Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
12947	12947	12947	0	0	This chapter would benefit from some quantitative measure of international cooperation, like scientometry of collaborative research in climate change.	Noted. However, this is beyond our ability to do in the timeframe we have.	Prashant Goswami	Institute of Frontier Science and Application	India
12949	0	0	0	0	Some discussion on cooperation among industrial sectors and non-governmental organizations may be relevant.	Noted.	Prashant Goswami	Institute of Frontier Science and Application	India
13027	0	0	0	0	Overall, this is a strong chapter, providing a detailed and extensive analysis of a wide range of governance arrangements. A general comment, having read through the chapter, is that there is a lot of repetition, notably in terms of description and assessment of the Paris Agreement. The chapter would benefit from consolidation and trimming in this respect, while recognising that some overlap is inevitable.	Accepted. The SOD attempts to do this.	Joanna Depledge	Climate Policy Journal	United Kingdom (of Great Britain and Northern Ireland)
13045	0	0	0	0	Overall, the chapter places too much emphasis on the shift from the KP to the PA, at the expense of recognising the continuities between the PA and the UNFCCC. This results in a remarkably limited treatment of the UNFCCC - just one very short paragraph on p, 14. I recognise that, of course, the UNFCCC has been in place since 1992, and therefore is not new, but the chapter errs in not establishing clearly that the UNFCCC, with its near universal membership and indeed acceptance, including by the US, represents the enduring foundation of the climate change. Moreover, to focus exclusively on the contrasts between the PA and KP - which I agree are considerable - misses the very important point that the PA builds heavily on the UNFCCC, where, for example, all parties, including developing countries, were already required to undertake adaptation and mitigation efforts, and to report on their actions. It that sense, the PA represents a continuation of the regime, rather than an abrupt break, which is the impression given at the moment. This could easily be remedied with a few sentences here and there to qualify remarks on the fundamental differences between the KP and the PA.	Accepted. The SOD takes this on board, and language is finessed in this regard, but as the reviewer notes, the UNFCCC has been in place since 1992, and the chapter highlights developments since AR5.	Joanna Depledge	Climate Policy Journal	United Kingdom (of Great Britain and Northern Ireland)
45355	0	0	0	0	The Chapter, at few instances, lack a proper diplomatic approach as evident by the mis-appropriate usages of few phrases/words.	Noted. But in the absence of particulars, difficult to address.	Jaimin Parikh	1. United Nations SDSN 2. European Institute of Policy Research and Human Rights 3. University of Delhi	India
34563	0		0		[Or, maybe for the Synthesis section]: The chapter makes no reference to either 'embodied' emission flows, national emission footprints, or consumption accounting. Nor does it seem to consider consumption-based policy instruments, and gives scant attention to BCAs. But all these are essentially international issues. I think the chapter could do a great service by looking at these from an international architecture and incentives perspective, placing them together more fundamentally. After all, consumption-based policies and non-discriminatory forms of BCA are, philosophically, saying that the consuming countries (which are generally richer), have a right – some might say, a responsibility – to also try and address emissions caused by their consumption. It would be extremely helpful if this chapter could simply lay out the logic, issues, and pros and cons of this perspective. The recent Climate Policy Journal Special Issue, on "Carbon Consumption Accounting and Policies", could be one place to start, though that remains thin on the explicit IR dimensions.	Accepted. The SOD engaged in deeper analysis on issues such as BCAs.	Michael Grubb	UCL - Institute of Sustainable Resources	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
13879	0	0			The United Nations Declaration on the Rights of Indigenous People (UNDRIP) must be incorporated in IPCC AR6. The Articles of UNDRIP, including free, prior and informed consent, apply to climate mitigation solutions and policy measures. Additionally, transformative climate action aligned with the SDGs must include creating and expanding the space for Indigenous participation in decision making circles, including through international cooperation. International governments and policy makers stand to benefit from including Indigenous worldviews, strategies, and knowledge.	Accepted, in principle. Reflected in the SOD.	Bridget Doyle	Tsleil-Waututh Nation	Canada
13883	0	0			TWN recommends the international community develop a mechanism, informed by the Warsaw International Mechanism for Loss and Damage associated with Climate Change Impacts (WIM), to compensate for the unique climate-related losses and damages experienced by Indigenous communities.	Noted. Considered for inclusion, to the extent we could find peer-reviewed literature supporting it.	Bridget Doyle	Tsleil-Waututh Nation	Canada
16419	0				In Chapter 14, consider adding a subsection that describes the increasing risk of nuclear arms proliferation as new countries acquire nuclear power, and the potential as well for a new international mechanism to control this risk. See, for example, Goldemberg, J., 2009. Nuclear energy in developing countries. Daedalus, 138(4): 71-80. Notably missing from plans for adopting nuclear power in a widespread fashion to address climate change is a new international mechanism that would identify the most nuclear-arms-proliferation-resistant pathway and require that this pathway be followed. The current Non-Proliferation Treaty was not adopted to address climate change, and its utility is not up to the task. For example, Saudi Arabia is presently developing facilities for nuclear materials enrichment to fuel its planned new nuclear power program, and this may be a pretext for nuclear arms production. As nearly 30 new countries are now attempting to adopt nuclear power, thereby doubling the number of nuclear-power countries globally, the risk of arms proliferation increases, and this increased risk ought to be addressed cogently in this chapter.	Noted, and accepted, in part. The SOD will include reference to the control of GHG emissions from the military sector, but there is not sufficient literature or space to justify a separate sub-section on this.	Daniel Helman	College of Micronesia-FSM	Micronesia, Federated States of
16421	0				In Chapter 14, consider adding a subsection on the potential of an international mechanism to limit GHG emissions from the military sector globally. The military sector is a driver of manufacturing, transport and food provisioning emissions and a key to their mitigation. Likewise, there exists a potential for eliminating warfare altogether as a means of addressing climate change. Global war diminishes the human potential for a sustainable and just future, such that increasing alliances globally for the purpose of climate mitigation may reduce the military sectors of all countries and lead to further benefits.	Noted, and accepted, in part. The SOD will include reference to the control of GHG emissions from the military sector, but there is not sufficient literature or space to justify a separate sub-section on this.	Daniel Helman	College of Micronesia-FSM	Micronesia, Federated States of
16423	0				In Chapter 14, please consider adding a description related to hot dry rock geothermal energy and the potential for government subsidy programs to fund oil and gas companies to transition to the geothermal industry, thereby leading a transition in the energy sector. Plant cost is mostly upfront, and funding provided by developed countries might be used to install geothermal power generation in developing countries to help decarbonize their energy sectors, while at the same time facilitating oil and gas companies to transition their assets to increase drilling capacity for hot dry rock geothermal. National mechanisms to enable this process would increase the rate of transition, and could be covered in this chapter.	Rejected. This is an interesting issue but perhaps more appropriately covered in Chapter 13	Daniel Helman	College of Micronesia-FSM	Micronesia, Federated States of

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
16431	0				In the discussion of SRM in Chapter 14, consider adding a description of a related technology that involves direct cooling of the planet by ionospheric emplacement of ice crystals. As these vaporize, cooling occurs at this level of the atmosphere and promotes increased cooling globally. Since the infrastructure involved is similar to ionospheric emplacement of sulfate aerosols, its inclusion alongside the description of SRM would add to the utility for the reader.	Rejected. This is beyond the scope of ch14 since it only adresses governance of SRM methods assessed in WGI, ch4	Daniel Helman	College of Micronesia-FSM	Micronesia, Federated States of
16779	0				Equity is a central element of the UNFCCC and Paris Agreement architecture. Equity is also essential for the achievement of the Paris Agreement temperature goals. The assessment of mitigation in the national context therefore needs to include an extensive equity component. The draft report touches upon the topic of equity and fairness in relation to mitigation ambition of individual countries in several subchapters (1.4.6 , 4.2.2.5, 4.4.4, 14.4.2.3.), but currently this assessment is insufficient. The report refers to the scientific literature that provides frameworks for assessing the fairness and equity of countries mitigation levels (4-15 line 38; 4-70, line 5; 14-20, line 37) but does not provide any assessment of the results of that literature. It is essential that the next draft of the report provides this assessment. Such assessments are available in the scientific literature, i.e. from Robiou du Pont et al. (2017), Winkler et al 2018, or Climate Action Tracker 2018).	Accepted. The SOD contains a much deeper engagement with equity issues than the FOD.	Dennis van Berkel	Urgenda	Netherlands
16781	0				[continued] This assessment might be best placed in the context of Chapter 4. This chapter however currently laks this assesment, which is why the following comments are adressed to both Chapter 4 and Chapter 14. The following will firstly address the elements that should be reflected in the results of this assessment. After this, further comments will follow on why this assessment needs to be included in the AR6 report. The results of the assessment should include the following: •The emission reduction ranges should be provided for 2030 and 2050. In connection to this the individual carbon budget ranges for these counties should be provided, in order to provide countries with policy option to vary the timing of their emission reductions while staying within the emission limits that are necessary to stay below the Paris long-term target.	Accepted, in principle. The SOD engages more deeply on the issue of equity, however within the constraints of space and the need to reduce overlap with/duplicate chapter 4.	Dennis van Berkel	Urgenda	Netherlands
16783	0				[continued] •The report should identify fair and equitable emission reduction ranges per country that are in line with holding global warming “well below 2C” and “1.5 C”. Due to the reported ambiguities with regards to the interpretation of the long-term temperature goal of the Paris Agreement (as discussed at 3-11 line 19), the report should also provide results for a higher likelihood than 66% chance of holding warming below 2C. •The results should make a clear distinction between effort sharing methods that are based on international law principles (particularly CBDR-RC and the precautionary principle) and methods that reflect countries practices. In connection with this the individual ranges should be provided such that if all countries reduce at the bottom of their range, that the Paris temperature target would still be in reach. Ranges that would not be in line which this would run counter to the international law principles.	Accepted, in principle. The SOD engages more deeply on the issue ofequity, however within the constraints of space and the need to reduce overlap with/duplicate chapter 4.	Dennis van Berkel	Urgenda	Netherlands
16785	0				[continued] •Specifically, there is a suggestion to include a table in the Annex to Chapter 4 that provides such ranges for all countries linked to either section 4.2.2.5 or 4.4.4.	Noted, the SOD ensures consistency with Chapter 4 on this.	Dennis van Berkel	Urgenda	Netherlands

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
16787	0				[continued] The importance of equity for achieving the Paris Agreement long term target is emphasised throughout the report. At 4-69, line 41, it is noted that equity is a "instrumentally an enabler of deeper ambition for accelerated mitigation". At 4-70, line 12, it is noted that: "the literature suggests a relationship between the effectiveness of cooperative action and the perception of fairness of such arrangements". Similar findings are reported in the context of chapter 14. At 14-13, line 28 it is noted that equity is of central importance to the climate debate, and hence for evaluating the effect of policies. This is also evidenced by the fact that that equity is repeatedly referenced in the UNFCCC, the Paris Agreement and the Paris Rulebook.	Accepted, in principle, and as above.	Dennis van Berkel	Urgenda	Netherlands
16789	0				[continued] Chapter 14 notes that the Paris Agreement encourages parties to bring their NDCs in line with the long term temperature target (14-18, line 30) and to explain how these are 'fair and ambitious' (14-20, line 15). Such an explanation can only take place meaningfully in the presence of scientific standards on equitable mitigation levels. The Chapter also notes that even though there is limited scope to assess the fairness of countries' ambitions within the institutional framework of the Paris Agreement (14-21), the "inclusion of equity in the global stocktake 'leaves the door open for a dialogue on equitable burden sharing'" (chapter 14. P. 22, line 5). However the chapter states that "[g]iven the limited avenues for multilateral determination of fairness, the onus is on the scientific community to generate methods to assess fairness (..).	Accepted, in principle and as above.	Dennis van Berkel	Urgenda	Netherlands
16791	0				[continued] The report thus clearly emphasises the importance of having a framework on the basis of which individual emission levels can be assessed against equity standards, but fails to operationalise this. For this reason such a framework on a country per country level should be included in the report. With respect to the aspects that should be reflected in this framework its is important that the report notes that "[n]on-binding pledges incorporated in parties' NDCs but subject to several normative expectations relating inter alia to progression and common but differentiated responsibilities and respective capabilities, in light of different national circumstances, in their formulation." (14-16, table 14.2).	Accepted, in principle, and as above.	Dennis van Berkel	Urgenda	Netherlands
16793	0				[continued] The report notes several other normative indicators that are relevant for assessing the effectiveness of the Paris Agreement, including industrialised leadership in mitigation action and differentiation in favour of developing countries (14-13, line 34). For this reasons the assessment should make a clear distinction between effort sharing methods that are based on international law principles (particularly CBDR-RC and the precautionary principle) and methods that reflect countries' practices (see also above).	Accepted, in principle. However we might be limited by the availability of literature on this issue.	Dennis van Berkel	Urgenda	Netherlands
28219	0				In section 14.5.2.3 it would be good to go beyond shipping and aviation and also include reference to the Transport Decarbonization Alliance as an example of public private cooperation in ambition action on transport decarbonization http://tda-mobility.org/	Accepted. Example included.	Cornie Huizenga	CESG	Germany
28221	0				In section 15.5.5.2 It would be good to refer to the joint 175 billion USD commitment made by 7 MDBs to address climate change and sustainabkle development in transport https://www.eib.org/attachments/press/statement_commitment_sustainable_transport_en.pdf	Accepted.	Cornie Huizenga	CESG	Germany

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
28223	0				I would expect that this chapter would make reference to what is know now as the Marrakech Partnership for Climate Action https://unfccc.int/climate-action/marrakech-partnership-for-global-climate-action which has resulted oin a wide range of internally coordinated actions by non-state actors to scale up climate action. See for initiatives in the transport sector as well as progress reports for 2017, 2018 and 2019 see http://www.ppmc-transport.org/transportinitiatives/	Accepted, the SOD includes a reference.	Cornie Huizenga	CESG	Germany
34551	0				Apologies I haven't found time to review this chapter beyond what seems a well-crafted and concise Exec Sum. Some broad thoughts for particular consideration follow.	Noted.	Michael Grubb	UCL - Institute of Sustainable Resources	United Kingdom (of Great Britain and Northern Ireland)
34553	0				First, that the type of international arrangements for setting objectives, ambition and procedures may differ substantially from those required to support implementation, the latter being mostly at sector level. I think this implicit in some of the literature and even organization of the chapter, but could be explicit; and then consider relationship of sector efforts to the UNFCCC process itself. Some of the subsequent work eg. led by Oberthur (building on the COP21-RIPPLES citation you use) may be helpful in this regard. It may be useful ? to frame a bit more explicitly in relation to two broad themes emerging in Chapter 1: (i) climate policy embedded within the wider socio-political context of sustainable development (synergies and tradeoffs), which differ in implications at different stages of economic development; and (ii) the fact that the economic and policy challenge in implementation is one of dynamic transitions, needed across multiple sectors, which can be usefully understood in terms of 3-level frameworks (generally termed micro, meso and macro), and their interactions, whether viewed from socio-technical or (broadened) economic perspectives. Sub-global International may be particularly important in terms of interactions between meso and macro levels, shaping the scale of investment and expectations of markets about international trends.	Accepted, in principle. The SOD is reorganized to separate out the UNFCCC regime from the Means of Implementation and Mutli-actor/multi-level governance, which takes care of part of this comment.	Michael Grubb	UCL - Institute of Sustainable Resources	United Kingdom (of Great Britain and Northern Ireland)
34555	0				Second, I find the insights from Xinyuan Dai – emphasizing that a key role of effective international institutions is to support domestic consistencies supporting cooperation and stronger action – to be a helpful focus, particularly as one moves from the global objectives and processes, to domestic implementation.	Noted.	Michael Grubb	UCL - Institute of Sustainable Resources	United Kingdom (of Great Britain and Northern Ireland)
34557	0				Third, I think some attention to Export Credit Agencies and other forms of international finance, including the dominance of State-Owned Enterprises in supporting coal power investments, should deserve some attention (see flag and reference in Ch.1. Maybe coordination with Ch.15 on finance?).	Noted. The SOD reflects coordination with Chapter 15.	Michael Grubb	UCL - Institute of Sustainable Resources	United Kingdom (of Great Britain and Northern Ireland)
41293	0				"Climate clubs" is mentioned in ES. I suggest you consider if this article is relevant: Incentives for small clubs of Arctic countries to limit black carbon and methane emissions, S Aakre, S Kallbekken, R Van Dingenen, DG Victor, Nature Climate Change 8 (1), 85-90	Noted. Thanks for the suggestion.	Jan Fuglestvedt	CICERO	Norway

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
16121	1	1	1	1	This is a very solid, clearly structured and well fleshed out chapter at a high level of polish. I offer one overarching point: 1. 14.3 rests on two oppositional frames of global public good vs. technology transition. I agree in spirit that the two framings offer different perspectives and are a useful lens. But these two, and particularly the latter, ignores the extent to which development transitions as a larger context for climate action offers yet another framing, one prominent in Ch 1 and 4 (and which we may expand on in CH 13). In many country contexts, a multiple objectives framing is more appropriate than a technology transition one. As an aside, sustainable development gets downgraded to a part theme in 14.3.2 with adaptation and loss/damage while it is really a higher level construct. It may be worth re-visiting this strict binary for the SOD. More generally, the Chapter may need to reflect on how it internalises and engages with development-driven frames, as set up by Ch 1.	Noted. Thanks for the helpful insight. The alternative narrative frames underpinning the literature are brought out more clearly in the SOD. The SOD also reflects greater coordination with Chapter 1 and 4.	Navroz Dubash	Centre for Polcy Research	India
6557	1	1			There is substantial mitigation potential in proper water management and waste water treatment as also described in the World water Development Report 2020 on Water and Climate Chnage (to be published on 23 March 2020). Given the fact that there is substantial international cooperation (although this potential is still underused) in the form of river basin organisations, there is. huge potential for international cooperation on mitigation through transboundary water management. For example, wetland restoration, as often such wetlands are in a border region where nither country shows interest.	Noted. Thanks for bringing this to our attention.	Jos Timmerman	Waterframes	Netherlands
13931	1	1			General comments: •The chapter seems to flow better from section 14.4 onwards •Some of the references are prior to AR5, I wonder whether these need to be updated. •Referencing within the text is not consistent throughout the document. •The explanation of acronyms is not consistent throughout the text. The full name should be given the first time the acronym is mentioned. This is not the case at present.	Noted. THe SOD addresses these polish/finish/flow issues.	Gonzalo Escribano	Universidad Nacional Educación a Distancia (UNED) and The Elcano Royal Institute	Spain
43627	1				The chapter rightly emphasizes the formation of climate clubs as key direction. It would be good to have more empirical litereature here. Where are there tentative climate clubs? What are their specific incentives? How does the formation of climate clubs interact with the recent extreme right shift in key administrations globally that are hostile against any sort of cooperation?	Accepted, the discussion on climate clubs is expanded and deepened in the SOD.	Felix Creutzig	MCC Berlin	Germany
17449	2	1	2	32	The contents discussed in this chapter do not match the AR6 wgIII approved outline. Some of the topics listed on the outline are not disccused. In addition, to be consistence with th AR5, internitonal coopertion is still examined from policy persepctives, documenting new developments since AR5, it would be btter to add the key words on the title of the chaper to make it more specific	Noted. The Chapter has been reoroganized to fit the narrative emerging from the literature, but all the elements indicated in the original outline find a place in the Chapter.	HONGXIA DUAN	Institute for Environment and Sustainable Development	China
42	3	3	3	5	International cooperation is important because climate change is a "global commen's problem".	Rejected. That is one way of framing climate change, but not the only way, as we clarify in the chapter.	Govindasamy Bala	Indian Institute of Science	India
19203	3	8	3	8	Difference between sub-global and regional is unclear and may be overlapping. This needs to be explained.	Rejected. We do so later in the chapter, and do not have room to do so here.	Chisa Umemiya	Institute for Global Environmental Strategies	Japan

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
6215	3	9	3	12	considering endogenous-driven technology as a basis for a country's development could be instrumental in the process of adopting a switch to new, acceptable forms of energy.	Taken into account. This falls within our third reason, but perhaps deserves a few lines.	Jude Ndzifon Kimengsi	Department of Geography and Environmental Studies, Catholic University of Cameroon (CATUC)	Cameroon
39943	3	11	3	11	Add after "… carbon technologies": "through public climate finance or revenues from the sale of emission credits". Reason: The means through which international cooperation is most effective need to be specified here.	Rejected. We don't think the diffusion that is relevant is limited to these conditions.	Axel Michaelowa	University of Zurich	Switzerland
13031	3	15	3	17	These lines do not summarise well the core differences between the PA and KP. I realise this paragraph must be brief, but the core differences are: "The core national commitments under the Kyoto Protocol were legally binding emission targets for a limited group of developed countries, based on common metrics and tied to strong regimes for monitoring and enforcement, whereas those under the Paris Agreement apply to all groups of parties and are process related". Please note the suggestion to change emission outcomes to emission targets, which is more easily understandable and accessible language. Please also note the suggestion to add "strong" to characterise the monitoring and enforcement regime, as of course the PA also has a monitoring (and to some extent enforcement) regime, but it is much weaker.	Noted. We think the language we used captured, in a few words, what you are getting at. We will be word smithing for the SOD, however, and will try to make this more clear.	Joanna Depledge	Climate Policy Journal	United Kingdom (of Great Britain and Northern Ireland)
18807	3	16	3	16	replace "were oriented towards" by: " consisted of "	Taken into account. This sentence has been changed, in any case.	Henry Tulkens	CORE, Université catholique de Louvain	Belgium
13033	3	18	3	19	What is your evidence that the PA was "designed to build capacity"? I agree this is an important goal, but where in the PA is building capaciity referred to in a way that would characterise it as a design feature? Stimulating climate-investments is indeed arguably a goal of the PA if you interpret Article 2.1(c) in a particular way, but it says nothing about developing countries.	Taken into account. I think the confusion relates to the meaning of the word "capacity," which we meant to include political capacity. We will revisit this wording.	Joanna Depledge	Climate Policy Journal	United Kingdom (of Great Britain and Northern Ireland)
2723	3	21	3	32	"The effectiveness of the Paris Agreement is contested" -- should be "Predictions regarding effectiveness of the Paris Agreement are contested" … All of what follows is about whether it will be effective, not whehter it has been effective. Last sentence of paragraph gets it right. More generally -- I think it would be good somewhere in this chapter that precise and confident conclusions about the effectiveness of Paris, Kyoto, or the UNFCCC as well as any other MEAs are hard to come by. Essentially, without undercutting the whole field, I think a fair assessment is that effectiveness assessments of specific MEAs that are supported by a range of different scholars are hard to come by. Quantitative conclusions, in particular, that find compelling evidence that a given MEA caused substantively and statistically significant changes in state behavior are simply hard to come by. Economic and econometric analyses do not generally reach convincing conclusions on particular MEAs altering state behavior in my experience.	Accepted. We clarify that we are talking about future effectiveness.	Ronald Mitchell	University of Oregon	United States of America
18809	3	22	3	22	after {14.4.2}, replace the first 8 words by the following words: " The strongest critiques of the Paris agreement are (i) that the conceptual basis of the likely outcomes of the Paris Agreeement in terms of emissions is of non cooperative nature (robust evidence, high agreement), and (ii) " ...	Accepted in principle. We have rephrased, but in less technical terms.	Henry Tulkens	CORE, Université catholique de Louvain	Belgium

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
16123	3	30	3	32	Perhaps this is too narrow a statement? What if countries increase their ambition (statements of intent) but continue to fail in implementation in many cases? Should we not be considering both ambition and implementation gaps? I think there is some justification for this dual emphasis in the literature, including in https://www.nature.com/articles/d41586-020-00571-x and https://onlinelibrary.wiley.com/doi/full/10.1002/wcc.622	Accepted. We include implementation in the sentence.	Navroz Dubash	Centre for Polcy Research	India
13035	3	31	3	31	Ambition is not enough, implementation is the key to effectiveness. I suggest amending to "….increase the ambition of their NDCs in the near future, and implement their commitments, will determine etc…"	Accepted. We include implementation in the sentence.	Joanna Depledge	Climate Policy Journal	United Kingdom (of Great Britain and Northern Ireland)
19205	3	31	3	31	In my view, it is not only the ambition of NDCs that detemine the effectiveness of the Paris Agreement, but also the extent to which those NDCs are acutally implemented and achieved affects the effectiveness of the Paris Agreement.	Accepted. We include implementation in the sentence.	Chisa Umemiya	Institute for Global Environmental Strategies	Japan
13037	3	34	3	34	"Conventions" is not the right term. Treaties or Agreements should be used instead.	Accepted.	Joanna Depledge	Climate Policy Journal	United Kingdom (of Great Britain and Northern Ireland)
39945	3	40	3	40	Revise "Trans-national partnerships … emission reductions" as follows: "Trans-national partnerships and alliances involving non-state and sub-state actors can stimulate low-carbon technology diffusion and emissions reductions in case of insufficient regulation at the national and international level". Evidence: Michaelowa and Michaelowa (2017) assess 109 trans-national partnerships and alliances based on four design criteria: existence of mitigation targets; incentives for mitigation; definition of a baseline; and existence of a monitoring, reporting, and verification procedure. About half of the initiatives do not meet any of these criteria, and not even 15% satisfy three or more. Michaelowa, Katharina; Michaelowa, Axel (2017): Transnational Climate Governance Initiatives: Designed for Effective Climate Change Mitigation?, in: International Interactions, 43, p. 129-155	Rejected. This is policy prescriptive in terms of suggesting what the appropriate level of governmental regulation should be.	Axel Michaelowa	University of Zurich	Switzerland
43483	3	40	3	40	The role and effectiveness of trans-national partnerships and alliances is highly contested; suggest to consider language to that effect.	Rejected. For the executive summary it is appropriate to say that their role in increasing. Whether this is a good thing comes up in the main chapter.	Matthias Honegger	Perspectives Climate Research gGmbH	Germany
6217	3	42	3	44	How international cooperation shapes th governance regimes of countries, should be considered for effective climate change mitigation.	Noted. We have taken this into account in the SOD, but not in sufficient depth for it to be reflected in the Executive Summary.	Jude Ndzifon Kimengsi	Department of Geography and Environmental Studies, Catholic University of Cameroon (CATUC)	Cameroon
39947	3	46	3	46	Insert after "… greenhouse gases": ", particularly through the use of market mechanisms". Reasons: Significant reductions of industrial gases and methane in developing countries were triggered by the Clean Development Mechanism.	Rejected.Given the lack of clarity about whether the main changes have been as a result of market mechanisms or other regulatory approaches, this would be inapproriate for the executive summary.	Axel Michaelowa	University of Zurich	Switzerland

