy helps to ensure clean air, water and land thereby improving the health of communities. Nuclear techniques play an essential role in diagnosing and treating various health conditions, in particular, non-communicable diseases such as cancer and cardiovascular diseases. Irradiation technologies can also be used to sterilize medical equipment. Etc.” See <a href="https://unece.org/sustainable-energy/publications/nuclear-entry-pathways">https://unece.org/sustainable-energy/publications/nuclear-entry-pathways</a> page 22.	Noted The section has been completely changed with a new figure substituting the previous table. The changes are based on consultations with all sectoral chapters, and supplementary material is added providing details about context specific issues and scaling. Confidence statements are added	Rauli Partanen	Think Atom	Finland
61903	55	1	55	6	Table 17.7, SDG4: According to UNECE 2021: “Nuclear science and technology is used in many fields including energy, medicine and agriculture. The need for skilled technicians, engineers, physicists, radiation experts and nuclear medicine specialists creates many opportunities for national and international education and training efforts. Opportunities in the nuclear sector can help boost interest in science, technology, engineering and mathematics (STEM) subjects in younger students. Some countries also grant educational scholarships to individuals in energy and medicine to secure the provision of talent needed for their national programmes.” See <a href="https://unece.org/sustainable-energy/publications/nuclear-entry-pathways">https://unece.org/sustainable-energy/publications/nuclear-entry-pathways</a> page 22.	Noted The section has been completely changed with a new figure substituting the previous table. The changes are based on consultations with all sectoral chapters, and supplementary material is added providing details about context specific issues and scaling. Confidence statements are added	Rauli Partanen	Think Atom	Finland
61905	55	1	55	6	Table 17.7, SDG5: The IAEA organization funds the Marie Skłodowska-Curie Fellowship program which offers up to 100 scholarships for women per year to pursue Master's degrees in nuclear science and technology, safety, and non-proliferation. Further, UNECE 2021: “In emerging countries increased access to cheap and reliable energy helps enhance labour emancipation and reduce jobs involving drudgery, which disproportionately affects women. The nuclear community, with the active participation of leading international agencies, is currently committed to attracting and retaining qualified women to the nuclear science and technology sector. As a traditional engineering field, men currently outnumber women in the nuclear industry, but many companies are now actively and publicly addressing the gender imbalance. As a result, the number of women in leadership and technical positions is increasing.” See <a href="https://unece.org/sustainable-energy/publications/nuclear-entry-pathways">https://unece.org/sustainable-energy/publications/nuclear-entry-pathways</a> page 22.	Noted The section has been completely changed with a new figure substituting the previous table. The changes are based on consultations with all sectoral chapters, and supplementary material is added providing details about context specific issues and scaling. Confidence statements are added	Rauli Partanen	Think Atom	Finland
61907	55	1	55	6	Table 17.7, SDG6: UNECE 2021: “Nuclear energy can be used to power desalination facilities and provide clean water to communities, helping to support energy-water-food nexus activities. Various nuclear techniques help scientists to study the quality and quantity of water resources. Naturally occurring isotopes in water can be used to determine the water’s origin, age, vulnerability to pollution, as well as how water resources move and interact with each other.” Further, nuclear reactors do not “use” water in a way that it would be lost or contaminated, but it is returned into the system slightly warmer. See <a href="https://unece.org/sustainable-energy/publications/nuclear-entry-pathways">https://unece.org/sustainable-energy/publications/nuclear-entry-pathways</a> page 23.	Noted The section has been completely changed with a new figure substituting the previous table. The changes are based on consultations with all sectoral chapters, and supplementary material is added providing details about context specific issues and scaling. Confidence statements are added	Rauli Partanen	Think Atom	Finland
61909	55	1	55	6	Table 17.7, SDG7: UNECE 2021: “Nuclear energy is complementary to renewable energy sources. When used together these technologies can help to achieve decarbonized electricity systems at low cost to consumers – as has been proven by France and Sweden. Nuclear power technology is evolving, and a range of new reactor technologies is being developed that offers greater flexibility and efficiency. These technologies can more readily contribute to energy services such as industrial heat, low-carbon hydrogen and synthetic fuel production.” To emphasize, nuclear is the only low-carbon energy source that can provide not just reliable electricity but also affordable, direct high-quality heat for industrial uses, and the only dispatchable, scalable source of low-carbon energy we have. See <a href="https://unece.org/sustainable-energy/publications/nuclear-entry-pathways">https://unece.org/sustainable-energy/publications/nuclear-entry-pathways</a> page 23.	Noted The section has been completely changed with a new figure substituting the previous table. The changes are based on consultations with all sectoral chapters, and supplementary material is added providing details about context specific issues and scaling. Confidence statements are added	Rauli Partanen	Think Atom	Finland
61911	55	1	55	6	Table 17.7, SDG8: UNECE 2021: “The nuclear industry supports a diverse range of jobs, including various engineering, technical, and other specialist roles. Sector pay tends to be higher than average, reflecting the specialist skills required. In addition, nuclear energy provides many developing countries with access to cheap, reliable and carbon-free electricity, which improves quality of life and productivity in those economies. These two effects combined act as a ‘job-multiplier’, greatly boosting regional employment. Nuclear energy projects also involve significant investment and regional infrastructure development, which contributes to economic growth and international exchange. In addition, the safety culture promoted throughout the global nuclear industry has resulted in one of the safest industrial workplaces.” The high energy return on investment (EROEI) of nuclear enables a high number of indirect jobs supported. See <a href="https://unece.org/sustainable-energy/publications/nuclear-entry-pathways">https://unece.org/sustainable-energy/publications/nuclear-entry-pathways</a> page 23.	Noted The section has been completely changed with a new figure substituting the previous table. The changes are based on consultations with all sectoral chapters, and supplementary material is added providing details about context specific issues and scaling. Confidence statements are added	Rauli Partanen	Think Atom	Finland

Comment Id	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
61913	55	1	55	6	Table 17.7.SDG9: UNECE 2021: “In simple terms, a nuclear power plant is major infrastructure development. With maintenance and periodic upgrades, a nuclear power plant can operate for 60 years or even longer, thereby reducing the volumes of new materials needed for energy production. Innovation is integral to achieving this longevity and enabling plants to operate at ever greater performance levels. Nuclear innovation is also resulting in spin-off technologies that can be used in other fields such as material research and structural mechanics. Nuclear energy is not yet widely deployed in the least developed countries and there is vast potential for increased international outreach to help introduce the technology in these countries. As a dispatchable and reliable low-carbon electricity source with low operating costs, nuclear is a perfect fit for data centres and other technology industries. Etc.” See <a href="https://unece.org/sustainable-energy/publications/nuclear-entry-pathways">https://unece.org/sustainable-energy/publications/nuclear-entry-pathways</a> page 23.	Noted The section has been completely changed with a new figure substituting the previous table. The changes are based on consultations with all sectoral chapters, and supplementary material is added providing details about context specific issues and scaling. Confidence statements are added	Rauli Partanen	Think Atom	Finland
61915	55	1	55	6	Table 17.7.SDG10:UNECE 2021: “Nuclear project developers must typically engage stakeholders in extensive consultation before beginning construction, making sure that different voices get their say, including indigenous and marginalized groups. As a centralized form of electricity generation run by large companies with a culture of regulatory compliance, it should be easier to enforce anti-discrimination policies within a nuclear workforce than in some others. Universal access to low-cost clean electricity will help reduce socio-economic inequalities.” See <a href="https://unece.org/sustainable-energy/publications/nuclear-entry-pathways">https://unece.org/sustainable-energy/publications/nuclear-entry-pathways</a> page 24.	Noted The section has been completely changed with a new figure substituting the previous table. The changes are based on consultations with all sectoral chapters, and supplementary material is added providing details about context specific issues and scaling. Confidence statements are added	Rauli Partanen	Think Atom	Finland
61917	55	1	55	6	Table 17.7.SDG11: UNECE 2021: “Nuclear energy can support urban development. Nuclear plants provide affordable reliable electricity which is well-suited to supplying cities where there is constant energy demand. Nuclear energy assists in the electrification of public transport, and especially rail networks, without contributing to air pollution. It supports municipal waste management and recycling. Since nuclear facilities are mostly located in rural communities, but headquarters and governments are based in cities, the nuclear industry creates links to different regions within a country. In addition, nuclear projects will result in significant economic development for the rural communities in which they are sited. Small modular reactors (SMRs) and microreactors are promising potential sources of electricity, district heating or desalination for off-grid remote communities.” See <a href="https://unece.org/sustainable-energy/publications/nuclear-entry-pathways">https://unece.org/sustainable-energy/publications/nuclear-entry-pathways</a> page 24.	Noted The section has been completely changed with a new figure substituting the previous table. The changes are based on consultations with all sectoral chapters, and supplementary material is added providing details about context specific issues and scaling. Confidence statements are added	Rauli Partanen	Think Atom	Finland
61919	55	1	55	6	Table 17.7.SDG12: UNECE 2021: “Nuclear energy generally requires fewer mineral inputs than other energy sources, including critical raw materials. Its primary ongoing mineral input is uranium however, there are no primary competing peaceful uses for this. The uranium resource is ample and distributed widely across the globe, and its mining and processing are subjected to high standards. Nuclear energy does produce waste – notably high-level radioactive waste – but the volumes are small. They need to be responsibly managed before final disposal. Most of the materials and components of a plant are suitable for release based on nuclear regulatory control and therefore available for reuse or recycling. Only a small percentage of the total mass of a plant needs to be disposed of. Innovations such as new fuel designs can increase the efficiency of nuclear power plants, reducing materials requirements even further.” See <a href="https://unece.org/sustainable-energy/publications/nuclear-entry-pathways">https://unece.org/sustainable-energy/publications/nuclear-entry-pathways</a> page 24.	Noted The section has been completely changed with a new figure substituting the previous table. The changes are based on consultations with all sectoral chapters, and supplementary material is added providing details about context specific issues and scaling. Confidence statements are added	Rauli Partanen	Think Atom	Finland
61921	55	1	55	6	Table 17.7.SDG13: UNECE 2021: “Nuclear energy is the world’s second-largest source of low-carbon electricity behind hydropower and it displaces fossil fuel sources that would produce about two gigatonnes of carbon dioxide every year. Nuclear energy can be scaled up in a country quickly compared to other low-carbon technologies, and including it in future energy pathways will help to reduce the time, costs, and risks of decarbonization. Nuclear plants can be engineered with a high degree of climate resilience and are less prone to many climate/weather disruptions than other low-carbon energy forms. Future reactors will be able to supply industrial heat and assist the production of synthetic fuels for transport applications, thereby further reducing carbon emissions from these sectors.” See <a href="https://unece.org/sustainable-energy/publications/nuclear-entry-pathways">https://unece.org/sustainable-energy/publications/nuclear-entry-pathways</a> page 24.	Noted The section has been completely changed with a new figure substituting the previous table. The changes are based on consultations with all sectoral chapters, and supplementary material is added providing details about context specific issues and scaling. Confidence statements are added	Rauli Partanen	Think Atom	Finland
61923	55	1	55	6	Table 17.7.SDG14: UNECE 2021: “Nuclear energy does not produce carbon dioxide emissions which contribute to ocean acidification or other chemical emissions that pollute waterways. Scientists are using nuclear techniques to monitor and studying ocean acidification and understand how it affects marine life and ecosystems, and identify ways to protect the ocean and coastal communities.” See <a href="https://unece.org/sustainable-energy/publications/nuclear-entry-pathways">https://unece.org/sustainable-energy/publications/nuclear-entry-pathways</a> page 25.	Noted The section has been completely changed with a new figure substituting the previous table. The changes are based on consultations with all sectoral chapters, and supplementary material is added providing details about context specific issues and scaling. Confidence statements are added	Rauli Partanen	Think Atom	Finland

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61925	55	1	55	6	Table 17.7,SDG15: UNECE 2021: “Nuclear energy has a very high energy density, and facilities take up minimal land. Plant boundaries are often set quite large for safety and security purposes, and within these, wildlife habitats are often found. Often plant operators support conservation activities which help to protect local species. Nuclear techniques can be used to assess soil quality and to study how crops take up nutrients, as well as how soil moves. This can also be used to combat desertification.” See <a href="https://unece.org/sustainable-energy/publications/nuclear-entry-pathways">https://unece.org/sustainable-energy/publications/nuclear-entry-pathways</a> page 25.	Noted The section has been completely changed with a new figure substituting the previous table. The changes are based on consultations with all sectoral chapters, and supplementary material is added providing details about context specific issues and scaling. Confidence statements are added	Rauli Partanen	Think Atom	Finland
61927	55	1	55	6	Table 17.7,SDG16: UNECE 2021: “Civil nuclear programmes require the development of strong national institutions, while nuclear facilities are subject to robust regulation that is often backed by international conventions. Notable conventions include the Convention on Nuclear Safety, the Convention on Physical Protection of Nuclear Material as well as the Paris and Vienna conventions (which cover third-party liability).” See <a href="https://unece.org/sustainable-energy/publications/nuclear-entry-pathways">https://unece.org/sustainable-energy/publications/nuclear-entry-pathways</a> page 25.	Noted The section has been completely changed with a new figure substituting the previous table. The changes are based on consultations with all sectoral chapters, and supplementary material is added providing details about context specific issues and scaling. Confidence statements are added	Rauli Partanen	Think Atom	Finland
61929	55	1	55	6	Table 17.7,SDG17: UNECE 2021: “The nuclear community has developed partnerships with governments, NGOs, educational institutions and many UN bodies, helping them to contribute their skills and resources to the sustainable development of nuclear technology. The IAEA promotes policy coherence by establishing safety standards, and providing security recommendations and technical guidance to its member states. The IAEA also develops partnerships through technical cooperation programmes. There is enormous potential to support newcomer governments in the development of sustainable nuclear energy entry pathways.” See <a href="https://unece.org/sustainable-energy/publications/nuclear-entry-pathways">https://unece.org/sustainable-energy/publications/nuclear-entry-pathways</a> page 25.	Noted The section has been completely changed with a new figure substituting the previous table. The changes are based on consultations with all sectoral chapters, and supplementary material is added providing details about context specific issues and scaling. Confidence statements are added	Rauli Partanen	Think Atom	Finland
61931	55	1	55	6	Table 17.7 overall evaluation. A complete re-evaluation on how nuclear contributes to SDG’s is needed, as clearly it can contribute to all the SDG’s at least in some ways, and for many, in very significant and clear ways. In this, the recent UNECE 2021 “Use of Nuclear Fuel Resources for Sustainable Development – Entry Pathways” ( <a href="https://unece.org/sustainable-energy/publications/nuclear-entry-pathways">https://unece.org/sustainable-energy/publications/nuclear-entry-pathways</a> ) publication provides valuable guidance that previously was unavailable, as does the earlier discussion by IAEA ( <a href="https://www.iaea.org/bulletin/57-3">https://www.iaea.org/bulletin/57-3</a> and <a href="https://www.iaea.org/sites/default/files/bull573sept2016.pdf">https://www.iaea.org/sites/default/files/bull573sept2016.pdf</a> )	Noted The section has been completely changed with a new figure substituting the previous table. The changes are based on consultations with all sectoral chapters, and supplementary material is added providing details about context specific issues and scaling. Confidence statements are added	Rauli Partanen	Think Atom	Finland
65939	55	1	55	6	Table 17.7, SDG1: Nuclear enables access to affordable and reliable energy, directly reducing and alleviating poverty. In this light, explain the given score and correct it to reflect the facts.	Noted The section has been completely changed with a new figure substituting the previous table. The changes are based on consultations with all sectoral chapters, and supplementary material is added providing details about context specific issues and scaling. Confidence statements are added	Eero Hirvijoki	Aalto University	Finland
65941	55	1	55	6	Table 17.7, SDG2: Nuclear energy and research have a large role in providing food security via irradiation and isotope techniques. Irradiation can inhibit spoilage and wastage of food via increasing shelf-life by delaying ripening; it can control pests, consequently preventing transmission of foodborne illnesses; it can reduce quarantine periods of imports; it can also be used to accelerate mutation-based plant breeding to produce more resistant and higher-yield crop varieties. Isotope-based management of fertilizer application can reduce excessive use and subsequent water-basin pollution. In this light, explain the given score and correct it to reflect the facts.	Noted The section has been completely changed with a new figure substituting the previous table. The changes are based on consultations with all sectoral chapters, and supplementary material is added providing details about context specific issues and scaling. Confidence statements are added	Eero Hirvijoki	Aalto University	Finland
65943	55	1	55	6	Table 17.7, SDG3: Nuclear energy and research sector contributes to medical radioisotopes for diagnosis of many diseases and therapies against cancer. Trivially, nuclear also contributes to reducing air pollution and the related millions of deaths per year via replacing fossil-fuel use, especially in the harmful open-fire cooking still commonplace in the poorest regions of the world. In this light, explain the given score and correct it to reflect the facts.	Noted The section has been completely changed with a new figure substituting the previous table. The changes are based on consultations with all sectoral chapters, and supplementary material is added providing details about context specific issues and scaling. Confidence statements are added	Eero Hirvijoki	Aalto University	Finland
65945	55	1	55	6	Table 17.7, SDG4 and SDG5: Affordable and reliable electricity enables study hours to be extended beyond daylight. Reliable electricity reduces dependency on open-fire cooking and enables use of productive electric appliances. Historically, this has significantly empowered women. Without a battery storage, a solar panel cannot reliably provide the same services. The IAEA organization funds the Marie Skłodowska-Curie Fellowship program which offers up to 100 scholarships for women per year to pursue Master’s degrees in nuclear science and technology, safety, and non-proliferation. In this light, explain the given scores and correct them to reflect the facts.	Noted The section has been completely changed with a new figure substituting the previous table. The changes are based on consultations with all sectoral chapters, and supplementary material is added providing details about context specific issues and scaling. Confidence statements are added	Eero Hirvijoki	Aalto University	Finland