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
41291	3	2	4	7	The ES has a nice and easy to read format. I understand that the content will be substantially expanded. I think statements on SRM and CDR would be useful fo to have in the ES.	Taken into account.	Jan Fuglestvedt	CICERO	Norway
38229	3		4		The ES should include the urgent need to end existing international agreement which are already locking energy systems in carbon and which may lock developing countries in carbon if these type of agreements are extending to the global South. One of these agreements is the Energy Charter Treaty which protect foreign investments in fossil fuels by means of private arbitration. For more information on this Treaty, see: https://www.openexp.eu/sites/default/files/publication/files/modernisation_of_the_energy_charter_treaty_a_global_tragedy_at_a_high_cost_for_taxpayers-final.pdf	Taken into account. This is an important point, which needs to be expressed in non-policy prescriptive terms. We highlighting it in the main text of the SOD.	Yamina Saheb	OpenExp, Ecole des Mines de Paris	France
38231	3		4		The ES should also include progressive proposals for international cooperation such as the proposal to develop a Treaty for the Non-Proliferation of Fossil Fuels. With a such Treaty, signatories will develop roadmaps to phase-out fossil fuels which would complement well NDCs requirement under the Paris Agreement. For more information on this Treaty, check: https://www.openexp.eu/sites/default/files/publication/files/modernisation_of_the_energy_charter_treaty_a_global_tragedy_at_a_high_cost_for_taxpayers-final.pdf	Rejected. This is too speculative.	Yamina Saheb	OpenExp, Ecole des Mines de Paris	France
38233	3		4		The ES should include the potential regulatory chill of trade agreements which leads to canceling and/or delaying and/or lowering ambition of Gvts' climate action by means of ISDS. See for example: https://www.cambridge.org/core/services/aop-cambridge-core/content/view/C1103F92D8A9386D33679A649FEF7C84/S2047102517000309a.pdf/regulatory_chill_in_a_warming_world_the_threat_to_climate_policy_posed_by_investorstate_dispute_settlement.pdf. The use of the provisions of the Energy Charter Treaty, mentioned in comment #1, is a good illustration of the use of ISDS by industry and investors to delay climate action.	Rejected. This is an inappropriate level of detail for the executive summary.	Yamina Saheb	OpenExp, Ecole des Mines de Paris	France
16407	3	2			In the Executive Summary of Chapter 14, consider adding a paragraph on the potential of an international mechanism to limit GHG emissions from the military sector globally. The military sector is a driver of manufacturing, transport and food provisioning emissions and a key to their mitigation.	Rejected. This is too speculative.	Daniel Helman	College of Micronesia-FSM	Micronesia, Federated States of
16409	3	2			In the Executive Summary of Chapter 14, consider adding a paragraph to describe the potential of eliminating warfare altogether as a means of addressing climate change. Global war diminishes the human potential for a sustainable and just future, such that increasing alliances globally for the purpose of climate mitigation may reduce the military sectors of all countries and lead to further benefits.	Rejected. This is too speculative.	Daniel Helman	College of Micronesia-FSM	Micronesia, Federated States of

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
16411	3	2			In the Executive Summary of Chapter 14, consider adding a paragraph that describes the increasing risk of nuclear arms proliferation as new countries acquire nuclear power, and the potential as well for a new international mechanism to control this risk. See, for example, Goldemberg, J., 2009. Nuclear energy in developing countries. Daedalus, 138(4): 71-80. Notably missing from plans for adopting nuclear power in a widespread fashion to address climate change is a new international mechanism that would identify the most nuclear-arms-proliferation-resistant pathway and require that this pathway be followed. The current Non-Proliferation Treaty was not adopted to address climate change, and its utility is not up to the task. For example, Saudi Arabia is presently developing facilities for nuclear materials enrichment to fuel its planned new nuclear power program, and this may be a pretext for nuclear arms production. As nearly 30 new countries are now attempting to adopt nuclear power, thereby doubling the number of nuclear-power countries globally, the risk of arms proliferation increases, and this increased risk ought to be addressed cogently in this chapter.	Rejected. This is too speculative.	Daniel Helman	College of Micronesia-FSM	Micronesia, Federated States of
13029	3	4			Change "but" to "and", or just delete "but". There is no contradiction (requiring but) between international cooperation being vital and the emergence of new considerations. Alternatively, this formulation would work: "International cooperation is vital for achieving climate mitigation goals in the context of sustainable development, with new considerations having emerged since AR5 that are relevant etc..."	Accepted.	Joanna Depledge	Climate Policy Journal	United Kingdom (of Great Britain and Northern Ireland)
13933	3	6			Include a reference to climate mainstreaming (Climate Policy Integration) ie Dupont, C. (2016), Climate Policy Integration into EU Energy Policy. Progress and Prospects. Oxon: Routledge . Also Recognise potential trade-offs between SDG objectives as well as synergies, ie: Weitz, N. et al. (2018), «Towards systemic and contextual priority setting for implementing the 2030 Agenda». Sustainability Science, 13: 531-548.	Taken into account. This is too much detail for the executive summary.	Gonzalo Escribano	Universidad Nacional Educación a Distancia (UNED) and The Elcano Royal Institute	Spain
13935	3	12			Add: 'subject to financial support' at the end of the sentence.	Rejected. We don't think it is always subject to this.	Gonzalo Escribano	Universidad Nacional Educación a Distancia (UNED) and The Elcano Royal Institute	Spain
2725	4	1	4	2	"considering not only environmental effectiveness but also transformative 1 potential, distributive 2 outcomes, economic performance, and institutional strength" -- should set up that there are MULTIPLE metrics of effectiveness in play in the literature BEYOND environmental effectiveness. This, otherwise, comes out of the blue.	Taken into account.	Ronald Mitchell	University of Oregon	United States of America
37621	4	4	4	6	why is solar radiation mentioned specifically? we know from IPCC SR1.5 that CDR is needed for all 1.5C consistent pathways, so the reference to negative emission technologies is appropriate here, but it is not clear that a reference to SRM should be placed on an equal footing. This should be rewritten to delete SRM, as it seems to falsely imply that there is a recognized need for SRM and international cooperation is expected on SRM	Accepted. We clarify that the lack of effect wrt SRM is about addressing the risks, not the promotion.	Michiel Schaeffer	Climate Analytics	Netherlands

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
47433	4	5	4	7	There are indications of emerging international cooperation with respect to Solar Radiation Management. In November 2019, the Scientific Assessment Panel of the Montreal Protocol passed a decision to include ""An assessment of information and research related to solar radiation management and its potential effect on the stratospheric ozone layer" in the Terms of Reference for the 2022 Ozone Assessment. This was approved by nearly all parties, including the United States. (United Nations Environment Programme (2019), Thirty-first Meeting of the Parties to the Montreal Protocol on Substances That Deplete the Ozone Layer, "Potential areas of focus for the 2022 quadrennial assessment reports of the Scientific Assessment Panel, the Environmental Effects Assessment Panel and the Technology and Economic Assessment Panel, UNEP/OzL.Pro.31/CRP.12, http://conf.montreal-protocol.org/meeting/mop/mop-31/crp/English/MOP-31-CRP12.En.docx"	Taken into account. We generally assess things as having little to no effect. But that may be changing in the future.	Kelly Wanser	SilverLining	United States of America
13039	4	6	4	6	"International cooperation is currently having little to no effect" - this is misleading when referring to NETs and SRM, as there is no international cooperation specifically targetting these sectors (as acknowledged on p.41, line 30) so obviously it can't have an effect. Please rephrase.	Accepted. We rephrase this in the SOD. Although technically, the fact that there is no specific form of internation cooperation addressing these areas means that international cooperation, as an overarching category of human activity, is having no effect.	Joanna Depledge	Climate Policy Journal	
35749	14-3	11	14-3	11	Consider using the term "low carbon economy"	Taken into account.	Ahmed Abdelrehim	Centre for Environment & Development for the Arab Region and Europe - CEDARE	Egypt
35751	14-3	18	14-3	19	the term "Climate investment" was not used in Paris Agreement. You may instead use the term " Climate finance"	Taken into account.	Ahmed Abdelrehim	Centre for Environment & Development for the Arab Region and Europe - CEDARE	Egypt
35753	14-3	29	14-3	29	Consider adding the word impact to be "dangerous climate change impacts"	Taken into account.	Ahmed Abdelrehim	Centre for Environment & Development for the Arab Region and Europe - CEDARE	Egypt
35755	14-4	1	14-4	7	You may also mention the "international cooperation on adaptation efforts" as stated in Article 7 point 6 of Paris Agreement	Rejected. That is outside of our scope.	Ahmed Abdelrehim	Centre for Environment & Development for the Arab Region and Europe - CEDARE	Egypt
35757					The executive summary does not include any text about adaptation measures or the needs of developing country	Noted. Adaptation is outside our scope.	Ahmed Abdelrehim	Centre for Environment & Development for the Arab Region and Europe - CEDARE	Egypt

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
48087					ES : section on reductions in emissions of GHG arising from other conventions => coordination with WGI could be relevant to provide a common (quantitative) message on the benefits of these reductions.	Noted. This is an important suggestion but difficult to implement given the scope of our work, and the timeframe.	Valérie Masson-Delmotte	CEA, IPSL/LSCE	France
48089					The final ES statement on solar radiation modification is quite surprising as formulated. What about interational cooperation in the sectors of aviation and shipping? What about cooperation in the sector of standardization (e.g. ISO standards)?	Accepted. We reformulate this.	Valérie Masson-Delmotte	CEA, IPSL/LSCE	France
36817	3		4		Overall an interesting chapter and a useful reference. But it would be more meaningful to have a detailed critique of what is working and what is not. If this is not possible because the Paris Agreement is new and little has been written, can you look outside of the area of climate change and comment on how other aspects of international cooperation have changed and how this might affect progress? Can you highlight other treaties or global agreements that may have similiar elements to the Paris Agreemnet strucuturally and identify if they worked and why?	Noted. There is an attempt to do this in the SOD, but the literature on the PA is inconclusive at this point, and there are constraints - word limits and time - on our ability to engage in a full scale analysis of other global agreements. Moreover few other global agreements replicate the elements of the PA.	Zinta Zommers	United Nations Office for Disaster Risk Reduction	Germany
38229	3		4		The ES should include the urgent need to end existing international agreement which are already locking energy systems in carbon and which may lock developing countries in carbon if these type of agreements are extending to the global South. One of these agreements is the Energy Charter Treaty which protect foreign investments in fossil fuels by means of private arbitration. For more information on this Treaty, see: https://www.openexp.eu/sites/default/files/publication/files/modernisation_of_the_energy_charter_treaty_a_global_tragedy_at_a_high_cost_for_taxpayers-final.pdf	Taken into account. This is an important point, which needs to be expressed in non-policy prescriptive terms. We highlighting it in the main text of the SOD.	Yamina Saheb	OpenExp, Ecole des Mines de Paris	France
38231	3		4		The ES should also include progressive proposals for international cooperation such as the proposal to develop a Treaty for the Non-Proliferation of Fossil Fuels. With a such Treaty, signatories will develop roadmaps to phase-out fossil fuels which would complement well NDCs requirement under the Paris Agreement. For more information on this Treaty, check: https://www.openexp.eu/sites/default/files/publication/files/modernisation_of_the_energy_charter_treaty_a_global_tragedy_at_a_high_cost_for_taxpayers-final.pdf	Rejected. This is too speculative.	Yamina Saheb	OpenExp, Ecole des Mines de Paris	France
38233	3		4		The ES should include the potential regulatory chill of trade agreements which leads to canceling and/or delaying and/or lowering ambition of Gvts' climate action by means of ISDS. See for example: https://www.cambridge.org/core/services/aop-cambridge-core/content/view/C1103F92D8A9386D33679A649FEF7C84/S2047102517000309a.pdf/regulatory_chill_in_a_warming_world_the_threat_to_climate_policy_posed_by_investorstate_dispute_settlement.pdf. The use of the provisions of the Energy Charter Treaty, mentioned in comment #1, is a good illustration of the use of ISDS by industry and investors to delay climate action.	Rejected. This is an inappropriate level of detail for the executive summary.	Yamina Saheb	OpenExp, Ecole des Mines de Paris	France
14915	3		92		The Climate and Clean Air Coalition (CCAC) should be mentioned as it is relevant for international cooperation.	Noted. Reference included in the SOD	Valentin Foltescu	UNEP/CCAC	India

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
35759	5	4	5	5	I am not sure what the word "regime" refers to while the framework was mentioned.	Noted. Clarified.	Ahmed Abdelrehim	Centre for Environment & Development for the Arab Region and Europe - CEDARE	Egypt
35761	5	9	5	9	"whether they are working" probably the word effective reads better than working	Rejected. Effectiveness is a term of art, this is a simpler statement.	Ahmed Abdelrehim	Centre for Environment & Development for the Arab Region and Europe - CEDARE	Egypt
6219	5	13	5	16	More in-depth information on the challenges of working together in the frame of the climate clubs, should be examined.	Accepted. Climate clubs discussed in greater depth in the SOD.	Jude Ndzifon Kimengsi	Department of Geography and Environmental Studies, Catholic University of Cameroon (CATUC)	Cameroon
13041	5	14	5	14	Climate clubs could include actors other than national governments, so I suggest adding "groups of countries and potentially non-state actors that can …"	Accepted, in principle.	Joanna Depledge	Climate Policy Journal	United Kingdom (of Great Britain and Northern Ireland)
16125	5	15	5	16	In addition to socio-technical transitions, there is also the framing of shifting development pathways, articulated in Ch 4, which suggests it is not just a transition to low carbon, but also a broader development transition that countries are exploring, as you note in your reference of TWI2050 below.	Accepted. The SOD reflects a greater attention to different framings.	Navroz Dubash	Centre for Polcy Research	India
2727	5	16	5	17	"as a problem of accelerating a socio-technical 16 transition or transformation," -- also note "or promoting a discursive shift toward discussing climate change as a normative obligation" (see Mitchell and Carpenter, JOGSS, 2019).	Accepted, in principle.	Ronald Mitchell	University of Oregon	United States of America
13043	5	20	5	21	"the Paris Agreement, which has taken over from the KP as setting the overall framework for international cooperation at the global scale" - I'm hesitant about this, as legally the UNFCCC itself remains the foundation of the climate change regime, and this could be highly politically significant, should the US remain outside of the Paris Agreement. I suggest adding "together with the UNFCCC, which remains the foundation of the regime" at the end of the sentence (or something similar).	Accepted, in principle. Language nuanced.	Joanna Depledge	Climate Policy Journal	United Kingdom (of Great Britain and Northern Ireland)
35763	5	24	5	24	"determined actions" better be specific "Climate action"	Rejected. Referring to NDCs in the context of the Paris Agreement.	Ahmed Abdelrehim	Centre for Environment & Development for the Arab Region and Europe - CEDARE	Egypt

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
35765	5	30	5	31	"criteria and indicators to assess the ongoing effectiveness" repeated sentence in line 30-31 while it could be rephrased to read better.	Noted. Language finessed.	Ahmed Abdelrehim	Centre for Environment & Development for the Arab Region and Europe - CEDARE	Egypt
13943	5	39	5	41	Question: Lines 39-41 seem to suggest that diversity in climate impacts makes cooperation essential. Does it? The link to the sentence that starts with 'Consequently,…' could be strengthened	Noted. AR5 reached this conclusion, but our conclusion will somewhat differ.	Gonzalo Escribano	Universidad Nacional Educación a Distancia (UNED) and The Elcano Royal Institute	Spain
6221	5	44	5	45	The challenge of dealing with regional cooperation, in the context of diverse and pluralistic legal systems, including rapidly changing institutions (rules) should be emphasized.	Rejected. We don't see this as a major finding of AR5	Jude Ndzifon Kimengsi	Department of Geography and Environmental Studies, Catholic University of Cameroon (CATUC)	Cameroon
36359	5	36	6	19	I wonder why IPCC is not mentioned here?	Noted. This is implicit in the entire paragraph.	Youba Sokona	South Centre	Switzerland
35767	5	37	6	29	Chapter 4 of the AR5 Synthesis Report Summary for Policymakers point 4.4.1 highlights "International and regional cooperation on adaptation and mitigation" this concept could mention the importance of "creation of adaptation strategies, plans, and actions at national, sub-national, and local levels" as indicated in this report	Rejected. We are primarily concerned about mitigation in this chapter.	Ahmed Abdelrehim	Centre for Environment & Development for the Arab Region and Europe - CEDARE	Egypt
13937	5	1			Rephrase: This chapter assesses the role of international cooperation in mitigating the effects of climate change. Suggested change: This chapter assesses the role of international cooperation in addressing climate change.	Rejected, as WGIII is on mitigation, that is the primary, albeit not exclusive focus of the chapter.	Gonzalo Escribano	Universidad Nacional Educación a Distancia (UNED) and The Elcano Royal Institute	Spain
13939	5	24			Add: The Paris Agreement has been depicted as a showing a hybrid climate policy architecture of 'bottom-up' climate commitments and 'top-down' procedural requirements and international oversight, ie: Bodansky, D. M. et al (2015), Facilitating linkage of climate policies through the Paris outcome. Climate Policy. http://dx.doi.org/10.1080/14693062.2015.1069175	Noted. This is discussed in detail in the rest of the chapter.	Gonzalo Escribano	Universidad Nacional Educación a Distancia (UNED) and The Elcano Royal Institute	Spain

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13941	5	29			Include the concept of climate governance as the governing activities of different actors at different administrative levels, from the international to the local and non-state actors. There is also an additional element of governance in the use of policy instruments which entails a greater uptake of market based instruments (MBIs) See Jordan et al (2003) among others that could be mentioned here for completeness: Kivimaa, P. et al (2017), Experiments in climate governance – A systematic review of research on energy and built environment transitions. Journal of Cleaner Production. Volume 169: 17-29. Jordan, A., & Huitema, D. (2014). Policy innovation in a changing climate: Sources, patterns and effects. Global Environmental Change, 29, 387–394. Jordan, A., Wurzel, R.K.W. and Zito, A.R. (2005). „The Rise of "New" Policy Instruments in Comparative Perspective: Has Governance Eclipsed Government?" Political Studies, 53, 3: 477-496. Jordan, A., Wurzel, R. K. W., & Zito, A. R. (2003). "New" Instruments of Environmental Governance: Patterns and Pathways of Change. Environmental Politics, 12(1), 1–24. doi:10.1080/714000665	Noted. The SOD engages with multi-level and multi-actor governance in a more robust manner.	Gonzalo Escribano	Universidad Nacional Educación a Distancia (UNED) and The Elcano Royal Institute	Spain
45939	5	39			The finding that cliamte change is a global commons problem is not new. E.g. it has been highlighted in TAR Ch. 10 already.	Rejected. This was highlighted as a major conclusion in AR5, even though it was not new.	Nico Bauer	Potsdam Institute for Climate Impact Research (PIK)	Germany
16127	6	1	6	19	Presumably this all refers to AR5. But the tenses in which this is written are confusing. It is not clear what time period "more recently" refers to. Also phrases like "there is recognition" and "instituitons have become" similarly confuse the reader on time scale. Perhaps this should all be written in a retrospective way?	Noted. Edited for clarity.	Navroz Dubash	Centre for Polcy Research	India
6223	6	8	6	10	The diversity of institutions also creates issues of redundancy, incoherence and the lack of synergy. This occurs mostly at national levels, especially for government ministries.	Rejected. This was not a core finding of AR5.	Jude Ndzifon Kimengsi	Department of Geography and Environmental Studies, Catholic University of Cameroon (CATUC)	Cameroon
45941	6	10	6	14	The wording here suppests that the more decentralized approach is superior to the centralized approach. This is due to the word traditionally. This is a highly contested issue. The centralized approach is more difficult to agree on in international climate negotiations, but once in place it is very likely that it significantly improves the capacity to limit and - what is necessary for achieving the Paris climate targets - to strongly and quickly reduce emissions. Also, the sentence is very concerning. It basically states that climiate policy does and should be undertaken in many different international and national and subnational entities, but the UNFCCC is a bad framework for that. Such implementation approach is very odd, because climate policies ould always be the sub-priority within another frmework. This cannot work, ibecause the demand for strong and quick emission reductions requires targeted and comprehensive approach. The cocktail of non-traiditoinal approaches will only allo for gradual emission limitattions, not substantial reductions.	Noted. We are not suggesting this approach is superior, but rather saying the AR5 identified its emergence.	Nico Bauer	Potsdam Institute for Climate Impact Research (PIK)	Germany
2729	6	19	6	19	You may also want to note that the increasing multiplication of actors a) leads to more interplay among these actors but b) also may lead to fragmentation, duplication, and contestation.	Noted. AR5 probably did say this, but we are not sure whether we want to highlight that in this short section.	Ronald Mitchell	University of Oregon	United States of America

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
35783	6	22	6	24	while the shift is "to engage developing countries in emissions reductions" but it worth mentioning that the adaptation efforts of developing country Parties were recognized, We need to keep balanced text towards developing countries.	Noted. This is primarily a report on mitigation, but we note the need to acknowledge developing countries' actions.	Ahmed Abdelrehim	Centre for Environment & Development for the Arab Region and Europe - CEDARE	Egypt
13047	6	22	6	29	This section is a prime example of the over emphasis on the so-called "fundamental" shift from the KP to the PA, without looking at the wider picture of continuities with the existing regime. I would suggest a much more straightforward section (as the details are elaborated on later), for example: "The key development since AR5 has been the negotiation and adoption of the Paris Agreement, which, while building on the UNFCCC, introduces a new approach to global climate governance. This new approach, as discussed further below, was driven by etc...". I strongly suggest deleting "The 2015 Paris Agreement is the culmination of ....". I'm sure the authors don't mean to imply this, but the use of "culmination" suggests that the PA is the end point of international climate diplomacy. This would be fine if there were no doubts as to the effectiveness of the PA, but given that these are growing, it would be rash to claim that it provides the definitive answer. Perhaps suitable alternative phrasing would be: "The 2015 Paris Agreement is the next stage in three decades of international climate diplomacy, which began with the launch of negotiations under the UN General Assembly in 1990 on what became the 1992 UNFCCC".	Noted. The language in the SOD has been suitably finessed to avoid the implication that the reviewer points out. The fact that there has been a fundamental shift in approach is undeniable, and we do acknowledge that the effectiveness of this approach is yet to be proven.	Joanna Depledge	Climate Policy Journal	United Kingdom (of Great Britain and Northern Ireland)
4709	6	23	6	23	Typo: "There architecture of global climate governance" to be changed with "The architecture of global climate governance".	Accepted	michele stua	APE-FVG	United Kingdom (of Great Britain and Northern Ireland)
19207	6	23	6	23	"There architecture" needs to be corrected.	Accepted	Chisa Umemiya	Institute for Global Environmental Strategies	Japan
43025	6	23	6	23	Replace There by The	Accepted	christophe cassen	CNRS-CIRED	France
39735	6	23	6	26	Need clarification or suggest removal of "the rapidly changing geopolitical context". It sounds a bit vague and unclear.	Accepted.The SOD adds a few words to clarify	Jinsun Lim	International Energy Agency (IEA)	France
4711	6	46	6	46	When citing SDG 13, you should specify what the content of the goal is.	Accepted.The SOD adds a few words to clarify	michele stua	APE-FVG	United Kingdom (of Great Britain and Northern Ireland)
35769	6	30	7	8	This section could focus entirely on SDGs and particularly elaborates more on SDG 13 targets. I would suggest that the text describing the World in 2050 moves to other sub section with respect to International and regional initiatives.	Accepted. The SOD focuses on the SDGs alone in this section.	Ahmed Abdelrehim	Centre for Environment & Development for the Arab Region and Europe - CEDARE	Egypt

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13945	6	4			Add: where it states that policy linkages offer climate change adaptation benefits, refer to policy diffusion. For instance see: Kammerer, M., & Namhata, C. (2018). What drives the adoption of climate change mitigation policy? A dynamic network approach to policy diffusion. Policy Sciences. doi:10.1007/s11077-018-9332-6 Dolowitz, D. and Marsh, D. (1996), 'Who learns from whom: a review of the policy transfer literature', Political Studies. XLIV: 343-357. Gilardi, F. (2010), Who Learns from What in Policy Diffusion Processes? American Journal of Political Science, Vol. 54, No. 3: 650-666.	Rejected. In this section we are merely repeating main findings in AR5, rather than going into more recent literature.	Gonzalo Escribano	Universidad Nacional Educación a Distancia (UNED) and The Elcano Royal Institute	Spain
13947	6	23			Typo: substitute 'There architecture of global climate governance…' for 'The architecture of global climate governance	Accepted	Gonzalo Escribano	Universidad Nacional Educación a Distancia (UNED) and The Elcano Royal Institute	Spain
36357	6	23			There should be The	Accepted	Youba Sokona	South Centre	Switzerland
36361	6	28			In Rio de Janeiro please add in 1992	Accepted	Youba Sokona	South Centre	Switzerland
13949	6	48			Add reference: Weitz, N. et al. (2018), «Towards systemic and contextual priority setting for implementing the 2030 Agenda». Sustainability Science. no 13: 531-548.	Accepted	Gonzalo Escribano	Universidad Nacional Educación a Distancia (UNED) and The Elcano Royal Institute	Spain
35033	7	9	7	21	Delete the paragraph 14.2.2.3 completely, as the 1.5 Special Report is not as critical as the other documents referred to, in this section i.e. the Paris Agreement and SDGs. Meanwhile, it is noteworthy that the report has not been approved by COP.	Rejected. The 1.5C Report was requested by the COP, and frames the debate, and much of the literature, around the global temperature goal.	Taghavinejad Ehsan	NIOC	Iran
35771	7	9	7	21	The main innovative part of IPCC 1.5 Special Report not only provides a new perception of the urgency of climate mitigation, it also highlights the importance of integration across disciplines within each chapter. Hence integrating adaptation and mitigation for each sector.	Noted. The SOD finesses language around this.	Ahmed Abdelrehim	Centre for Environment & Development for the Arab Region and Europe - CEDARE	Egypt
36799	7	9	7	21	Should you not add mention of Land report and oceans report. Land report in particular had much discussion on mitigation?	Accepted	Zinta Zommers	United Nations Office for Disaster Risk Reduction	Germany
43033	7	9	7	21	The SR 1.5°C also gives an overview of the enabling conditions to achieve the 1.5°C.	Accepted	christophe cassen	CNRS-CIRED	France
17379	7	9	7	22	According to discussions held during COP25 and lack of international consensus in IPCC special report on the impacts of global warming of 1.5 °C above pre-industrial levels, the mentioned texts should appear to be reviewed.	Rejected. The 1.5C Report was requested by the COP, and frames the debate, and much of the literature, around the global temperature goal. The fact that there may not be political consensus on the Report does not detract from its scientific merit.	Zeyaeyan Sadegh	Islamic Republic of Iran Meteorological Organization (IRIMO)	Iran
45239	7	15	7	18	Role of media SHOULDN'T be generalised for every region of the globe. The Phrase which CAN alternatively be used is: "The report has crystalized media coverage in many regions of the world but the quantitative media coverage is lacked, with respect to same, in many countries of the world"	Noted. The language in the SOD relating to media coverage has been suitably finessed.	Jaimin Parikh	1. United Nations SDSN 2. European Institute of Policy Research and Human Rights 3. University of Delhi	India

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
44723	7	16	7	16	I suggest to cut out the "CO2" here. There has been a "net zero 2050" discourse, but the media did not reflect on the fact that this is the "CO2 only" number and that SR1.5 explicitly says that net zero GHG year would be 2067 (only in table 2.2., unfortunately not in the SPM of SR1.5)	Accepted.	Oliver Geden	German Institute for International and Security Affairs	Germany
43027	7	18	7	18	Remove 'a' between 'in a transnational climate'	Accepted.	christophe cassen	CNRS-CIRED	France
5771	7	19	7	21	If there is no literatiuure supporting this assertion then this should be deleted as its speculative only.	Noted. Since this was written, a growing number of countries have endorsed net zero targets. The SOD refers to this, and finesses the language of causality.	David Leary	University of Technology Sydney	Australia
44725	7	19	7	21	The EU's new target is net zero GHGs by 2050, which should be mentioned to avoid confusion. Almost all country-level net zero targets are GHG targets (not surprisingly, since this is the standard for industrialized countries), including the UK, Sweden, Finland, Austria etc. A notable exemption is New Zealand, where biogenic methane is not expected to go to zero	Accepted.	Oliver Geden	German Institute for International and Security Affairs	Germany
44727	7	19	7	21	I think there is indeed reason to believe that SR1.5 played a major role here, but Art 4 PA (balance of sources and sinks) played a major role as well (see https://www.nature.com/articles/ngeo2699). In fact, both the UK government and the EU Commission began preparing net zero assessments well before SR1.5, to be able to present proposals right after the publication of SR1.5. There's indeed no peer-reviewed literature on this yet, but I know of uppcoming papers analyzing this for the EU and individual European countries. I wonder if the 'net zero' discourse should play a more prominent role in your chapter (maybe starting with an expansion of this very section), because it is an interesting example how actor-specific targets are (partly) derived from global 'targets' (not sure if the Art 4 'balance' really is a target, in international law terminology), and the role of scientific knowledge in this (mainly via the prominent, even if only partly understood, SR1.5 framing)	Accepted. The SOD adds a few sentences on net zero.	Oliver Geden	German Institute for International and Security Affairs	Germany
39949	7	25	7	26	Reword "One of the developments … society" as follows: "One of the developments is AR 6 is an increased emphasis on transformation to a low carbon society in order to achieve the global public good of avoiding a dangerous climate change". Reason: A transformation to a low carbon society is not an aim in its own, it is driven by the aim to provide the global public good.	Rejected. It is true that a transformation to a low carbon society will achieve the goal of eliminating emissions and halting climate change. But framing the latter as a global public good is very much within the economics discourse, which the transitions framing is largely parallel to. The public good framing is built around their being positive externalities associated with climate protection. The transitions framing actually represents a moving away from seeing these as the main reason for the under-provision of climate mitigation.	Axel Michaelowa	University of Zurich	Switzerland
6225	7	28	7	30	Building bridges between collaborators, and reducing redundancies should be tackled in the framing of cooperation at all levels.	Rejected. This appears to us to be a policy prescriptive statement. We will avoid it.	Jude Ndzifon Kimengsi	Department of Geography and Environmental Studies, Catholic University of Cameroon (CATUC)	Cameroon

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
8699	7	35	7	37	[14.3.1. Logical inconsistency] This sentence does not seem to be proper or misleading in consideration of the notion of 'the tragedy of commons' in the previous section. The tragedy of commons is indicative of the spoiling or destruction of collective interest by the pursuit of individual interests. In this sentence, the author sets 'the abatement of emissions' is done by countries' own interests, and I am not sure this setting is appropriate. Therefore, I suggest that this sentence needs to be deleted.	Rejected. We disagree. The two statements are consistent. In this sentence we are simply reminding the reader that countries would abate also based on their own interest (in the Nash equilibrium), but that they would do even more abatement if they would take into account the benefits that they abatement induces in other countries (in the cooperative equilibrium).	Chaewoon Oh	Green Technology Center	Republic of Korea
13957	7	36	7	44	Rephrase?: Instead of stating twice in these sentences that countries would do more if they took into account the benefits to other countries perhaps it would be more straightforward to just say cooperation in the provision of a stable climate is elusive due to the fact that self-interest (and lack of price on carbon) is the norm in addressing climate change?	Noted. We believe that the wording in the FOD provides a little more detail about the relevant issues. There are many reasons that cooperation is illusive. In any event, we have streamlined this section.	Gonzalo Escribano	Universidad Nacional Educación a Distancia (UNED) and The Elcano Royal Institute	Spain
8701	7	40	7	42	[14.3.1. Lack of sufficient explanation on the theory] This sentence starts with 'The Theory does not preclude ~'. What theory are you referring to? In this section, a certain theory is not specifically mentioned. Relevant indications are 'public good' and 'tagedy of the commons problem'. In the later part of this section, the author mentioned divisive approaches between the market failure in neo-classical economics and the theory of transition in evolutinoary economics. Then, I suggest that the author needs to explicitly start and indicate a theory of market failure in neo-classical economics. It is because this market failure leads to intervening actions to produce public goods.	Taken into account. We will include an explanation of the theory and provide additional references. Nevertheless, due to space limitations this will need to be brief.	Chaewoon Oh	Green Technology Center	Republic of Korea
8703	7	42	7	44	[14.3.1. Logical inconsistency] To this sentence, I am a bit puzzled. In neo-classical economics, market failure occurs because the actors are egoistic and self-interested. This sentence seems to posit a different actor (country) which is interested in making such a transition to a zero-carbon economy even faster if it were to take into account the benefits to other countries. I suggest that the author considers a logical development of 'why multilateral binding agreement' as a global intervening policy is needed' on the basis of 1) market failure in the lesser production of public goods as a phenomenon (with negative externalities), ii) public goods characteristics and behavioral problems of free-riding, and iii) the collective binding rules as a policy approach in this 'section'.	Noted. We are simply stating that the move from the Nash equilibrium to the social optimum can be seen only in quantities in a static context but can also imply a faster transition in a dynamic context. We rephrase to increase clarity, but taking into account our space limitations.	Chaewoon Oh	Green Technology Center	Republic of Korea
28183	7	46	7	47	What are the main points of these recent theoretical insights? How do they address the free-rider problem?	Noted. Due to space limitations, we refer the reader to the reference included at the end of the sentence. There are several recent theoretical insights, but we do not have the space to go into them in detail.	Martin Kesternich	ZEW – Leibniz Centre for European Economic Research	Germany
39741	7	24	8	24	Suggest including more information on the potential benefits of governmnet interventions (positive externalities) and how they can create synergies leading to an improved level of welfare for everyone. The current texts seem to focus on the negative impacts of free-riding, rather than the potential benefits of cooperation.	Noted. Several sentences argue that the government has a role, and that cooperation could bring us closer to the social optimum. Unfortunately, we do not have the space to add additional text here.	Jinsun Lim	International Energy Agency (IEA)	France

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
28185	7	47	8	2	A fully multilateral binding agreement does not only ensure that all benefits are taken into account by the parties but also fosters cost effectiveness as marginal abatement cost are equalized. I feel that this last point might be added here.	Accepted.	Martin Kesternich	ZEW – Leibniz Centre for European Economic Research	Germany
8697	7	24	9	17	[14.3.1. Refurbishment on the current two framing approaches] - This is a suggestion for framing approaches to climate mitigation policy in the following way. - The stabilization of GHG concentrations or climate mitigation is a public goods. In order to produce this public goods, there are two phenomena that we need to consider, and they are all related to market failure. One is the 'negative externality' that economic activity on the basis of individual interests generates too much GHG and exacerbates the climate system (negative harm is more produced than optimal). Only through the intervening action to reduce negative externaltiy, climate mitigation is attained. The other is the 'positive externality' that technological transition (by new technology development and transfer/adoption) brings out with new technology development and spill-over and network effect (positive benefits is less produced than optimal). Only through the intervening action to push positive externaltiy, climate mitigation is further attained. - I hope that my sggestion for framing approaches can be considered. This does not lead to confusion amongst theories in economics (neo-classical economics and evolutionary economics). Also, for your information, there is an mitigation approach on the basis of transaction cost economics as well. Therefore, I think going too broadly with institutional economics of evolutionary economics leads us to question the exhaustive coverage of economic theories in the author's approach.	Rejected. This suggestion would put both framings within a neo-classical economic lens, namely that of externalities' induced market failure. We describe this in the first part of the section, but the reality is that theory on transitions is rather orthogonal to ideals of externalities. It is more about issues of lock-in and increasing returns to scale. So we respectfully decline to reframe our discussion.	Chaewoon Oh	Green Technology Center	Republic of Korea
35773	7	24	9	17	The section focuses only on international cooperation with respect to mitigation efforts. Paris agreement stressed that parties should strengthen their cooperation on enhancing action on adaptation, taking into account the Cancun Adaptation Framework. Cooperation on climate action with respect to adaptation is crucial for many developing countries. The text as it stands does not addressing many of these countries.	Noted. That is true. However, the scope of Working Group III is mitigation, and adaptation is covered in Working Group II. We will be clearer in the introduction to this chapter that we are dealing primarily with mitigation.	Ahmed Abdelrehim	Centre for Environment & Development for the Arab Region and Europe - CEDARE	Egypt
44729	7	24	9	17	This is very well-argued overview on these two framing approaches. I wonder if you shouldn't add the strong empirical grounding of the socio-technical transitions approach (maybe on p. 8, 25-38), because that really distinguishes it from the often more normative macro-economic approaches looking for efficient markets	Accepted. Yes, we highlight the fact that the transitions literature is very much historically grounded, rather than being based on an axiomatic approach.	Oliver Geden	German Institute for International and Security Affairs	Germany
13951	7	8			Perhaps adding two paragraphs here. One on International finance tailored to fostering sustainable development. Refer to the 2015 Third International Conference on Financing for Development that took place in Addis Ababa, Ethiopia in July 2015. And another on the development of voluntary climate risk disclosure institutions such as the G-20's FSB Task force on Climate-related Financial Disclosure (TCFD) as a tool to reallocate financial flows towards climate goals.	Noted. These developments are reflected in other sections of the Chapter 14.	Gonzalo Escribano	Universidad Nacional Educación a Distancia (UNED) and The Elcano Royal Institute	Spain
13953	7	22			Add: the IPCC special reports on Oceans and Cryosphere and on Land	Accepted.	Gonzalo Escribano	Universidad Nacional Educación a Distancia (UNED) and The Elcano Royal Institute	Spain

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
13955	7	36			Verbe tense: Change take for took	Accepted. Will change.	Gonzalo Escribano	Universidad Nacional Educación a Distancia (UNED) and The Elcano Royal Institute	Spain
39951	8	4	8	6	Delete "… recent developments emphasize the importance … Péreau 2017". Reason: Literature on sectoral and regional agreements was thriving in the 2000s and covered fully in AR 4 and AR 5. See e.g. the literature quoted in the line "sectoral approaches" in Table 13.2. "Description of recent proposals for climate change policy architectures" of Chapter 13 of AR 5.	Noted. The papers we cite here post-date the AR5, and what is relatively new is the emphasis on these approaches as building blocks. This is more relevant after AR5 because we have moved to a framework without a global binding agreement. However, we will modify the text.	Axel Michaelowa	University of Zurich	Switzerland
43485	8	4	8	6	This is nothing new; sectoral and regional agreements were fully addressed already in AR 4 and AR 5.	See response to comment 39951.	Matthias Honegger	Perspectives Climate Research gGmbH	Germany
39737	8	6	8	8	Suggest rewriting "The fact that global emissions…" to "The fact that global emissions have continued to grow can be taken as support for the proposition that the free-ride problem needs to be addressed urgently."	Rejected. This would make the sentence more policy prescriptive, which we want to avoid.	Jinsun Lim	International Energy Agency (IEA)	France
18811	8	8	8	9	Insert here an additional paragraph, saying: "Parallel to these developments, the global commons-public good frame has been conceptually enriched and made more policy relevant by being extended to dynamics in both its economic and game theoretic components. The progress is in the recognition that the appropriate modelling of the worldwide and century long climate problem differs according to the purpose of the analysis. While optimal control optimization, widely used until recently (Nordhaus 1994, Nordhaus and Yang 1996, Eyckmans and Tulkens 2003, Yang 2008, Bréchet, Gerard and Tulkens 2011) is an appropriate tool to describe time evolutions of the physical state of the system and policies remaining fixed over time, it is not fit to model the process of decisions that can, and do, take place along that time span. Instead, such processes are more realistically and usefully formulated in terms of dynamic sequences of time-indexed distinct cooperative games whose solutions are alternative policies of cooperation vs partial cooperation vs non cooperation are handled at each time stage. For the global economy and game, the overall optimization is then computed by dynamic programming instead of optimal control. From its original formulation (Germain et al. 1999 and Germain et al 2003), the approach is by now in a rigorous cooperative game theoretical form (Chander 2017), and put in economic theoretic perspective (Tulkens 2019). The policy relevance, claimed above, results from the possibility to introduce this methodology in Integrated Assessment Models (IAMs) dealt with in Annex C of this Report. This and two more such applicability features are further argued in this reviewer's comment of Annex C.	Taken into account. Thank you for this excellent suggestion. We have incorporated new references and briefly expanded the coverage of new developments in the global public goods framework. Unfortunately, we could not include the full paragraph at this is more detail about theory than we want to go into in this section. Also, this paragraph focuses on modelling issues that are dealt with mainly in other chapters of this report, including Annex C as pointed out by the reviewer. We will refer to those chapters and to the appropriate references for details on this issue.	Henry Tulkens	CORE, Université catholique de Louvain	Belgium

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
45241	8	9	8	24	Political Activism MUST HAVE founded a place here. The following phrase COULD BE considered: "Political Activism deserves a place in the regions which lack considerable support from political executives in policy implementation regard. There must be an increase in the scope of stakeholders from respective political spectrum of the countries."	Rejected. We decline, as this is policy prescriptive.	Jaimin Parikh	1. United Nations SDSN 2. European Institute of Policy Research and Human Rights 3. University of Delhi	India
8695	8	9	8	38	[14.3.1. Re-consideration of the current approach to technology innovation under public goods framing] - This section divides the current framing of climate mitigation into a) mananing global commons or a public goods and b) triggering a transformation to a low carbon society, which is regarded as the development in AR6. For 'public goods' framing approach, the author mentioned two things of i) climate mitigation and ii) technology innovation, both of which having public goods characteristics. For 'transition' framing approach as an alterantive framing, the author deals with technological transitions. - To these two framing approaches, I am puzzled by the division between 'technology innovation' under public goods framing and 'technological transitions' under transition framing. The author mentioned that 'transition' framing is based on 'evolutionary economics, not with market failures of efficient markets (in neo-classical economics). However, when the author mentioned on the 'technology innovation' under public goods framing, the author explicated the infrasructure lock-in, network effects, and path-dependency in line 11-12 in p.14, and these are the notions of evolutionary economics. - I suggest the author needs to re-consider the current approaches of putting 'technology innovation' under the public goods framing approach. Furthermore, not just technology innovation, there is a word of 'technology development and transfer'.	Noted. Thank you for this comment. This section has been rewritten. Please note that all the references included in lines 9 to 24 are based on neoclassical economics, in particular dynamic macroeconomics, and that lock-in and path-dependencies are studied extensively in this literature (see, e.g., Aghion et al. 2014; Acemoglu et al. 2012).	Chaewoon Oh	Green Technology Center	Republic of Korea
28187	8	18	8	20	Taxes and subsidies can both be used to foster clean activities but they both differ in their economic incentives and potentially also in the externalities they adress. This might be clarified here.	Noted. Thanks, but this is too much detail for this point in this chapter.	Martin Kesternich	ZEW – Leibniz Centre for European Economic Research	Germany
25303	8	18	8	24	Delete “The general conclusion ... (Caparros et al. 2015).” as these argument do not take into account matters related to sustainable development.	Noted. It is true that they do not pertain to sustainable development, but they do pertain to climate mitigation. This report is not limited to material with clear overlaps to sustainable development.	Eleni Kaditi	Organization of the Petroleum Exporting Countries (OPEC)	Austria
5773	8	19	8	20	A narrow range of policy alteratives is argued for here. Are there not many other options? (eg as discussed in Chapter 13).	Noted. Yes, absolutely there are many other options. But in this section we are relating specific options to specific bodies of theory, and these are the options that relate to the body of theory that we are describing here.	David Leary	University of Technology Sydney	Australia
39739	8	22	8	22	Need explanation (or examples) of "flexible standards" and "political economy considerations".	Noted. Thanks, but this is too much detail for this point in this chapter. In any case, we will rewrite this section and this sentence will be modified or disappear.	Jinsun Lim	International Energy Agency (IEA)	France

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
16129	8	25	8	38	I am not sure a clear and binary distinction can be drawn between a global public goods framing and a technology transition framing alone. Clearly the latter is a distinct frame that has achieved prominence. But so has a perhaps less well defined frame around embedding climate transitions within broader economic development transitions, characterised by an understanding of synergies and trade-offs across climate-development, understood in a multiple objectives frame work. This is not inconsistent with the tech transition idea, but perhaps the latter is a special case of these larger transitions. Certainly in developing countries a low carbon tech transitoin is embedded in a larger conversation about a development transition. I also undertand CH1 to be using this more expansive framing. We may need to reconcile language and concepts across chapters.	Accepted. Thanks. You are right. We have rewritten this section to align more clearly with the material in chapter 1.	Navroz Dubash	Centre for Polcy Research	India
39953	8	25	8	38	The paragraph describes accelerating a set of technological transitions as a new frame that emerged since AR5 and as a stand-alone paradigm. This is not a correct reflection of the literature. AR 5 for example discussed technological transitions in Chapter 5.6 "Technological change", AR 4 in Chapter 3.4 "The role of technologies in long term mitigation and stabilization". The sentence "Since AR5 an alternative framing for climate policy has emerged in the scholarly literature." should thus be deleted. The rest of the discussion would be better situated in Chapter 13.	Rejected. We respectfully disagree. It is true that previous reports have described efforts at accelerating a technological transition, but they have done largely within the neo-classical economic paradigm, such as by recognizing spillover effects. What is new is the framing of the transition outside of the theoretical box of economics, with a great deal of attention to a wider range of factors. For example, the MLP does not speak at all about externalities and spillovers. A consequence of the development of the transitions framing outside of the economics theoretical box is attention to a somewhat different set of policy interventions. In any case, we also recognize that similar notions have been analyzed within a more standard economic approach, see the paragraph where we deal with the contributions of Aghion et al. (2014); Acemoglu et al. (2012) and Baldwin et al. (2019).	Axel Michaelowa	University of Zurich	Switzerland
43487	8	25	8	38	The study of technological transitions is not new or novel. Suggest to reword with a somewhat more modest claim.	Please see our reply to comment 39953.	Matthias Honegger	Perspectives Climate Research gGmbH	Germany
39955	8	47	9	4	Revise "Most importantly … Lilliestam et al. 2012" as follows: "Some authors (Patt and Lilliestam 2018, Lilliestam et al. 2012) suggest that the transitions framing would mean that free riding would eventually lose its relevance, and the clean technology would no longer require any policy support. However, the majority of the literature (see e.g. Kirchner et al. 2019, or Twinnereim and Mehling 2018) stresses that even high carbon prices are ninsufficient overcome the cost differential between high and low carbon technologies and need to be complemented by other policies." Kirchner, Mathias; Schmidt, Johannes; Wehrle, Sebastian (2019): Exploiting Synergy of Carbon Pricing and Other Policy Instruments for Deep Decarbonization, Joule 3, p. 891–898. Tvinnereim, Endre, Mehling, Michael (2018): Carbon pricing and deep decarbonisation, Energy Policy 121, p.185–189.	Taken into account. Thanks for these suggestions. We have reviewed the papers you reference. The sentence in the FOD, however, does not say that future policy interventions are never needed. Often they are. But in some cases they may not be.	Axel Michaelowa	University of Zurich	Switzerland

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
43489	8	47	9	4	This paragraph creates the impression of two incompatible paradigms, which is clearly not a good reflection of the literature; carbon pricing and other (regulatory or innovation triggering) interventions have long been viewed as complementary. Suggest to include: Kirchner, Mathias; Schmidt, Johannes; Wehrle, Sebastian (2019): Exploiting Synergy of Carbon Pricing and Other Policy Instruments for Deep Decarbonization, Joule 3, p. 891–898.	See response to comment 39955.	Matthias Honegger	Perspectives Climate Research gGmbH	Germany
45949	8	47	9	4	This is naive. First it assumes that fossil fuels are replaced without any leakage effect. Second, additional low-carbon enregy in the first place stacks up on top of fossil fuels. The first effect is that more energy is produced and the price decreases. Only if fossil fuels are at the margin, they will be replaced. However, the existing stock of fossil fuel infrastructure is large enough to emit significant amounts of CO2. This is the reason why well-below 2°C and 1.5°C scenarios require pre-mature abandoning of fossil fuel infrastructure (also known as stranded assets). It seems that the authors are arguing in a conceptual context that has no expertise in quantities and scales.	Noted. We respectfully disagree. The transitions literature points to many instances where learning effects have led new technologies to become so much more attractive that they have led to the stranding of existing assets. We are not saying that this is necessarily going to be the case with the energy system, but the transitions literature points to it as a possibility. In any case, we will stress further in the new version that this is a possibility, not a certain fact.	Nico Bauer	Potsdam Institute for Climate Impact Research (PIK)	Germany
13959	8	11			Add that local government fossil fuel revenue stream as an additional barrier to decarbonisation. See Lázaro Touza, L. (2018), Governing the Geopolitics of Climate Change after the Paris Agreement. In Considine, J. (Ed.), Handbook of Energy Politics. Cheltenham: Edward Elgar, pp. 435-482	Noted. Taken into account, but too much detail for this section.	Gonzalo Escribano	Universidad Nacional Educación a Distancia (UNED) and The Elcano Royal Institute	Spain
2731	9	5	9	5	I believe a third framing should be at least mentioned, namely a normative framing. The two framings presented here are both "logic of consequences" framing that suggest addressing climate change be addressed because it is in our interests to do so. A "logic of appropriateness" framing is also being discussed (if also dismissed) in which action for climate change is based in a moral framing that it is "the moral and right thing to do, even if it proves costly to do so in material terms." Greta Thunberg is the most visible, if not best, avatar of this argument. But there is scholarly literature on this topic in many fields, but perhaps most notably Gardiner's Perfect Moral Storm argument but also the Pope's recent Papal Encyclical. I believe strongly that these quite different forms of argument should be brought into this chapter, even if only briefly, to bring this third framing into the literature.	Noted. Interesting. We see a difference between the level of ambition for mitigation that we agree on, and the means to achieve that ambition. The moral framing you are talking was probably part of the reason to agree on a 2° and then 1.5° target, which is a key element of Paris. But then there is a second framing issue as to how we achieve that target. There, I think, the moral framing has little to say.	Ronald Mitchell	University of Oregon	United States of America

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
16131	9	5	9	6	This is an important point and an important para. It may be worth also noting that there are different mechanisms through which international agreements interact with and drive or induce change at national scales, and these also map to different framings. Right now, this is not discussed explicitly anywhere in the chapter- how do we think international agreements actually have impact on national actions? Specifically, the presumption often is that international agreements work through explicit allocation+compliance, failing which through naming and shaming aided by transparency. But (consistent with a transition framing) there is a literature that suggests it happens through inducing changes in national dynamics by providing opportunities and openings for domestic political actors. https://www.tandfonline.com/doi/abs/10.3763/cpol.2010.0146?journalCode=tcpo20. In this telling, the international process is useful in part because it induces national changes, including in domestic institutions https://onlinelibrary.wiley.com/doi/full/10.1002/wcc.622. It may be worth a para laying out the different explanations for the driving force and mechanics of interaction between international and national.	Taken into account. Thanks for these references.	Navroz Dubash	Centre for Polcy Research	India
39957	9	5	9	17	The paragraph argues that assessing the effectiveness of international collaboration by the emissions level is flawed, as transformative impact would only occur later. This would however not allow to assess effectiveness at all, as the contribution to transformation can be seen differently if purely framed in qualitative terms. One observer would see transformational benefits completely different from another, dependent e.g. on political/ideological worldview. Operationalization of what means "transformational" has been extremely difficult in practice, e.g. under the Green Climate Fund. The paragraph should be revised to reflect a clear, quantitative assessment of effectiveness.	Noted. We are not arguing that using emissions as an indicator is necessarily flawed. We are rather suggesting that under one of the framings it may be problematic. The transitions framing would suggest that there is no clear quantitative indicator for assessing progress, if progress is highly non-linear, and the degree of non-linearity is uncertain. We emphasize this point more clearly in the SOD.	Axel Michaelowa	University of Zurich	Switzerland
43491	9	5	9	17	There is a policy risk associated with leaving all quantifiable aspects behind; the GCF and the NDC Partnership (as well as the earlier NAMA partnership) operationalization of "transformative change" revealed insurmountable challenges, which led to a narrow-institutional self-interest-driven approach to allocate funding.	Accepted. Yes, we point out the challenges that might be encountered where we can not agree on a good indicator of progress. But it reminds me of the story of the drunk man who lost his car keys leaving a bar at night, and is searching for his keys under a lamp post. A passer by asks him if he lost his keys under the lamp post, and the drunk man replies "No, I don't think so. But at at least here I can see something." So using emissions as an indicator of transformative change may not be very good, but it least it can be applied in an objective manner.	Matthias Honegger	Perspectives Climate Research gGmbH	Germany
16133	9	19	9	21	I am not sure that embedding sustainable development in a section on adaptation, and L&D actually represents the role it plays in framing and shaping policy conversation and coordination challenges. See my previous comments, suggesting that the binary between global public good and tech transition may be missing this element of larger sustainable development transitions.	Noted, the SOD seeks to mainstream the SD framing, among others (including tech transition and global public goods), and also coordinates with Chapter 4 on this. However, it is important to include sustainable development in this section, highlighting it´s specific links with mitigation, adaptation, L&D.	Navroz Dubash	Centre for Polcy Research	India

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
25715	9	26	9	27	Please refer to the glossary for the IPCC definition of adaptation. Adaptation is defined as: 'in human systems, the process of adjustment to actual or expected climate and its effects, in order to moderate harm or exploit beneficial opportunities. In natural systems, the process of adjustment to actual climate and its effect; human intervention may facilitate adjustment to expected climate and its effects.'	Accepted.	Renee van Diemen	WG III TSU	United Kingdom (of Great Britain and Northern Ireland)
31601	9	27	9	30	It can seek to reduce present and future exposure to specific climate risks (Adger et al. 2003), mainstream climate information into existing planning efforts (Gupta et al. 2010; van der Voorn et al, 2012; 2017), and reduce vulnerability (or increase resilience) of people or communities to the effects of climate change (Kasperson and Kasperson 2001)	Accepted.	Tom van der Voorn	Institute for Environmental Systems Research	Netherlands
31605	9	30	9	33	here is a body of literature highlighting potential synergies and conflicts between adaptation actions – in any of the three areas above – and mitigation actions - and potential strategies for resolving them (Watkiss et al. 2015; Casado-Asensio and Steurer 2014; Suckall et al. 2015; Locatelli et al. 2011; Duguma et al. 2014; Van der Voorn et al, 2020).	Accepted. References considered for inclusion in the SOD.	Tom van der Voorn	Institute for Environmental Systems Research	Netherlands
31603	9	35	9	36	In most cases it involves transboundary actions, such as in the case of transboundary watershed/water resources management (Milman et al. 2013; Wilder et al. 2010; Van der Voorn et al, 2017).	Accepted. References considered for inclusion in the SOD.	Tom van der Voorn	Institute for Environmental Systems Research	Netherlands
38949	9	35	9	36	In cases where adaptation actions in one country affect other countries positively, i.e. where adaptation has positive transnational spillovers, opportunistic free-riding on other nations' efforts can occur. This makes international cooperation for transnational adaptation necessary in such cases, as for example in tackling climate change-induced eutrophication in the Baltic Sea (Roggero, M., Kähler, L., & Hagen, A. (2019). Strategic cooperation for transnational adaptation: Lessons from the economics of climate change mitigation. International Environmental Agreements: Politics, Law and Economics, 19(4-5), 395-410.).	Rejected. Chapter 14 of WG3 (Mitigation) is focused on international cooperation on mitigation, and adaptation only to the extent that it is linked to mitigation. We recognize the imporance of the links, but cannot justify a detailed discussion on adaptation in the chapter.	Achim Hagen	Humboldt-Universität zu Berlin	Germany
45243	9	39	9	40	The "effective institution" COULD BE replaced by "effective institution which must necessarily be rescued from political influences of any regard"	Rejected. This is policy prescriptive, and not supported by references.	Jaimin Parikh	1. United Nations SDSN 2. European Institute of Policy Research and Human Rights 3. University of Delhi	India
4713	9	42	9	46	Stating that "an implicit bargain that developing countries participate in global mitigation policy in return for receiving financial and technical assistance for adaptation and development from industrialized countries" sounds outdated at the light of the most recent evolutions in international climate change negotiations (especially in COPs that followed Paris). I suggest either extending literature references or cutting the lines.	Rejected. This is not outdated. Many developing countries pledges under the Paris Agreement are contitioned on the reception of finance and technical assistance. However, the SOD does nuance the language on this, and adds references.	michele stua	APE-FVG	United Kingdom (of Great Britain and Northern Ireland)
25305	9	42	9	46	Delete "At a more general level, ... from industrialized countries.", as this argument is subjective.	Accepted, in principle. The language in the SOD is different.	Eleni Kaditi	Organization of the Petroleum Exporting Countries (OPEC)	Austria
29101	9	26	10	8	Please check consistency with WGII on loss and damage	Accepted.	Minal Pathak	Ahmedabad University	India