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65947	55	1	55	6	Table 17.7, SDG6: Nuclear technology enables isotope techniques that are often used to monitor water quality. The potential of nuclear desalination technique is vast and the largest nuclear plant in the US, the Palo Verde facility, already "recycles more than 20 billion gallons of waste water from surrounding municipalities" per year and uses that as the plant coolant. I dispute the view that nuclear would be problematic from the water-use perspective: plants are never built in places where water scarcity is possible. Instead, nuclear could provide clean drinking water via sea water desalination for hundreds of millions of people world wide. Desalination also offers a very simple grid-flexibility option via co-operating electricity production and desalination. See <a href="https://www.world-nuclear.org/information-library/non-power-nuclear-applications/industry/nuclear-desalination.aspx">https://www.world-nuclear.org/information-library/non-power-nuclear-applications/industry/nuclear-desalination.aspx</a> and references therein. In this light, explain the given score and correct it to reflect the facts.	Noted The section has been completely changed with a new figure substituting the previous table. The changes are based on consultations with all sectoral chapters, and supplementary material is added providing details about context specific issues and scaling. Confidence statements are added	Eero Hirvijoki	Aalto University	Finland
65949	55	1	55	6	Table 17.7, SDG7: nuclear energy directly contributes to delivering affordable dispatchable clean energy and electricity around the clock. It has the highest capacity factors of any clean energy installations. There is no question of whether this is beneficial from the sustainable development goals' perspective. Explain the given score and correct it to reflect the facts.	Noted The section has been completely changed with a new figure substituting the previous table. The changes are based on consultations with all sectoral chapters, and supplementary material is added providing details about context specific issues and scaling. Confidence statements are added	Eero Hirvijoki	Aalto University	Finland
65951	55	1	55	6	Table 17.7, SDG8 and SDG9: The relationship between reliable and affordable energy and economic growth are well established and widely recognized. Industry co-ownership of nuclear plants reduces the risk to electricity price volatility via purchase at cost price and, hence, diverts energy intensive companies away from coal use to clean electricity. From an employee perspective clean energy supply to industry is a major health benefit and contributes towards sustainable work conditions. I find it difficult to understand how steady electricity supply to industry and individuals would not be beneficial from the perspective of sustainable economic growth and industrialization. In this light, explain the given scores and correct them to reflect the facts.	Noted The section has been completely changed with a new figure substituting the previous table. The changes are based on consultations with all sectoral chapters, and supplementary material is added providing details about context specific issues and scaling. Confidence statements are added	Eero Hirvijoki	Aalto University	Finland
65953	55	1	55	6	Table 17.7, SDG10: The clean and affordable electricity from nuclear directly reduces the damaging externalities from the use of fossil fuel and consequently benefits the poorest in the society the most. Among countries, it is the denied access to nuclear energy that drives inequality while access to it reduces inequalities and enables clean industrialization. In this light, explain the given score and correct it to reflect the facts.	Noted The section has been completely changed with a new figure substituting the previous table. The changes are based on consultations with all sectoral chapters, and supplementary material is added providing details about context specific issues and scaling. Confidence statements are added	Eero Hirvijoki	Aalto University	Finland
65955	55	1	55	6	Table 17.7, SDG11: Clean and affordable electricity together with clean district heating and cooling from nuclear sources directly contribute to reducing air pollution and to creating sustainable city environments. In this light, explain the given score and correct it to reflect facts.	Noted The section has been completely changed with a new figure substituting the previous table. The changes are based on consultations with all sectoral chapters, and supplementary material is added providing details about context specific issues and scaling. Confidence statements are added	Eero Hirvijoki	Aalto University	Finland
65957	55	1	55	6	Table 17.7, SDG13: Energy sector is the single biggest contributor to anthropogenic climate change. Adopting nuclear energy enables one-to-one replacing of coal plants both in electricity production and in district heating. Without extensive storage capabilities the same cannot be said of solar and wind as has been proven in Germany where the phaseout of nuclear has not been countered from renewables but new coal plants have been opened. It is unacceptable to think that nuclear energy could not play a pivotal role in combating climate change. In this light, explain the given score and correct it to reflect reality.	Noted The section has been completely changed with a new figure substituting the previous table. The changes are based on consultations with all sectoral chapters, and supplementary material is added providing details about context specific issues and scaling. Confidence statements are added	Eero Hirvijoki	Aalto University	Finland
65959	55	1	55	6	Table 17.7, SDG14: Replacing coal and gas plants with nuclear plants directly reduces the ocean acidification driven by atmospheric CO2 concentration and global warming.	Noted The section has been completely changed with a new figure substituting the previous table. The changes are based on consultations with all sectoral chapters, and supplementary material is added providing details about context specific issues and scaling. Confidence statements are added	Eero Hirvijoki	Aalto University	Finland
65961	55	1	55	6	Table 17.7, SDG15: Out of all clean energy sources, nuclear has the smallest footprint on both land and material use per energy produced. Embracing nuclear energy therefore directly contributes to sustainable use of terrestrial ecosystems. In this light, explain the given score and correct it to reflect reality.	Noted The section has been completely changed with a new figure substituting the previous table. The changes are based on consultations with all sectoral chapters, and supplementary material is added providing details about context specific issues and scaling. Confidence statements are added	Eero Hirvijoki	Aalto University	Finland
65963	55	1	55	6	Table 17.7, SDG16 and SDG17: As a sustainable and affordable energy supply, nuclear encourages the development of partnerships and fostering peace. A textbook example of how nuclear drives for these goals is the highly recognized and respected IAEA. In this light, explain the given scores and correct them to reflect reality.	Noted The section has been completely changed with a new figure substituting the previous table. The changes are based on consultations with all sectoral chapters, and supplementary material is added providing details about context specific issues and scaling. Confidence statements are added	Eero Hirvijoki	Aalto University	Finland

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30785	55	2	55	2	In table 17.7 <ul style="list-style-type: none"> <li>• according to the footnote, the reference is from sectoral chapter 6,7,9,10,11, however, according to chapter 6 of solar and nuclear, solar power shows synergies in 10 areas, while nuclear has only 1. The definition to state the synergies is vague and should be clarified.</li> <li>• The meaning to sort mitigation options and their relations with SDGs by the number of the referencing reports is not scientific. Moreover, the relation cannot uniformly be said true for the whole world, and will only hold true in some cases. In page 55 L15-16, it is written that the impacts are context-specific and can vary from place to place, however this figure can make assumptions that the relation uniformly holds true for the whole world.</li> <li>• The reason of how the plus's and minus's have been defined should be raised clearly including the reports used as reference.</li> </ul>	Noted The section has been completely changed with a new figure substituting the previous table. The changes are based on consultations with all sectoral chapters, and supplementary material is added providing details about context specific issues and scaling. Confidence statements are added	Government of Japan	Climate Change Division - Ministry of Foreign Affairs	Japan
23757	55	3	55	6	This table appears problematic. Most rating regarding nuclear energy are impossible to understand. For example, for the nuclear energy, it seems disputable that a negative impact is reported on SGDS (industry, innovation and infrastructure). It is surprising that Nuclear energy is the only mitigation option (among the 40 listed) with a negative impact on SDG10 (Reduce inequalities). What is the justification for solar and wind to be positive for SDG5 (Gender Equality), and not nuclear? The word "gender" is not present in Chapter 6. The evaluation of several SDG (for example: SDG13 Climate action) raises questions considering that only mitigation options are in this table but some are evaluated as "non applicable". Chapter 6 clearly states that nuclear generates more low carbon electricity than both wind and solar, and that the LCA CO2 emission of solar is significantly larger than that of nuclear. Comparing the energy sector options' ratings, there seem to be a lot of evaluation of SDG goals which seems rather objectively "non applicable" ; and it raises questions why some SDG are "non applicable" for some mitigation options and not for others. Thus, we suggest that this table be revised and specifically documented for each case with link to the exact references used to justify the rating (the reference given here is to several chapters of hundreds of pages is insufficient, and could be further specified and targeted). This comment is all the most important since it is also in the TS and SPM.	Noted The section has been completely changed with a new figure substituting the previous table. The changes are based on consultations with all sectoral chapters, and supplementary material is added providing details about context specific issues and scaling. Confidence statements are added	Government of France	Ministère de la Transition écologique et solidaire	France
18605	55	5	55	6	It's not immediately clear to me how activities are classed as applicable or not - for example 'reduced overconsumption' is listed as not relevant to any of the SDGs, whereas it could be expected that this would be in synergy with several Goals, such as 11,12,14 & 15.	Noted The section has been completely changed with a new figure substituting the previous table. The changes are based on consultations with all sectoral chapters, and supplementary material is added providing details about context specific issues and scaling. Confidence statements are 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)
31651	55	8	55	17	Suggestion: P55L8-17:Transport has no trade-offs. Please recheck. See Chapter 10 table 10.1 chapter 5 Figure 5.6 and also SR 1.5 chapter 5 table 5.2	Noted The section has been completely changed with a new figure substituting the previous table. The changes are based on consultations with all sectoral chapters, and supplementary material is added providing details about context specific issues and scaling. Confidence statements are added	Shreya Some	Ahmedabad University	India
71127	55	8	55	17	To update also regarding SDG14.	Noted The section has been completely changed with a new figure substituting the previous table. The changes are based on consultations with all sectoral chapters, and supplementary material is added providing details about context specific issues and scaling. Confidence statements are added	Philippe Tulkens	European Union (EU) - DG Research & Innovation	Belgium
11693	55	11	55	12	"...which reflects conflicts over land-use between bioenergy production and other land-uses." One primary issue here is the potential conflict of land use for agricultural crops or biomass use. In the UK where 40% of the agricultural crop land is significantly degraded. In 2017, the Minister for Environment and Rural Affairs, Michael Gove said "The UK is only 30 to 40 years away from "the fundamental eradication of soil fertility" adding "... no country can withstand the loss of its soil and fertility" (See: <a href="https://www.openaccessgovernment.org/gove-warns-eradication-soil-fertility-due-intensive-farming/39039/">https://www.openaccessgovernment.org/gove-warns-eradication-soil-fertility-due-intensive-farming/39039/</a> . Viewed 11/8/2020).	Noted The section has been completely changed with a new figure substituting the previous table. The changes are based on consultations with all sectoral chapters, and supplementary material is added providing details about context specific issues and scaling. Confidence statements are added	Paul Dumble	Paul's Environment Ltd	United Kingdom (of Great Britain and Northern Ireland)
31761	55				Ch 12 shows links with SDGs for DAC but table 17.7 shows n.a for all SDGs. Please check P26-27 of chapter 12	Noted The section has been completely changed with a new figure substituting the previous table. The changes are based on consultations with all sectoral chapters, and supplementary material is added providing details about context specific issues and scaling. Confidence statements are added	Shreya Some	Ahmedabad University	India
31763	55				Enhanced weathering: Shows synergies only with SDG 3, 7 and n.a for SDG 11. However ch 12 clearly explains it has tradeoffs with SDG 3, 7, 11 (P28 of chapter 12)	Noted The section has been completely changed with a new figure substituting the previous table. The changes are based on consultations with all sectoral chapters, and supplementary material is added providing details about context specific issues and scaling. Confidence statements are added	Shreya Some	Ahmedabad University	India

Comment Id	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
31765	55				Suggestion: in cross sectoral "Ocean-based approaches" as a CDR technology can be considered. Ch 12 has a rich section on co-benefits and trade-offs PP29-32	Noted The section has been completely changed with a new figure substituting the previous table. The changes are based on consultations with all sectoral chapters, and supplementary material is added providing details about context specific issues and scaling. Confidence statements are added	Shreya Some	Ahmedabad University	India
31767	55				ChC21:190eek Chapter 12 Fig 12.11 1)Energy efficiency: Fig 12.11 shows Energy efficiency having co-benefits with poverty. However, table 17.7 shows n.a in SDG 1? 2)Energy efficiency: Fig 12.11 shows Energy efficiency having co-benefits with health. However, table 17.7 shows n.a in SDG 3? 3)Energy efficiency: Fig 12.11 shows Energy efficiency having co-benefits and trade-offs with employment. However, table 17.7 shows only + in SDG 8?  Please crosscheck with chapter 11 also	Noted The section has been completely changed with a new figure substituting the previous table. The changes are based on consultations with all sectoral chapters, and supplementary material is added providing details about context specific issues and scaling. Confidence statements are added	Shreya Some	Ahmedabad University	India
75687	55				Table 17.2 Increased solar power – impact to Life on Land or Food or Economy is potentially negative, as it strongly depends on the form of application – if solar is applied as big plants substituting fields the impact on all three is evidently negative, in case of application on roof only the impact on food or Life on Land is not possible evaluate (n.a. – not applicable), but concerning the economy the impact will strongly depends on the stability of electrical grid, price of electricity and because the solar will increase the price (it is included in remarks) the evaluation must be negative. On other hand the sufficient energy will have positive impact to Improved assess to water – as example desalination of see water is energy intensive. So here the evaluation must be positive instead of n.a.	Noted The section has been completely changed with a new figure substituting the previous table. The changes are based on consultations with all sectoral chapters, and supplementary material is added providing details about context specific issues and scaling. Confidence statements are added	Jiri Duspiva	Czech Nuclear Society	Czech Republic
77265	55				Considering the cited sources of infomation in the report to compile this table (which reduces to chapter 6 only, as the sole where nuclear is discussed), and in light of the comments above, it is hard to understand the rationales for (and share) several judgements on the synergies/trade-offs which nuclear would induce: - SDG1 -> not requiring additional installations or provisions for grid stability (i.e., unlikely vRES) and notably if deployed at vast scale, nuclear can be an extremely cheap source, making energy available at low price for all -> suggested "+"; - SDG6 -> there is no net water consumption in nuclear, and the temperature increase of cooling water already respects tight requirements that pose no other issue than distancing between plants on the same river -> suggested "+", or at least "+/-"; - SDG7 -> for sure, nuclear energy is affordable and clean, and this is not reflected in the judgement; the question of waste management is not an objective issue, because of the very low volume (the lowest among all sources) and finite timespam of the associated concern (which is instead infinite for "chemicals") -> suggested "+"; - SDG8 -> nuclear jobs are among the most qualified, and nuclear-based economies among the one sustaining better economic growth -> suggested "+"; - SDG9 -> nuclear has always been one of the most innovating sectors (as also proven by the revolutionary perspective for Generation-IV systems) and high worth for industry -> suggested "+"; - SDG10 -> nuclear can be realized everywhere with the same effectiveness (differently from renewables), allowing access to affordable and secure energy to all -> suggested "+"; - SDG13 -> nuclear sustains climate actions just as much as any other low-carbon source -> suggested "+"; - SDG15 -> nuclear makes the lowest use of land, with minimal impact on life -> suggested "+".	Noted The section has been completely changed with a new figure substituting the previous table. The changes are based on consultations with all sectoral chapters, and supplementary material is added providing details about context specific issues and scaling. Confidence statements are added	Giacomo Grasso	ENEA	Italy
8931	55		55		This table is very important, but the links with the rest of the chapters seem to be very weak... In all the chapter 17, there is not a single quotation of nuclear. In the chapter 6, there are rarely clear links with the table 17-7 concerning these nuclear technologies and their roles with respect to the SDG. Hereunder, we can give some information in ordre to modify the brown zones allocated to nuclear, which appears to be a strong judgement: in fact, nuclear appaears as the worst techno in this table. Is it really what IPCC wants to claim? Is it really true? I do not think it is.	Noted The section has been completely changed with a new figure substituting the previous table. The changes are based on consultations with all sectoral chapters, and supplementary material is added providing details about context specific issues and scaling. Confidence statements are added	Jean-Guy DEVEZEUX DE LAVERGNE	Université Paris-Dauphine & Société Française d'Energie Nucléaire	France