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
13143	9	19	11	8	This section lacks a discussion of mitigation links to human rights, despite human rights being explicitly mentioned in the subtitle. The section should explain, in particular, that human rights are recognised as a legal basis for states' mitigation obligations (e.g. Duyck et al (2018), Bach (2015-2016), Wewerinke-Singh (2019)).	Accepted, in principle. The SOD addresses human rights in a more comprehensive fashion.	Margaretha Wewerinke-Singh	Leiden University; University of the South Pacific	Netherlands
16799	9	19	11	8	This chapter omits a description of the human right links to mitigation, despite the topic being mentioned in the title. There's been a large scholarship on human rights obligations with regards to mitigation, especially in recent years. Recent expressions of that obligation include a report by the UN Special Rapporteur on human rights and the environment (https://undocs.org/en/A/74/161), and joint statement by five UN human rights treaty bodies https://www.ohchr.org/EN/NewsEvents/Pages/DisplayNews.aspx?NewsID=24998&LangID=E See also https://doi.org/10.1163/18786561-00903005 The report should give broad attention to these very significant development. In addition to this, domestic court have ruled on the human rights obligations of governments with regards to mitigation. The most prominent judgement is the so called Urgenda case, in which the Dutch Supreme Court ruled on 20 December 2019 in highest and last instance. (See: https://www.ejiltalk.org/a-new-classic-in-climate-change-litigation-the-dutch-supreme-court-decision-in-the-urgenda-case/).	Accepted, in principle. The SOD addresses human rights in a more comprehensive fashion.	Dennis van Berkel	Urgenda	Netherlands
16801	9	19	11	8	[continued] The importance of the case is reflected in the amount of scholarly articles that have been published on it. A google scholar search on the Urgenda case provides more than 1400 search results: https://scholar.google.nl/scholar?as_sdt=1,5&q=urgenda&hl=nl&as_ylo=2015&as_yhi=2020&as_vis=1 The case has sparked a wave of climate cases around the world and several courts have by now followed the Dutch Court in its conclusion that there are fundamental rights obligations with regards to mitigation (i.e. in Colombia, Norway and Germany). These development have been extensively described in the literature and should thus be reflected in the report. The chapter should link to the description of climate litigation chapter 13.9.3 of the draft report.	Accepted, in principle. The SOD addresses human rights in a more comprehensive fashion.	Dennis van Berkel	Urgenda	Netherlands
29043	9	19	11	8	Some of the loss and damage details probably belong to WGII	Accepted. The SOD checks for overlaps and duplication with WGII coverage on these issues.	Priyadarshi Shukla	Ahmedabad University	India
36363	9	23			What about Development? Why no mention of it? Sustainable Development is different from Development	Noted, however, this is covered by other chapters, and Chapter 14 is focused on international cooperation on mitigation, and this section is looking specifically at the conceptual and governance links that mitigation has with SD, adaptation, loss and damage and human rights.	Youba Sokona	South Centre	Switzerland

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
4715	10	4	10	7	Affirming that literature did not directly examine "leverage adaptation support into meaningful mitigation actions" is incorrect. For instance refer to Stua, M., 2017: Approaches to the Exchange of Mitigation Outcomes and Stua, M., 2017: A Hybrid Model to Govern the Mitigation Alliance, both in: M. Stua (Ed.), From the Paris agreement to a low-carbon bretton woods: Rationale for the establishment of a mitigation alliance. Springer International Publishing. These Chapters widely explore the relevance of the so-called 'share of proceeds' included in Article 6 of the Paris Agreement as a key tool for leveraging adaptation though mitigation actions.	Accepted. References considered for inclusion in the SOD.	michele stua	APE-FVG	United Kingdom (of Great Britain and Northern Ireland)
39743	10	5	10	17	Suggest elaborate more about the links between mitigation-adaptation-loss and damage. How the "direct link" would work? How would adaptation and loss and damage are differentiated? Wouldn't loss and damage be a part of a broad category of adaptation?	Accepted.	Jinsun Lim	International Energy Agency (IEA)	France
37623	10	11	10	11	rewrite to refer to addressing losses, not just reducing losses, e.g,.":and the technical and financial assistance needed to reduce and address those losses."	Accepted, in principle.	Michiel Schaeffer	Climate Analytics	Netherlands
37625	10	17	10	17	this sentence needs to be rewritten - "the higher the collective mitigation ambition, and the likelihood of achieving it, the lower the need for adaptation and likelihood of loss and damage" -- the second half of this sentence does not follow from the first half. Could be rewritten as "the higher the collective mitigation ambition and the likelihood of achieving it, the lower the scale of adaptation ultimately needed and the lower the scale of loss and damage anticipated." We already know from the last two assessment reports that there will be loss and damage - impacts to which adaptation is not possible.. So the "likelihood" of loss and damage is already 100% now, regardless of future mitigation ambition. It is an issue of scale.	Accepted. The SOD text reflects this nuance.	Michiel Schaeffer	Climate Analytics	Netherlands
37627	10	18	10	19	worth noting though that the concept of state responsibiity is not contested under international law - and is referenced in the UNFCCC preamble. or include cross reference to later section of this chapter that addresses loss and damage and refers to state responsibility.	Noted, however the elements and application of state responsibility to the climate problematic is disputed. Also, state responsibility, as a term of art, is not referenced in the UNFCCC preamble. The SOD builds in better cross references across the chapter.	Michiel Schaeffer	Climate Analytics	Netherlands
13961	10	18	10	20	Add a paragraph on the role of central banks and financial regulators in addressing climate change: Setzer, J. and Vanhala, L. C. (2019), Climate change litigation: A review of research on courts and litigants in climate governance. WIREs CLimate Change. 1-19: DOI10.1002/wcc.580	Rejected. This topic is beyond the scope of this chapter. However, the role of financial sector regulation through the TCFD is discussed in the SOD, along with the role of multilateral development banks.	Gonzalo Escribano	Universidad Nacional Educación a Distancia (UNED) and The Elcano Royal Institute	Spain
2733	10	18	10	26	On liability generally, it would be worth noting in some regard that powerful / rich countries are, clearly, the ones that will be expected to pay compensation to weaker / poorer countries but that, in the event, they will have no material incentives to follow through on any commitments they might make. Indeed, the only reason to pay a compensation claim within an international setting is one of moral compunction.	Noted, reflected to the extent the literature supports this statement.	Ronald Mitchell	University of Oregon	United States of America

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
37629	10	22	10	26	This sentence is inappropriate, imbalanced and not logical as a legal matter. Should be deleted. The link is between emissions and responsibility for the impacts that follow from those emissions. It is possible to find liability and assess damages related to that liability, or to find liability but then reduce damages assessed against a liable Party, in view of compensation already paid to address related impacts. Reducing one's emissions (investing in aggressive mitigation through an ambitious NDC) is not tantamount to paying damages to a second Party -- it is merely reducing one's own ongoing or future liability that would follow from emissions that would otherwise have been emitted. This could not be understood to be reducing legal "liability" for past or ongoing emissions. delete sentence - illogical question in the context of the UNFCCC loss and damage discussion, not framed as a proper research topic	Accepted.	Michiel Schaeffer	Climate Analytics	Netherlands
25307	10	32	10	43	Delete “The same implicit bargain ... Linner, 2016).”, as this argument is subjective.	Rejected, this statement is based on literature.	Eleni Kaditi	Organization of the Petroleum Exporting Countries (OPEC)	Austria
36801	10	34	10	39	The authors mention the SDGs and the links to Paris Agreement. However the 2030Agenda is much broader than the SDGs and some mention should be made of other frameowrks. For example the Sendai Framework for Disaster Risk Reduction,focuses on DRR but also mentioned the imporance of mitigation. Governments agreed to, "Promote the incorporation of disaster risk knowledge, including disaster prevention, mitigation, preparedness, response, recovery and rehabilitation, in formal and non-formal education, as well as in civic education at all levels, as well as in professional education and training." Governments must also work to achive these goals and in so doing they can contribute to climate and development goals. Much has recently been written on interlinkages and coherence between the different goals and policy frameworks and I encourage the authors to include this literature, often grey lit, in this paragraph. The OECD, GIZ, GNDR, DIE have all recently released publications on coherence or links between SDGs, climate change adaptaiton and mitigation, and DRR.	Accepted. The SOD includes references to the Sendai FDRR, and other frameworks.	Zinta Zommers	United Nations Office for Disaster Risk Reduction	Germany
4717	10	39	10	46	What you state in these lines appears to contraddict statements from Chapter 3 of this report and its sections focused onthen nexus between mitigation actions and sustainable developemnt. I suggest you to double-check and review either of the sections in order to guarantee consistency to this report.	Accepted. The SOD takes this into account.	michele stua	APE-FVG	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
38113	10	40	10	45	Suggest to revise Dzebo A. et al (2019) from SEI paper on the interlinkages between PA and SDG in regards to the negatives as pects too…it is true mitigation measures could reduce poverty, improve economic development. But also negatives aspects could be fomented due to mitigation measures such as gender equality, peace and justice. Refer to: Dsebo A. et all. (2019). Connections between the Paris Agreement and the 2030 Agenda. SEI. https://www.sei.org/wp-content/uploads/2019/08/connections-between-the-paris-agreement-and-the-2030-agenda.pdf The paper demonstrates that the actions outlined in the NDCs to various extents foster synergies with national development priorities that reflect the 2030 Agenda. We find that a large number of climate activities support, for example, SDG 7 (affordable and clean energy), SDG 15 (life on land) and SDG 2 (zero hunger), but that significant gaps exist in relation to SDGs such as SDG 5 (gender equality), SDG 1 (no poverty) and SDG 16 (peace and justice).	Accepted. The SOD extends the discussion to take into account positive and negative aspects.	Karla Solis	onu	Germany
45245	10	41	10	45	The mention of link between mitigation efforts and poverty reduction IS NOT BACKED by any DATA. The appropriate data MUST be included as an evidence so as to back the claim.	Noted. The SOD includes references on this.	Jaimin Parikh	1. United Nations SDSN 2. European Institute of Policy Research and Human Rights 3. University of Delhi	India
6227	10	45	10	46	But financial assistance in itself does not guarantee sustainability in terms of poverty alleviation projects. Equally, most of the aid do not end up targeting the poorest of the poor.	Noted. The SOD includes references on this.	Jude Ndzifon Kimengsi	Department of Geography and Environmental Studies, Catholic University of Cameroon (CATUC)	Cameroon
38115	10	47	11	2	Suggest to revise this paper (Brandi, et al 2019, Climate Policy, 'The 2030 Agenda and the Paris Agreement: voluntary contributions towards thematic policy coherence') which highlights that: An assessment of thematic policy coherence between the voluntary domestic contributions regarding the Paris Agreement and the 2030 Agenda should be integrated in national policy cycles for sustainable and climate policy-making to identify overlaps, gaps, mutual benefits and trade-offs in national policies. Source: Climate Policy https://www.tandfonline.com/doi/abs/10.1080/14693062.2019.1677549?journalCode=tcpo20	Accepted	Karla Solis	onu	Germany
13963	10	26			Acknowledge that, at the request of the US, the decision accompanying the Paris Agreement, explicitly precludes the possibility of claiming compensation and of liability.	Noted, and a reference to the decision is included in the SOD, however, other developed countries were also supportive of this paragraph in 1/CP.21, and it is not appropriate for the IPCC to single out a country in this way.	Gonzalo Escribano	Universidad Nacional Educación a Distancia (UNED) and The Elcano Royal Institute	Spain

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
27133	11	9	11	9	I wonder if the Chapter does not underestimate the role and potential of customary international law. I would insert a new paragraph on the role of customary law (14.3.3, with the current 14.3.3 becoming 14.3.4). In my opinion, the broad interpretation of due diligence, the customary nature of which is established, has significant consequences for States. It can be seen as an attractive basis for State responsibility claims for climate change damage. Beyond its preventive role, it paves the way for increasing litigation based on an increasing knowledge of the thresholds not to be crossed in order to 'prevent dangerous anthropogenic interference with the climate system'. This is all the more interesting in a matter like climate change that this direct obligation of the State has an indirect impact on private stakeholders within its territory or jurisdiction, who are responsible for a very large part of GHG emissions (this is the essence of due diligence obligations). The due diligence obligation is an obligation of 'means' and not of results: 'an obligation to deploy adequate means, to exercise best possible efforts, to do the utmost, to obtain this result' (ITLOS, Responsibilities and Obligations of States with respect to Activities in the Area, 2011, at 39). Is is a positive obligation, and a very strict one : 'it is an obligation which entails not only the adoption of appropriate rules and measures, but also a certain level of vigilance in their enforcement and the exercise of administrative control applicable to public and private operators, such as the monitoring of activities undertaken by such operators' (ICJ, Pulp Mills on the River Uruguay (Argentina v Uruguay) 2010 at 14 par 197). It is a general obligation – applicable to all States notwithstanding they have ratified more specific treaties. as it is binding on all States, including major emitters who lack specific emissions reduction obligations under the Kyoto Protocol or Paris Agreement. This obligation is extremely wide. Due to its 'umbrella' character, it could make up for the potential shortcomings of treaties. And it is in any case an interesting basis that could be relied upon in addition to	Noted, and accepted, in principle. This is an important element, and one we do not touch on in the FOD, in part because it does not represent a development since AR5. However, the PA does rely more closely on due diligence obligations than the Kyoto Protocol does, and this needs to be referenced. We cannot, regretfully, engage in the full analysis that this deserves, however, given constraints of space and time.	Sandrine MALJEAN-DUBOIS	CNRS	France

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
32617	11	11	11	32	This is a misleading sentence: “The Montreal Protocol, for example, may not be instructive in solving climate change, because the former was facilitated by factors such as the technically discoverable and calculable stock of ozone depleting chemicals, and the availability of commercially viable substitutes….” In fact, the Montreal Protocol (MP) has already solved as much climate change as CO2 is causing, when you consider the initial citizen boycotts, national measures in a few countries, and the MP. Velders G. J. M., et al. (2007) The Importance of the Montreal Protocol in Protecting Climate, Proc. Nat’l. Acad. Sci 104(12)4814–4819. It is the only global treaty with mandatory climate mitigation measures, and is widely regarded as the most successful international environmental agreement. Hunter, Salzman, & Zaelke, International Environmental Law and Policy (5th ed. 2015). It solved the first global threat to the atmosphere and put the stratospheric ozone layer on the path to recovery by 2060. See UNEP (2019) SYNTHESIS OF THE 2018 ASSESSMENT REPORTS OF THE SCIENTIFIC ASSESSMENT PANEL, THE ENVIRONMENTAL EFFECTS ASSESSMENT PANEL AND THE TECHNOLOGY AND ECONOMIC ASSESSMENT PANEL, UNEP/OzL.Pro.31/8 (“The atmospheric concentrations of both total tropospheric chlorine and bromine from long lived ozone-depleting substances controlled under the Montreal Protocol have continued to decline since the 2014 assessments. Progress continues to be made in every consumer, commercial, industrial, agricultural, medical and military sector, with ozone-depleting substances having been phased out of many applications worldwide… presently, about 99 per cent of global reported controlled uses have been phased out.”).	Noted. Thank for pointing this out. Clearly the MP has some insights for solving climate change, and has led to major GHG emissions reductions. But the MP may not offer insights into some important areas of the mitigation challenge, such as how to enhance action in areas where key technologies are not yet competitive. Accordingly revised.	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
32619	11	11	11	32	The MP also is the most successful treaty for mitigating climate change, so far, having reduced greenhouse gas emissions by a net of 135 billion tons of CO2-equivalent, or 11 billion tons per year, from 1990 to 2010, delaying climate forcing by 7 to 12 years; when early voluntary and national measures to reduce ODSs are included from 1974 onwards, the delay in climate forcing is from 35 to 41 years, avoiding as much warming as CO2 is causing today (Velders G. J. M., et al. (2007) The Importance of the Montreal Protocol in Protecting Climate, Proc. Nat'l. Acad. Sci 104(12)4814–4819). Phasing down HFC refrigerants can avoid up to 0.5C of warming by 2100 (Xu Y, et al. (2013) The role of HFCs in mitigating 21st century climate change, ATMOS. CHEM. & PHYS. 13:6083–6089, 6083 ("Here we show that avoiding production and use of high-GWP (global warming potential) HFCs by using technologically feasible low-GWP substitutes to meet the increasing global demand can avoid as much as another 0.5 ºC warming by the end of the century."); the initial phasedown schedule of the 2016 Kigali Amendment will capture about 90% of this, avoiding up to 0.44C of future warming, with additional mitigation provided by the amendments requirement for parties to use best efforts to reduce HFC-23, a by-produce of the production of HCFC-22. See UNEP (2019) SYNTHESIS OF THE 2018 ASSESSMENT REPORTS OF THE SCIENTIFIC ASSESSMENT PANEL, THE ENVIRONMENTAL EFFECTS ASSESSMENT PANEL AND THE TECHNOLOGY AND ECONOMIC ASSESSMENT PANEL, UNEP/OzL.Pro.31/8. Additional climate mitigation of up to 39-64 Gt CO2-e is available by capturing the ODS at product end-of-life and destroying or recycling it. Velders G. J. M., et al. (2014) Growth of climate change commitments from HFC banks and emissions, ATMOS. CHEM. PHYS. 14:4563–4572. Parallel efforts to improve energy efficiency of cooling equipment during the mandated phasedown of HFCs under the Kigali Amendment can double the climate benefits of the phasedown. UNEP (2019) SYNTHESIS OF THE 2018 ASSESSMENT REPORTS OF THE SCIENTIFIC ASSESSMENT PANEL, THE ENVIRONMENTAL EFFECTS ASSESSMENT PANEL AND THE TECHNOLOGY AND ECONOMIC ASSESSMENT PANEL, UNEP/OzL.Pro.31/8; WMO, et al. (2019) Scientific Assessment of Ozone Depletion:	See our response to comment 32617.	Durwood Zaelke	Institute for Governance & Sustainable Development	United States of America
32621	11	11	11	32	The MP illustrates the strength of a sectoral approach to climate protection, which is increasingly being pursued, for example by ICAO and IMO, and could be extended further to such sectors as steel, aluminium, and cement. The Paris Agreement can measure, account, and coordinate sectoral sister agreements.	Accepted. Thank you fort pointing this out. Noted in the revised draft.	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
32623	11	11	11	32	The ozone protection regime controls upstream production and consumption of the chemicals within its jurisdiction and has successfully eliminated about 99% of the production and consumption of ozone depleting substances (ODSs). The MP now covers 96 ODSs and 18 ozone-safe but high GWP HFCs, which are organic compounds that contain hydrogen and fluorine atoms. The MP builds on general international legal principles, foremost that a State is responsible for activities under its jurisdiction or control that cause damage to another State, or to areas beyond national control (Hunter, Salzman, and Zaelke, International Enviornmental Law and Policy (5th ed. 2015), 466–472). The MP incorporates core international legal principles, including: the precautionary principle of taking action before irreversible damage is evident; and common but differentiated responsibilities and respective capabilities (Hunter, Salzman, and Zaelke 2015, 463-466), operationalized through earlier phaseout control schedules for developed countries, and financing by developed country parties of the agreed incremental cost for ODS phaseout for developing country parties. The MP also has an innovative procedure for “adjustments”, which have been used to strengthen past phasedown schedules; the adjustments are binding on all parties, without the need for ratification, six months after being agreed, unless a party affirmatively opts out. The MP also has standing scientific, environmental effects, and technology assessment panels that are authorized to publish reports without editing by Parties. SO Andersen and K Madhava Sarma (L Sinclair (ed)), Protecting the Ozone Layer: The United Nations History (Earthscan London 2002).	Noted. Thank you for pointing these out.	Durwood Zaelke	Institute for Governance & Sustainable Development	United States of America
32625	11	11	11	32	National governments have used many strategies to promote MP implementation and compliance. Customs codes and permits for production, import, and export of ODSs, product bans and use controls, sector phaseout schedules, refrigerant service procedures that included venting prohibition, recovery/recycling, service training and certification, and sale of ODSs only to certified technicians working in shops, ODSs recycling, and manufacturing containment have played important roles. Economic incentives and disincentives in the market, such as government procurement preference for ODS-free products and ODS taxes, public disclosure of corporate and facility ODS emissions, fees, and trading and auctioning schemes have been introduced. Public awareness and consumer empowerment, including educational campaigns, labelling requirements (official, third-party, or self-certification), industry education, review and approval of ODSs alternatives, equipment standards, establishment of halon banks, and research and development have been other key government activities. Collaboration among stakeholder groups and quasi-governmental activities, such as industry standard associations, health and medical registration, voluntary government/industry programmes, company pledges, and industry/government/NGO partnerships have also played a role in the successful implementation of the MP.	Noted.Thank you for pointing these issues out. Section revised.	Durwood Zaelke	Institute for Governance & Sustainable Development	United States of America
32627	11	11	11	32	The MP is considered a “start and strengthen” treaty. It has been amended five times to add new chemical substances to the control schedules and adjusted six times to accelerate phaseout schedules. The last adjustment was in 2007 to accelerate the phaseout of HCFCs for both ozone protection and climate protection, and the last amendment, the Kigali Amendment in 2016, was to phase down ozone-safe but high GWP HFCs.	Noted. Thank you for pointing this out. Section revised.	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
13049	11	33	11	33	The Backstrand et al reference is repeated here and on p.33, line 10 - it should only appear once. From a substantive perspective, this is another example of unnecessary over-emphasis on the newness of the PA.	Accepted. SOD revised to note the importance of the overall UNFCCC relative to the Paris Agreement.	Joanna Depledge	Climate Policy Journal	United Kingdom (of Great Britain and Northern Ireland)
13051	11	33	11	34	I know such pronouncements are common in the literature, but the Paris Agreement itself says next to nothing about polycentric governance, with only a reference in its preamble. It is decision 1/CP.21, and the process leading up to and after Paris, which indeed recognised and gave greater emphasis to the benefits of working with other actors (although I would say focussing much more on civil society, businesses and other NSAs, rather than other MEAs).	Noted. I believe that it is the literature analysing the Paris architecture that categorizes it in terms of polycentric governance, rather than the Paris Agreement specifically mentioning this itself.	Joanna Depledge	Climate Policy Journal	United Kingdom (of Great Britain and Northern Ireland)
6229	11	33	11	36	dealing with emergent recentralization that is associated with the institution of decentralised resource governance and climate mitigation regimes, should be taken into account. At local levels, the emergence of powerful actors who dominant and drive local processes to their benefits still remains an issue to be addressed. As a potential consideration, the institution of bottom-up institution building processes - constitutionality - could serve as an entry point to address power asymmetry linked to decentralised participatory processes.. See also: Haller, T., Acciaioli, G., & Rist, S. (2016). Constitutionality: Conditions for Crafting Local Ownership of Institution-Building Processes. Society & Natural Resources, 29(1), 68–87. DOI: https://doi.org/10.1080/08941920.2015.1041661 Kimengsi, J. N., Aung, P.S., Pretzsch, J., Haller, T. and Auch, E. (2019). Constitutionality and the Co-Management of Protected Areas: Reflections from Cameroon and Myanmar. International Journal of the Commons, 13(2), pp. 1003–1020. DOI: https://doi.org/10.5334/ijc.934	Rejected. We don't see these issues as having a strong bearing on international cooperation, but rather on national level policy making as described in Ch 13.	Jude Ndzifon Kimengsi	Department of Geography and Environmental Studies, Catholic University of Cameroon (CATUC)	Cameroon
45247	11	33	11	36	NEED TO EMPHASIZE the 'WILL POWER' of local administration of the regions. The phrase which alternative could be included is: "...for more decentralised 'polycentric' forms of government, which has been highly uncertain at implementation level and requires an immediate attention of the local authorities, and that engages diverse actors..."	Rejected. Adopting the language in the comment would, we believe, push us towards policy prescriptive statements, which we need to avoid.	Jaimin Parikh	1. United Nations SDSN 2. European Institute of Policy Research and Human Rights 3. University of Delhi	India

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
38117	11	33	11	42	The issue of incentivazing the NAZCA, Non-State Actions for Climate Change (incuding the private sector was also acknowledged by the international negotiators in COP14, 2004 (LIma). The lesson being learnt from NAZCA is that climate ambition and action will be able to be analyzed by different sectors (not only at national level). Hence, demonstrating the new ere of hybrid multilateralism presented by Backstrand et al. 2017 in line 33. A report (a bit outdated though, Yale University, 2016) highlights the key achievements of the non party/state actions: ● NAZCA's largest portion of climate actions comes from cities and regions, areas that represent 46 percent of all individual pledges on the platform. ● Most climate actions are categorized as "emissions reduction" commitments, reflecting a UNFCCC norm that focuses primarily on climate mitigation efforts, as opposed to adaptation measures. ● Most of the city and company climate actions captured by NAZCA are in developed countries. Seventy-four percent of NAZCA's city climate actions are based in Europe. The largest data gaps of recorded climate action occur in Africa, Southeast Asia and parts of East Asia, and Latin America. ● Large corporate leaders representing 30 percent of Forbes 2000 are taking climate actions, yet some heavily-emitting sectors, including fossil fuel companies, are lagging. ● Institutional investors have committed to invest up to $720 million in green projects and technologies, while companies representing more than one-third of the global economy have pledged various kinds of climate action. ● Cities, regions, companies, investors, and CSOs have committed to issuing $46.8	Rejected. Thank you for this reference. We think this fits better into chapter 13, looking at governance issues and institutions more generally.	Karla Solis	onu	Germany
2735	11	38	11	48	"the effectiveness of cooperative efforts at other governance levels and in other forums" -- might also compare MEA effectiveness to effectiveness of non-governmental efforts, including public/private partnerships, NGO efforts, MNC actions, and civil society efforts.	Noted. That is what we meant. Clarified.	Ronald Mitchell	University of Oregon	United States of America
8705	11	44	12	2	[14.3.4 Additional explanation] - This section deals with the criteria and indicators for assessing effectiveness of overall international cooperation on climate mitigation. These criteria and indicators are utilized to make an assessment of 'current levels of international cooperation' for climate mitigation at the end of this chapter, and this is summarized in to the Figure 14.1. This means that these criteria and indicators are highly important to assess not only individual/different form of international cooperation but also the overall international cooperation of numerous different forms of international cooperation in this chapter. - Therefore, I suggest that the author can explain further on the utilization of these criteria and indicators in this chapter for the assessment of overall international cooperation.	Noted. This comment asks us basically to improve this section, and explain the indicators and their application more clearly. This section has been revising towards this end.	Chaewoon Oh	Green Technology Center	Republic of Korea

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
38119	11	1	14	18	Overall Section 14.3.4 provides a framework to assess the effectiveness of international cooperation. However, it is not clear how the set list of criterion (5) with a total of 19 indicators are being analysed. Suggestion to include a measurement that will allow a more objective/numerical results of subjective theme. E.g. Criterion 1 Environmental effectiveness Indicator: AFLOU: limits CO2 emissions Measurement: tCO2/period To include units for the particular indicator: tCO2 To indicate the amount of CO2 emissions reduced during a period of time - when assessment the specific cooperation/MA Criterion 5 Institutional strength Indicator: administrative capacity Measurement: Number of staff in the team supporting the specific MA or Hours training on the MA in a particular year of study	Accepted. These are usfeul suggestions, but we are constrained by the literature that we are reviewing and citing. That literature uses a variety of indicators, and we now realize that we are constrained to these.	Karla Solis	onu	Germany
13965	11	9			Acknowledge the role of non-state actors I fostering/supporting international cooperation via the climate action agenda and the potential emission reductions that can be expected from non-state actors, as well as the limitation of NSA commitments? Acknowledge the role of the NAZCA platform and the Yearbook since 2017 in making commitments visible? References: Ref: https://climateaction.unfccc.int/ Ref: UNFCCC (2019), Yearbook of Global Climate Action. Marrakech Partnership for Global Climate Action. Bonn: UNFCCC. Ref: Sullivan, R. and Gouldson, A. (2017), Business Strategy and the Environment Bus. Strat. Env. 26, 413–425 (2017) The Governance of Corporate Responses to Climate Change: An International Comparison Ref: Littlewood et al (2018), Examining the drivers and outcomes of corporate commitment to climate change action in European high emitting industry. Business Strategy and the Environment. 1-13.	Noted, this is covered in other sections of the chapter.	Gonzalo Escribano	Universidad Nacional Educación a Distancia (UNED) and The Elcano Royal Institute	Spain
13967	11	27			Add reference: Barrett, S,. (2007), Why cooperate. The incentive to supply public goods. New york. Oxford University Press.	Noted. We are attempting to limit our coverage of theory to new developments since AR5.	Gonzalo Escribano	Universidad Nacional Educación a Distancia (UNED) and The Elcano Royal Institute	Spain
13969	11	33			Add reference: Bodansky, D. et al (2015), Facilitating linkage of climate policies through the Paris outcome. Climate Policy. http://dx.doi.org/10.1080/14693062.2015.1069175	Accepted. Thank you for this reference.	Gonzalo Escribano	Universidad Nacional Educación a Distancia (UNED) and The Elcano Royal Institute	Spain

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
13971	11	33			Add reference: Sullivan, R. and Gouldson, A. (2017), Business Strategy and the Environment Bus. Strat. Env. 26, 413–425 (2017) The Governance of Corporate Responses to Climate Change: An International Comparison	Rejected. We see this as falling more clearly within the ambit of Chapter 13, as it is a comparison of alternative national approaches.	Gonzalo Escribano	Universidad Nacional Educación a Distancia (UNED) and The Elcano Royal Institute	Spain
2737	12	4	12	4	You might mention something about "institutional robustness" and "dynamic effectiveness" to get at how the institution's effectiveness looks and develops over time.	Noted. We revise the set of indicators to better match what the literature actually covers.	Ronald Mitchell	University of Oregon	United States of America
19221	12	4	12	4	In Table 4.1, transformative potential should also include as an indiator the basic capacity of countries, such as education, scientific capacity, statistical capacity. These elements, which exist regardless of climate change issues, are fundamental to move forward transformative potential. See, for example, • Umemiya, C., White, M., Amellina, A. & Shimizu, N. (2017) National greenhouse gas inventory capacity: An assessment of Asian developing countries. Environmental Science and Policy, 78: 66–73. * Khan (2018) The Paris Agreement Capacity Building.	Noted. This is an interesting issue, although it better fits the transformative potential within particular countries, as relating to national level policies, and hence chapter 13 more than here.	Chisa Umemiya	Institute for Global Environmental Strategies	Japan
38121	12	4	12	4	Specifcs to Table 14.1: 1) To include a brief description of each indicator in order to provide a better understanding of what is means by creating a new column. Additional info is provided for Criteria 1 and 4. But other criterion do not have further info. E.g.: Criterion 4 - Economic performance Indicator: Cost effectiveness Description: Ability to reach targets in a least-cost manner Criterion 5 - Institution strength Indicator: Regulative quality Description: Institutions and agreements have a fundamental guidance and signalling function. 2) For criterion 1 - why not to mention the specific gases for other Kyoton Annex A and non-Annex A? This will provide better clarity on what gases are assessed. Would this indicator be valid: AFOLU: limits emissions of non-Annex A gases? 3) Criterion 2- what is the difference between infrastructure planning and engineering indicators? Whay institutional capacity is not included in criterion 5 - Institutional strenght. I udnerstand that the capacity for criterion 2 refers to the capacity improved due to the low carbon technologies. Hence, then the assessment could provide 2 indicators; one referring to improve loc-carbon engineering (measured in MW installed capacity in a period) and another indicator could be to improve technical capacities of low-carbon technologies measured with the number of renewable energy technicians trained in a particular country and period of time.	Nopted. These are all really useful ideas. However, after writing the FOD, we realized that we were constrained by what the literautre itself assesses, and the indicators it uses. Better defining the indicators here does not help us in our assessment, when that doesn't match what individual studies have used.	Karla Solis	onu	Germany

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
39959	12	4	12	4	There is no clear case, why AFOLU is separated from the bundle of other sectors. One could argue that the difference between waste and industry is similarly large. - Except the first one, the criteria for "transformative potential" cannot be operationalized, as they depend on value judgements of the observer. It would be preferable to apply the criteria used by Hermwille et al. (2015): Change of prevailing structures, Promotion of technology transfer, Technological learning, Economies of scale. Hermwille, Lukas; Obergassel, Wolfgang; Arens, Christof (2015): The transformative potential of emissions trading, Carbon Management, 6:5-6, p. 261-272, - Change distributive criteria in "rich" instead of "industrialized" and "poor" instead of "developing" countries.	Noted. Thank you for both the idea and the reference. Our reason for separating afolu and non-afolu was that while non-Afolu is very much about industrial activities and technologies. Afolu is generally not, but rather primarily about issues such as land tenure. Progress in one area may not be an indicator of progress in another.	Axel Michaelowa	University of Zurich	Switzerland
43493	12	4	12	4	The entire table is cannot be argued as rooted in the literature. The categories are arbitrary and cannot be operationalized: Is the use of Bioenergy with CCS an AFOLU or an energy sector activity? How are industrialized vs. developing country efforts operationalized? As per the archaic KP Annex-1 vs. NAI?	Noted. The table is not primarily rooted in the literature. It is an attempt to harmonize the assessment criteria used by this chapter in AR5 with the criteria used elsewhere in AR6, with some consideration of new aspects in the literature. Changed in the SOD.	Matthias Honegger	Perspectives Climate Research gGmbH	Germany
45249	12	4	12	4	One of the important aspect which table neglects is the outcomes or results at grassroots and it finds no mention in it.	Accepted. This is an interesting point, and arguably falls under institutional strength. We will search the literature for any papers on this issue.	Jaimin Parikh	1. United Nations SDSN 2. European Institute of Policy Research and Human Rights 3. University of Delhi	India
45251	12	4	12	4	Under Economic Performances the following indicators SHOULD be added: I) Co-operation in the field of Circular Economy 2)co-operation in FDIs involving green projects	Noted. These are interesting ideas, but we are constrained by what the literature uses as indicators.	Jaimin Parikh	1. United Nations SDSN 2. European Institute of Policy Research and Human Rights 3. University of Delhi	India
45253	12	4	12	4	Another criteria which could have been included is that of CLIMATE DIPLOMACY	Rejected. We don't understand how this would be an indicator relevant to the performance of a particular form of cooperation. It would seem to describe the cooperation itself.	Jaimin Parikh	1. United Nations SDSN 2. European Institute of Policy Research and Human Rights 3. University of Delhi	India
12951	12	4	12	5	Table 14.1 is somewhat misleading in that it does not really provide any measure of effectiveness of collaboration; it only lists goals.	Noted. The idea is that we would assess the effectiveness of various forms of cooperation at reaching the stated goals.	Prashant Goswami	Institute of Frontier Science and Application	India

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
13053	12	4	12	5	The listing of indicators against the criterion of environmental effectiveness is confusing. Why is AFOLU the reference point, and why does "non-AFOLU: limits CO2 emissions" - the central challenge in addressing climate change - come third? The designation "AFOLU/non-AFOLU", and the many categories is unnecessarily distracting, when essentially we are simply concerned with cutting emissions. Why not simply have three categories: "limits CO2 emissions (non-AFOLU and AFOLU); limits emissions of other Kyoto Protocol Annex A GHGs (non-AFOLU and AFOLU); and limits emissions of other GHGs not included in the Kyoto Protocol's Annex A". I would also make sure to specify what you mean by Annex A GHGs (and do you include NF3?). Having now read the full chapter, the detail of these criteria and indicators is inconsistent with the short actual assessments provided on pages 29-30, which cover literally less than a page. For example, non-Annex A gases are not even mentioned. The table promises a lot, but the actual assessment doesn't deliver.	Noted. You are correct that the list of indicators is inconsistent with what we actually do later in the chapter. We have revised this section accordingly. In terms of separating AFOLU and non-AFOLU, as well as different gases, the idea was that a given instrument might do a really great job at influence emissions of a particular kind in a particular sector, but yet those emissions in that sector are not necessarily important in the big scheme of things. So for example, we can only solve climate change so much by improving even more on the Montreal Protocol.	Joanna Depledge	Climate Policy Journal	United Kingdom (of Great Britain and Northern Ireland)
32229	12	4	12	5	The table and criteria and indicators are overall sound. However, the criteria seem to ignore the potential for "problem-shifting": in other words, while climate cooperation may be deemed "effective", it leads to the exacerbation of other problems, such as biodiversity loss or food security. This may be captured in "Promotion of co-benefits" to some extent, but ideally questions about e.g. biodiversity loss and non-climate change mitigation environmental effects (including both positive and negative spillovers) should be captured under the broadly framed criterion of environmental effectiveness (which at present only captures indicators related to GHG emissions).	Noted.That is a really interesting point. Ultimately we are constrained by what the literature uses as indicators, as we discovered during writing the FOD.	Harro van Asselt	University of Eastern Finland	Netherlands
37639	12	4	12	5	Table: would be useful to present a clear understanding of transformational. What is being transformed? from what to what? Is it transformational to a low-carbon economy? The final two elements under this heading are different in nature from the others (non-AFOLU negative emissions and technologies/institutions for SRM). Non-AFOLU negative emissions is a bit cryptic - what is actually meant here? Reference to SRM should be deleted, as not related to emissions or removals. The heading on environmental effectiveness would benefit from references to SDGs and consistency with other treaty processes.	Noted. WRT transformative potential, we are linking to chapter 1, and alternative framings, and that is where this is described in depth. We include SRM because we were required to by the IPCC plenary. Non-AFOLU negative emissions means DACCS.	Michiel Schaeffer	Climate Analytics	Netherlands
38235	12	4	12	5	Table 14,1 should include indicators to assess lock-in effect of international cooperation such as those mentiioned in previous comments and the use of development funds to develop low ambition standards in the global South which lead to spreading outdated technologies in the global South. This is teh case of standards and labels for cars and appliances	Noted. We are ultimately constrained by the literature, and have revised this table accordingly. We also consider this later in the chapter, on sectoral agreements and standards.	Yamina Saheb	OpenExp, Ecole des Mines de Paris	France
4719	12	9	12	9	When citing Chapter 17, I suggest adding also a reference to Chapter 3 that widely explores the subject.	Accepted. Thank you pointing this out.	michele stua	APE-FVG	United Kingdom (of Great Britain and Northern Ireland)
37631	12	9	12	9	this is not an appropriate reference to the global goal under the UNFCCC or PA - "achieving temperature targets such as 1.5°C – 2°C". The goal is explicitly not 2C. See Schleussner et al (2016) on temperature goal, see also Mace (2016) Mitigation Commitments under the Paris Agreement and the Way Forward (Climate Law) with history of SED and temperature goal Could rewrite more accurately as "pursuit of the 1.5C limitation in temperature increase requires progress in all areas"	Noted. We used this as an illustrative temperature goal, recognizing that there are many possible goals.	Michiel Schaeffer	Climate Analytics	Netherlands

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
45255	12	10	12	10	The Phrase ("not to group all actions together") is clearly flawed as it contradicts the previous claims in the chapter. Instead the following MUST be used: "...it is essential to comprehensively put the actions together, while equally emphasizing on each actions separately..."	Rejected. We strongly disagree. If one lumps all actions together to assess only their combined effectiveness, one may miss areas of strength and weakness, and learn from them.	Jaimin Parikh	1. United Nations SDSN 2. European Institute of Policy Research and Human Rights 3. University of Delhi	India
19209	12	12	12	12	In the case of AFOLU, iindicators of, such as, forest area, forest biomass stock and forest species should be mentioned. International cooperation, if measured only by gases, will prove to be effective, only in large emitting countries. Small countries will be left behind.	Noted. These are good points. We are constrained by the literature, however, and so can only list these to the extent that the literature assessing effectiveness uses them.	Chisa Umemiya	Institute for Global Environmental Strategies	Japan
18367	12	4	13	43	Equity is a precondition of international cooperation and the UNFCCC and its Paris Agreement have extensive equity provisions. Effectiveness of international cooperation should be measured in GHG or temperature related terms somehow as a result of outcome of the cooperation. Distributive outcomes are not relevant criteria because the goal of climate treaty is not to improve global distribution.	Rejected. We disagree. Consistent with previous IPCC reports, we believe it is relevant to assess outcomes not only in terms of GHG reduction, but also with respect to other societal goals. That is a central tenent of policy analysis.	Kazuhiko Hombu	Graduate School of Public Policy, The University of Tokyo	Japan
8707	12	6	13	4	[14.3.4. Rather simplistic indicators of environmental evffectiveness] - This section explains the indicator of 'environmental effectiveness' as one of criteria for assessing effectiveness of international cooperation. I think the explanation on the environmetnal effectiveness itself is fine. However, the indicators for envirionmental effectiveness are too simplistic. All indicators are only the scope of gases. I understand that this 'scope of gases' approach is inevitable to assess the effect of numerous forms of international cooperation on climate mitigation. - Yet, 'Indicators' are highly important. For example, they are applied in the assessment of the Paris Agreement in the section 14.4.2.13. In this section, the assessment on the Paris Agreement is made only in terms of the scope of gases. I think this indicator is not enough to assess the environmental effectiveness of the Paris Agreement. There are some studies on the indicators or the conditions for environmental effectiveness of international cooperation/agreement/institutions. - Therefore, I suggest that the author can consider distinctive sutides such as Dimitrov et al. (2019) and Barret (2008) and that the author can consider the other indicators such as i) participation scope, ii) level of commitments, and iii) compliance rates as well. Even though these are not fully applied in the assessment, I suggest that the author can mention these indicators. Also, the author can explain why the author chose only one indicator of 'scope of gases' (<- this is because the author attempted to assess 'overall' assessment of many different forms of international cooperation). - Dimitrove et al. (2019). Institutional and environmental effectiveness: Will the Paris Agreement work? Wires Climate Change. Doi: 10.1002/wcc.583. - Barrett, S. (2008). Climate treaties and the imperative of envforcement. Oxford Review of Economic Policy, 24(2), 239-258.	Noted. Thanks for these references. We are ultimately constrained by what the literature offers us, and these studies have apparently looked at sensible indicators. We have read and cited as approriate.	Chaewoon Oh	Green Technology Center	Republic of Korea
13055	12	18	13	1	To the best of my knowledge, HFCs are the only Annex A GHG that are covered by another agreement, namely the Kigali Amendment to the MP. Please correct, otherwise the phrasing suggests that methane, nitrous oxide, PFCs, SF6 and NF3 are also covered by other agreements (note that I don't know about NF3).	Accepted. Thanks for this information. Revised accordingly.	Joanna Depledge	Climate Policy Journal	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
13973	12				Table 14.1: Why is promotion of co-benefits in distributive outcomes? In the last column on Institutional strength, add a category on National Climate Legislation adopted as a result of (as the enforcement arm of) the Paris Agreement and fostered by hosting a COP? see for instance: Clare, A., Fankhauser, S. and Gennaioli, (2017), The national and international drivers of climate change legislation in Averchenkova, FAnkhauser and Nachmany (eds.), Trends in Climate Legislation. Cheltenham: Edward Elgar: 19-36.	Noted. These are good ideas, and thank you for the references. We are constrained by the literature in our indicators.	Gonzalo Escribano	Universidad Nacional Educación a Distancia (UNED) and The Elcano Royal Institute	Spain
19211	13	5	12	12	Transformation in social system, which includes technology as a part, is an important factor and indicator. The current text can be read as if technology is the only factor this chapter considers as important, which I must fully disagree with.	Accepted. Thank you, this is correct. We believe that this comes up within Chapter 1,. but we have revised here accordingly.	Chisa Umemiya	Institute for Global Environmental Strategies	Japan
4721	13	5	13	5	"As is recognized throughout this report" to be changed with "As recognized throughout this report".	Accepted. Thank you.	michele stua	APE-FVG	United Kingdom (of Great Britain and Northern Ireland)
37633	13	5	13	6	same comment as for p 12, line 9 - "1.5°C – 2°C" is not an accurate expression of the global goal. Neither the UNFCCC nor the PA has a 2C goal, and in fact a 2C limit was explicitly rejected as inadequate in 10/CP.21. Can rewrite as "As is recognized throughout this report, pursuit of climate objectives such as limiting average global warming to 1.5°C will require..."	See our response to comment 37631.	Michiel Schaeffer	Climate Analytics	Netherlands
45257	13	5	13	7	There has been no mention of "Circular Economy" and "Green economic ideas" here which should have had found a place.	Noted. These issues are discussed in other chapters, but to the extent it is appropriate to consider them in terms of the effectiveness of international cooperation, we have done so.	Jaimin Parikh	1. United Nations SDSN 2. European Institute of Policy Research and Human Rights 3. University of Delhi	India
4723	13	7	13	10	What is affirmed in this sentence, especially as to what concerns early diffusion to renewable energy technologies, appears to contradict most of the findings described in Chapter 3 of this report. Moreover, literature supporting your statements appears significantly weaker when compared to the scenarios analysis and literature review included in Chapter 3. I suggest revieweing this part in order to guarantee consistency to this report.	Noted. We will check for consistency, but we are confident that our statement is correct. For example, there is empirical evidence that the steps Germany took to promote solar PV in the 2000's had a great impact on PV cost curves, and hence will be of large importance for future mitigation pathways, and yet had virtually no impact on GHG emissions in Germany during those years. Chapter 13 does not look at these historical trends.	michele stua	APE-FVG	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
4725	13	13	13	19	When discussing about Multi-Level Perspective, I suggest you to add references to the milestones of Socio-Technical Transition Theories. These should include at least: Kemp, R., 1994: Technology and the transition to environmental sustainability: the problem of technological regime shifts. Futures 26, 1023–1046. Kemp, R., Schot, J.W., Hoogma, R., 1998: Regime shifts to sustainability through processes of niche formation: the approach of strategic niche management. Technology Analysis and Strategic Management 10, 175–196. Rip, A., Kemp, R., 1998: Technological change. In Human choice and climate change, vol. 2, edited by S. Rayner and E. L. Malone, 327–99. Columbus, OH: Battelle. Berkhout, F., 2002: Technological regimes, path dependency and the environment. Global Environmental Change 12, 1–4. In addition, given the relevance of Evolutionary Economics for a full understanding of Multi-Level Perspective theories, I would suggest the inclusion of two key papers setting their foundations: Dosi, G., 1982: Technological paradigms and technological trajectories: a suggested interpretation of the determinants and directions of technical change. Research Policy 11, 147–162. Nelson, R. R., Winter S. G., 1982: An evolutionary theory of economic change. Cambridge, MA: Belknap.	Noted. Thank you for the references. We cite these as appropriate and useful.	michele stua	APE-FVG	United Kingdom (of Great Britain and Northern Ireland)
4727	13	19	13	27	I suggest to enhance what you affirm in these lines with some literature, where available.	Accepted. Yes, you are right. As we discovered when writing the FOD was that we were constrained by what is in the literature, and so we need to pay closer attention to what indicators people have used already, when introducing these here.	michele stua	APE-FVG	United Kingdom (of Great Britain and Northern Ireland)
39961	13	19	13	27	Except the first one, the criteria for "transformative potential" cannot be operationalized, as they depend on value judgements of the observer. For example, there is no objective reason why to separate AFOLU NETs and non-AFOLU ones, as the challenges are comparable. Covering SRM in the report may not be appropriate as SRM is no "mitigation". It would be preferable to apply the criteria used by Hermwille et al. (2015): Change of prevailing structures, Promotion of technology transfer, Technological learning, Economies of scale. Hermwille, Lukas; Obergassel, Wolfgang; Arens, Christof (2015): The transformative potential of emissions trading, Carbon Management, 6:5-6, p. 261-272,	Noted. We are agree that their are valiue judgments required. But we also believe that it is impossible to separate onesself from value judgments. Why did we separate out AFOLU NETs and non-AFOLU NETS? Because they are very different technologies, with very different implementation challenges, and different governance challenges. That's our subjective belief, to be sure.	Axel Michaelowa	University of Zurich	Switzerland
43495	13	19	13	27	Except the first one, the criteria for "transformative potential" cannot be operationalized, as they depend on value judgements of the observer. For example, there is no objective reason why to separate AFOLU NETs and non-AFOLU ones, as the challenges are comparable. Covering SRM in the report may not be appropriate as SRM is no "mitigation". It would be preferable to apply the criteria used by Hermwille et al. (2015): Change of prevailing structures, Promotion of technology transfer, Technological learning, Economies of scale. Hermwille, Lukas; Obergassel, Wolfgang; Arens, Christof (2015): The transformative potential of emissions trading, Carbon Management, 6:5-6, p. 261-272,	Please see our response to comment 39961.	Matthias Honegger	Perspectives Climate Research gGmbH	Germany

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
4729	13	28	13	43	Given the relevance of equity, I strongly suggest to increase references to literature. These shall include both references to pre-Paris literature and to post-Paris one. I suggest including: insights from Stua, M., 2017: The Mitigation Alliance Target and Its Distribution in:M. Stua (Ed.), From the Paris agreement to a low-carbon bretton woods: Rationale for the establishment of a mitigation alliance. Springer International Publishing. Baer, P., Athanasiou, T., Kartha, S., Kemp-Benedict, E., 2009: Greenhouse development rights: A proposal for a fair global climate treaty. Ethics, Place and Environment, 12(3), 267–281. Bretschger, L., 2017: Equity and the convergence of nationally determined climate policies. Society for Environmental Economics and Policy Studies,19(1), pages 1-14. Garibaldi, J. A., 2014: The economics of boldness: Equity, action, and hope. Climate Policy, 14(1), 82–101. Grubb, M., 1995: Seeking fair weather: Ethics and the international debate on climate change. International Affairs, 71, 463–496. Leimbach, M., 2003: Equity and carbon emissions trading: A model analysis. Energy Policy, 31, 1033–1044. Markandya, A., 2011: Equity and distributional implications of climate change. World Development, 39(6), 1051–1060. Méjean, A., Lecocq, F., Mulugetta, Y., 2015: Equity, burden sharing and development pathways: Reframing international climate negotiations. International Environmental Agreements, 15, 387–402. Rose, A., Stevens, B., Edmonds, J., Wise, M., 1998: International equity and differentiation in global warming policy. Environmental and Resource Economics, 12, 25–51. Winkler, H., Rajamani, L., 2014: CBDR&RC in a regime applicable to all. Climate Policy, 14(1), 102–121.	Noted. Thank you for these references. We have paid closer attention to equity in the SOD.	michele stua	APE-FVG	United Kingdom (of Great Britain and Northern Ireland)
6231	13	33	13	34	perhaps, viewing the equity spectrum from three dimensions: contextual procedural and distributive will provide a holistic picture and improve efforts aimed at addressing equity issues in the context of climate change mitigation. See: Kenfack Essougong, U. P., D. Foundjem-Tita, and P. A. Minang. (2019). Addressing equity in community forestry: lessons from 20 years of implementation in Cameroon. Ecology and Society 24(1):9.	Noted. Thank you for these references. We cite, to the extent they touch on the assessment of interntional cooperation.	Jude Ndzifon Kimengsi	Department of Geography and Environmental Studies, Catholic University of Cameroon (CATUC)	Cameroon
45259	13	36	13	36	The aspect of Least Developed Countries (LDCs) seems to have been neglected. The following phrase should be included: "both industrialized and developing countries must show their responsibility towards the under developed countries which are the least responsible for the disaster of climate change but are suffering the most"	Noted. We agree that we need to pay closer attention to issues relevant for LDCs. However, we also want to avoid policy prescriptive statements, which is what you suggest here.	Jaimin Parikh	1. United Nations SDSN 2. European Institute of Policy Research and Human Rights 3. University of Delhi	India
39963	13	36	13	37	The terms "industrialized" and "developing" countries is not clearly defined and since the Paris Agreement has lost ist relevance for international climate policy, as the Kyoto "bifurcation" is over. Therefore replace the terms by "rich" and "poor" countries, respectively, to indicate that the categories are shifting.	Noted. Thanks for this idea. Of course the framing used in the Paris Agreement does not constrain us, but we use language consistent with current usage.	Axel Michaelowa	University of Zurich	Switzerland
43497	13	36	13	37	Industrialized vs. Developing countries is no longer an appropriate framing. The world is no longer binary.	Please see our response to comment 39963.	Matthias Honegger	Perspectives Climate Research gGmbH	Germany
2739	13	47	13	48	"to attain a prescribed level of environmental performance at least cost" should say "to attain a prescribed level of environmental performance at least cost relative to available alternatives to address the problem"	Accepted. This isa good suggestion. Thanks, we make this explicit.	Ronald Mitchell	University of Oregon	United States of America

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
45959	13	18			Here the authors mention that changes in governenace have huge influence on niche technologies. I do not understand why the authors seem to ignore that thie policies here are the emission regulations. Here is the deep interconnection between energy transitions and emission regulation. I know that most energy transition researchers tend to ignore this. However, it is key. This has been highlighted by the overall literature of induced technological change that has been reviewed in previous ARs. The authors should be familiar with this concept.	Noted. Thank you for the suggestion. We are familiar with the concept of induced innovation. To our knowledge, however, the literature assessed in previous assessment reports focused on the issue at a fairly high level, and within an economic framework. What we believe is relatively new is the attention to the issue at a more detailed level, and considering non-economic issues such as regime shifts.	Nico Bauer	Potsdam Institute for Climate Impact Research (PIK)	Germany
13975	13	27			Add a reflection on the current limits to cooperation (i.e. current NDCs, even if fully implemented lead to a >3º warmer worlds vs preindustrial levels). Insert reference to the need to research breakthrough low carbon technologies?	Rejected. We don't see a place for this idea here.	Gonzalo Escribano	Universidad Nacional Educación a Distancia (UNED) and The Elcano Royal Institute	Spain
14239	14	41	10	43	NDC implementation is in its very early stages and the statement made in this paragraph therefore seems rather sweeping. Also one study only in support of such a blunt statement seems inadequate, given that there is plenty literature suggesting that decoupling economic growth from GHGs emissions is indeed possible. I would therefore suggest qualifying this statement	Accepted. Text revised accordingly.	Annalisa Savaresi	University of Stirling	United Kingdom (of Great Britain and Northern Ireland)
45261	14	4	14	9	The following fourth indicator CAN be mentioned: "the ability to influence the inflow of FDIs and capital for green investment and infrastructure into the country."	Accepted. This is a very good idea, and we include it to the extent that literature assesses it.	Jaimin Parikh	1. United Nations SDSN 2. European Institute of Policy Research and Human Rights 3. University of Delhi	India
36803	14	9	14	37	This reads seciton, and the chapter generally, reads a little like a text book.It is interesting and informative but could there be some analysis? How effective are voluntary commitments? What can be done to make sure governments deliver on their commitments?	Noted. Yes, this is certainly the text-book-ish part of the chapter. We shorten this section, and devote more attention to the actual assessment in the SOD.	Zinta Zommers	United Nations Office for Disaster Risk Reduction	Germany
4731	14	12	14	15	Any chance to add more literature confirming this assertion?	Noted. We've added this in the SOD.	michele stua	APE-FVG	United Kingdom (of Great Britain and Northern Ireland)
28189	14	12	14	15	Nyborg et al. 2016 (Science, Vol 654, Issue 6308, 42-43) could be a relevant source here as well, as this article stresses the idea of social norms and their role for passing behavioral tipping points to foster international cooperation	Noted. Thank your for the reference.	Martin Kesternich	ZEW – Leibniz Centre for European Economic Research	Germany
13617	14	15	14	15	Add citation (Redgwell 2006). Full citation: Redgwell, C., 2006: International Soft Law and Globalisation. In Barton et al (eds), Regulating Energy and Natural Resources (Oxford University Press), ch 5. DOI:10.1093/acprof:oso/9780199299874.003.0005.	Noted, however, we focus on papers after AR5, except in exceptional cases.	Stuart Bruce	Wilmer Cutler Pickering Hale and Dorr LLP	United Kingdom (of Great Britain and Northern Ireland)