Comment Id	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
8933	55		55		SDG 1 (no poverty): Nuclear offers today a contribution to desalination (low cost water) when coupling nuclear and desalination plants, such as in Saudi Arabia (and other projects in North Africa and in the Middle East). Nuclear power is also a very efficient source of energy for desalination. In the world they are 10 reactors devoted to that purpose (see the IAEA PRIS database). <a href="https://www.sciencedirect.com/science/article/abs/pii/S0011916418323531">https://www.sciencedirect.com/science/article/abs/pii/S0011916418323531</a>	Noted The section has been completely changed with a new figure substituting the previous table. The changes are based on consultations with all sectoral chapters, and supplementary material is added providing details about context specific issues and scaling. Confidence statements are added	Jean-Guy DEVEZEAUX DE LAVERGNE	Université Paris-Dauphine & Société Française d’Energie Nucléaire	France
8935	55		55		SDG 2 (zero hunger): There is clearly a potential large contribution to desalination and agriculture in dry countries. <a href="https://www.forbes.com/sites/jamesconca/2019/07/14/megadroughts-and-desalination-another-pressing-need-for-nuclear-power/">https://www.forbes.com/sites/jamesconca/2019/07/14/megadroughts-and-desalination-another-pressing-need-for-nuclear-power/</a>	Noted The section has been completely changed with a new figure substituting the previous table. The changes are based on consultations with all sectoral chapters, and supplementary material is added providing details about context specific issues and scaling. Confidence statements are added	Jean-Guy DEVEZEAUX DE LAVERGNE	Université Paris-Dauphine & Société Française d’Energie Nucléaire	France
8937	55		55		SDG6 (Clean water and sanitation): Note that quite all the water flow is only heated by few degrees and that there is almost no water losses, and clearly absolutely no pollution. In case of water scarcity, possibility to add cooling towers (with a little water transformation in cold steam). Note that all the sea-shore plants have actually no impact on the sea. In addition, dry cooling is possible, with a very low water consumption, if needed see: <a href="https://reader.elsevier.com/reader/sd/pii/S1364032119305994?token=539F3CD6FAB8F5373D81F5799D8CB4F36236051A9E9D2D1EDC9AB89A3D99CFE5B4BB68A18DF71A7FB6717CA32D478B3">https://reader.elsevier.com/reader/sd/pii/S1364032119305994?token=539F3CD6FAB8F5373D81F5799D8CB4F36236051A9E9D2D1EDC9AB89A3D99CFE5B4BB68A18DF71A7FB6717CA32D478B3</a> It is also possible to use low (or medium) temperature water for heating, especially through co-generation techniques with a very high yield and sound economics. <a href="https://epjn.epj.org/articles/epjn/abs/2016/01/epjn150084/epjn150084.html">https://epjn.epj.org/articles/epjn/abs/2016/01/epjn150084/epjn150084.html</a> <a href="https://doi.org/10.1016/j.energy.2019.116728">https://doi.org/10.1016/j.energy.2019.116728</a> In case of water scarcity, possibility to add cooling towers (with a little water transformation in cold steam). Note that all the sea-shore plants have actually no impact on the sea. In addition, dry cooling is possible, with a very low water consumption, if needed see: <a href="https://reader.elsevier.com/reader/sd/pii/S1364032119305994?token=539F3CD6FAB8F5373D81F5799D8CB4F36236051A9E9D2D1EDC9AB89A3D99CFE5B4BB68A18DF71A7FB6717CA32D478B3">https://reader.elsevier.com/reader/sd/pii/S1364032119305994?token=539F3CD6FAB8F5373D81F5799D8CB4F36236051A9E9D2D1EDC9AB89A3D99CFE5B4BB68A18DF71A7FB6717CA32D478B3</a> In that case the water consumption is almost zero. Nuclear power is also a very efficient source of energy for desalination. In the world they are 10 reactors devoted to that purpose (see the IAEA PRIS database). <a href="https://www.sciencedirect.com/science/article/abs/pii/S0011916418323531">https://www.sciencedirect.com/science/article/abs/pii/S0011916418323531</a> In addition, With IAEA support, some countries are now treating wastewater from industrial activities using radiation to reduce contaminants and improve water quality, making the water safer for reuse. <a href="https://www.iaea.org/bulletin/57-3">https://www.iaea.org/bulletin/57-3</a> . A good example is given by Bolivia, where they have been able to manage their geologic water reserve when using nuclear radioisotopes to determine the water age and transfer physics. <a href="https://www.iaea.org/publications/magazines/bulletin/57-3/managing-water-resources-bolivia-unlocks-aquifers-secrets-with-nuclear-technology">https://www.iaea.org/publications/magazines/bulletin/57-3/managing-water-resources-bolivia-unlocks-aquifers-secrets-with-nuclear-technology</a>	Noted The section has been completely changed with a new figure substituting the previous table. The changes are based on consultations with all sectoral chapters, and supplementary material is added providing details about context specific issues and scaling. Confidence statements are added	Jean-Guy DEVEZEAUX DE LAVERGNE	Université Paris-Dauphine & Société Française d’Energie Nucléaire	France
8939	55		55		SDG8: Decent work and economic growth In many countries, nuclear is a competitive technology with a very low GHG impact <a href="https://www.oecd-nea.org/jcms/pl_15000/the-costs-of-decarbonisation-system-costs-with-high-shares-of-nuclear-and-renewables">https://www.oecd-nea.org/jcms/pl_15000/the-costs-of-decarbonisation-system-costs-with-high-shares-of-nuclear-and-renewables</a> <a href="https://www.oecd-nea.org/jcms/42970_Media/redcost">https://www.oecd-nea.org/jcms/42970_Media/redcost</a> The macroeconomic impact of nuclear in Europe will be positive in the future, as it has been assessed with the model used by the EU (operated by E3-Modeling). See <a href="http://www.sfen.org/sites/default/files/public/atoms/files/le_nucleaire_francais_dans_le_systeme_energetique_europeen_-_sfen_-_ppe.pdf">http://www.sfen.org/sites/default/files/public/atoms/files/le_nucleaire_francais_dans_le_systeme_energetique_europeen_-_sfen_-_ppe.pdf</a>	Noted The section has been completely changed with a new figure substituting the previous table. The changes are based on consultations with all sectoral chapters, and supplementary material is added providing details about context specific issues and scaling. Confidence statements are added	Jean-Guy DEVEZEAUX DE LAVERGNE	Université Paris-Dauphine & Société Française d’Energie Nucléaire	France
8941	55		55		SDG 9: Industry, Innovation and infrastructure Nuclear is a high tec technology with several spillover, in many domains: medicine, electronics, measure, welding, monitoring, materials, modelling.... See for example this study for Korea: INTERNATIONAL ATOMIC ENERGY AGENCY, Nuclear Technology and Economic Development in the Republic of Korea, Information Booklet, IAEA, Vienna (2009). <a href="https://www.iaea.org/sites/default/files/rok0809.pdf">https://www.iaea.org/sites/default/files/rok0809.pdf</a>	Noted The section has been completely changed with a new figure substituting the previous table. The changes are based on consultations with all sectoral chapters, and supplementary material is added providing details about context specific issues and scaling. Confidence statements are added	Jean-Guy DEVEZEAUX DE LAVERGNE	Université Paris-Dauphine & Société Française d’Energie Nucléaire	France
8943	55		55		SDG 13: Climate action Many countries (China, UK, France, Poland, Turkey, India...) rely on nuclear to reach their NDCs. As you may know, OECD/IEA report on avoided emissions thanks to nuclear and analyses nuclear energy as a necessary technology to meet the COP21 target. Nuclear has a weak global impact: see NEEDS (2009) Deliverable D10.2 - RS2b "Final report on sustainability assessment of advanced electricity supply options" Project no: 502687 NEEDS New Energy Externalities Developments for Sustainability <a href="http://www.needs-project.org/docs/NEEDS_RS2b_D10-2%20-%20Final%20Report.pdf">http://www.needs-project.org/docs/NEEDS_RS2b_D10-2%20-%20Final%20Report.pdf</a>	Noted The section has been completely changed with a new figure substituting the previous table. The changes are based on consultations with all sectoral chapters, and supplementary material is added providing details about context specific issues and scaling. Confidence statements are added	Jean-Guy DEVEZEAUX DE LAVERGNE	Université Paris-Dauphine & Société Française d’Energie Nucléaire	France
37313	55		55		How does nuclear impact SDG-9 and SDG -10 negatively?	Noted The section has been completely changed with a new figure substituting the previous table. The changes are based on consultations with all sectoral chapters, and supplementary material is added providing details about context specific issues and scaling. Confidence statements are added	Arun kumar Nayak	Bhabha Atomic Research Centre Trombay Mumbai	India
37315	55		55		The rationale behind indications in the figure should be explained. There are assigned arbitrarily without any scientific basis.	Noted The section has been completely changed with a new figure substituting the previous table. The changes are based on consultations with all sectoral chapters, and supplementary material is added providing details about context specific issues and scaling. Confidence statements are added	Arun kumar Nayak	Bhabha Atomic Research Centre Trombay Mumbai	India

Comment Id	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
72947	55		55		To complete this very interesting table (17.7) , and in addition to the thematic chapters quoted below (Chapters 6, 7, 9, 10, 11, and 12), maybe use the widely used reference by AR5 of the "Global Energy Assessment (GEA)" on the link between solar and in general renewable energy and SDGs on gender, poverty and education [GEA, 2012: Global Energy Assessment– Toward a Sustainable Future, Cambridge University Press, Cambridge UK and New York, NY, USA and the International Institute for Applied Systems Analysis, Laxenburg, Austria]. Maybe use also the previous opus edited by UNEP in 2000 with table 3 p.35 linking electrification with other SDGs such as infant mortality, education and gender [UNDP 2004 World Energy Assessment, Goldenberg et al. <a href="https://sustainabledevelopment.un.org/content/documents/2420World_Energy_Assessment_Overview_2004_Update.pdf">https://sustainabledevelopment.un.org/content/documents/2420World_Energy_Assessment_Overview_2004_Update.pdf</a> ]	Noted The section has been completely changed with a new figure substituting the previous table. The changes are based on consultations with all sectoral chapters, and supplementary material is added providing details about context specific issues and scaling. Confidence statements are added	Antoine BONDUELLE	EE-Consultant	France
9141	56	1	56	39	Not sure why but this section fails to mention the land use impacts of the transition as a potential barrier. Related to this is the fact that all decarbonisation and energy transition projects will require environmental assessment and this will add significant time to deployment. For example, see Iñigo Capellán-Pérez, Carlos de Castro, Iñaki Arto, Assessing vulnerabilities and limits in the transition to renewable energies: Land requirements under 100% solar energy scenarios, Renewable and Sustainable Energy Reviews, Volume 77, 2017, Pages 760-782, ISSN 1364-0321, <a href="https://doi.org/10.1016/j.rser.2017.03.137">https://doi.org/10.1016/j.rser.2017.03.137</a> . ( <a href="https://www.sciencedirect.com/science/article/pii/S1364032117304720">https://www.sciencedirect.com/science/article/pii/S1364032117304720</a> ). Also, the above mentioned Princeton University report identifies significant constraints to physical deployment of the necessary transition infrastructure. <a href="https://acee.princeton.edu/rapidswitch/projects/net-zero-america-project/">https://acee.princeton.edu/rapidswitch/projects/net-zero-america-project/</a> .	Accepted - reference to land use impacts of the transition has been made in this section.	Brendan Barrett	Osaka University	Japan
16789	56	1	56	39	Factors affecting transition are multiple in terms of location, actors and time scale. Technological innovation and shift in market, policies and governance arrangement all affect the belief systems and market forces. Rational assessment of benefit and cost of policies and technologies is not enough to help overcome the barriers. Breaking lock-in technology, path dependency and resistance to change is needed.	Noted, no change made as these points are made with references in paragraph 2 of 17.4	Government of Republic of Korea	Korea Meteorological Administration (KMA)	Republic of Korea
18607	56	1	56	39	It could be helpful to include some clearer summaries here of what the key barriers and enablers, distilling the key points to strengthen the main messages from the subsections below, which provide wider exploratory coverage of the examples and evidence available.	Accepted. Distilled list of barriers added to second paragraph of 17.4	Government of United Kingdom (of Great Britain and Northern Ireland)	Department for Business, Energy & Industrial Strategy	United Kingdom (of Great Britain and Northern Ireland)
60533	56	1	56	39	Factors affecting transition are multiple in terms of location, actors and time scale. Technological innovation and shift in market, policies and governance arrangement all affect the belief systems and market forces. Rational assessment of benefit and cost of policies and technologies is not enough to help overcome the barriers. Breaking lock-in technology, path dependency and resistance to change is needed.	Noted, no change made as these points are made with references in paragraph 2 of 17.4	HWANIL PARK	STEPI	Republic of Korea
43477	56	1	64	2	Economic sanctions should also be seen as an obstacle to sustainable development, including the issue of climate action. These sanctions are used as policy tools to force the sanctioned country to change its course, policies, and actions by imposing pressure on the economy of the sanctioned country. In response to sanctions and to evade its grip, the sanctioned country adopts a range of survivalist, aggressive, and unsustainable policies that reduce the economic pressure of sanctions at the expense of accelerated resource consumption and environmental degradation [Madani, K. (2020). How international economic sanctions harm the environment. <i>Earth's Future</i> , 8, c2020EF001829. <a href="https://doi.org/10.1029/2020EF001829">https://doi.org/10.1029/2020EF001829</a> ]. Thus, the impacts of these sanctions will go beyond the economy and directly prevent the country from achieving SDGs. In practice, sanctions can cause significant collateral damages to ordinary citizens and their economic welfare. [Dizaji, S. F. (2012). The effects of oil shocks on government expenditures and government revenues nexus in Iran (as a developing oil-export based economy). <i>ISS Working Paper Series/General Series</i> , 540: 1–41, No. 540, Erasmus University Rotterdam. <a href="http://hdl.handle.net/1765/32269">http://hdl.handle.net/1765/32269</a> , Accessed: August 31, 2020.], [Neuenkirch, M., & Neumeier, F. (2016). The impact of US sanctions on poverty. <i>Journal of Development Economics</i> , 121, 110–119. <a href="https://doi.org/10.1016/j.jdeveco.2016.03.005">https://doi.org/10.1016/j.jdeveco.2016.03.005</a> ]. The scientific literature has repeatedly raised concerns about the striking impacts of economic sanctions on health, food, and human rights, including “the enjoyment of a safe, clean, healthy, and sustainable environment”. The existing humanitarian exemptions of the sanctions (mainly related to food and medicine) do not cover most of these issues. [Butler, D. (2013). Iran hit by drug shortage. <i>Nature</i> , 504(7478), 15–16. <a href="https://doi.org/10.1038/504015a">https://doi.org/10.1038/504015a</a> ], [Danaei, G., et al. (2019). Iran in transition. <i>Lancet</i> , 393(10184),1984–2005. <a href="https://doi.org/10.1016/S0140-6736(18)33197-0">https://doi.org/10.1016/S0140-6736(18)33197-0</a> ], [Kokabisaghi, F. (2018). Assessment of the effects of economic sanctions on Iranians' right to health by using human rights impact assessment tool: A systematic review. <i>International Journal of Health Policy and Management</i> , 7(5), 374–393. <a href="https://doi.org/10.15171/ijhpm.2017.147">https://doi.org/10.15171/ijhpm.2017.147</a> ], [Moret, E. S. (2015). Humanitarian impacts of economic sanctions on Iran and Syria. <i>European Security</i> , 24(1), 120–140. <a href="https://doi.org/10.1080/09662839.2014.893427">https://doi.org/10.1080/09662839.2014.893427</a> ], [Palaniappa, S. (2013). Sanctions without humanitarian implications—An impossible feat. (2013). Honors in the Major Thesis (HIM) 1990–2015, 1538, University of Central Florida. <a href="https://stars.library.ucf.edu/honortheses/1990-2015/1538/">https://stars.library.ucf.edu/honortheses/1990-2015/1538/</a> ]	Noted - outside the scope of this section	sadegh zeyaayan	Head of national center for forecasting and weather hazards management of Islamic Republic of Iran Meteorological Organization (IRIMO)	Iran