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
45263	14	15	14	15	The word "conditions" is left open to the interpretation which might serve as a loophole because of different interpretations of the same by various actors. Instead it SHOULD BE well defined by conditions being stated.	Rejected. We don't understand the ambiguity.	Jaimin Parikh	1. United Nations SDSN 2. European Institute of Policy Research and Human Rights 3. University of Delhi	India
2741	14	26	14	26	This section should also mention variation in whether sanctions, rewards, reciprocity, normative pressure, or the like are the mechanisms by which an MEA seeks to influence state behavior - the "responses" to states for complying or not complying are not really mentioned here but, I think, should be.	Noted. This is a good suggestion. We are constrained by the literature, and so include this only to the extent the literature has assessed this.	Ronald Mitchell	University of Oregon	United States of America
13057	14	30	14	34	This paragraph does not do justice to the central position of the UNFCCC in the global climate change regime. This central position needs to be establish and elaborated upon, not least in light of the withdrawal of the US from the PA. The list of elements "captured" by the UNFCCC needs to include its differentiation of commitments between developed and developing countries, with the listing of parties in Annexes I and II. I know you mention Annex I in the next paragraph on the KP, but it would be more logical and accurate to do so in the paragraph on the UNFCCC.	Accepted. The SOD does this.	Joanna Depledge	Climate Policy Journal	United Kingdom (of Great Britain and Northern Ireland)
45265	14	30	14	34	There is no mention of the Stockholm Conference (United Nations Conference of Human Development) of 1972 which was essentially a formal beginning.	Rejected. The Stockholm conference a central role in the evolution of international environmental law, but did not mark a formal beginning for the international climate change regime.	Jaimin Parikh	1. United Nations SDSN 2. European Institute of Policy Research and Human Rights 3. University of Delhi	India
13059	14	39	14	39	"as well as to expand the coverage of Parties with GHG commitments". This needs to be phrased more precisely. The mandate for the negotiations of the second commitment period of the KP specifically and explicitly referred only to Annex I Parties (see decision 1/CMP.1, which "Decides to initiate a process to consider further commitments FOR PARTIES INCLUDED IN ANNEX I for the period beyond 2012" (emphasis added)). Perhaps you mean instead the launch of the "Dialogue on long-term cooperative action to address climate change by enhancing implementation of the Convention" (decision 1/CP.11)? If so, it is far too much of a stretch to say that this aimed to expand the coverage of GHG commitments. The mandate for the dialogue was deliberately vague, and made no such mention.	Accepted. The SOD adds this nuance.	Joanna Depledge	Climate Policy Journal	United Kingdom (of Great Britain and Northern Ireland)
4733	14	44	14	44	Even if well known, when using the acronym COP, I suggest for you to first use it in its full length, eventually specifying its meaning.	Noted. The acronym is expanded when first used.	michele stua	APE-FVG	United Kingdom (of Great Britain and Northern Ireland)
13061	14	44	14	44	Please provide a reference for the Copenhagen Accord.	Accepted	Joanna Depledge	Climate Policy Journal	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
13063	14	44	14	44	It is not accurate to say that the Copenhagen Accord was "operating outside the UNFCCC". It was taken note of at a UNFCCC COP, and the actual Accord was appended to a COP report. I suggest rephrasing as follows: "The result instead was the Copenhagen Accord, which, although it could not be formally adopted, was taken note of by the COP; whlle it was only a political agreement, it reflected etc..."	Accepted. The language has been fine-tuned.	Joanna Depledge	Climate Policy Journal	United Kingdom (of Great Britain and Northern Ireland)
29041	14	53	14	54	Section 14.6 needs to convey the key policy takeaways from the chapter. This needs to go beyond hte broad categories of cooperation- consider adding details into what mechanisms of international cooperation have worked, what is the success of recent initatives, and what could be expected under different climate and socioeconomic conditions.At the moment, this section lacks specifics. Please consider for SOD	Accepted. We have revising this part substantially to address this issue.	Priyadarshi Shukla	Ahmedabad University	India
9451	14	1	15	7	Considering that the chapter is assessing the role of international cooperation, the Executive Summary should provide a summary of such an assessment. At the moment, only one form of international cooperation is mentioned specifically, namely the Paris Agreement. This seems odd given the many other forms of international cooperation mentioned in the rest of the chapter. I would also like to see policy recommendations in the Executive Summary.	Accepted, in part. The SOD includes references to other forms of cooperation, but does nor include policy recommendations, as this would be policy prescriptive.	Cornelia Maarfield	Climate Action Network (CAN) Europe	Germany
9453	14	1	15	7	International trade is an important form of international cooperation with a direct effect on climate mitigation. I would therefore suggest to include a reference to the effects that trade agreements can have on the climate: 1) Trade and investment rules can impede climate policies: certain climate policies might not be conform with existing trade rules (i.e. need to reform trade rules or ensure that they rank lower than international climate agreements; Note that trade rules currently trump climate rules. Even the Paris Agreement states that climate policies must not pose a barrier to international trade (Article 3(5)); certain trade rules can be used to challenge climate policies (regulatory cooperation; Investor-State Dispute Settlement). 2) Measures that increase international trade irrespective of the climate-impact of the traded goods lead to higher GHG emissions. 3) The Paris Agreement excepts trade from emission reductions: Countries are not obliged to reduce the imported emissions, so there is no incentive to reduce overconsumption; Emissions from international transportation are not accounted for.	Accepted, in part. The SOD contains a detailed and up to date section on Trade.	Cornelia Maarfield	Climate Action Network (CAN) Europe	Germany
14241	14	26	15	27	A reference to other authors that have long conceptualised the bottom up/top down nature of the regime work here would seem appropriate here: e.g. Rajamani L and Bodansky D, 'Evolution and Governance Architecture of the Climate Change Regime' in Detlef Sprinz and Urs Luterbacher (eds), Global Climate Policy: Actors, Concepts, and Enduring Challenges (MIT Press 2018)	Accepted. Reference added	Annalisa Savaresi	University of Stirling	United Kingdom (of Great Britain and Northern Ireland)
4735	14	35	15	44	The use of "Annex I" of both "Annex B" terminologies with no specific differentiation between the two may lead to misunderstandings in readers. I suggest to adopt a signle terminology in order to avoid such misunderstanding.	Noted. The terms are more carefully used in the SOD.	michele stua	APE-FVG	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
8709	14	43	15	3	[14.4.1. Inclusion on the establishment of the Technology Mechanism] This section deals with the significant progress made by Copenhagen Accord in terms of setting global temperature, calling for the all countries' participation, establishing the broad terms on MRV, calling for the establishment of the GCF. I think the establishment of the Technology Mechanism is also noteworthy from the viewpoint that developing countries called for the financial and technology support in an enhanced manner. Therefore, I suggest the revision of 'calling for the establishment of a new Green Climate Fund' to 'calling for the establishment of the Green Climate Fund, as another operating entity of the Financial Mechanism, and the Technology Mechanism'.	Noted. The SOD adds the establishment of the Technology Mechanism to the list of outcomes captured by the Copenhagen Accord. However, the exact phrasing suggested is rejected, as it implies that the Green Climate Fund is an operating entity of the Financial Mechanism and the Technology Mechanism, which it is not.	Chaewoon Oh	Green Technology Center	Republic of Korea
14243	14	37	17	39	The statement on the rulebook is correct. At the same time, it does not adequately capture the fact that references to human rights have continued to appear in COP decisions on various matters, including the Indigenous and Local Communities Platform, as well as in NDCs. A mention of the use of human rights bodies to make climate change related complaints would seem in order here. A link with chapter 13.9.3 could also be made	Accepted, the SOD discusses human rights in greater depth, albeit in a different section, under a new structure.	Annalisa Savaresi	University of Stirling	United Kingdom (of Great Britain and Northern Ireland)
14245	14	46	32	49	Including REDD+ under 'Other relevant non-climate agreements' seems odd, since REDD+ is arguably part and parcel of the climate regime. Since this issue is dealt with more extensively elsewhere in the report, it would make sense to delete it here.	Noted, but the SOD has been restructured substantively, such that this issue does not arise.	Annalisa Savaresi	University of Stirling	United Kingdom (of Great Britain and Northern Ireland)
18851	14		33		Carbon credit offers permission for greenhouse emissions from an emission reducing project between individuals, government, organizations or companies.	Noted.	Michael Ugom	University of Nigeria, Nsukka	Nigeria
13977	14	15			Include a reference to the G-20 FSB Task Force on Climate-related Financial Disclosure (TCFD) https://www.fsb-tcfd.org/wp-content/uploads/2017/06/FINAL-2017-TCFD-Report-11052018.pdf	Noted. We try to avoid references to items outside the peer reviewed literature.	Gonzalo Escribano	Universidad Nacional Educación a Distancia (UNED) and The Elcano Royal Institute	Spain
13979	14	24			Please clarify: the secretariat to the UNFCCC?	Accepted. Clarified in the SOD.	Gonzalo Escribano	Universidad Nacional Educación a Distancia (UNED) and The Elcano Royal Institute	Spain
45961	14	24			I do not understand why you mention the secretariat here.	Noted. Clarified.	Nico Bauer	Potsdam Institute for Climate Impact Research (PIK)	Germany
13981	14	27			Add: a paragraph analysing the extent to which international cooperation has been one of the driving factors of domestic climate laws as the enforcement mechanism of the Paris Agreement. Ref: Gabriela Lacobuta, Navroz K. Dubash, Prabhat Upadhyaya, Mekdelawit Deribe & Niklas Höhne (2018) National climate change mitigation legislation, strategy and targets: a global update, Climate Policy, 18:9, 1114-1132, DOI: 10.1080/14693062.2018.1489772. And Nachmany, M. and Setzer, J. (2018), Global trends in climate change legislation and litigation: 2018 snapshot Policy Brief. Grantham Research Institute.	Accepted. This is an important point, and we are revising the section to highlight better the linkages between intwernational cooperation and national law.	Gonzalo Escribano	Universidad Nacional Educación a Distancia (UNED) and The Elcano Royal Institute	Spain

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
16413	14	28			In Section 14.4 International cooperation through global agreements, consider adding a subsection that describes the increasing risk of nuclear arms proliferation as new countries acquire nuclear power, and the potential as well for a new international mechanism to control this risk. See, for example, Goldemberg, J., 2009. Nuclear energy in developing countries. Daedalus, 138(4): 71-80. Notably missing from plans for adopting nuclear power in a widespread fashion to address climate change is a new international mechanism that would identify the most nuclear-arms-proliferation-resistant pathway and require that this pathway be followed. The current Non-Proliferation Treaty was not adopted to address climate change, and its utility is not up to the task. For example, Saudi Arabia is presently developing facilities for nuclear materials enrichment to fuel its planned new nuclear power program, and this may be a pretext for nuclear arms production. As nearly 30 new countries are now attempting to adopt nuclear power, thereby doubling the number of nuclear-power countries globally, the risk of arms proliferation increases, and this increased risk ought to be addressed cogently in this chapter.	Noted, and accepted, in part. The SOD includes reference to the control of GHG emissions from the military sector, but there is not sufficient literature to justify a separate sub-section on this.	Daniel Helman	College of Micronesia-FSM	Micronesia, Federated States of
16415	14	28			In Section 14.4 International cooperation through global agreements, consider adding a subsection on the potential of an international mechanism to limit GHG emissions from the military sector globally. The military sector is a driver of manufacturing, transport and food provisioning emissions and a key to their mitigation. Likewise, there exists a potential for eliminating warfare altogether as a means of addressing climate change. Global war diminishes the human potential for a sustainable and just future, such that increasing alliances globally for the purpose of climate mitigation may reduce the military sectors of all countries and lead to further benefits.	Noted, and accepted, in part. The SOD will include reference to the control of GHG emissions from the military sector, but there is not sufficient literature to justify a separate sub-section on this.	Daniel Helman	College of Micronesia-FSM	Micronesia, Federated States of
33155	14				Over the last decade I observed that many regional experts found that IPCC report are wordy and not easy to understand. It would be highly appreciated if final version can reduce jargons and apparently present different concepts and implications. There are limited direction how end users such as individuals and households who may be significant stakeholders in one way or other, get involve and be part of climate change mitigation and adaptation. Primary level school curriculum should include basic and fundamental concept of climate change, mitigation and adaption particularly individual behaviour and awareness in relation to agriculture, forestry and other land uses (AFOLU), demand, services and behaviour aspects of mitigation, urban system and settlement, building construction, transport, industry, emission and mitigation pathways.	Noted. We attempt to make the chapter accessible, although, inevitably it will not be to school children. We are also not mandated to provide policy prescriptive advise to stake holders.	Edris Alam	Rabdan Acadmey	United Arab Emirates

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
43031	15	8	15	8	Regarding the equity dimention and how COP16 departs from a burden sharing approach in terms of commitment, the Cancun conference also called for ‘’…a paradigm shift towards building a low-carbon society that offers substantial opportunities and ensures continued high growth and sustainable development’’ (paragraph 10) and introduced the concept of ‘equitable access to sustainable development'. The special issue The Economics of a Paradigm Shift in the Climate Negotiations published in INEA (Volume 15, Issue 4, November 2015) comes back on the implications of this paradigm shift in particular Hourcade, J., Shukla, P. Cancun’s paradigm shift and COP 21: to go beyond rhetoric. Int Environ Agreements 15, 343–351 (2015). https://doi-org.inshs.bib.cnrs.fr/10.1007/s10784-015-9305-6 and Hourcade, J., Shukla, P. & Cassen, C. Climate policy architecture for the Cancun paradigm shift: building on the lessons from history. Int Environ Agreements 15, 353–367 (2015). https://doi-org.inshs.bib.cnrs.fr/10.1007/s10784-015-9301-x	Noted. The SOD addresses equity in greater detail than the FOD, and takes this work into account. However, this section is a telegraphic history of the climate regime, and does not lend itself to too much detail on specific milestones.	christophe cassen	CNRS-CIRED	France
13065	15	18	15	18	Rephrase for accuracy "Given the subsequent adoption of the Paris Agreement, the Kyoto Protocol is unlikely etc.."	Accepted. The text relating to the Doha amendment has also been updated to reflect its entry into force.	Joanna Depledge	Climate Policy Journal	United Kingdom (of Great Britain and Northern Ireland)
13067	15	22	15	24	In line with my comments above, I would advise not to over-emphasise the distinction between the KP and the PA, as this misrepresents the totality of the regime as a whole, which is based on the UNFCCC. I would add, for example, after the Keohane and Oppenheimer quote, something like "although the Paris Agreement builds upon the foundations of the UNFCCC, and in many ways represents a continuation of it". On this, you may wish to cite my chapter "Depledge, J. (2017) The legal and policy framework of the United Nations Climate Change Regime" in The Paris Agreement on climate change: Analysis and commentary, D. Klein, M. Pía Carazo, M. Doelle, J. Bulmer, and A. Higham, Eds., p. 27-42 (with specific ref on this issue to p. 28).	Noted. The SOD attempts to address this cross-cutting comment. However, the extent to which the Paris Agreement represents a departure from the UNFCCC (or not) is also subject to academic and political debate, and it will need to be balanced with the view expressed by the reviewer.	Joanna Depledge	Climate Policy Journal	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
13069	15	25	15	25	It is inaccurate to state that the Kyoto Protocol's emission targets were "multilaterally negotiated". This implies that they were subject to formal negotiation as part of the COP process, which the historical record (FCCC/TP/2000/2) indicates was not the case. Rather, the targets were tabled by the countries themselves throughout 1997, and "very little negotiation, or even discussion" of the level of individual targets took place "until the very last days of COP 3" (FCCC/TP/2000/2, paragraph 201). The proposed targets were subject to some informal negotiation among a very small group of Annex I Parties, and the negotiating Chairman made some proposals, but ultimately, on the last night of COP 3, the Chairman "invited Annex I Parties to submit their revised, final, numbers to the podium....the submitted numbers were simply inserted by the secretariat into the blank draft annex B. They were circulated at the very end of the final meeting and adopted without debate..." (paragraph 214). I realise that you don't want to go into detail, but this historical record hardly suggests targets that were "multilaterally negotiated". What is actually much more important, is that the Kyoto Protocol targets are based on common metrics, which WERE multilaterally negotiated. This is a very big difference with the Paris Agreement, and a highly significant one, especially in the current context, where the lack of common metrics is proving problematic for transparency, accountability, and Article 6.. I would therefore suggest rephrasing to focus on the common metrics, eg: "The mitigation efforts under the Kyoto Protocol take the form of differentiated, legally binding targets with common metrics (economy-wide, absolute emission targets, with common timeframes, coverage of GHGs and treatment of AFOLU) whereas under the Paris Agreeent, parties have nationally determined contributions, which can take various forms in term of type, coverage, timeframe and other metrics."	Noted. This is an important point which the SOD addresses, especially in relation to common metrics. However, in addition to the lack of space to expand on the details, which the reviewer recognizes, there is also a formal legal distinction between targets that are subject or offered to the multilateral negotiation process (as Kyoto targets were, notwithstanding the actual fact that they were based on self-selected targets, and there was limited negotiation of these), and targets that are exclusively self-selected and not formally subject to the multilateral process (indeed, are deliberately excluded from such a multilateral process).	Joanna Depledge	Climate Policy Journal	United Kingdom (of Great Britain and Northern Ireland)
45267	15	26	15	30	It seems ABSOLUTELY UNJUSTIFIED to differentiate both at top-down and bottom-up NDCs cannot be completely called bottom up because those are still up-down when seen from the countries perspective . As rural areas are still not having an influent say when it comes to NDCs, these aren't completely bottom up approaches but merely a step towards it.	Rejected. The literature makes this distinction, which is reflected in the Report.	Jaimin Parikh	1. United Nations SDSN 2. European Institute of Policy Research and Human Rights 3. University of Delhi	India
13089	15	27	15	27	"Some have characterized this as a distinction between a "top down" and "bottom up" approach (Doelle 2016; Chan 2016)", please add "but others disagree" (Depledge, 2017). Here, I refer to my op cit, specifically p. 33 ("It is worth emphasizing that these targets were not assigned through a "top down" process".)	Accepted. The reference and disagreement is recorded.	Joanna Depledge	Climate Policy Journal	United Kingdom (of Great Britain and Northern Ireland)
13091	15	32	15	32	Annex I parties, not Annex B. The KP refers almost exclusively to Annex I Parties.	Accepted.	Joanna Depledge	Climate Policy Journal	United Kingdom (of Great Britain and Northern Ireland)
11887	15	36	15	37	Not accurate reflection of Paris Agreement, Article 4.12: "Nationally determined contributions communicated by Parties shall be recorded in a public registry maintained by the secretariat."	Noted. The FOD text was referring to operation (ie states can upload their own NDCs) rather than the maintenance of it (which is a function the Secretariat performs. The SOD clarifies.	Maria Malene Kvalevåg	Norwegian Environment Agency	Norway

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
39965	15	38	15	38	Insert "International" before "Emissions Trading in order to use correct terminology	Accepted.	Axel Michaelowa	University of Zurich	Switzerland
43499	15	38	15	38	This refers to International Emissions Trading	Accepted.	Matthias Honegger	Perspectives Climate Research gGmbH	Germany
39967	15	40	15	40	Insert after "...markets": "in form of cooperative approaches under Article 6.2, and a mechanism under international oversight under Article 6.4"	Accepted.	Axel Michaelowa	University of Zurich	Switzerland
43501	15	40	15	40	Use specific reference instead of "markets": "cooperative approaches under Article 6.2, and a mechanism under international oversight under Article 6.4"	Accepted.	Matthias Honegger	Perspectives Climate Research gGmbH	Germany
45965	15	40	15	44	This part is mainly descriptive. It lacks an assessment. It does not discuss the differences and the potential transitoin from one regime to the other.	Noted. The assessment is captured in SOD 14.3.3.	Nico Bauer	Potsdam Institute for Climate Impact Research (PIK)	Germany
39969	15	46	15	46	Line "Implementation": Replace "voluntary cooperation on mitigation" by "market mechanisms (Art. 6.2, 6.4)"	Noted. The SOD includes a reference to market approaches under Article 6, but 'voluntary approaches' in Article 6(1) is wider than just market mechanisms.	Axel Michaelowa	University of Zurich	Switzerland
13983	15	3			Acknowledge that many of the building blocks of the Paris Agreement were in place since the Copenhagen Accord of 2009	Noted. This is referred to earlier.	Gonzalo Escribano	Universidad Nacional Educación a Distancia (UNED) and The Elcano Royal Institute	Spain
45963	15	19			This is a very important finding! This should be highlighted in the Exectuive summary. There are many authors who suggest otherwise (David Victor, etc.) However, the Kyoto protocol worked. This is also very important because it clarifies that the top-down regulatory approach can be implemented. This is however, at odds with much of the conceptual talk in Section 14.3 and other parts of the chapter.	Accepted. This is in the Executive Summary of the SOD.	Nico Bauer	Potsdam Institute for Climate Impact Research (PIK)	Germany
13985	15	27			Adding the reference: Bodansky, D. et al (2015), Facilitating linkage of climate policies through the Paris outcome. Climate Policy. http://dx.doi.org/10.1080/14693062.2015.1069175	Accepted. Reference added.	Gonzalo Escribano	Universidad Nacional Educación a Distancia (UNED) and The Elcano Royal Institute	Spain
13987	15	41			Acknowledge the difficulties in defining the rules of article 6 of the Paris Agreement Stephanie La Hoz Theuer, Lambert Schneider & Derik Broekhoff (2019) When less is more: limits to international transfers under Article 6 of the Paris Agreement, Climate Policy, 19:4, 401-413, DOI: 10.1080/14693062.2018.1540341	Accepted. Reference added.	Gonzalo Escribano	Universidad Nacional Educación a Distancia (UNED) and The Elcano Royal Institute	Spain

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
13071	16	1	16	1	Consistent with comments 25 and 30, I would strongly suggest that you add a column on the UNFCCC, which remains the cornerstone of the regime. Excluding the UNFCCC from this table risks misrepresenting how the regime has evolved over the past 30 years and, consistent with my earlier comments on this issue, unnecessarily over-emphasises the alleged break represented by the PA. Entries on objective, architecture (general commitments for all, specific for AI and AII parties), implementation (AIJ), transparency (reporting for all, more stringent for AI) would be particularly relevant.	Rejected. Although, consisent with the excellent comments made by this reviewer, the importance of the UNFCCC will be asserted in the text, AR6 is intended to showcase developments since AR5, rather than provide an overview of the entire regime. The Kyoto Protocol's compliance period ended, and the Paris Agreement was adopted and entered into force since AR5. It is that this section has to highlight, and this table is intended to do that.	Joanna Depledge	Climate Policy Journal	United Kingdom (of Great Britain and Northern Ireland)
13073	16	1	16	1	Entry on architecture - please refer to comments 36 and 37 above. The following would be more accurate "Differentiated targets based on national offers, with negotiated common metrics"	Noted in relation to common metrics, but specific suggestion for text, rejected, in line with earlier response.	Joanna Depledge	Climate Policy Journal	United Kingdom (of Great Britain and Northern Ireland)
37759	16	1	16	1	Table 14.2. "Implementation" - awkward heading. Cooperation perhaps, rather than implementation - the KP was primarily implemented through domestic implementation, the same is intended under the PA (see, e.g., Art 4.2 of PA referring to domestic implementation). This section could be termed instead cooperation, and then also refer to funding mechanisms under the PA. Also, both the KP mechanisms and PA Article 6 are both voluntary, so "voluntary" is not really a distinction. On "reporting and review" note that KP Article 10 reaffirms developing country reporting obligations and enhances them.	Noted, and accepted, in part. The term 'implementation' is intended to convey the means that are used to implement international commitments, which include market mechanisms, but are not limited to them. The SOD expands the explanatory text to clarify this, but retains the term 'implementation'. It does, however, add an entry on support, including finance and technology. The term 'voluntary' appears in Article 6.1, and is referred to as a term of art here, rather than in its generic sense.	Michiel Schaeffer	Climate Analytics	Netherlands
13075	16	3	16	4	In line with my earlier comments, I would add "…in the post-2020 period, based on the framework of the UNFCCC" or something similar.	Noted, accepted in part. The cross-cutting suggestion is implemented in the SOD, but this particular textual suggestion is not implemented, as the text, as drafted, is concise and precise.	Joanna Depledge	Climate Policy Journal	United Kingdom (of Great Britain and Northern Ireland)
13619	16	4	16	4	Add citation (Klein et al 2017). Full citation: Klein, D., et al, 2017: The Paris Agreement on Climate Change (Oxford University Press). DOI:10.1093/acprof:oso/9780199299874.003.0005	Accepted.	Stuart Bruce	Wilmer Cutler Pickering Hale and Dorr LLP	United Kingdom (of Great Britain and Northern Ireland)

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
37635	16		16		"Implementation" - awkward heading. Cooperation perhaps, rather than implementation - the KP was primarily implemented through domestic implementation, the same is intended under the PA (see, e.g., Art 4.2 of PA referring to domestic implementation). This section could be termed instead cooperation, and then also refer to funding mechanisms under the PA. Also, both the KP mechanisms and PA Article 6 are both voluntary, so "voluntary" is not really a distinction. On "reporting and review" note that KP Article 10 reaffirms developing country reporting obligations and enhances them.	Noted, and accepted, in part. The term 'implementation' is intended to convey the means that are used to implement international commitments, which include market mechanisms, but are not limited to them. The SOD expands the explanatory text to clarify this, but retains the term 'implementation'. It does, however, add an entry on support, including finance and technology. The term 'voluntary' appears in Article 6.1, and is referred to as a term of art here, rather than in its generic sense.	Michiel Schaeffer	Climate Analytics	Netherlands
2747	16	2	31	31	"14.4.2 Paris Agreement" All the subheads under this heading should be arranged in a more logical flow of the argument -- at present, they are a list of different items, each of which is important, but which are not presented in any obvious or compelling order. For example, why does it go from Tech Xfer to Forests & REDD to Voluntary additional cooperation on mitigation?	Noted. The sub-headings in the SOD follow a more logical order.	Ronald Mitchell	University of Oregon	United States of America
10937	16		31		Sectyion 14.4.2 provides an informative and far-ranging background to the Paris Agreement's main components but the critical evaluation of these elements is relatively brief compared with its descriptive elements. The final seciton deals more directly with critical appraisal and there are brief appraisals in some sections, but I do have concerns that the extent and detail of debates on the Paris Agreement (receognising that ex post evaluation is difficult) may be insufficient for government parties to be adequately appraised of academic research on its limitations and Achilles Heels and therefore insufficiently inspired to address these in a forthright way at future COPs, beginning in Glasgow. The NDC review period is approaching, for example, and all evidence indicates that current commitments around entail around 3C GMT increase, so being forthright on the rationales for addresisng such issues is a mpriority. I appreciate that there is potrential to stray into the terrain of policy prescription and the sections as the are written do show evidence of attempts to address these issues but I would still urge greater ambition here.	Noted, and accepted in part. Section 14.3.3 of the SOD assesses the PA in greater depth than the FOD does. The assessment of the PA is also better captured in the Executive Summary, and the synthesis at the end of the Chapter.	Ian Bailey	University of Plymouth	United Kingdom (of Great Britain and Northern Ireland)
13989	16				Table 14.2: Add a row on adaptation and a row on climate finance requirements in the Kyoto Protocol and in the Paris Agreement.	Accepted. Added in SOD.	Gonzalo Escribano	Universidad Nacional Educación a Distancia (UNED) and The Elcano Royal Institute	Spain
19213	17	12	17	13	For Annex 1 Parties, the extent of information required to report is basically the same for the Kyoto Protocol and the Paris Agreement. "Extensive" information requirements hence apply to developing countries only. However, it should also be noted that the enhanced transparency framework provides flexibility for developing countries that need it in the light of their capacity. This means extensiveness can be less for those countries without adequate capacity.	Noted. Language finessed.	Chisa Umemiya	Institute for Global Environmental Strategies	Japan
13077	17	14	17	14	Please avoid the misleading term "top down". What you mean here is "In contrast to the Kyoto Protocol, with its legally binding targets and timetables for emission reductions, based on common metrics and inscribed in the treaty itself, the Paris Agreement ...."	Rejected. This term is used in the literature, and is being presented here in quotations.	Joanna Depledge	Climate Policy Journal	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
28191	17	14	17	18	Is there any past evidence from international agreements that a "bottom-up" approach with a ratcheting up mechanism foster durable international coopeation?	Noted. This part of the statement has less evidence supporting it, so has been deleted in the SOD.	Martin Kesternich	ZEW – Leibniz Centre for European Economic Research	Germany
13079	17	16	17	16	Why does the PA hybrid system promise "more durable international cooperation"? There is no evidence given here as to how or why this should be the case. I would at least qualify as "which some argue promises etc…". The balance of evidence presented in the Executive Summary is much more circumspect, and as you say further below, there are both optimistic and pessimistic assessments.	Accepted. This part of the statement has less evidence supporting it, so has been deleted in the SOD.	Joanna Depledge	Climate Policy Journal	United Kingdom (of Great Britain and Northern Ireland)
19215	17	18	17	18	To be more specific, the importance of wider participation by developing countries should also be mentioned. This is a completely different picture of the Paris Agreement, compared with the Kyoto Protocol. See, for example, • Umemiya, C., White, M., Amellina, A. & Shimizu, N. (2017) National greenhouse gas inventory capacity: An assessment of Asian developing countries. Environmental Science and Policy, 78: 66–73.	Accepted, in part. The SOD refers to wider participation in GHG mitigation measures in the PA, but refers to other literature that make this point more centrally than the one suggested does.	Chisa Umemiya	Institute for Global Environmental Strategies	Japan
35899	17	26	17	26	After the words 'to integrate this in the climate change regime' I would integrate a sentence in the spirit of '(Trans)national climate change ltigation relies increasingly succesfully on human rights.' Perhaps with a reference to 'a rights turn in lcimate change litigation' by Peel and Osofsky --> https://www.cambridge.org/core/journals/transnational-environmental-law/article/rights-turn-in-climate-change-litigation/0E35456D7793968F37335429C1163EA1#fndtn-metrics and perhaps to Burgers & Staal 'Climate Action as Positive Human Rights Obligation: The Appeals Judgment in Urgenda v the Netherlands' --> https://link.springer.com/chapter/10.1007/978-94-6265-331-3_10	Accepted, in principle. The SOD provides to more literature on the human rights aspects, including litigation. The Peel and Osofsky piece is referred to.	Laura Burgers	PhD Candidate, University of Amsterdam	Netherlands
37641	17	47	17	48	" This is a single temperature goal with two inseparable elements, the well below 2°C goal pressing towards 1.5°C" - this is not a uniformly accepted understanding. It has also been and can be understood as a unitary goal, of a 1.5 ceiling with minimal overshoot. See Mace, 2016 Mitigation Commitments under the PA and the way forward (Climate Law)	Noted. The language in the SOD has been finessed to indicate that this is not the only view, however the view referred to by the reviewers is in the minority, and is not supported by the plain text of Article 2.	Michiel Schaeffer	Climate Analytics	Netherlands
13991	17	6			Reorganise: place box 14.1 here	Noted. The reorganization of Chapter 14, renders this comment moot.	Gonzalo Escribano	Universidad Nacional Educación a Distancia (UNED) and The Elcano Royal Institute	Spain
13993	17	34			Missing reference in bibliography: Macadam (2016	Noted. Addressed in the SOD.	Gonzalo Escribano	Universidad Nacional Educación a Distancia (UNED) and The Elcano Royal Institute	Spain
13995	17	43			Add: reference to some notion of strong sustainability in the Paris Agreement temperature goals as requiring the maintenance of certain forms of natural capital (i.e. a stable climate).New references: (1) Neumayer, E. (2013), Weak versus Strong Sustainability. Exploring the Limits of Two Opposing Paradigms. Cheltenham. Edward Elgar. (2) Barbier, E. and Burgess, J. (2017). Natural Resource Economics, Planetary Boundaries and Strong Sustainability. Sustainability, 9(10), 1858	Accepted, in principle. The SOD adds references to literature on planetary boundaries.	Gonzalo Escribano	Universidad Nacional Educación a Distancia (UNED) and The Elcano Royal Institute	Spain

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
19217	18	2	18	5	These sentences are difficult to understand. What is available information?	Noted	Chisa Umemiya	Institute for Global Environmental Strategies	Japan
4737	18	13	18	13	"With $100 per year as a floor" appears a typo. Does it refer to the $100 billion pledge?	Noted, corrected in the SOD.	michele stua	APE-FVG	United Kingdom (of Great Britain and Northern Ireland)
8711	18	13	18	13	[14.4.2.1] - There is an omitted word on the text of "with $100 billion per year".	Accepted	Chaewoon Oh	Green Technology Center	Republic of Korea
39971	18	13	18	13	Insert "billion" after "$100"	Accepted	Axel Michaelowa	University of Zurich	Switzerland
25309	18	20	18	27	Sub, Delete “This carefully drafted provision ... Karim, 2016).”, as this text reflects an interpretation of the Paris Agreement provisions.	Rejected, the interpretation is supported by literature.	Eleni Kaditi	Organization of the Petroleum Exporting Countries (OPEC)	Austria
44731	18	32	18	42	Since "net zero" (as derived from the GHG balance requirement of Art 4.1) has become a centerpiece both the IPCC's communication (since SR1.5) and climate target setting by governments and other entitites it would be worthwhile to expand this section a little. If the net zero provision is just a 'non binding requirement' what would be the best single-word term to describe its function at the international level (I guess it's not a 'target' or a 'goal'). What is the de facto function of Art 4.1 if it's non-binding. Is it just creating expectations? At lest the "peaking as soon as possible" clause has been part of almost every COP decision since Copenhagen	Noted.	Oliver Geden	German Institute for International and Security Affairs	Germany
44733	18	34	18	38	Whenever you write net zero it's best to write net zero GHGs, just to avoid misunderstandings. For LTTG-consistent net zero years (for both 1.5C and well below 2C) please check with ch3 (in SR1.5, the net zero GHG year for 2C was beyond 2100, due to the expansion of the carbon budget! But that might change again in AR6). I think it doesn't make sense to give numbers for sectors, unless you want to highlight the huge differences between sectors in modelling (but, sectors are not even actors). The "may imply CDR" sentence is confusing since it is absolutely clear that we will need CDR to offset residual emissions (e.g. from agriculture or aviation) to get to net zero. The IAM numbers for global net zero years (1.5C: 2050 for CO2 only, 2067 for 2C) always imply going into net negative territory afterwards, since without the net negative option, the respective years would sound utterly unrealistic	Accepted	Oliver Geden	German Institute for International and Security Affairs	Germany
25311	18	36	18	37	Sub, Delete “for example, ... in energy systems.”	Accepted	Eleni Kaditi	Organization of the Petroleum Exporting Countries (OPEC)	Austria
13997	18	5			Add figures of the numerical illustration or take out the last sentence	Noted.	Gonzalo Escribano	Universidad Nacional Educación a Distancia (UNED) and The Elcano Royal Institute	Spain

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
45969	18	35			These figures require specification whether this is CO2 only or GHG. Also the numbers must be cross-checked by experts. Rogelj is surely willing to assist here.	Noted.	Nico Bauer	Potsdam Institute for Climate Impact Research (PIK)	Germany
13999	18	46			Given that Parties have a binding procedural obligation to 'pursue domestic mitigation measures? Then the criteria for assessing international cooperation should include an analysis of national climate legislation (both legislative and executive)?	Noted. Chapter 13 considers the spread of climate legislation in national jurisdictions. An analysis of national climate legislation, however, is beyond the scope of this chapter.	Gonzalo Escribano	Universidad Nacional Educación a Distancia (UNED) and The Elcano Royal Institute	Spain
18813	19	1	19	1	Insert a period (.) after the word parties, drop the word although, and then insert the following: " Referring to the two strands of framing concepts identified in Section 14.3.1, this characteristic - genuine to the Paris Agreement - belongs to the first strand, namely global commons or public good. More precisely, the actions so designated have been characterized (Tulkens 2016), in standard economic theory terms, as an equilibrium in voluntary provision of a public good (or equilibrium with subscription (Malinvaud 1972)) and in game theory terms as a Non Cooperative Nash Equilibrium. Such equilibrium is known to be inefficient (in the Pareto sense) at the world level, but one may see this limitation as a price to pay to achieve an environmental outcome which is desirable because Pareto superior to business as usual. Moreover" ... certain normative expectations a.s.o.	Noted. The concepts referred to are included in the SOD in the framing section 14.2.1 and in the assessment section 14.3.3. However, its inclusion here, in the context of describing the Paris Agreement architecture would detract from the flow and logic of the paragraph.	Henry Tulkens	CORE, Université catholique de Louvain	Belgium
45269	19	8	19	8	The following phrase could be given a place: "...diligence standard as it becomes very much necessary for all the responsible developed countries to play a role of mentor cum partner with the developing countries with regards to Paris Climate Agreement of 2015."	Rejected. The sentence is not supported by relevant literature, and represents an opinion.	Jaimin Parikh	1. United Nations SDSN 2. European Institute of Policy Research and Human Rights 3. University of Delhi	India
8713	19	12	19	14	[14.4.2.2: Reference correction] - The reference information needs to be further specified (i. e., UNFCCC 2019a, Annex I → UNFCCC 2019a, Annex I, para. 1).	Accepted.	Chaewoon Oh	Green Technology Center	Republic of Korea
8715	19	21	19	21	[14.4.2.2: word change] - There is a need for clarification. "updated before 2020" to "updated by 2020". Referred to paragraph 23 to 24 of the decision 1/CP.21, Parties are requested to communicate its new or updated NDC by 2020.	Accepted.	Chaewoon Oh	Green Technology Center	Republic of Korea
19219	19	25	19	25	"several NDCs are conditional" can be misleading, as many NDCs are conditional to some extent. This is also mentioned in the later part of this chapter.	Accepted. The SOD reflects this nuance.	Chisa Umemiya	Institute for Global Environmental Strategies	Japan
37615	19	38	19	46	Rogelj et al 2017 (Nature Communications) on uncertainties in NDCs, Fyson and Jeffery 2019 (Earth's Future) on assessing the land-use components of NDCs and Forsell et al 2016 (assessing INDC's land use, land use change and forest emissions projections) might be relevant here.	Accepted.	Michiel Schaeffer	Climate Analytics	Netherlands
25313	19	39	19	40	Sub, Delete "CO2 intensity of fossil fuels, ... total energy use".	Rejected. The reviewer does not indicate on what basis this is to be excluded. The current text is an accurate reflection of the literature.	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
4739	19	47	20	13	When discussing about the limits of NDCs, I suggest you to further extend your literature references. In particular, I suggest the inclusion of: Van Asselt, H., 2016: International climate change law in a bottom-up world. Questions of International Law, 26, 5–15. Den Elzen, M. C. J., Admiraal, A., Roelfsema, M., van Soest, H., Hof, A. F., Forsell, N., 2016: Contribution of the G20 economies to the global impact of the Paris agreement climate proposals. Climatic Change, 137, 655–665. Morgan, J., 2016: Paris COP 21: Power that speaks the truth? Globalizations, 13(6), 943-951. Rogelj, J., den Elzen, M., Hohne, N., Fransen, T., Fekete, H., Winkler, H., Schaeffer, R., Sha, F., Riahi, K., Meinshausen, M., 2016: Paris agreement climate proposals need a boost to keep warming well below 2 °C. Nature, 354, 631–639.	Accepted, in principle. Many of these references are included in other parts of the chapter, but references are extended here too.	michele stua	APE-FVG	United Kingdom (of Great Britain and Northern Ireland)
44735	19	47	20	13	There's a tension in the way you present and try to reconcile both perspectives. When critics claim that the NDC system is not able to deliver the emissions reductions necessary to keep us on track to reach the LTTG (hence the 2030 emissions gap) then it is a little insufficient to say that the PA will deliver more than a prolongation of current policies. There is a gap between saying "it's not enough to meet the LTTG" and saying "but it's better than nothing". It is also a sign for the inconsistencies in the PA and the Post-Paris policy-/expectation-making. As you describe it correctly elsewhere, the PA is a bottom-up or hybrid regime, but the way climate policymakers, NGOs and many scientists talk about it still suggests that the PA should be able to deliver "top down"-like results. This seems unrealistic (see ch4), but this kind of 'constructive ambiguity' was probably necessary to get a deal in Paris (see https://onlinelibrary.wiley.com/doi/abs/10.1002/wcc.427). Now, during the implementation and delivery phase, there will be disappointments, and it will be interesting to see how the more progressive actors will deal with these in their expectation management	Noted. The tension the reviewer refers to is included in 14.3.3., the PA assessment section of the SOD.	Oliver Geden	German Institute for International and Security Affairs	Germany
14001	19	37			Perhaps adding that the degree of further convergence and comparability in NDC reporting will be further analysed in 2020 when the next round of NDCs are expected.	Accepted.	Gonzalo Escribano	Universidad Nacional Educación a Distancia (UNED) and The Elcano Royal Institute	Spain
14003	19	48			Perhaps adding the following reference: United Nations Environment Programme (2019). Emissions Gap Report 2019. UNEP, Nairobi.	Accepted	Gonzalo Escribano	Universidad Nacional Educación a Distancia (UNED) and The Elcano Royal Institute	Spain
25315	20	12	20	12	Replace “commitments” with “contributions”.	Rejected. The PA uses the term 'contributions' but not all the literature does, so converting all references to 'commitments' to 'contributions' would misrepresent the literature.	Eleni Kaditi	Organization of the Petroleum Exporting Countries (OPEC)	Austria
47587	20	27	20	27	In addition, I suggest quoting: Robiou du Pont, Y. et al. Warming assessment of the bottom-up Paris Agreement emissions pledges. Nature Communications 7, (2018), available at: https://doi.org/10.1038/s41467-018-07223-9. This article combines equity metrics representative of the CBDR-RC in a bottom-up manner that reflects the Paris Agreement architecture.	Accepted.	Yann Robiou du Pont	IDDRI	France

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
45271	20	37	20	37	The following must be included: "generating awareness among people and taking their viewpoint on the matter which can be implemented in their region and then having a framework based on it"	Rejected. This is policy prescriptive, and the reviewer does not support this with references/ literature.	Jaimin Parikh	1. United Nations SDSN 2. European Institute of Policy Research and Human Rights 3. University of Delhi	India
47591	20	37	20	37	There could be a paragraph reconciling finance and emissions rights distribution (what is misleadlingly called carbon budgets). The different between cost-optimal IAM distribution of emissions, and equity based allocation provide the amount of emissions rights that each country should buy/sell to align with both these idealised scenarios. This provides an intication of the equitable support that each country can provide or received in addition to its domestic mitigation efforts.	Noted. Brief references included to the extent it is supported in the literature.	Yann Robiou du Pont	IDDRI	France
25317	20	37	20	44	Delete “These include: ... (Aldy et al. 2017).”, as these approaches are not aligned with the Paris Agreement rulebook.	Rejected. The reviewer is expressing an opinion on the alignment of these approaches with the PA. The existing statement is supported by the literature.	Eleni Kaditi	Organization of the Petroleum Exporting Countries (OPEC)	Austria
45273	20	37	20	46	Tthe concept of FDIs on green economy MUST find a place here.	Noted. This is referred to in the finance section of the Chapter.	Jaimin Parikh	1. United Nations SDSN 2. European Institute of Policy Research and Human Rights 3. University of Delhi	India
28193	20	39	20	40	Kesternich et al. 2014 (ZEW-DP ZEW Discussion Paper No. 14-031) use survey data from participants involved in climate negotiations to assess their preferences for allocating different national emissions, more harmonized international views on need-based approaches	Noted, however we are trying to focus on more recent work, since AR5 (unless the work is field-defining).	Martin Kesternich	ZEW – Leibniz Centre for European Economic Research	Germany
47589	20	47	20	47	It may be worth recalling that equity considerations also apply subnationally. I suggesting reading or citing the ambition assessment at the subnational level for Australian states commissioned by the state government of Victoria, Australia: Meinshausen et al, 2018, Greenhouse gas emissions budgets for Victoria https://www.climatechange.vic.gov.au/__data/assets/pdf_file/0016/421702/Greenhouse-Gas-Emissions-Budgets-for-Victoria.pdf This report is based on the results of Robiou du Pont, Y. et al. Equitable mitigation to achieve the Paris Agreement goals. Nature Climate Change 7, (2017), available at: http://dx.doi.org/10.1038/nclimate3186	Noted. However, the climate change regime does not address this, so it is of limited relevance in this section.	Yann Robiou du Pont	IDDRI	France
16795	20	14	21	2	Given the importance of equity for the achievement of the Paris temperature target, the report should include a more in-depth assessment of how equity can be operationalised in international cooperation. This chapter should link to the other chapters in the report which also discuss equity. (1.4.6 , 4.2.2.5, 4.4.4). Currently none of these chapters discusses equity in much depth.	Accepted. The SOD discusses equity in greater depth, and in a cross-cutting fashion.	Dennis van Berkel	Urgenda	Netherlands

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
14005	20	1			Add that the size of the gap and the implications for global mean temperature increases compared to pre-industrial levels.	Accepted, in principle. Reflected in the re-write of the SOD.	Gonzalo Escribano	Universidad Nacional Educación a Distancia (UNED) and The Elcano Royal Institute	Spain
14007	20	13			Add: Given that the Special IPCC report on 1.5ºC stated that by 2030 emissions reductions in 1.5ºC pathways with no or limited overshoot should decline by 45% from 2010 levels (40% to 60% interquantile range), this means that emission reductions in the next round of NDC commitments should be multiplied by 3.75 to limit temperature increases to 1.5ºC. assuming that the 12% figure is also referenced to 2010 as stated in line 8. Ref: https://www.ipcc.ch/site/assets/uploads/sites/2/2019/05/SR15_SPM_version_report_LR.pdf	Accepted, in principle. Reflected in the re-write of the SOD.	Gonzalo Escribano	Universidad Nacional Educación a Distancia (UNED) and The Elcano Royal Institute	Spain
8717	21	2	21	3	[14.4.2: Consideration of insertion of adaptation section] - In the section 14.4.2 (Paris Agreement), ther are sub-sections on context/objective/purpose, NDCs/fairness/equity, transparency/accountability, global stocktake, finance, technology transfer, forests and REDD+, voluntary additional cooperation on mitigation, implementation and compliance, loss and damage, and assessment of the Paris Agreement. - This means there is no section on 'adaptation', despite a separate section loss and damage. I would like to suggest that the author can consider the insertion on the section on adaptation right after the section on NDCs/fairness/equity.	The SOD contains references to and discussion of adaptation to the extent it intersects with mitigation, however our mandate is to discuss international cooperation on mitigation (adaptation is dealt with by WG2) and that is the focus of this chapter.	Chaewoon Oh	Green Technology Center	Republic of Korea
37617	21	3	21	39	Fyson and Jeffery 2019 (Earth's future) may be helpful here (see the discussion section, which looks at the transparency and NDC guidance provisions in the Katowice Rulebook with a focus on the land sector)	Accepted.	Michiel Schaeffer	Climate Analytics	Netherlands
45275	21	4	21	4	Again as mentioned in one of my previous comments - it would be highly unauthentic to refer NDCs as a reflection of "bottom-up" model"	Noted. However, the current text is a reflection of the literature on the subject, which is accurately reflected, even if not in accordance with the reviewer's view.	Jaimin Parikh	1. United Nations SDSN 2. European Institute of Policy Research and Human Rights 3. University of Delhi	India
8719	21	11	21	11	[14.4.2.4: word change] There is a need for using official language or title: 2006 IPCC Guidelines	Accepted. The SOD reflects this change.	Chaewoon Oh	Green Technology Center	Republic of Korea
8721	21	16	21	16	[14.4.2.4: word change] I suggest that the word, "uniform" seems to be inappropriate and needs to be replaced with the word 'common.' In the context of the enhance transparency framework, certain expressions such as 'uniform' or 'unified' have political connotations. Also, the words, 'common and flexibility' are used in pairs in the context of transparency.	Accepted. The SOD reflects this change.	Chaewoon Oh	Green Technology Center	Republic of Korea
11889	21	16	21	17	Not accurate reflection of decision 18/CMA.1 which says "...at the latest by 31 December 2024".	Accepted. The SOD reflects this change.	Maria Malene Kvalevåg	Norwegian Environment Agency	Norway
11891	21	16	21	19	The reference should be to para 5 of the Annex to decision 18/CMA.1. Also, it is important to include some text that covers the beginning of this para, i.e. "These MPGs specify the flexibility that is available to those developing country Parties that need it in the light of their capacities...".	Accepted, in principle. The SOD reflects this change, but not in the exact language offered by the reviewer.	Maria Malene Kvalevåg	Norwegian Environment Agency	Norway

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
8723	21	19	21	19	[14.4.2.4: reference change] The reference information needs to be corrected as the para. 5 referred to in the reference information is not para.5 of decision 18/CMA.1 but para. 5 of Annex (I. e., UNFCCC 2019c, para. 5 → UNFCCC 2019c, Annex, para. 5).	Accepted. The SOD reflects this change.	Chaewoon Oh	Green Technology Center	Republic of Korea
45277	21	23	21	25	The following phrase must be included: " There seems a further involvement of UN agencies like UNDP and UNDESA to maintain the transparency into the respective biennial reports."	Rejected. The reviewer does not offer any literature to support the inclusion of this text.	Jaimin Parikh	1. United Nations SDSN 2. European Institute of Policy Research and Human Rights 3. University of Delhi	India
32231	21	32	21	39	A recent contribution examined the limited extent to which the enhanced transparency framework is likely to lead to enhanced NDC ambition: Weikmans, Romain, Harro van Asselt & J. Timmons Roberts (2020, forthcoming). Transparency Requirements under the Paris Agreement and Their (Un)likely Impact on Strengthening the Ambition of Nationally Determined Contributions (NDCs). Climate Policy. https://doi.org/10.1080/14693062.2019.1695571	Accepted. The SOD reflects this change.	Harro van Asselt	University of Eastern Finland	Netherlands
25319	22	9	22	12	Delete “The Rulebook does not ... Bodanksy, 2019).”, as this is a subjective statement.	Rejected. The statement is supported by literature.	Eleni Kaditi	Organization of the Petroleum Exporting Countries (OPEC)	Austria
45279	22	22	22	42	The concept of "Green Bonds" and their promotions have not been discussed here and MUST find a due place.	Noted, and considered for inclusion, in so far as the literature supports it.	Jaimin Parikh	1. United Nations SDSN 2. European Institute of Policy Research and Human Rights 3. University of Delhi	India
25717	22	21	23	45	For readability, it might be useful to include an explicit link to Chapter 15 on finance in these two paragraphs which address international factors that influence national decision-making. For example, a statement such as '(see Chapter 15 on investment and finance)', or the specific section in Chapter 15 that is relevant to this discussion, could be included here.	Accepted.	Renee van Diemen	WG III TSU	United Kingdom (of Great Britain and Northern Ireland)
36805	23	5	23	8	Should private finance be mentioned?	Accepted. The SOD refers to private finance.	Zinta Zommers	United Nations Office for Disaster Risk Reduction	Germany
4741	23	15	23	17	Did the process lead to any outcome during COP25? I suggest updating the sentence in light of the 2020 negotiations round's results.	Accepted, and updated in the SOD	michele stua	APE-FVG	United Kingdom (of Great Britain and Northern Ireland)
2743	23	18	23	21	"It is widely recognized that the USD 100 billion figure" both this and the US$474 figure need to be specified as ANNUAL RECURRING costs unless these are meant as TOTAL, which they clearly are not.	Accepted, and clarified in the SOD.	Ronald Mitchell	University of Oregon	United States of America

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
38237	23	39	23	42	The sentence refers to the need for fiscal reforms in developing countries to ensure international finance is not used for unsustainable activities. There is also a need to ensure development funds ar enot use of unstainable activities. One example of the use of development funds is the use of EU funds to facilitate the accession of developing countries to the ecocide energy charter treaty mentioned in comments 1 & 2. See for example https://www.energycharter.org/fileadmin/DocumentsMedia/CCDECS/2018/CCDEC201819_-_NOT_Report_by_the_Secretary_General.pdf	Noted, and considered for inclusion, in so far as the literature supports it.	Yamina Saheb	OpenExp, Ecole des Mines de Paris	France
42289	23	21	24	41	What means "consistent" and "pathway" as mentioned in 2.1c in the Paris Agreement concretly? One approach is to assess what is inconsistent and then derive consistency (finance flows). The OECD (2019) study presents a good overview: "Tracking finance flows towards assessing their consistency with climate objectives Proposed scope, knowns and unknowns – Environment Working Paper No. 146".	Noted, the SOD clarifies this	Michael König	Frankfurt School of Finance and Management	Germany
14009	23	22			For reference, include the latest estimates of international climate finance ($71.2 billion): OECD (2019), Climate Finance Provided and Mobilised by Developed Countries 2013-17. Paris: OECD.	Accepted, and updated in the SOD	Gonzalo Escribano	Universidad Nacional Educación a Distancia (UNED) and The Elcano Royal Institute	Spain
45283	24	1	24	40	Another aspect which COULD be added is that of Green Education. Following phrase can be considered: "Proper emphasis is required in the concept of Education on Sustainable Development, of which the Green School concept is a part. The "Green School Programmes" must be promoted at country as well as international level."	Taken into account and reference added to PA article on education and training. Assessment of national and sub-national policies is the focus of ch 13.	Jaimin Parikh	1. United Nations SDSN 2. European Institute of Policy Research and Human Rights 3. University of Delhi	India
35775	24	2	24	3	maybe national and sub-national capacity building efforts and cooperation should be recognized. This will allow cross reference with section 14.5.10. Civil society groups have conducted numerous activities at the sub regional and regional levels. This will also connect with section 14.5.8	Taken into account in new capacity building section 14.4.2 to the extent relevant for international cooperation. Assessment of national and sub-national policies is the focus of ch 13.	Ahmed Abdelrehim	Centre for Environment & Development for the Arab Region and Europe - CEDARE	Egypt
45281	24	12	24	24	There has been no mention or distinction in the roles of Low and Middle Income Countries (LMICs), Less Economically Developed Countries (LEDCs), and the Industrially Developing Countries, particularly that of Global South	Rejected. Discussion of distinctions between countries limited to recognised UN groupings.	Jaimin Parikh	1. United Nations SDSN 2. European Institute of Policy Research and Human Rights 3. University of Delhi	India
8725	24	42	24	42	[14.4.2.8. Title change] This section is titled as 'technology transfer'. The article 10 of the Paris Agreement deals with 'technology development and transfer'. Therefore, I suggest the author change the title to 'technology development and transfer'.	Accepted. Title of section changed.	Chaewoon Oh	Green Technology Center	Republic of Korea