Comment Id	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
50383	56	1	64	2	Economic sanctions should also be seen as an obstacle to sustainable development, including the issue of climate action. These sanctions are used as policy tools to force the sanctioned country to change its course, policies, and actions by imposing pressure on the economy of the sanctioned country. In response to sanctions and to evade its grip, the sanctioned country adopts a range of survivalist, aggressive, and unsustainable policies that reduce the economic pressure of sanctions at the expense of accelerated resource consumption and environmental degradation [Madani, K. (2020). How international economic sanctions harm the environment. <i>Earth's Future</i> , 8, e2020EF001829. <a href="https://doi.org/10.1029/2020EF001829">https://doi.org/10.1029/2020EF001829</a> ]. Thus, the impacts of these sanctions will go beyond the economy and directly prevent the country from achieving SDGs. In practice, sanctions can cause significant collateral damages to ordinary citizens and their economic welfare. [Dizaji, S. F. (2012). The effects of oil shocks on government expenditures and government revenues nexus in Iran (as a developing oil-export based economy). <i>ISS Working Paper Series/General Series</i> , 540: 1–41, No. 540, Erasmus University Rotterdam. <a href="http://hdl.handle.net/1765/32269">http://hdl.handle.net/1765/32269</a> . Accessed: August 31, 2020.], [Neuenkirch, M., & Neumeier, F. (2016). The impact of US sanctions on poverty. <i>Journal of Development Economics</i> , 121, 110–119. <a href="https://doi.org/10.1016/j.jdeveco.2016.03.005">https://doi.org/10.1016/j.jdeveco.2016.03.005</a> ]. The scientific literature has repeatedly raised concerns about the striking impacts of economic sanctions on health, food, and human rights, including “the enjoyment of a safe, clean, healthy, and sustainable environment”. The existing humanitarian exemptions of the sanctions (mainly related to food and medicine) do not cover most of these issues. [Butler, D. (2013). Iran hit by drug shortage. <i>Nature</i> , 504(7478), 15–16. <a href="https://doi.org/10.1038/504015a">https://doi.org/10.1038/504015a</a> ], [Danaei, G., et al. (2019). Iran in transition. <i>Lancet</i> , 393(10184),1984–2005. <a href="https://doi.org/10.1016/S0140-6736(18)33197-0">https://doi.org/10.1016/S0140-6736(18)33197-0</a> ], [Kokabisaghi, F. (2018). Assessment of the effects of economic sanctions on Iranians' right to health by using human rights impact assessment tool: A systematic review. <i>International Journal of Health Policy and Management</i> , 7(5), 374–393. <a href="https://doi.org/10.15171/ijhpm.2017.147">https://doi.org/10.15171/ijhpm.2017.147</a> ], [Moret, E. S. (2015). Humanitarian impacts of economic sanctions on Iran and Syria. <i>European Security</i> , 24(1), 120–140. <a href="https://doi.org/10.1080/09662839.2014.893427">https://doi.org/10.1080/09662839.2014.893427</a> ], [Palaniappa, S. (2013). Sanctions without humanitarian implications—An impossible feat. (2013). Honors in the Major Thesis (HIM) 1990–2015, 1538. University of Central Florida. <a href="https://stars.library.ucf.edu/honorstheses1990-2015/15381">https://stars.library.ucf.edu/honorstheses1990-2015/15381</a> ]	Noted - outside the scope of this section	Government of Iran	Islamic Republic of Iran Meteorological Organization (IRIMO)	Iran
60045	56	2			Not sure a broad synthesis was provided. Describe the contrasting theories and the evidence for each. Most coverage was very general and, without reading the original chapters, Chapter 17 provides little insight.	Noted - revisions made throughout chapter to offer a clearer synthesis	Government of United States of America	U.S. Department of State	United States of America
12313	56	5	56	5	“Rather, such ...” Please consider deleting “such”	Accepted - revision made	Christophe Deissenberg	Institute for Non-Linear Dynamic Inference	Luxembourg
60047	56	5	56	7	“Rather, such marked departures from business as usual typically involve several factors, ranging from technological innovations to shifts in markets, and from policies and governance arrangements to changes in belief systems and market forces.” Consider adding (to foreshadow 17.4.1.1): “... the concerted efforts of scientists and engineers to raise awareness and explain the benefits of improvements”.	Accepted, with minor alteration	Government of United States of America	U.S. Department of State	United States of America
60049	56	8			Not sure “co-evolutionary” is really meant.	Noted -co-evolutionary is the intended word here	Government of United States of America	U.S. Department of State	United States of America
12315	56	16	56	17	Deleting “with a carbon tax and feed-in tariffs” will greatly improve the understanding without loss of content	Accepted -revision made	Christophe Deissenberg	Institute for Non-Linear Dynamic Inference	Luxembourg
2787	56	20	56	22	Building national or regional systems of innovation that enable domestic innovation and increase technology absorption capacity is fundamental to innovation diffusion	Accepted but added to next paragraph on enablers rather than this paragraph on barriers. Citing Wiczorek 2018.	Leonardo Barreto	Head of center "EU&International"	Austria
71129	56	30	56	33	Shocks are identified as crucial openings for accelerated transitions to sustainable development. Covid-19 is not mentioned as a current shock, though the opportunity to 'Build back better' is briefly mentioned in an earlier section. The reference stated is from 2014. It seems like a missed opportunity to reflect on how the current pandemic opens new opportunities - as well as risks - for accelerating a systemic transition to zero-carbon development, aligned with the Paris Agreement temperature goal.	Accepted -COVID-19 reference made, citing McNeely and Munsinghe 2021	Philippe Tulkens	European Union (EU) - DG Research & Innovation	Belgium
4609	56	40	57	6	It is a bit surprising to find new topics in a summary part. I think it would be good to use the terms behaviour change and lifestyle change earlier. Maybe parts of this section could even be moved to section 17.2.	Noted - these topics are mentioned in earlier section, but this is where they are framed as enablers/barriers specifically	Adrian Brügger	University of Bern, Dep of Consumer Behavior	Switzerland

Comment Id	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
74019	56	40	57	6	We could emphasize here that it is important to understand individual attitudes and perceptions for changing behavior and there are significant potential in utilizing tools such as micro-targeting, depending upon their characteristics such as openness to change and environmental awareness. That would require the availability of detailed data and the protection of privacy. References: Spandagos, Constantine, Erik Baark, Tze Ling Ng, and Masaru Yarime, "Social Influence and Economic Intervention Policies to Save Energy at Home: Critical Questions for the New Decade and Evidence from Air-condition Use," Renewable and Sustainable Energy Reviews, forthcoming. Spandagos, Constantine, Masaru Yarime, Erik Baark, and Tze Ling Ng, "'Triple Target' Policy Framework to Influence Household Energy Behavior: Satisfy, Strengthen, Include," Applied Energy, 269, 115117 (2020).	Rejected - while an interesting aspect of individual attitudes and perceptions, this is a level of detail that is beyond the scope of the chapter	Masaru Yarime	Hong Kong University of Science and Technology	China
16791	56	40	58	38	Both individual and collective actions for mitigation are essential to accelerate the transition. Education and social movement at the community, local, global level should be connected and networked. Knowledge production and transfer in innovative way is needed.	Accepted - we included aspects of both individual and collective action	Government of Republic of Korea	Korea Meteorological Administration (KMA)	Republic of Korea
60535	56	40	58	38	Both individual and collective actions for mitigation are essential to accelerate the transition. Education and social movement at the community, local, global level should be connected and networked. Knowledge production and transfer in innovative way is needed.	Accepted - we included aspects of both individual and collective action	HWANIL PARK	STEPI	Republic of Korea
7723	56	41			In providing appropriate method for transfer to sustainable development, against to industrial era method which based to more consumption and abusing from existing resources, use of productions which producing less carbon or less carbon used for their production must be mentioned. Using labels that show amount of carbon which produce or consumed suggested.	Accepted - We included a reference to labelling	Leila Rashidian	Meteorological	Iran
9033	56	41	56	41	in providing appropriate method for transfer to sustainable development, against to industrial era method which based to more consumption and abusing from existing resources, use of productions which producing less carbon or less carbon used for their production must be mentioned. Using labels that show amount of carbon which produce or consumed suggested.	Accepted - duplicate of comment above	Behzad Layeghi	IRIMO	Iran
2789	56	41	56	43	Behavioural science has an important role to play in understanding the behaviour of energy consumers, their motivations, biases and choices. It can support the design of policies and measures to guide consumers to make more energy and resource efficient and low-carbon choices	accepted and added; see also chapter 5	Leonardo Barreto	Head of center "EU&International"	Austria
23763	56	42	56	42	This section 17.4.1 should mention the body of work on lifestyle movements in sociology, which has demonstrated to capacity of these movements to foster structural social change	Accepted - change made	Government of France	Ministère de la Transition écologique et solidaire	France
3115	56	43	56	47	Individual actors will not all take the same actions (and this needs to be more explicit here) and each individual will engage in many different actions. Time, contexts, competing imperatives, etc matter. Brief attention should be given to the importance of capacities and resources as factors that influence individual actions - and sometimes in ways where actions are inconsistent with values etc	Accepted - change made	Beth Edmondson	Federation University	Australia
60051	56	44	56	45	Is this the definition of "collective action" used throughout the report? It should be clear that this may be a working definition for the purposes of this chapter or WGIII AR6, but this is not a universal definition. It is good that authors used "may", because there are many instances in which "collective action" did not endure efficient, equitable, or effective outcomes, and the outcomes may strongly depend on the status of citizen participation in governance (e.g., universal democracy), power structures, existing institutions, the status of human rights, the effectiveness and responsiveness of governance, etc. The repeated references to "collective action" seem very normative and not empirically examined. Inclusion of those qualifications where the term is used would make the text more balanced and less apparently biased.	Accepted and changed; see also Chapter 5 on this issue	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
4607	56	44	57	1	Possible additional references for the claim that individual action need to be complemented by collective action: Capstick, S. B., Lorenzoni, I., Corner, A., & Whitmarsh, L. (2014). Prospects for radical emissions reduction through behavior and lifestyle change. <i>Carbon Management</i> , 5(4), 429–445. <a href="https://doi.org/10.1080/17583004.2015.1020011">https://doi.org/10.1080/17583004.2015.1020011</a> Cook, J., Kotcher, J., Stenhouse, N., & Maibach, E. (2019). Editorial: Public will, activism and climate change. <i>Frontiers in Communication</i> , 4, Article 72. <a href="https://doi.org/10.3389/fcomm.2019.00072">https://doi.org/10.3389/fcomm.2019.00072</a> IPCC. (2018). Global warming of 1.5 °C. An IPCC special report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty. IPCC. Messerli, P., Murniningtyas, E., Eloundou-Enyegue, P., Foli, E. G., Furman, E., Glassman, A., Hernández Licona, G., Kim, E. M., Lutz, W., Moatti, J.-P., Richardson, K., Saidam, M., Smith, D., Kazimieras Staniskis, J., & van Ypersele, J.-P. (2019). Global sustainable development report 2019 The future is now—Science for achieving sustainable development. United Nations. Thøgersen, J., & Crompton, T. (2009). Simple and painless? The limitations of spillover in environmental campaigning. <i>Journal of Consumer Policy</i> , 32(2), 141–163. <a href="https://doi.org/10.1007/s10603-009-9101-1">https://doi.org/10.1007/s10603-009-9101-1</a>	Accepted - references incorporated	Adrian Brügger	University of Bern, Dep of Consumer Behavior	Switzerland
10057	56	47	57	4	In line with title of the above paper, it is hypothesized that the slow transition or even failure in attaining the CC targets towards SDG was due to lack of moral responsibility and honest intention of the actors. Therefore, above all of the good action plan to accelerate transition, the most important basic foundation should be thought about by actors is moral responsibility. This will be expected to minimize vested interests and any hidden agenda, so this will accelerate the transition as required	Accepted and included in 17.2.	Government of Indonesia	Ministry of Environment and Forestry	Indonesia
60053	57	1	57	6	This section could benefit from contrasting collective action for sustainability with the commercial and ideological action that is taken by adversaries to sustainability, such as zero-sum framing and appeal to the loss aversion mental bias of the public and lawmakers. This is somewhat elided in the current section. Mentioning this adversarial activity is an important addition to the section because collective action for sustainability must not only motivate for positive change (and against status quo bias), but it must also often counteract adversarial messaging (again, loss aversion bias). This helps telegraph some of the topics that are covered in Sections 17.4.1.2 and 17.4.4.	accepted - included some parts of it.	Government of United States of America	U.S. Department of State	United States of America
20231	57	3	57	6	On narratives and debates: - Sorman, A. H., Turhan, E., & Rosas Casals, M. (2020). Democratizing energy, energizing democracy: Central dimensions surfacing in the debate. <i>Frontiers in Energy Research</i> , 1-6.	Accepted - reference added	Nikas Alexandros	National Technical University of Athens	Greece
60055	57	5			This is the opportunity to provide tangible recommendations.	Noted - recommendations are provided throughout	Government of United States of America	U.S. Department of State	United States of America
53429	57	7			This section claims to be about "Social movements and education" but barely touches on social movements at all, and their evidenced capacities to enable social change. A good references is, e.g. Engler and Engler 2016, This is an Uprising, Bold Type Books, New York.	Accepted - additional material and references have been added on social movements	Elke Pirgmaier	University of Lausanne	Switzerland
4691	57	7	57	7	This section has far too little on social movements and the role they play, and places far too much hope in MOOCs or alternative education frameworks. This balance should be rectified, starting with the student strikes (this goes far beyond "children" and encompasses youth as a category), the divestment movement (Fergus Green's "antifossil norms" article should be cited here. Oscar Berglund's work on Extinction Rebellion is also relevant.	Accepted - additional material and references have been added on social movements	Julia Steinberger	University of Lausanne	Switzerland
20229	57	8	57	14	On movements, intentional and non-mainstream communities and lifestyle changes, see also: - 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 &amp; Social Science</i> , 70, 101780.	Accepted - reference added	Nikas Alexandros	National Technical University of Athens	Greece
64887	57	8	58	10	It is vital to mention importance of sharing experiences and co-educating between local communities in developing countries. This type of education and community knowledge creation is more important than top-down strategies for transition. An example is this qualitative Indian case study, which highlight that Understanding differences in the perspectives of women using different fuels is vital to unpack the dynamics of cooking fuel transition. <a href="https://www.nature.com/articles/s41560-020-00722-4">https://www.nature.com/articles/s41560-020-00722-4</a>	Accepted - reference added	Marta Balruszewicz	University of Leeds	United Kingdom (of Great Britain and Northern Ireland)
4217	57	12	57	14	This is a highly controversial and highly politically biased claim; I strongly suggest deleting this sentence.	Partially Accepted - sentence has been revised.	Marcel Wissenburg	Radboud University Nijmegen	Netherlands



Comment Id	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
17895	57	16			"Bhutan"	Accepted - revised accordingly	Robert Brecha	Climate Analytics	Germany
4215	57	16	57	16	Buthan --> Bhutan	Accepted - revised accordingly	Marcel Wissenburg	Radboud University Nijmegen	Netherlands
60057	57	35			Why call out a single and particular course?	Noted - it is one very good example and worthwhile to visit as an intercontinental joint action building on research, social practices and traditional knowledge.	Government of United States of America	U.S. Department of State	United States of America
60059	57	47			To say that individual action "must be coupled with collective action" is not a proven statement. Do authors mean governance? Cooperation? This is the view of, as far as the text suggests, one person. More research on this concept should be included here, especially if it is included in the Executive Summary. It is not adequately supported here. One could refer to works on government interventions (Pigou), what markets can do (Hayek), polycentric decisionmaking (Ostrom -- which may or may not be what authors mean by collective action), etc. Would collusion be considered collective action? Imposition of tariffs, such as border carbon adjustments? It doesn't appear that the assessment has thoroughly examined or supported this broad statement.	Noted We are however not supposed to go so much into details with the arguments from economic theory	Government of United States of America	U.S. Department of State	United States of America
4611	58	11	58	38	Same for habits: They were only mentioned in passing and now appear in a summary. This seems a bit unusual. Why not mention it before more explicitly or even move parts to section 17.2?	Noted Issues related to habits are also addressed in section 17.2	Adrian Brügger	University of Bern, Dept of Consumer Behavior	Switzerland
60061	58	12			Have authors mentioned pros/cons of congestion pricing as part of this discussion? This is often unpopular, but sometimes effective, in reducing externalities of private transport, including air quality and petroleum energy usage. <a href="https://doi.org/10.3390/su12093655">https://doi.org/10.3390/su12093655</a> is a useful reference.	Accepted - reference added	Government of United States of America	U.S. Department of State	United States of America
64889	58	13	58	15	This type of framing is not giving a justice to issues related to lock-ins and inequalities within transportation sector. An excellent example comes from yellow-vest movement. Pushing poorer groups to underdeveloped (incl. public transport) suburbs pushes people to use private transportation. It is not a want or lifestyle choice but a need - high carbon intensive lock-in. Using tax on fuels as type of taxing luxury product when in reality it is a subsistence good is unjust to say the least. So it is important to say WHY transitioning to low-carbon modes can be challenging - saying that it is a choice or lifestyle is not tackling the real problem of inequalities here. Please refer to this excellent study of the political economy of car dependence by Mattioli et al (2020) <a href="https://www.sciencedirect.com/science/article/pii/S2214629620300633">https://www.sciencedirect.com/science/article/pii/S2214629620300633</a>	Accepted and point made; reference added	Marta Baltruszczyk	University of Leeds	United Kingdom (of Great Britain and Northern Ireland)
53431	58	19			Please add a recent relevant reference here: Mattioli, Giulio, Cameron Roberts, Andrew Brown, and Julia Steinberger. 2020. "Elements of a Political Economy of Car Dependence." <i>Energy Research &amp; Social Science</i> 66 (101486): 1–18.	Accepted - reference added	Elke Pirgmaier	University of Lausanne	Switzerland
53057	58	21	58	23	Sentence is contradictory. BRT failed for several reasons. However, it can not both be a top down approach and have limited public support at the same time.	Rejected - a top-down approach can absolutely lack public support.	Government of Saudi Arabia	Sustainability Advisor to the Minister Ministry of Petroleum and Mineral Resources	Saudi Arabia
4219	58	25	58	25	delete second 'may' in this line.	Accepted -change made	Marcel Wissenburg	Radboud University Nijmegen	Netherlands
12317	58	25	58	25	Please check the use of "dynamic" and the sentence structure	Noted - this is the correct use of this word.	Christophe Deissenberg	Institute for Non-Linear Dynamic Inference	Luxembourg
4221	58	27	58	32	Delete. To anyone not living in Manchester, and probably 90% of the Mancunians, it is absolutely unclear what these lines mean, or add to the text.	Reject - this example illustrates the many dimensions of values and discourses, rather than a specific place-based example.	Marcel Wissenburg	Radboud University Nijmegen	Netherlands
16793	58	39	59	33	Entrepreneurship plays important role for transition to the sustainable development. Technological and social innovation can replace the incumbent and even incumbent can expand its operation into sustainable development pathway.	Noted - entrepreneurship is mentioned here	Government of Republic of Korea	Korea Meteorological Administration (KMA)	Republic of Korea
60537	58	39	59	33	Entrepreneurship plays important role for transition to the sustainable development. Technological and social innovation can replace the incumbent and even incumbent can expand its operation into sustainable development pathway.	Noted - entrepreneurship is mentioned here	HWANIL PARK	STEPI	Republic of Korea

Comment Id	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
74023	58	39	59	33	In discussing key barriers and enablers of the transition in technological innovation, it would be useful to classify them into four categories, namely, supply-side, infrastructure preparation, demand side, and institutional design. In the case of fuel-cell vehicles, for example, while there are robust measures to tackle supply-side and infrastructure challenges, demand-side measures rely on public subsidies and lack regulatory instruments to stimulate vehicle demand, and institutional strategies to increase the pool of FCV makers are lacking visible outcomes. Reference: Trencher, Gregory Patrick, Araz Tacihagh, and Masaru Yarime, "Overcoming Barriers to Developing and Diffusing Fuel-Cell Vehicles: Governance Strategies and Experiences in Japan," Energy Policy, 142, 111533 (2020).	Noted, and however this section intends to present innovation as a process that is more than technical/economic.	Masaru Yarime	Hong Kong University of Science and Technology	China
60063	58	40	59	33	It would be helpful if, in this or another section, the role of government in (a) directly funding green innovation and (b) purchasing green innovations and creating a large market signal was described (or if it's implied, laid out more specifically). This minor addition would tie in nicely with Sections 17.4.3 and 17.4.4.	Accepted - added to 17.4.2	Government of United States of America	U.S. Department of State	United States of America
20233	59	13	59	22	See also Koasidis, K., Karamaneas, A., Nikas, A., Neofytou, H., Hermansen, E. A., Vaillancourt, K., & Doukas, H. (2020). Many miles to Paris: A sectoral innovation system analysis of the transport sector in norway and canada in light of the Paris Agreement. Sustainability, 12(14), 5832.	Accepted - reference added	Nikas Alexandros	National Technical University of Athens	Greece
20099	59	16	59	18	Along transfer of knowledge, innovation spillover across actors in multiple sectors can also occur (Koasidis et al., 2020): -Koasidis, K., Karamaneas, A., Nikas, A., Neofytou, H., Hermansen, E. A., Vaillancourt, K., & Doukas, H. (2020). Many miles to Paris: A sectoral innovation system analysis of the transport sector in norway and canada in light of the Paris Agreement. Sustainability, 12(14), 5832.	Accepted - reference added	Haris Doukas	National Technical University of Athens, Greece	Greece
20101	59	27	59	29	For the importance of spatial context and the geography of sustainability transitions for innovation activities see also: -Coenen, L., Benneworth, P., & Truffer, B. (2012). Toward a spatial perspective on sustainability transitions. Research policy, 41(6), 968-979. -Hansen, T., & Coenen, L. (2015). The geography of sustainability transitions: Review, synthesis and reflections on an emergent research field. Environmental innovation and societal transitions, 17, 92-109.	Accepted - reference added	Haris Doukas	National Technical University of Athens, Greece	Greece
20235	59	27	59	33	See also: -Hansen, T., & Coenen, L. (2015). The geography of sustainability transitions: Review, synthesis and reflections on an emergent research field. Environmental innovation and societal transitions, 17, 92-109. - Koasidis, K., Karamaneas, A., Nikas, A., Neofytou, H., Hermansen, E. A., Vaillancourt, K., & Doukas, H. (2020). Many miles to Paris: A sectoral innovation system analysis of the transport sector in norway and canada in light of the Paris Agreement. Sustainability, 12(14), 5832.	Accepted - reference added	Nikas Alexandros	National Technical University of Athens	Greece
60065	59	34			Finally, in 17.4.3, the authors begin to describe more systematically what actions might provide impetus and direction to a transition. This should be consolidated with other references sprinkled through the chapter, to potential actions to "accelerate" a transition and to include them in one section. Perhaps they could be organized by the relevant actor(s), whether governments, philanthropies, business and business associations, personal decisionmaking, etc. It is the identification and evaluation of these options that would be most helpful in this chapter, but it has been omitted almost completely except this section.	Noted - this section is intended to draw these actions together, but we will not organize it by actor, rather by domain of enabler/barrier (much like the 1.5 degree report did)	Government of United States of America	U.S. Department of State	United States of America
16795	59	34	60	18	Market oriented policies can promote low carbon technology and private and public investment can enable transition.	Accepted - revision made	Government of Republic of Korea	Korea Meteorological Administration (KMA)	Republic of Korea
53433	59	34	60	18	This section is, again, written in the narrative of mainstream economics. Line 45/46: one of the root causes of the failure of financial systems is the failure to undervalue natural capital and assign property rights. You mention the degrowth movement, but in a very biased way, with a negative connotation that they have failed to grapple with the structure of the international political economy (p60, line 17-18). I would like to tell you that I have started out as a conservative and have, through my interest and concern of ecological issues studied economics for a decade, and find that some bright degrowth scholars understand more about the "international political economy" than most mainstream economists. Why do you pay such lip service to degrowth movement? If you are skeptical, why do you include them at all? The way you portray them here is unfair. I suggest that you either try to provide a more balanced representation of different points of view, or leave out what you find not convincing. Or explain in detail why you are skeptical, rather than dismissing them without - what seems to me - not really understanding what degrowth scholarship is about.	Noted - retained reference to degrowth but removed dismissive last sentence.	Elke Pirgmaier	University of Lausanne	Switzerland

Comment Id	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
60539	59	34	60	18	Market oriented policies can promote low carbon technology and private and public investment can enable transition.	Accepted - duplicate of comment above	HWANIL PARK	STEPI	Republic of Korea
12231	59	35	59	43	We believe that a special mention should be made about the importance of the involvement of the state in promoting and backing larg scale energy projects. This is also a recommendation of the UNECE report. Market failures can be prevented by use of mechanisms such as Contracts for Difference (UK and other EU contries) along with carbon pricing.	Noted - revision made to 17.4.3	Lavinia Rizea	SN Nuclearelectrica SA	Romania
60067	59	39	59	43	Delete inadvertently repeated phrase: "market failures ... hinder ... low-carbon investments"	Accepted - revision made	Government of United States of America	U.S. Department of State	United States of America
28929	59	41	59	43	If it cannot be used alone, what are the combinations please?	Accepted - sentence revised to include "rather than in combination with flexible regulations and incentives"	Nathalie Hilmi	Centre Scientifique de Monaco	France
48313	59	41	59	43	Need to connect high political costs to this beyond the presumptive associations	Comment unclear, but sentence revised to improve grammar.	Susana Hancock	University of Oxford	United States of America
28111	59	44	59	45	Investment in energy systems is based on the priorities of developing countries and it should not be a top-down approach. This sentense should be revised.	Noted, but this sentence does not speak to the priorities of developing countries nor top-down, but rather the investment in carbon-intensive sectors	Eleni Kaditi	Organization of the Petroleum Exporting Countries, OPEC	Austria
28931	60	1	60	8	Missing here : the role of sustainable finance and ESG investments and norms....	Noed - ESG investig is mentioned in the 3rd paragraph of 17.43	Nathalie Hilmi	Centre Scientifique de Monaco	France
16799	60	1	61	34	For the energy transition, energy justice is underrepresented even though its value is high. Justice in climate change are protecting vulnerable population from the climate change, mitigating impacts of transformation, and considering an equitable decarbonised world.	Noted - justice is dealt with in detail I 17.4.5 and elsewhere in the chapter	Government of Republic of Korea	Korea Meteorological Administration (KMA)	Republic of Korea
60543	60	1	61	34	For the energy transition, energy justice is underrepresented even though its value is high. Justice in climate change are protecting vulnerable population from the climate change, mitigating impacts of transformation, and considering an equitable decarbonised world.	Noted - justice is dealt with in detail I 17.4.5 and elsewhere in the chapter	HWANIL PARK	STEPI	Republic of Korea
53059	60	9	60	10	Citation needed	Accepted -citation added	Government of Saudi Arabia	Sustainability Advisor to the Minister Ministry of Petroleum and Mineral Resources	Saudi Arabia
60069	60	11			Use a different word than "augering".	Noted	Government of United States of America	U.S. Department of State	United States of America
60071	60	13	60	15	The difference should be made clear between "transition" and "transformation" and the bodies of theory from which they emerge.	Noted - this is dealt with in section 17.2	Government of United States of America	U.S. Department of State	United States of America
16797	60	19	61	46	Institutions, policy system and multi-level governance affect the consensus of sustainability and the speed of transition.	Thank you for this. This will be revised in line with your suggestion	Government of Republic of Korea	Korea Meteorological Administration (KMA)	Republic of Korea
60541	60	19	61	46	Institutions, policy system and multi-level governance affect the consensus of sustainability and the speed of transition.	Thank you for this. This will be revised in line with your suggestion	HWANIL PARK	STEPI	Republic of Korea
20237	60	20	60	26	Also relevant for the building sector: - Song, L., Lieu, J., Nikas, A., Arsenopoulos, A., Vasileiou, G., & Doukas, H. (2020). Contested energy futures, conflicted rewards? Examining low-carbon transition risks and governance dynamics in China's built environment. Energy Research & Social Science, 59, 101306.	Noted. Will incorporate.	Nikas Alexandros	National Technical University of Athens	Greece
12319	60	28	60	30	Why?	This is now explained.	Christophe Deissenberg	Institute for Non-Linear Dynamic Inference	Luxembourg
28113	60	40	60	42	The costs of development are vital for policymakers and should be limited to such approaches highlighted in this sentence.	This has now been revised.	Eleni Kaditi	Organization of the Petroleum Exporting Countries, OPEC	Austria
3117	60	40	60	43	Cross agency agreements can take many different forms. And can be created at many different scale levels. Some further attention to scale, context, purpose of agreement, nature of actors etc is needed here.	Noted. Will highlight some of this nuance.	Beth Edmondson	Federation University	Australia
64891	61	1	61	3	Using example from developing countries should be prioritized here. Mentioning the role of debt in line with power relations and lock ins in structures is also essential. Please consider example from Fenton et al study (2014) of Bangladesh – one of the poorest countries and at risk of going underwater due to rising sea levels - pays back over US\$3 for every US\$1 it receives in climate finance to service long-term bilateral debt [https://www.nature.com/articles/nclimate2303]	The issue of debt--while important--falls a little outside the cope of this subsection.	Marta Baltruszewicz	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
85909	61	1	61	7	In intervening period since the referenced 2016 paper was published, there have been further policy measures and outcomes including the development of a long-term, fit-for-purpose market framework through the 'Post-2025 Market Design project'. This project will identify and implement changes to the current systems, tools and regulatory frameworks that Australia's electricity needs as it transitions. At the same time, the Government is working to integrate and balance the continued deployment of new renewable energy which in 2019 was occurring at a rate 10 times faster per capita than the global average.	Noted. Some framing text suggests the recent progress.	Government of Australia	Department of Industry, Science, Energy and Resources	Australia
60073	61	13			Delete "While" and add "but" after second comma.	Relevant text has been revised.	Government of United States of America	U.S. Department of State	United States of America
28115	61	16	61	17	It is important to acknowledge the sovereign rights of countries for policy and decision making and establishing infrastructure and processes to achieve sustainable development. This sentence should be revised substantially.	Relevant text has been revised.	Eleni Kaditi	Organization of the Petroleum Exporting Countries, OPEC	Austria
64893	61	20	61	21	This needs to be clarified by who should be taxed. It is important to tax luxury good and services and more importantly wealthy should be taxed not the poor. Recognition of poor being locked into using high-intensive carbon products and services (e.g. car dependency) is also essential to be aware of. I would urge to re-write this sentence to, for example: "Regulatory taxation of the high emitters, ... ". Please use study from Wledman et al about warning on affluence (2020) <a href="https://www.nature.com/articles/s41467-020-16941-y?fbclid=IwAR0AG6Lz_CcR2XY0uxVvKNmjnlWP0YLX16iBcUfl8gcZmTjR7-ZVb3W3oes">https://www.nature.com/articles/s41467-020-16941-y?fbclid=IwAR0AG6Lz_CcR2XY0uxVvKNmjnlWP0YLX16iBcUfl8gcZmTjR7-ZVb3W3oes</a>	Reflected with modest revisions to proposed text.	Marta Baltruszewicz	University of Leeds	United Kingdom (of Great Britain and Northern Ireland)
12321	61	43	61	46	It would greatly enhance the comprehension if you quoted Roberts in extenso: 1) the role of coalitions in supporting and hindering acceleration; 2) the role of feedbacks, through which policies may shape actor preferences which, in turn, create stronger policies; and 3) the role of broader contexts (political economies, institutions, cultural norms, and technical systems) in creating more (or less) favourable conditions for deliberate acceleration.	This is now explained based on the provided text.	Christophe Deissenberg	Institute for Non-Linear Dynamic Inference	Luxembourg
60079	62	1			This section needs to begin with an explanation that there is no universal definition of "energy justice" or "environmental justice" or of any kind of "justice". The terms are socially and politically (including legally) defined, if at all. The language should be read carefully to eliminate presumption and bias about what these terms mean. They should even be eliminated from the glossary, along with other politically determined terms. Many in the glossary are very subjective and leading -- not what IPCC reports should be asserting. For example, in lines 9-11, whose view is this? Is it the only one (no)? Who agrees or disagrees? Is justice only for "vulnerable populations"? It is important for an assessment to critically consider the views it is putting forward.	Noted - language has been added to indicate that these are contested terms.	Government of United States of America	U.S. Department of State	United States of America
60075	62	1	62	17	Issues surrounding a "just transition" are mentioned throughout randomly. There needs to be a strong initial section on this topic that is referred back to with more specific examples later on. Perhaps move some of this discussion forward.	Noted - this section is intended to present a strong concluding section on the role of justice in enabling, or serving as a barrier to transitions	Government of United States of America	U.S. Department of State	United States of America
60077	62	1	62	34	Section 17.4.5 contains a very important finding: Climate justice should be more broadly defined, and not only by a particular interest, such as those who are opposed to fossil fuel production. Lines 9-11 clearly identify the breadth of climate justice issues. The challenge of managing the transformation is that those who are currently part of the fossil fuel industry need to be able to see themselves in a future decarbonised world (link to Section 17.3.2.3). It isn't just about the potential for stranded assets, but also for 'stranded lives'. If the climate policy discourse is not inclusive, then polarisation becomes more entrenched (already mentioned on page 61, line 5), and proposed actions become more difficult to negotiate between stakeholders.	Noted - no changes made	Government of United States of America	U.S. Department of State	United States of America
20241	62	2	62	3	See also: - Green, F., & Gambhir, A. (2020). Transitional assistance policies for just, equitable and smooth low-carbon transitions: who, what and how?. Climate Policy, 20(8), 902-921. - 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. Energy Research & Social Science, 70, 101780.	Accepted - references incorporated	Nikas Alexandros	National Technical University of Athens	Greece
48315	62	6	62	7	How does this fit with the incoming NDCs?	Noted - very broad question; addressing the shifting ambition of the NDCs is beyond the scope here	Susana Hancock	University of Oxford	United States of America

Comment Id	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
78035	62	9	62	9	Suggested edit: At the end of the sentence add: "(Chichilnisky and Bal 2019, p. 262-271) propose a novel technology for profitable carbon negative electric power generation that could boost economic development in rich and poor countries (in the context of new "conditional" global ETS and CDM agreement) while reversing climate change." Rationale: see reference. Reference: Chichilnisky, Graciela and Peter Bal. 2019. Reversing Climate Change. Singapore: World Scientific Publishing Co. Pte. Ltd.	Rejected, too narrow in scope given the content of this paragraph	Ron Baiman	Benedictine University	United States of America
20103	62	13	62	15	The notion of just transitions from a multi-level perspective is also examined here: -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. Energy Sources, Part B: Economics, Planning, and Policy, 15(10-12), 513-544.	Accepted - references incorporated	Haris Doukas	National Technical University of Athens, Greece	Greece
20239	62	13	62	15	See 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. Energy Sources Part B: Economics, Planning, and Policy, 15(10-12), 513-544.	Accepted - references incorporated	Nikas Alexandros	National Technical University of Athens	Greece
2793	62	18	62	21	When it comes to adaptation and resilience to climate change, local communities have a key role to play. Local community groups can mobilise and adapt quickly in times of crisis to provide other services and care for their weaker members.	Accepted - this point is made in the last sentence of this paragraph	Leonardo Barreto	Head of center "EU&International"	Austria
2791	62	18	62	27	Energy Communities bring a number of benefits, including generation of local jobs and keeping financial resources in the region, thus contributing to local economic development. They also boost energy citizenship and democratisation of decision-making in energy projects	Noted, but reference required to justify this statement	Leonardo Barreto	Head of center "EU&International"	Austria
28117	62	28	62	34	There should be a very comprehensive approach by resource-rich developing countries to utilize all their capacities within the energy sector and the rest of the economy to assess the impacts on their economies and find ways and means to address them based on their national circumstances. A one-size-fits-all approach will not be a suitable proposal. The two sentences should be revised completely or be deleted.	Rejected - this paragraph does not recommend a one-size-fits all approach but rather points out how the impacts of resource extraction are unevenly distributed.	Eleni Kaditi	Organization of the Petroleum Exporting Countries, OPEC	Austria
60081	62	28	62	34	Consider including employment and wealth generation as part of the energy equity discussion, and consider specifically mentioning women. International development NGOs may be further along in creating frameworks and pilots that promote equity than state actors. See <a href="https://doi.org/10.1080/09614524.2018.1526257">https://doi.org/10.1080/09614524.2018.1526257</a> for an example.	Accepted, and reference added	Government of United States of America	U.S. Department of State	United States of America
12323	62	30	62	31	"both communities adjacent to these sites and those who work in them" è those employed in extraction and on the adjacent communities	Note - no change required	Christophe Deissenberg	Institute for Non-Linear Dynamic Inference	Luxembourg
16801	62	35	64	2	Sectoral coordination and institutional coherence enhance the sustainable use of resources such as WEF. Systematic approach of nexus considers interaction with SDGs. Variouls strategies and processes can facilitate the transition of barriers to enablers.	Accepted - no change made; these points are made in this first paragraph	Government of Republic of Korea	Korea Meteorological Administration (KMA)	Republic of Korea
60545	62	35	64	2	Sectoral coordination and institutional coherence enhance the sustainable use of resources such as WEF. Systematic approach of nexus considers interaction with SDGs. Variouls strategies and processes can facilitate the transition of barriers to enablers.	Comment duplicate	HWANIL PARK	STEPI	Republic of Korea
84265	62	35	64	2	The GSDR 2019 report, which is present in the reference list of the chapter, could usefully be used in this section.	Accepted - refence added	Jean-Pascal van Ypersele	Université catholique de Louvain	Belgium
3119	62	36	62	37	Recognition should be given to there being many different unsustainable uses of resources.Homogenising, generalising into a single pattern in this manner presented here masks crucial challenges, skips over problems, and works against building a narrative about what holistic planning would entail.	Accepted - added "a wide range" to this sentence; the goal here is not to homogenize, however, and the paragraphs that follow unpack some of these differences	Beth Edmondson	Federation University	Australia
60083	62	36	64	2	May be another place where it is worthwhile to mention the role of NGOs in supporting the development of coalitions, especially at the subnational (state, province, city) level. A relevant publication addressing this topic is <a href="https://doi.org/10.1007/s11077-018-9314-8">https://doi.org/10.1007/s11077-018-9314-8</a>	Accepted - reference added	Government of United States of America	U.S. Department of State	United States of America
20105	62	41	62	44	See also: -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. Energy Research & Social Science, 70, 101780.	Accepted - refence added	Haris Doukas	National Technical University of Athens, Greece	Greece
80547	63	2	63	2	Add after L2: However, a systemic nexus approach requires not only the development of nexus toolboxes based on our present concepts and knowledge, but also that of new concepts to bridge up common knowledge gaps. This is particularly the case for the ubiquitous variability of the system components and related fields over a wide range of space-time scales (Lovejoy and Schertzer, 2013, Schertzer and Tehiguirinskaia 2020).	Rejected - the point that new toolboxes are needed has already been made in this paragraph, and text regarding 'ubitiqous variability of system components' is rather too vague for this section.	Daniel Schertzer	Hydrology Meteorology and Complexity, Ecole des Ponts ParisTech	France

Comment Id	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
60085	63	3	63	9	Authors could also mention the need for quantifiable goals and endpoints.	Partially accepted - not all desirable goals are quantifiable per se (ie aesthetics, spiritual significance of natural spaces, many dimensions of equity or justice). But reference to clearly identifiable goals was inserted.	Government of United States of America	U.S. Department of State	United States of America
12325	63	5	63	5	"movement development and growth. This movement"?????	Noted - changed to 'an accelerated transition.'	Christophe Deissenberg	Institute for Non-Linear Dynamic Inference	Luxembourg
20245	63	10	63	20	See also Neofytou, H., Nikas, A., & Doukas, H. (2020). Sustainable energy transition readiness: A multicriteria assessment index. Renewable and Sustainable Energy Reviews, 131, 109988.	Accepted - added earlier in section 17.4.6	Nikas Alexandros	National Technical University of Athens	Greece
60087	63	10	63	20	Iterative risk management, as a framework for decisionmaking, appears to be relevant to Section 17.4.6. This framework is discussed extensively in IPCC WGII AR5 Chapter 2 (Jones et al., 2014). This relates directly to iterative evaluations (line 14) and decisionmaking in the face of uncertain or incomplete information (lines 16-18). Iterative risk management was also highlighted in the WGII AR5 SPM, section A-3. Perhaps it would be worth checking WGII AR6 to see if there is follow-up on this from the AR5 assessment.	Accepted - reference to iterative risk management added	Government of United States of America	U.S. Department of State	United States of America
85911	63	21	63	27	In the intervening period since the 2016 paper was published, there has continued to be a significant growth in the deployment of renewable energy in Australia. The Federal government, market bodies and state and territory governments have been working together to manage the energy transition. The need for the appropriate physical infrastructure is managed by the Australian Energy Market Operator (see the Integrated System Plan and the plan for Renewable Energy Zones <a href="https://aemo.com.au/energy-systems/major-publications/integrated-system-plan-isp/2020-integrated-system-plan-isp">https://aemo.com.au/energy-systems/major-publications/integrated-system-plan-isp/2020-integrated-system-plan-isp</a> ). The need for appropriate market structures and regulation is being managed through the Australian Energy Market Commission and the Australian Energy Regulator and supported by advice from the Australian Energy Security Board.	Noted - reference to Australia was removed, as the key point here is the integration between climate and energy policies yielding success in some cases.	Government of Australia	Department of Industry, Science, Energy and Resources	Australia
48317	63	24	63	24	Other factors? Such as?	Noted - this part of the sentence has been deleted in response to another comment	Susana Hancock	University of Oxford	United States of America
48319	63	24	63	27	What makes Australia special when compared to the US/UK? This should be clarified further especially as the three are often grouped together as comparable economies.	Noted - this part of the sentence has been deleted in response to another comment	Susana Hancock	University of Oxford	United States of America
5625	63	30	63	30	Replace "Renewable" by low carbon sources. See Turkey, Iran, Emirates, etc. who are looking at nuclear	Accepted - change made	Michel SIMON	Retraité/ Pdt d'association	France
53061	63	34	63	37	Citation needed	Accepted - reference added. Kruger, W., Stritzke, S., & Trotter, P. A. (2019). De-risking solar auctions in sub-Saharan Africa—A comparison of site selection strategies in South Africa and Zambia. Renewable and Sustainable Energy Reviews, 104, 429-438.	Government of Saudi Arabia	Sustainability Advisor to the Minister Ministry of Petroleum and Mineral Resources	Saudi Arabia
31655	64	2	64	2	P64L2: Please mention references	Accepted - reference added	Shreya Some	Ahmedabad University	India
60089	64	4			What is a "sustainable development transition"?	Noted It means a transition to sustainable development	Government of United States of America	U.S. Department of State	United States of America
9407	64	5	64	19	I am afraid I do not see how the FAQ question is answered - although the text reads nicely and could be introduced by a different FAQ question. For the current question, I wonder in which of areas that you mention decarbonisation is supposed to take place and how that process would interact with the necessary transitions.	Noted We are addressing this in line 7, and in lines 12-14	Maïke Nicolai	Helmholtz Centre Geesthacht	Germany
9411	64	5	64	33	As said in my previous comments, I wonder if the questions are suitable to introduce FAQ 17.1 and 17.2. But I would not lose the information provided in them. Maybe they could be merged and a different question be found that highlights the cross-sectoral, just and inclusive approach that supports the systems transition that is needed to limit warming to 1.5/2°C and sustainable development? The current questions also seem to assume that development is not sustainable yet. Is this in line with the common use of this term?	Noted We have chosen to emphasize equity, speed and quality in our FAQs. WE do not think that the current development is sustainable	Maïke Nicolai	Helmholtz Centre Geesthacht	Germany
60091	64	7	64	19	This section is very conceptual and idealized. Sustainable development is in fact very challenging to define and move towards, involving many trade-offs and uncertainties. Remove the normative language from this section like "will be particularly important". The IPCC is supposed to be analytical and not a cheerleader, however laudable the intent. The statements about "using climate change as a key" is philosophical and unanalyzed or proven. The second paragraph of FAQ17.1 is much better, although replace "is also essential" with "may also consider".	Noted We have revised the text to avoid normative issues	Government of United States of America	U.S. Department of State	United States of America
9409	64	20	64	33	If I understand correctly, justice and inclusivity are only one small aspect in this text. So I wonder the question that introduces this FAQ is the most suitable one?	Noted The subelements in the text are related to justice and inclusivity	Maïke Nicolai	Helmholtz Centre Geesthacht	Germany

Comment Id	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
60093	64	20	64	33	This is very philosophical language and aspirational, and is not supported by the evidence or analysis. Where is the reference to analysis of how difficult transitions have been, for example, that experience in the UK and Germany shows that these are difficult, take decades, and have had limited success. There are similar experiences in the United States in other context. They can create resentment, anger, and other adverse impacts on social capital. These should have been analyzed in the section on Just Transition (see, for example, Caldecott, Lesson from previous 'coal transitions', 2017, and other research literature).	Noted We are in the chapter going into related issues and dealing with stranded assets and Just Transitions which are close related to the issues addressed	Government of United States of America	U.S. Department of State	United States of America
12327	64	22	64	33	These lines emphasize the negative and mention positive aspects as an afterthought. I suggest following reformulation: Ambitious climate change mitigation policies can generate incomes, new jobs, and other benefits. Care must be taken to align them well with key sustainable development goals such as the SDGs (no poverty, access to energy, water, and food, etc), to avoid the otherwise possible emergence of economic and social impacts which are undesirable per se and might slow the transition process. Among others, specific policies and investments may need to include all segments of society in the new activities and industries created by the climate change mitigation policies, and to create new opportunities in those industries and geographical areas negatively affected by the transition to low carbon. A poor understanding of how governance at multiple levels can meet the transition challenges may impair significant progress regarding national policies and global climate agreements, thus constituting a limiting factor.	Noted The following lines mentions the opportunities, FAQ is supposed to be very short	Christophe Deissenberg	Institute for Non-Linear Dynamic Inference	Luxembourg
28119	64	30	64	31	While the governance is important, it is also critical to not overemphasize solely this factor and all other factors should be considered in a just transition, especially the key role of international support for developing countries and socio- economic factors.	Noted Institutions are highlighted in FAQ 17.3	Eleni Kaditi	Organization of the Petroleum Exporting Countries, OPEC	Austria
9413	64	35	64	36	Please specify in the question: transition to what?	Noted The transition is already mentioned extensively in e.g. line 39 of the FAQ	Maïke Nicolai	Helmholtz Centre Geesthacht	Germany
23759	64	35	64	36	FAQ 17.3: Where to position citizens in this scheme? The text mentions above the mobilisation of young people, for example.	Noted See e.g. lines 6-8 page 65	Government of France	Ministère de la Transition écologique et solidaire	France
12329	65	3	65	5	This paragraph reads as if lobbies etc. could decide upon taxation etc. to influence politicians. What do you really mean?	Noted This is however what we want to say	Christophe Deissenberg	Institute for Non-Linear Dynamic Inference	Luxembourg
78751	67	16	67	18	bibliography is not complete, as the volume and article number is missing	Updated	Christian Breyer	LUT University	Finland
30627	70	7	70	9	This statement is not accurate. For example, Ans Kolk (2015) point out the importance of the protection of intellectual property rights for further clean energy investments in and transfer to least developed countries, and identified lack of 'enabling environment' as a challenge in these countries. Kolk, Ans. "The role of international business in clean technology transfer and development." Climate Policy 15.1 (2015): 170-176.	Misplaced	Government of Japan	Climate Change Division - Ministry of Foreign Affairs	Japan
70025	70	30	70	30	Add: Córdova, R., Hogarth, N., Kanninen, M. 2019. Mountain farming systems' exposure and sensitivity to climate change and variability: Agroforestry and conventional agriculture systems compared in Ecuador's indigenous territory of Kayambi people. Sustainability 11(9) 2623. <a href="https://doi.org/10.3390/su11092623">https://doi.org/10.3390/su11092623</a> .	References updated	Markku Kanninen	University of Helsinki	Finland
80549	81	17	81	17	Add after L17: Lovejoy, S.,Schertzer, D. (2013). The weather and climate: Emergent laws and multifractal cascades.,Cambridge University Press. 512 p.	References updated	Daniel Schertzer	Hydrology Meteorology and Complexity, Ecole des Ponts ParisTech	France
84269	89	33	89	36	Please use the correct reference for the GSDR2019. The recommended citation is given on its page ii	References updated	Jean-Pascal van Ypersele	Université catholique de Louvain	Belgium
80551	92	46	92	46	Add after L46: Schertzer, D., Tchiguirinskaia, I. (2020). A century of turbulent cascades and the emergence of multifractal operators. Earth Sp. Sci. 7 e2019EA000608. doi.: 10.1029/2019EA000608.	References updated	Daniel Schertzer	Hydrology Meteorology and Complexity, Ecole des Ponts ParisTech	France
4575					References are cited inconsistently (ordered by year vs. author name) and sometimes the subject is missing in the sentences (authors just mentioned in parentheses).	References updated	Adrian Brügger	University of Bern, Dep. of Consumer Behavior	Switzerland
11307					It seems to me that the chapter is too general. I expected some key policy frameworks to achieve the SDG.	Noted	Daniel Alejandro Pacheco Rojas	IPCC - WG III / UNAM	Mexico
11309					Section 17.3.2 pp 19- 31 could be more detailed. I think this is a key subsection and it could be improved in the writing.	Noted Details are added	Daniel Alejandro Pacheco Rojas	IPCC - WG III / UNAM	Mexico
11311					I think the chapter is repetitive and I suggest authors reread the full chapter and try to be less redundant.	Noted	Daniel Alejandro Pacheco Rojas	IPCC - WG III / UNAM	Mexico

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11313					A lot of the references are very old across the chapter. Could you update several references?	References updated	Daniel Alejandro Pacheco Rojas	IPCC - WG III / UNAM	Mexico
15555					All comments are based on the publication of the IAEA Nuclear Power and Sustainable Development, IAEA, Vienna 2016 and Nuclear Power for Sustainable Development, 2019, Rosatom/Oversiz. The SDG-2 column identifies the non-use of the nuclear power system to achieve this goal. It is proposed to replace it by at least q/- because the electricity and heat of nuclear energy sources allow the agricultural sector to be improved by the operation of machinery and equipment, the provision of farms and farms for lighting, heating, or cooling. The SDG-4 column identifies the non-use of the nuclear power system to achieve this goal. It is proposed to replace it by at least q/- because nuclear power contribute to the development of human resources, as nuclear power plants require highly educated and trained personnel. The SDG-5 column identifies the non-use of the nuclear power system to achieve this goal. It is proposed to be replaced by at least q/- because there is no gender limitation for personnel for nuclear power plants. The SDG-6 column identifies the negative impact of the nuclear power system on this goal. It is proposed to replace it by at least q/- because the effective water cycle is part of the operation of the nuclear powerplant. In addition, it can be said that any cleaning plants require the energy that the nuclear power system can provide for its work. The SDG-9 column identifies the negative impact of the nuclear energy system on this goal. It is proposed to replace it by at least q/- because the nuclear energy systems, as the development of nuclear energy shows, directly affects the development of industry, innovation and infrastructure. The SDG-10 column identifies the negative impact of the nuclear energy system on achieving this goal. It is proposed to replace by at least q/- because the introduction of nuclear energy systems smooths the barriers of inequality between developing and developed economies, providing access to reliable energy for all as a basis for consistent economic growth. The SDG-11 column identifies the non-use of the nuclear power system to achieve this goal. It is proposed to replace by at least q/- because nuclear energy systems are crucial for the development of safe and sustainable human settlements, providing them with electric energy and heat. It also provides modern living conditions and create jobs. The SDG-13 column identifies the non-use of the nuclear power system to achieve this goal. It is proposed to be replaced by at least q/- because nuclear energy systems are carbon-free energy sources and thus contribute directly to the preservation of the climate on the Earth. The SDG-14 column identifies the non-use of the nuclear power system to achieve this goal. It is proposed to replace by at least q/- because the construction of nuclear energy systems requires an environmental impact assessment to ensure that all the specific features of local terrestrial and aquatic ecosystems are taken into account to avoid any damage to the environment. The SDG-16 column identifies the non-use of the nuclear power system to achieve this goal. It is proposed to replace it by at least q/- because one of the objectives of the IAEA Charter is to "accelerate and expand the contribution of nuclear energy to world peace, health and prosperity". The SDG-17 column identifies the non-use of the nuclear power system to achieve this goal. It is proposed to replace by least q/- because nuclear power provides solutions for various stakeholders: governments, local communities, and commercial institutions. The overall sustainability of nuclear power depends on a constant dialogue between consumers and suppliers, as well	References updated	Vladimir Kucinov	National Research Nuclear University "MEPHI" (Moscow Engineering Physical Institute)	Russian Federation
16803					SOD has been improved from the FOD. There are many examples described to explain the real practice of specific countries. But some of those do not fit into the purpose and are not related with the topic. Overall, the description tends to be abstract and normative, so it needs to be more specific and practical. It would be great that how will COVID19 affect the transition and whether it enable or disable the just transition.	Noted We have added more details and also COVID 19 issues	Government of Republic of Korea	Korea Meteorological Administration (KMA)	Republic of Korea
31643					Table 17.4: "Economic"- Will this be economy?	Noted The table is substituted with figure 17.1	Shreya Some	Ahmedabad University	India
31647					1) No section on Knowledge gaps. 2) To a reader it seems the chapter has ended very abruptly. Missing section on Uncertainties and knowledge needs (which is in chapter outline)	Noted A section with conclusions have been added	Shreya Some	Ahmedabad University	India
31649					Section 17.3.3.7 talks about sectoral overview but title is "cross sectoral"- apologies for misinterpreting	Noted	Shreya Some	Ahmedabad University	India
31685					Nowhere the following is mentioned in this chapter (useful to add as this chapter talks about achievement of SDGs) All 193 countries have their own SDG dashboard. <a href="https://dashboards.sdgindex.org/profiles">https://dashboards.sdgindex.org/profiles</a> Sachs et al (2020) <a href="https://s3.amazonaws.com/sustainabledevelopment.report/2020/2020_sustainable_development_report.pdf">https://s3.amazonaws.com/sustainabledevelopment.report/2020/2020_sustainable_development_report.pdf</a>	Noted	Shreya Some	Ahmedabad University	India



Comment Id	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
31713					<p>Sentences not clear</p> <p>P12L41-43: “Furthermore, Pauw et al. (2020) concluded that financing for the implementation of conditional NDCs can be a vulnerability for some countries and their future ambition, and should be considered a potential bottleneck”- explanation can be helpful</p> <p>P17L7: “economic theories may also miss trade-offs between climate and difficult to model or quantify goals”- words missing and which goals Paris or SDGs</p> <p>P17L32-35: “IAMs and macroeconomic models typically calculate mitigation costs based on the assumption that markets internalise externalities like GHG emissions through carbon prices (IEA, 2017; 2019) (ETP2017, WEO2019 Barker, T. et al.) GDP and employment effects of policies to close the 2020 emission gap”- is there any missing words before GDP?;</p> <p>P19L33-35: “One conclusion is that the NDCs of less developed countries would tend to reduce poverty alleviation, but this can be offset if international financial support is provided for the mitigation actions”- will this be reduce poverty?- last part not clear</p> <p>P20L45-46: “There are several synergies and trade-offs on many agendas regarding sustainable development , while quantitative and systematic analyses using models will support understanding the sustainable development pathways for decarbonization”- won't this be goals instead of agendas?</p>	Noted	Shreya Some	Ahmedabad University	India
60095					<p>Throughout the chapter, there is normative and/or hortatory language that does not belong in an objective assessment. The authors should search for "should" and "needs" and "requires" and perhaps similar words and rewrite those sentences. The ideas could be presented as the opinions of cited authors/papers, or could be stated as options, or other means. It is not the role of the IPCC to be making recommendations, except in identifying further analysis or research that would be helpful. The hortatory language is particularly concerning in the Executive Summary. Words like "desirable" and "must be" are inappropriate and reflect the authors' values. It needs to be edited out.</p>	Noted We have edited to avoid normative language	Government of United States of America	U.S. Department of State	United States of America
60097					<p>Chapter 17 lacks a framework for understanding what "The Transition" might be. At least one paragraph should be added up front to identify what the current state is of whatever the transition is (e.g., the economy, human consumption that results in climate change, patterns of development, perceptions and management of climate change risks that leave humans and ecosystems vulnerable to projected climate change) -- which is up to the authors to decide based on assessment of the literature and the scope of the chapter. That paragraph and a later section need to explain what The Transition is to, in concrete terms, recognizing that there are not universally accepted end points or milestones, and the starting points would vary by country and population. Later sections should be reordered with the first couple being on economic theories (of what drives economic and social change) and on the roles of institutions and socio-demographic and cultural factors in setting the parameters of economies (which is where GHG emissions come from, after all, and how investors decide where to locate physical structures and communities that may be vulnerable to climate change risks). When these factors establish a foundation for why the current systems are the way they are (recognizing differences between agricultural, industrial, and service-oriented economies, and between market-based versus planned economies, etc.), then the chapter should provide some discussion of how economies and societies might be different consistent with addressing climate change -- in other words, what might the end points of transition be? Section 17.3.2.1 discusses this to some degree, as well as what those transitions might entail. There is not research or political agreement that suggests that the end points would be universal, so the discussion needs to allow for socio-political choices. Part of this might refer to scenarios, including the IPCC scenarios and SSPs, and what the end points might be if there were not a transition to a more climate-benign development. The section focusing on the SDGs provides material for this, in the sense that they are somewhat defined and broadly, if not universally, accepted. So the SDGs may be part of what may drive The Transition, if they were to be achieved. After describing what The Transitions may be, and what drives economies (and emissions, land use, and vulnerabilities), then it makes sense to move to the discussion of the tools that societies, including governments have (Section 17.2.2), to influence the transitions. This is where authors would use existing sections on a few of the policy tools available -- like the paragraph or two on carbon taxes (17.2.4), government investment in infrastructure, and the sections on social, cultural, and other aspects of change (Section 17.2.3). Alternatively, move the limited discussion of policy tools back into Section 17.4, noting market failures as a barrier to transition. These latter are, arguably, operating on the margin of what may drive transitions. To the degree the socio-cultural changes are fundamental, the chapter hasn't explained what might make them change over time to drive a transition. Section 17.3.2 and most of the rest of 17.3 seem to follow, as they mostly discuss government planning, or -- in later subsections -- in details of technologies or characteristics of technologies in use and economies that may be deployed by The Transition. It's appropriate for these more descriptive details to be toward the end of the chapter. While they are interesting, the emphasis of the chapter, judging by the title, is supposed to be on how to make The Transition happen, not as much on the details of how it may turn out. Throughout the chapter, reflecting a lot of the literature, is a confusion between what changes one might observe in a more climate-benign world (e.g., more renewable energy, "fossil fuel phase-out", more social equity, lifestyle changes) and too little attention on how people and governments might make that change happen. This may be through policy tools, but it might also be through polycentric decisionmaking (see work by Elinor Ostrom and others), or through models provided in some indigenous cultures of nonmarket mechanisms -- though the latter may not explain how change is effected. It would be best to consolidate the research and evidence on these socio-political actions that might drive The Transition as the</p>	Noted WE have added definitions of transition and transormation	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
60099					While the chapter includes an impressive set of references, it is also clear that broad swaths of relevant literature, reflecting certain topical areas, have not been included. This is also apparent when, in many paragraphs, there is only one source cited for a particular idea, or there are only one or two references cited among a wealth of literature -- often containing alternative ideas. This creates both a gap in information for readers, as well as potential bias in the choice of literature covered. It makes reviewers wonder what kind of literature search was conducted, and how thorough it was, to support the chapter.	Noted More references have been added	Government of United States of America	U.S. Department of State	United States of America
60101					The connections among SDGs is not officially spelled out. This is fundamentally complicating and trade-offs are difficult. Tables throughout Chapter 17 need to be dealt with in a much clearer manner with provision of information for the relative trade-offs across SDG areas for a given mitigation intervention.	Noted We have worked in depth with the new figure 17.1 which in depth is mapping the issues	Government of United States of America	U.S. Department of State	United States of America
60103					Sustainable development is an aspiration not a straight line. Long-term sustainability results not from movement along a smooth trajectory, but rather from continuous adaptation to changing conditions, which involve both stressors and shocks (EEA, 2017). Sustainability in the context of climate change supports decisions that integrate both adaptation and mitigation considerations (see NCA4, 2014).	Noted This is reflected in various sub-sections	Government of United States of America	U.S. Department of State	United States of America
60105					Throughout this chapter there needs to be additional discussion about the role of decision science in determining aspects of individual and collective behavior.	Noted It is however not in our scope to go deeply into different methodologies, which are not directly related to studies and conclusions	Government of United States of America	U.S. Department of State	United States of America
60107					It would be ideal to see increased discussion of laws and incentives that support transitions effectively. Furthermore, some discussion of assessment during and ex post "interventions" (mitigation or adaptation) is much needed for a complete and effective chapter.	Noted This is rather issues for chapters 13 and 14	Government of United States of America	U.S. Department of State	United States of America
60109					Chapter 17 is not really a 'science' chapter. It is a chapter on enabling decisions to be made, and implemented. So this is actually about challenges and opportunities in negotiating a complex portfolio of climate actions between multiple interests. However, while the importance of stakeholders is recognized, along with extensive assessment of trade-offs, there is no discussion about negotiation between stakeholders, or the role of climate change science in enabling climate actions to be supported by stakeholders, and ultimately implemented.	Noted This is rather issues for chapters 13 and 14	Government of United States of America	U.S. Department of State	United States of America
60111					This chapter offers very important assessments of synergies and trade-offs between climate change actions (mitigation, adaptation) and indicators of human conditions (access to food and water, poverty, etc.). This reveals much about the decisionmaking challenge. Tables 17.1 to 17.7 are effective at communicating synergies and trade-offs, but they need to be checked for consistent use of the grey color, white color, and the 'n.a.' symbol.	Noted We have in depth been in a dialogue with the sectoral chapters in order to consolidate our conclusions on tradeoffs and synergies	Government of United States of America	U.S. Department of State	United States of America
60113					There is only brief mention of 'nature-based solutions' (in Section 17.3.3.5, page 48, lines 29-38). These types of actions are discussed elsewhere in 17.3.3, without referring to them in this way. Perhaps it would help the reader if the term 'nature-based solutions' could be used in other sections where relevant -- including in the Executive Summary, the key message on page 4, lines 7-15 (this is likely to be a term listed in the AR6 Glossary). Important to note that assessments on the effectiveness of nature-based solutions have been published by Chausson and others (2020; Global Change Biology, 26: 6134-6155), and the Nature-Based Solutions Initiative at University of Oxford. The IUCN launched a global standard for assessing these types of actions, including synergies and trade-offs with SDGs.	Noted We are dealing with such solutions in different sections as e.g on landuse and adaptation-mitigation	Government of United States of America	U.S. Department of State	United States of America
60547					SOD has been improved from the FOD. There are many examples described to explain the real practice of specific countries. But some of those do not fit into the purpose and are not related with the topic. Overall, the description tends to be abstract and normative, so it needs to be more specific and practical. It would be great that how will COVID19 affect the transition and whether it enable or disable the just transition.	Noted WE have added details to the cases and COVID 19 is also considered	HWANIL PARK	STEPI	Republic of Korea
61457					Please add a paragraph about interlinkages between the distinct but complementary roles of the 3 Rio Conventions, including the UNCCD which often provides the practical link between climate change mitigation and biodiversity conservation agendas	Noted The context is addressed in section 17.1	Graham von Maltitz	UNIVERSITY OF STELLENBOSCH; UNCCD SCIENCE POLICY INTERFACE	South Africa

Comment Id	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
70001					It seems the chapter does not consider improvements of indoor air quality, which, together with facilitating energy access, improving gender equality and people's health, would result from electrification of cooking with very efficient devices such as electric pressure cookers, which could be linked, on grid and off grid, to Pv electricity. See, e.g. Batchelor, S. et al. 2019, Two Birds, One Stone - Reframing Cooking Energy Policies in Africa and Asia, Energies 12, 1591; Couture T. and D. Jacobs, 2019, Beyond Fire, World Future Council - Hivos; Esmap, MECS and World Bank Group, 2020, Cooking with Electricity, A Cost Perspective, The World Bank. On recent improvement and prospects for distributed solar PV on-grid linked to electric cookstoves see Khan, R and I Alam, 2020, A Solar PV-Based Inverter-Less Grid-Integrated Cooking Solution for Low-Cost Clean Cooking, Energies, 13, 5507.	Rejected This is too specific, and we refer these issues to chapter 10	Cédric PHILIBERT	Institut Français des Relations Internationales	France
75689					Table 17-7 First – all chapter above related to the negotiation and evaluation of various synergies or trade-off did not distinguished various source – for example nuclear is not compared with other sources in table 17.2. Why? Here the nuclear is evaluated for various SDGs, but their definition is very questionable, as there are no SDGs focused energy systems. If we want to evaluate the sustainable development, this term must be defined specifically for each of area of evaluation – here for energy. So the most important SDGs for energy systems are following – to enable the access to energy for whole population on the Earth, the access to energy sources must be sufficient and stable, and also at acceptable price. The energy systems must not produce unacceptable burden of nature – to measure not only release of CO2, but also other pollutants like hard metals, SO2, and so on. Last, but not least also the release of unused energy or energy losses to the environment must be evaluated. And all these factors must be evaluated for whole life cycle including all externalities. The evaluation of nuclear in table 17.7 is very incorrect and has to be modified in following manners:	Noted The section has been completely changed with a new figure substituting the previous table. The changes are based on consultations with all sectoral chapters, and supplementary material is added providing details about context specific issues and scaling. Confidence statements are added	Jiri Duspiva	Czech Nuclear Society	Czech Republic
75691					SDG 1 (no poverty): (table 17.7 rating as not applicable- grey) Nuclear is very effective energy source which can support with electricity and heat, but also requires for its operation and maintenance •Qualified personnel and thus the development of education in technical fields to provide experts needed for construction, operation, in the long term decommissioning and also supervision of all life stages •Development of the production of technologies with high added value, which is not feasible without stable provision of electricity •And in connection with the development of education for energy fields, the support of science and research will also be developed, which will further accelerate the development of society So the evaluation must be positive (+), i.e synergy.	Noted The section has been completely changed with a new figure substituting the previous table. The changes are based on consultations with all sectoral chapters, and supplementary material is added providing details about context specific issues and scaling. Confidence statements are added	Jiri Duspiva	Czech Nuclear Society	Czech Republic
75693					SDG 2 (zero hunger): (table 17.7 rating as not applicable-grey) Generally the access to stable energy sources enables to solve such issues as water resources (desalination of sea water for agricultural applications), technical production like agriculture machines, production of CO2 free fuels for agriculture machines. So the evaluation must be positive (+), i.e synergy.	Noted The section has been completely changed with a new figure substituting the previous table. The changes are based on consultations with all sectoral chapters, and supplementary material is added providing details about context specific issues and scaling. Confidence statements are added	Jiri Duspiva	Czech Nuclear Society	Czech Republic
75695					SDG3 (Good health and well-being): (table 17.7 rating as "trade-offs could be expected"- light blue) There are several reasons, why the sufficient and stable energy sources due to nuclear application have very positive impact, like -Safe use of medical radioisotopes for diagnosis of many diseases and therapies against cancer (IAEA) -Clean air: nuclear has prevented deaths from small particules (Pushker A. Kharecha and James E. Hansen, Environmental Science & Technology, 2013 ) -High regulation and control by safety authorities of health impacts of nuclear energy (IAEA + each country) But also as the synergy with the previous SDG2 – zero hunger – support of sufficient and healthy food production have key impact to health of population. So the evaluation must be positive (+), i.e synergy.	Noted The section has been completely changed with a new figure substituting the previous table. The changes are based on consultations with all sectoral chapters, and supplementary material is added providing details about context specific issues and scaling. Confidence statements are added	Jiri Duspiva	Czech Nuclear Society	Czech Republic

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75697					SDG5 (Gender equality): (table 17.7 rating as “not applicable”-grey) There are several evidences that the nuclear supports the gender equality. There re historically many examples of women in nuclear and the IAEA, for example opened a program “Sklodowska-Curie Fellowship Program to Push for More Women in Nuclear” March 2020. Another clear evidence is that in all countries with the nuclear program the local/national societies of Women in Nuclear exist and operate (in Czech republic Women in Nuclear Czech <a href="https://win-czech.webnode.cz/">https://win-czech.webnode.cz/</a> ), more over they have world wide common network Women in Nuclear network ( <a href="https://win-global.org/">https://win-global.org/</a> ). So the evaluation must be positive (+), i.e synergy.	Noted The section has been completely changed with a new figure substituting the previous table. The changes are based on consultations with all sectoral chapters, and supplementary material is added providing details about context specific issues and scaling. Confidence statements are added	Jiri Duspiva	Czech Nuclear Society	Czech Republic
75699					SDG6 (Clean water and sanitation): (table 17.7 rating as “trade off can be expected”- RED) The evaluation as negative is absolutely out of reality. The Nuclear has two main benefits to this SDG. The first – sufficient energy sources enables its application to water cleaning, water desalination and so on -it means to provide sufficient water. The second area is the possible contribution of other non-energetic application of nuclear to use of isotopic techniques to water quality control (see IAEA) So the evaluation must be positive (+), i.e synergy.	Noted The section has been completely changed with a new figure substituting the previous table. The changes are based on consultations with all sectoral chapters, and supplementary material is added providing details about context specific issues and scaling. Confidence statements are added	Jiri Duspiva	Czech Nuclear Society	Czech Republic
75701					SDG7 (Affordable and clean energy): (table 17.7 rating as “trade-offs could be expected”- light blue) The operation of several hundreds of nuclear reactors worldwide shows that they produce electricity at very affordable and price competitive level. The competition on many markets is not fear due to many regulations and subsidies to other energy sources, usually motivated by political decisions without any economical justification. Many data are available in OECD reports (affordable) or IAEA reports on CO2 emissions and absence of air pollution. So the evaluation must be positive (+), i.e synergy.	Noted The section has been completely changed with a new figure substituting the previous table. The changes are based on consultations with all sectoral chapters, and supplementary material is added providing details about context specific issues and scaling. Confidence statements are added	Jiri Duspiva	Czech Nuclear Society	Czech Republic
75703					SDG8 (Decent work and economic growth): (table 17.7 rating as “trade-offs could be expected”- light blue) The Nuclear application to the electricity and heat production strongly requires qualified and local jobs, it reduce price volatility to attract industries. Sufficient and stable electrical sources are necessary condition of the economic growth, which determines conditions of workers. Insufficient energy sources with unstable electrical grid cause non-qualified jobs and pure community. So the evaluation must be positive (+), i.e synergy.	Noted The section has been completely changed with a new figure substituting the previous table. The changes are based on consultations with all sectoral chapters, and supplementary material is added providing details about context specific issues and scaling. Confidence statements are added	Jiri Duspiva	Czech Nuclear Society	Czech Republic
75705					SDG 9 (Industry, Innovation and infrastructure): (table 17.7 rating as “trade-offs can be expected”- RED) The nuclear energy is very intensively developing technical area, because the development of new generation of reactors (GenIII+, Gen IV, SMRs), application to spaceship engines, application in medicine and so on. There are many overlaps with other technical areas like material development, chemistry, biology and so on. More over – development of nuclear sources is in relation to development of educational system for production of sufficient personnel of university graduated experts, and university have also the R&D programmes. So the evaluation must be positive (+), i.e synergy.	Noted The section has been completely changed with a new figure substituting the previous table. The changes are based on consultations with all sectoral chapters, and supplementary material is added providing details about context specific issues and scaling. Confidence statements are added	Jiri Duspiva	Czech Nuclear Society	Czech Republic
75707					SDG10 (Reduced inequalities): (table 17.7 rating as “trade-offs can be expected”- RED) Support in development of nuclear sources worldwide will cause reduction of inequalities in access to stable energy with all positive impact to possibility of development of industry, agriculture, sufficient water sources, and so on. So the evaluation must be positive (+), i.e synergy.	Noted The section has been completely changed with a new figure substituting the previous table. The changes are based on consultations with all sectoral chapters, and supplementary material is added providing details about context specific issues and scaling. Confidence statements are added	Jiri Duspiva	Czech Nuclear Society	Czech Republic
75709					SDG 13 (Climate action): (table 17.7 rating as “not applicable” Grey) Such evaluation is not based on real argues, because the application of nuclear sources seriously reduces production of CO2 during electricity and/or heat production. The nuclear is very low carbon source (IPCC SR 15 report) and must be included in the pathways. Also IEA report documented that nuclear avoids emissions. So the evaluation must be positive (+), i.e synergy.	Noted The section has been completely changed with a new figure substituting the previous table. The changes are based on consultations with all sectoral chapters, and supplementary material is added providing details about context specific issues and scaling. Confidence statements are added	Jiri Duspiva	Czech Nuclear Society	Czech Republic
75711					SDG 17 (Partnership for the goals): (table 17.7 rating as “not applicable” Grey) There are so many evidences of international or worldwide cooperation in the nuclear, as examples close collaboration between IAEA, FAO, WHO, civil societies, or local partnerships. So the evaluation must be positive (+), i.e synergy.	Noted The section has been completely changed with a new figure substituting the previous table. The changes are based on consultations with all sectoral chapters, and supplementary material is added providing details about context specific issues and scaling. Confidence statements are added	Jiri Duspiva	Czech Nuclear Society	Czech Republic

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81101					Chapter 17 seems a rich and interesting chapter - I learnt from skimming it, and would learn more I can make time to read everything more closely. My main comments concerns its relationship to the overall report.	Noted We have added references to other parts of the report and worked on concluding based on previous chapters	Michael Grubb	UCL - Institute of Sustainable Resources	United Kingdom (of Great Britain and Northern Ireland)
81103					I doubt that any human being will read AR6 in full - all 2000+ pages (not to mention Annexes, including to some chapters). Chapter 17 is almost admirably brief compared to some. In an ideal world, a reader who understands the strong constraints on the SPM really wants to get an understanding of the fundamental insights from this massive effort, might assume they could read chapter 1 for introduction, key concepts and framing that run through the work – and then skip to the concluding chapter 17 for a synthesis of findings and implications for climate mitigation in the context of sustainable development. It is entirely possible that I misconceived its role.	Noted We have added references to other parts of the report and worked on concluding based on previous chapters	Michael Grubb	UCL - Institute of Sustainable Resources	United Kingdom (of Great Britain and Northern Ireland)
81105					Possibly that ‘synthesising and implications’ role could be taken by the Technical Summary, though that may be weighed down by the desire to summarise the immensity of technical materials in the chapters between Chapters 1 and 17. So I will still offer a few light comments from my perspective of original expectations. I think a little work in the direction of integration could go a long way. If there is interest, one practical possibility could be to engage contributing authors – Chapter 17 is almost unique in having only two.	Noted We have added references to other parts of the report and worked on concluding based on previous chapters	Michael Grubb	UCL - Institute of Sustainable Resources	United Kingdom (of Great Britain and Northern Ireland)
81107					As said, on its own terms it seems a good, tight and informative chapter. It does however cover quite a few issues that are also covered in Chapter 1. Whether that helps or confuses, enriches or complicates, any reader that tries to read both, is I think double-edged because it probably does all of these, but it certainly displays a lack of coordination. Academia of course thrives on diversity and disagreement, but its not obvious that is helpful in a context of IPCC assessment. Perhaps the TSU, if they want more consistency, should lock Chapter 1 and Chapter 17 CLAs in a room to try and converge on some common languages and concepts at least, which could help with consistency if not synthesis of all that lies between! My following comments – light in view of time and uncertainty about the overall aim and reception- could be considered as input to such a conversation.	Noted We have coordinated our conclusions with chapter 1 and other chapters	Michael Grubb	UCL - Institute of Sustainable Resources	United Kingdom (of Great Britain and Northern Ireland)
81109					Chapter 17 reads as if it almost deliberately avoids the terms and concepts – and to some extent, literatures - in many other chapters. I couldn’t see a single reference to the cross-chapter boxes that tried to capture synthesising efforts across multiple chapters. The phrase “Shifting Development Pathways towards Sustainability” (or acronym SDPS) does not occur. There is no direct reference to the feasibility framework developed across chapters 6-12 and 3; nor enabling conditions developed in Chapter 4 and utilised elsewhere; nor to the observation in Chapter 1 about some common elements in the various Dimensions of Evaluation these point to, nor the Four Analytic Frameworks set out there.	Noted References to Chapter 1 and 4 have been added	Michael Grubb	UCL - Institute of Sustainable Resources	United Kingdom (of Great Britain and Northern Ireland)
81111					Indeed direct references to other chapters seem to be very limited. As said, maybe conclusion or synthesis is just not the purpose of the chapter, but it still seems odd to me.	Noted References to other chapters have been added	Michael Grubb	UCL - Institute of Sustainable Resources	United Kingdom (of Great Britain and Northern Ireland)
81113					There are 20 uses of the word “enabling” but the only reference to “enabling conditions” is telling, in saying the chapter “... synthesises its findings and conclusions, and identifies the key enabling conditions for acceleration of the transition to sustainable development and to achieving the 15 climate targets (Section 17.4)”. 17.4 is titled “key barriers and enablers of the transition: synthesising results”. The subsections and topics covered are actually really quite closely aligned with the Dimensions of Evaluation flagged in Chapter 1, including their rendition in the Enabling Conditions of Chapter 4. This is intellectually encouraging; but it does feel strange that Chapter 17, p.65 simply says “Key enabling conditions appear to be ....”, without any indication at all of all this prior material in the report. It reads like a new discovery.	Noted	Michael Grubb	UCL - Institute of Sustainable Resources	United Kingdom (of Great Britain and Northern Ireland)
81115					Similarly, Chapter 17 has sections on “17.1.1.2 Transition Processes”, and “17.2 Explaining transitions”. There are overlaps and differences with the effort to organise thinking on transitions around the multiple levels involved (most obviously, the MLP literature, also the associated different domains of decision-making involved) but the absence even of attempts to integrate thinking or terminology I don’t think is helpful to government, or even academia. The Sustainability Transitions Research Network has attempted to do so (chapter 1 ended up appointing a Contributing Author who helped to lead this specifically to try and get more coherence in to how we present and summarise transition literatures).	Noted The issues related to MLP etc are added	Michael Grubb	UCL - Institute of Sustainable Resources	United Kingdom (of Great Britain and Northern Ireland)

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81117					NB That section on Transition Processes include a section on economics which seems to focus mainly on critiquing IAMs. The framing in Chapter 1 (section 1.6) is that IAMs largely focus on the first of the four Analytic Frameworks (aggregate efficiency- broadly based on assumed Second Domain ie. optimising behaviours, as in classical econ theory. This is indeed a problem if the results are taken at face value without considerations from the other Frameworks, and also it is important to be clear about distinction between static and dynamic efficiency – that more explicit transition and agent-based approaches are needed for examining questions in which the dynamic factors dominate over static efficiency. (Ref if need explanation, Grubb, Hourcade and NEuhoff (2014), Planetary Economics: Energy Climate Change and the Three Domains of Sustainable Development, also (2015). The Three Domains structure of energy-climate transitions. Technological Forecasting and Social Change, 98, 290-302.doi:10.1016 /j.techfore.2015.05.009	Noted This section has been changed accordingly	Michael Grubb	UCL - Institute of Sustainable Resources	United Kingdom (of Great Britain and Northern Ireland)
81119					Just Transition is an important feature in Chapter 17, it features strongly in Chapter 4 and quite a few other chapters, and Chapter 1 argues that the need for “Just transition” is a natural and logical consequence of applying the Four Analytic Frameworks – though the political dimensions tend to get somewhat underrepresented, perhaps because they can impede equity (just look at the role of the US Congress and its fossil fuel industry), and almost inevitably slow down and can sometimes entirely block desirable transitions. But the point is, I genuinely think the Ch.17 discussion on Just Transition would be stronger, and certainly more influential, if it could be linked into the wider narrative and evidence in AR6.	Noted The JT section is further developed and in particular delves with issues facing low income countries	Michael Grubb	UCL - Institute of Sustainable Resources	United Kingdom (of Great Britain and Northern Ireland)
81121					Similar remarks could go for other things in the chapter. This seems a pity, because as I said at outset, there really is a lot of good material here, just that for a final chapter especially, it may be a missed opportunity if it so apparently isolated from the rest.	Noted	Michael Grubb	UCL - Institute of Sustainable Resources	United Kingdom (of Great Britain and Northern Ireland)
85617					First author name is missing. There are many other references missing the first author.	Noted	San Win	Environmental Conservation Department, Ministry of Natural Resources and Environmental Conservation	Myanmar