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
45791	24	45	24	48	It states: "Technology development and the transfer of environmentally sound technologies for climate mitigation have been heavily contested issues between developed and developing countries, and these differences are likely to continue under 48 the Paris Agreement". For a discussion on the ideological differences underlying the North-South technology transfer debate, refer: • Das, Kasturi, 'Technology Transfer under the Clean Development Mechanism: An Empirical Study of 1000 CDM Projects', Working Paper # 14, The Governance of Clean Development Working Paper Series, University of East Anglia and Economic and Social Research Council (ESRC), UK, 2011.Available at: http://re.indiaenvironmentportal.org.in/files/file/gcd_workingpaper014.pdf • Phillips, Jon, Kasturi Das, Peter Newell, "Governance and Technology Transfer in the Clean Development Mechanism in India", Global Environmental Change, Elsevier, 23, 1594–1604, 2013.	Noted. References are to pre-AR5 literature and not included.	Kasturi Das	1. Professor of Economics, Institute of Management Technology, Ghaziabad, India; 2. Member, Climate Strategies	India
45793	24	45	24	48	For a historical account of the technology transfer debate, refer: Padmashree Gehl Sampath and Pedro Roffe, Unpacking the International Technology Transfer Debate: Fifty Years and Beyond (2012), ICTSD Working Paper. Available at: https://www.ictsd.org/sites/default/files/downloads/2012/07/unpacking-the-international-technology-transfer-debate-fifty-years-and-beyond.pdf	Noted. Reference is to grey literature, pre-AR5 so not included.	Kasturi Das	1. Professor of Economics, Institute of Management Technology, Ghaziabad, India; 2. Member, Climate Strategies	India
2745	24	42	25	5	The section on technology needs much fuller development than it has currently if it is to be compelling.	Accepted. Technology section revised in liaison with ch 16 and divided into section focused on Paris Agreement and one on technology development in broader UN climate regime.	Ronald Mitchell	University of Oregon	United States of America
38239	24	42	25	48	Here, reference should be made to the use of developing countries as a waste bin of global North instead of ensuring the transfer of the most efficient technologies, we usually transfer our outdated technologies to the South and developing funds are used to develop low ambition policies which encourages this transfer. See the work done in Ghana to stop being the waste bin of EU countries.	Noted. Broader discussion of technology transfer now included in new section on technology and innovation. No specific literature cited to support point which seems to be more a concern about dumping of e-waste (which has been an issue in Ghana). There is no specific linkage made in the Paris Agreement between technology transfer/development and waste generated from transferred technologies.	Yamina Saheb	OpenExp, Ecole des Mines de Paris	France

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
8727	24	43	25	5	[14.4.2.8. Section re-writing] - Technology development and transfer (article 10 of the Paris Agreement) is one of three means of implementation. The other two means are financing (article 9) and capacity-building (article 11). Currently, the space allotted respectively for financing (4 paras) and capacity-building(3 paras) is much larger than that for technology development and transfer(1 para). I suggest that the author takes a balanced approach in the explanation on the means of implementation. - In this regard, I further suggest the re-writing of this section on the basis of what is already written in the following manner. (para 1) position and role of technology development and transfer (including the countries' response in their NDC in terms of technology development & transfer) (para 2) Indication of the article 10 of the Paris Agreement (para 3) Indication on the Technology Mechanism (its establishment and activities since 2010) (para 4) Current key issues (Financial instability of the Technology Mechanism, linkage between the Technology Mechanism and the Financial Mechanism, Support on innovation, etc) - On the basis of the afore-mentioned paras, I would like to suggest the draft in the following cell. The changed part is made in blue.	Accepted. Section re-written.	Chaewoon Oh	Green Technology Center	Republic of Korea
8729	24	43	25	5	[14.4.2.8. Section re-writing] (Continued) ▶(para 1) Technology development and trasnfer comes to the fore as one of three means of implementation to accomplish the obejctives of mitigation and adaptation. Importance of technology is implicated in the intended nationally determined contributions(INDCs) submitted of 156 Parties as of 4 November 2015. 94 developing countries mentioned technology in their INDCs, and 66% of developing countries reported that international support for technology development and transfer is needed in the implementation of their INDCs (UNFCCC 2016). Yet, the issue of technology development and the transfer of enviornmentally sound technologies to respond to climate change has been heavily contested between developed and developing countries over the negotaition process to formulate the Paris Agreement, and this contestation is likely to continue over the concrete rule-making and implementation of the Paris Agreement (Oh 2019). ▶(para 2) Article 10 of the Paris Agreement articulates a long-term vision on the importance of fully realizing technology development and trasnfer in order to improve resilience to climat echange and to reduce greenhouse gas emissions (UNFCCC, 2015, Art. 10.1). All Parties are obligated to strengthen cooperative action on technology development and trasnfer, and developing countries shall be supported (Ibid., Art.10.2 and 10.6). In order to support Parties' cooperative action, the Technology Mechanism, established in 2010 under the UNFCCC, is set to serve the Paris Agreement. The work of the Technology Mechanism to support Parties' implementation of the Paris Agreement is subject to the guidance of a newly established 'technology framework' (Ibid., Art. 10.4). The Paris Agreement emphasizes efforts to accelerate, encourage and enable innovation to be supported, including the the Technology Mechanism and the Financial Mechanism of the UNFCCC (Ibid., Art. 10.5). The Paris Rulebook further elaborates the guiding principles and five 'key themes' for the technology framework, including innovation, implementation, enabling environment and capacity-building, collaboration and stakeholder engagement, and support (UNFCCC 2019b). Particulalry, Parties	Accepted, in principle. Section re-written.	Chaewoon Oh	Green Technology Center	Republic of Korea

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
8731	24	43	25	5	[14.4.2.8. Section re-writing] (Continued) ▶(para 3) The Technology Mechanism consists of the Technology Executive Committee (TEC) as a policy arm and the Climate Technology Centre and Network (CTCN) as an implementation arm to support developing countries (UNFCCC 2015b). The TEC focuses on identifying and recommending policies that can support countries in enhancing and accelerating the development and trasnfer of climate technologies (TEC 2020). The CTCN has provided three core services to developing countreis: i) technical assistance (TA) through network member organizations having technology expertise by the request of developing countries, ii) information and knowledge, and iii) network and collaboration & capacity building (CTCN 2020a). Thus, the CTCN finds and solicits technology needs from the National Designated Entities of developing countries and mobilizes policy and technical expertise of the CTCN network members to deliver technology solutions, capacity building and implementation advice to developing countries (CTCN 2020b). As of February 2020, the CTCN has provided technical assistances to developing countries out of 289 requests since its operation in 2013 (CTCN 2020c). The TEC and the CTCN incorporated the guidance contained in the technology framework in their respective 2019-2022 workplan and programme of work in 2019 and develop joint activities to be undertaken in 2020 (UNFCCC 2019a). ▶(para 4) The work of the Technology Mechanism to support countries' technology cooperation is critical in the implementation of the Paris Agreement. There are several issues to be noteworthy. The first is the financial instability of the CTCN. The CTCN depend its funding on the voluntary contribution from "various sources, including the financial mechanism of the Convention, bilateral/multilatera/private sector channels, philanthropic sources as well as financial and in-kind contributions from the host organization and participants in the Network" (UNFCCC 2011, paras 135(f) and 139). The CTCN's current finncial resources are highly dependent on voluntary contributions from developed countries, so the matter of securing a sustainable funding for the CTCN by resource mobilization and diversification is a recurring challenge (UNFCCC 2019b,	Accepted, in principle. Section re-written.	Chaewoon Oh	Green Technology Center	Republic of Korea

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
8733	24	43	25	5	[14.4.2.8. Section re-writing](Continued) Relevant references in the cell above are as follows: ▶(New References) CTCN. (2020a). About CTCN. https://www.ctc-n.org/about-ctcn. Accessed on February 27, 2020. CTCN. (2020b). Network. https://www.ctc-n.org/network. Accessed on February 27, 2020. CTCN. (2020c). CTCN. https://www.ctc-n.org/. Accessed on February 27, 2020. Oh, C. (2019). Discursive contestation on technological innovaiton and the institutional design of the UNFCCC in the new climate change regime. New Political Economy, DOI: 10.1080/13563467.2019.1639147. Oh, C. (Forthcoming). Contestation over the financial linkage between the UNFCCC's Technology and Financial Mechanism. Using the lens of institutional interaction. International Environmental Agreements: Politics, Law and Economics. TEC. (2020). Overview. http://unfccc.int/ttclear/tec. Accessed on February 27, 2020. UNFCCC. (2011). Report of the conference of the parties on its seventeenth session, held in Durban from 28 November to 11 December 2011. http://unfccc.int/resource/docs/2011/cop17/eng/09a01.pdf. Accessed February 10, 2020. UNFCCC. (2015b). Technology Mechanism: enhancing climate technology development and transfer.	Accepted, in principle. Section re-written. Thank you for these detailed comments.	Chaewoon Oh	Green Technology Center	Republic of Korea
35777	24	43	25	5	Article 10 of Paris Agreement also called for technology for the implementation of mitigation and adaptation actions. This, through financial means, could strengthen any cooperative action on technology development and transfer as stated in PA.	Noted. This section has been rewritten.	Ahmed Abdelrehim	Centre for Environment & Development for the Arab Region and Europe - CEDARE	Egypt
45285	24	43	25	5	There could have been a mention of "Proper effective usage" of the Artificial intelligence and the upcoming 5th-Generation (5G) technology in the future so that these can be used in education as well in generating the environmental ethics among the local people.	Noted. There is a section on technology and innovation included in the SOD.	Jaimin Parikh	1. United Nations SDSN 2. European Institute of Policy Research and Human Rights 3. University of Delhi	India
14011	24	7			Add: The RIOCC (Red Iberoamericana de Oficinas de Cambio Climático): http://www.lariocc.es/es/	Noted. Considered for inclusion in new section on capacity-building 14.4.2	Gonzalo Escribano	Universidad Nacional Educación a Distancia (UNED) and The Elcano Royal Institute	Spain

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
16417	24	42			In Section 14.4.2.8 Technology transfer, please consider adding a description related to hot dry rock geothermal energy and the potential for government subsidy programs to fund oil and gas companies to transition to the geothermal industry, thereby leading a transition in the energy sector. Plant cost is mostly upfront, and funding provided by developed countries might be used to install geothermal power generation in developing countries to help decarbonize their energy sectors, while at the same time facilitating oil and gas companies to transition their assets to increase drilling capacity for hot dry rock geothermal. National mechanisms to enable this process would increase the rate of transition, and could be covered in this chapter.	Rejected. Not relevant to discussion in this chapter which is focused on international cooperation.	Daniel Helman	College of Micronesia-FSM	Micronesia, Federated States of
37643	25	6	25	16	This section is a bit misleading, insofar as it suggests that REDD+ has been endorsed as a "cooperative approach" within the understanding of 6.2. This is contested.	Accepted. We've changed the language.	Michiel Schaeffer	Climate Analytics	Netherlands
4743	25	6	25	33	Given that the section discusses Article 5 of the Paris Agreemnt, and that this does not discriminate in between forestry actions in developed and developing countries, it may worth specfying that the REDD+, to which the section devotes most of its space, cannot be considered as a comprehensive solution as it is now. By a matter of fact, REDD+ applies only to developing countries, hence leaving a significant gap for Article 5 implementation in developed ones. I suggest to esxtend the section by including elements related to LULUCF and other initiatives that may involve forestry management worldwide, regardless the countries' status.	Accepted. Section rewritten to be more balanced between REDD and LULUCF, given space considerations.	michele stua	APE-FVG	United Kingdom (of Great Britain and Northern Ireland)
37637	25	7	25	9	This wording should be changed -- "cooperative approach" is now a term of art under Article 6 and it would not be proper to imply that Article 5 expressly encourages transfers of REDD+ credits. For this reason, this sentence, which refers to REDD+ in Article 5, should use Article 5 language (action rather than "approach"). It could be altered to read as follows: Article 5 of the Paris Agreement explicitly calls for parties to take action to conserve and enhance sinks and reservoirs of greenhouse gases, including forests, and encourages countries to take action to support the REDD+ framework under the Convention.	Accepted. We've changed the language.	Michiel Schaeffer	Climate Analytics	Netherlands
37645	25	15	25	15	The following sentence is misleading as it implies that REDD+ has been endorsed as a key "cooperative approach" for purposes of Article 6: "A key cooperative approach endorsed by Article 5 is REDD+," This should be rewritten more neutrally as "Article 5 addresses REDD+, which refers to mechanisms under the UNFCCC etc " - this tracks language of Art 5.	Accepted. Language changed.	Michiel Schaeffer	Climate Analytics	Netherlands

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
28735	25	24	25	26	In the discussion of “appropriate finance support for REDD+”, it is becoming increasingly common to point out the importance of private as well as public financing. Therefore, to strengthen and enrich the argument, I added this point to the sentence (highlighted in red color): “Appropriate finance support for REDD+ is also considered critical to move from its inclusion in many countries’ NDCs to implementation on the ground (Hein et al. 2018). Since public finance for REDD+ is limited, private sector participation is expected to leverage REDD+ (Streck and Parker, 2012; Henderson et al., 2013; Pistorius and Kiff, 2014; Seymour and Busch, 2016; Ehara et al., 2019).” Added reference Streck, and C., Parker, C., 2012. Financing REDD+. In: Angelsen, A., Brockhaus, M., Sunderlin, W.D., Verchot, L. (Eds.), Analysing REDD+: Challenges and Choices. Center for International Forestry Research (CIFOR), Bogor, pp. 111–127. Henderson et al. 2013. The Role of the Private Sector in REDD+: The Case for Engagemet and Options for Intervention, UN-REDD Programme Policy Brief 04. Geneva. Pistorius, T., Kiff, L., 2014. The Politics of German Finance for REDD+ (No. 390). Washington, DC. Seymour, F., Busch, J., 2016. Why Forests? Why Now? The Science, Economics, and Politics of Tropical Forests and Climate Change. Center for Global Development, Washington DC.	Accepted and text amended. References considered for inclusion. Financing for REDD+ as part of bilateral and multilateral cooperative arrangements is considered further in the expanded section on the forestry sector later in the chapter.	Makoto Ehara	Forestry and Forest Products Research Institute	Japan
8735	25	34	25	34	[14.4.2.10. Title change] - This section 14.4.2.10 is titled as 'voluntary additional cooperation on mitigation' does not seem to be proper. 'Current title, Voluntary additional cooperation on mitigation, does not seem to capture the ethos of the Article 6 of the Paris Agreement. It is because article 6.1 of the Paris Agreement indicates that Parties can pursue volutary cooperation in the implementation of the NDC to allow for higher ambition in their mitigation and adaptaion actions. I suggest the change of this title to i) 'Voluntary cooperation in the implementation of NDC', ii) 'Voluntary cooperation for higher ambition, iii) 'Article 6 as a foundation for global carbon market', or iv) 'Voluntary cooperation for additional mitigation'.	Accepted. We have followed your advice and changed the title. The material included in the old section 14.4.2.10 can be found now in the following sections:	Chaewoon Oh	Green Technology Center	Republic of Korea
39973	25	34	25	34	Replace headline for 14.4.2.10 by "International market and non-market mechanisms" Reason: The term "additional cooperation" is not defined anywhere and misleading.	Accepted. We have followed your advice and changed the title, avoiding the term “additional cooperation”. The material included in the old section 14.4.2.10 can be found now in the following sections: 14.3.2.10 Article 6 Cooperative approaches [FOD 14.4.2.10] 14.4.4 Cooperative approaches and markets 14.4.4.1 Cooperative mechanisms and markets in UN climate regime, including and beyond Paris [Expanding on FOD 14.4.2.10]	Axel Michaelowa	University of Zurich	Switzerland

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
43503	25	34	25	34	"Additional cooperation" is not a term.	14.4.4 Cooperative approaches and markets Accepted. We have followed your advice and changed the title, avoiding the term “additional cooperation”. The material included in the old section 14.4.2.10 can be found now in the following sections: 14.3.2.10 Article 6 Cooperative approaches [FOD 14.4.2.10] 14.4.4 Cooperative approaches and markets 14.4.4.1 Cooperative mechanisms and markets in UN climate regime, including and beyond Paris [Expanding on FOD 14.4.2.10]	Matthias Honegger	Perspectives Climate Research gGmbH	Germany
8737	25	35	25	35	14.4.2.10. [Meaning of article 6] I suggest the author can consider the insertion of a separate paragraph to explain the meaning of article 6 in the Paris Agreement, instead of directly indicating the article 6.1 of the Paris Agreement.	Accepted. The section 14.3.2.10 “Article 6 Cooperative approaches” has changed and is now more focused on article 6.	Chaewoon Oh	Green Technology Center	Republic of Korea
37647	25	37	25	37	- need reference to adaptation - "higher ambition in their mitigation and adaptation actions'" 6.1	Accepted. We have added additional references on adaptation.	Michiel Schaeffer	Climate Analytics	Netherlands
8779	25	37	25	40	[14.4.2.10. Divison of article 6] - The sentence starts with 'It lists a number of specific types of cooperative apporaches~, including ITMOs, a mechanism to contribute to mitigation and support sustainable development, and a framework fo rnon-market mechanisms. In this sentence, i) the subject 'It' is not clear, ii) article 6 does not list a number of specific types of cooperative approaches but list three coopration tracks, and iii) three cooperation tracks are a) cooperative approaches involving the use of ITMOs, b) a mechanism to conribute to the mitigation of GHG and support sustainable development, and c) non-market apporaches. Therefore, I suggest the change of the sentence to 'Article 6 lists three specific types of cooperation, and they are i) cooperative approaches, ii) a mechanism to conribute to the mitigation of GHG and support sustainable development, and iii) non-market apporaches'.	Taken into account. We have followed your advice and modified the text.	Chaewoon Oh	Green Technology Center	Republic of Korea
39975	25	37	25	42	Reword "It lists - REDD+"as follows to ensure consistency of terminology: "Art 6.2 and 6.4 on market mechanisms, respectively, define cooperative approaches with international guidance and a mechanism under international oversight. Art. 6.8 covers non-market approaches. The market mechanisms generate internationally transferred mitigation outcomes (ITMOs). Reason: The term "cooperative approaches" is limited to Art. 6.2 and does not apply to Art. 6.4. Whether REDD+ is eligible under the market mechanisms is currently highly contested in the UNFCCC negotiations.	Accepted, in principle. The relevant text in the SOD clarifies this.	Axel Michaelowa	University of Zurich	Switzerland
8739	25	41	25	42	[14.4.2.10] Art 6.2 guidance does not include REDD+. I would like to suggest the change of "including regional carbon markets or REDD+" to "including crediting mechnism by bilateral cooperation or linking Emissions Trading Scheme".	Taken into account. We have followed your advice and modified the text accordingly.	Chaewoon Oh	Green Technology Center	Republic of Korea
37649	25	41	25	42	"Article 6.2 suggests ITMOs can originate from a variety of sources including regional carbon markets" - there is no support for such a specific statement in the text of 6.2. More appropriate to stick to the language of Article 6.2, and perhaps note that "given the open-endedness of the language of 6.2, it may be that ITMOs could derive from a variety of sources."	Taken into account. We have followed your advice and modified the text accordingly.	Michiel Schaeffer	Climate Analytics	Netherlands
8743	25	45	25	46	[14.4.2.10] Art 6.2 is a ground for creating an international carbon market. Thus, the text, saying "does not create an international carbon market", is not appropriate. I suggest the deletion of this text.	Taken into account. We did not delete the text, but we modified it to incorporate your suggestion.	Chaewoon Oh	Green Technology Center	Republic of Korea

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
39977	25	45	25	46	Replace "While … market, it enables" by: "This mechanism, in a form similar to "Track 1" of JI under the Kyoto Protocol, enables …" Reason: Art. 6.2 provides for an international carbon market with the rules determined by the participating parties, like it was the case under track 1 of JI, where ther was no international oversight.	Taken into account. Although we did not follow your wording exactly, we included a reference to the JI under the Kyoto Protocol.	Axel Michaelowa	University of Zurich	Switzerland
38603	25	34	26	6	It is my feeling that some facts on the potential of international cooperation, as suggested through Article 6 of PA provisions could be stated also in this chapter, before the discussion on Article 6 itself. Economic potential of Article 6 of the Paris Agreement implementation has been already discussed in Chapter I of this report To complement the statement made in Chapter 1 (quote of lines) on this issue, one could use a summary of recent results has been collected in a report published by IETA, CPLC and University of Maryland (Reference to be possibly included : IETA, University of Maryland and CPLC, September 2019, "The Economic Potential of Article 6 of the Paris Agreement and Implementation Challenges", Washington, D.C. License: Creative Commons Attribution CC BY 3.0 IGO).	Taken into account. We fully agree that a statement about the economic potential of Article 6 should be included, although we have used a different reference as we try to rely on peer-review literature whenever possible.	Jean-Yves CANEILL	IETA	France
38605	25	34	26	6	I am proposing the following addition that could be placed at the begining of section 14.4.2.10 : "Recent results (quote the reference) suggest that the benefits to cooperation under Article 6 are large and that the potential cost reductions over independent implementation of countries' NDCs could total about $250 billion per year in 2030. This indicates how important to design clear and transparent rules for the implementation of Article 6". Nota for editors of this chapter - the report can easily been collected at the following site : https://www.ieta.org/resources/International_WG/Article6/CLPC_A6%20report_no%20crops.pdf I am conscious that this is not a peer reviewed paper but given the recognition of the institutions and authors (and the fact that the scientific results have been submitted to formal publication), I would encourage IPCC to quote it. The important point is at least to indicate that Article 6 could be a cost effective way to cooperate if properly designed.	Taken into account. We fully agree that a statement about the economic potential of Article 6 should be included, although we have used a different reference as we try to rely on peer-review literature when possible.	Jean-Yves CANEILL	IETA	France

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
4745	25	34	26	42	Given the relevance that Article 6 operationalisation has been playing during the last COPs (and is forecasted to play also in COP26), I suggest to expand the section with further considerations and to significantly increase literature references by including studies and publications (entirely or partially) devoted to the Article's rationale, scope, functioning and potential. As for the suggested literature, I propose Stua, M., 2017: Article 6 of the Paris Agreement as Foundation for the Mitigation Alliance) in: M., Stua (Ed.), From the Paris agreement to a low-carbon bretton woods: Rationale for the establishment of a mitigation alliance. Springer International Publishing, which introduces a holistic perspective on the Article and provides several elements linking the Article to other parts of the Agreement (i.e.: Articles 2, 4, 5, 7, 9, 10, 11, 13 and 16). In addition, I suggest including as reference literature: Marcu, A., 2016: Carbon market provisions in the Paris agreement (Article 6). CEPS Special Report 128. Klein, D., Carazo, M. P., Doelle, M., Bulmer, J., Higham, A., 2017: The Paris Agreement on Climate Change. Oxford University Press. La Hoz Theuer, S., Schneider, L., Broekhoff, D. (2018). When less is more: limits to international transfers under Article 6 of the Paris Agreement. Climate Policy 19(4), 401-413. Gao, S., Li, M, Duan, M., Wang, C., 2019: International carbon markets under the Paris Agreement: Basic form and development prospects. Advances in Climate Change Research 10(1), 21-29. Michaelowa, A., Espelage, A., Müller, B., 2019: Negotiating cooperation under Article 6 of the Paris Agreement. European Capacity Building Initiative. Schneider, L., Duan, M., Stavins, R., Kizzier, K., Broekhoff, D., Jotzo, F., Winkler, H., Lazarus, M., Howard, A., Hood, C., 2019: Double counting and the Paris Agreement rulebook. Science 366(6462), 180-183. Zenker, A., 2020: International Climate Agreements under Review. Springer International Publishing.	Taken into account. Thank you for pointing out these references. We have included some of them. Unfortunately, due to space limitations we could not include all of them.	michele stua	APE-FVG	United Kingdom (of Great Britain and Northern Ireland)
45287	25	34	26	42	There could have been a mention of "Proper effective usage" of the Artificial intelligence and the upcoming 5th-Generation (5G) technology in the future so that these can be used in education as well in generating the environmental ethics among the local people.	Noted, thanks, there is a section on technology and innovation in the SOD but this otherwise is beyond the scope of our chapter.	Jaimin Parikh	1. United Nations SDSN 2. European Institute of Policy Research and Human Rights 3. University of Delhi	India
25321	25	46	26	3	Delete "for example, ... (Howard, 2017).", as this matter is still under negotiation under UNFCCC processes.	Taken into account.	Eleni Kaditi	Organization of the Petroleum Exporting Countries (OPEC)	Austria
39979	25	48	26	3	Reword "Article 6.2 ...Howard, 2017" as follows: "Beyond projects and programmes, ITMOs could also be generated through linkage of mitigation policies across two or more parties, or sectoral and policy crediting (Howard 2017). Reason: The current wording generates the impression that ITMOs "fall from the sky".	Accepted, in principle. The relevant text in the SOD clarifies this.	Axel Michaelowa	University of Zurich	Switzerland
5007	25	34	27	6	Goal 13: Adopt urgent measures to combat climate change and its effects. In this sense, the global response to the threat of climate change should be strengthened, and the Paris Agreement that all countries agreed to work to limit the increase in global temperature to less than 2 degrees Celsius should be followed. The implementation of the Paris Agreement is essential to achieve the Sustainable Development Goals, and provides a roadmap for climate actions that will reduce emissions and create the climate resilience that the world needs.	Noted. Goal 13 is referred to in section 14.	MARIA DEL VALLE MORRESI	UNIVERSITY	Argentina

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
14013	25	33			Add a reference to Nature Based Solutions: Kabisch, N., N. Frantzeskaki, S. Pauleit, S. Naumann, M. Davis, M. Artmann, D. Haase, S. Knapp, H. Korn, J. Stadler, K. Zaunberger, and A. Bonn (2016), Nature-based solutions to climate change mitigation and adaptation in urban areas: perspectives on indicators, knowledge gaps, barriers, and opportunities for action. Ecology and Society 21(2):39. http://dx.doi.org/10.5751/ ES-08373-210239	Noted. References considered for inclusion, space permitting.	Gonzalo Escribano	Universidad Nacional Educación a Distancia (UNED) and The Elcano Royal Institute	Spain
39981	26	4	26	4	Replace "ITMOs are" by "that it is". Reasons: ITMOs are the outcome of a transaction but not the underlying mechanism.	Taken into account. Thank you for pointing out these references. We have included some of them. Unfortunately, due to space limitations we could not include all of them.	Axel Michaelowa	University of Zurich	Switzerland
43505	26	4	26	4	ITMOs are the units of transfer, not the mechanism.	Taken into account.	Matthias Honegger	Perspectives Climate Research gGmbH	Germany
39983	26	14	26	14	Insert after ".. Mehling 2018).": "Michaelowa et al. (2019) provide evidence why a dedicated additionality determination is necessary to ensure environmental integrity under Article 6.2 and suggest specific approaches for additionality testing of mitigation policy instruments." Michaelowa, Axel; Hermwille, Lukas; Obergassel, Wolfgang; Butzengeiger, Sonja (2019): Additionality revisited: guarding the integrity of market mechanisms under the Paris Agreement, in: Climate Policy, 19, p. 1211–1224	Accepted, references taken into consideration for the SOD.	Axel Michaelowa	University of Zurich	Switzerland
37651	26	21	26	22	Insert: "Unlike the CDM, the 6.4 mechanism aims to deliver an overall mitigation in global emissions."	Partially accepted,. We discuss this in the revision of this section.	Michiel Schaeffer	Climate Analytics	Netherlands
39985	26	26	26	28	Reword "Compared …stronger ..." as follows: "As the CDM under the Kyoto Protocol, the SDM has dual climate and development objectives. Some researchers now see a stronger ....." Reason: In both the Kyoto Protocol (CDM) and the Paris Agreement (SDM), the sustainable development contribution has the same rank as the emissions reduction.	Partially accepted,. We discuss this in the revision of this section.	Axel Michaelowa	University of Zurich	Switzerland
8745	26	27	26	28	[14.4.2.10] With regard to the text, saying "The SDM has a more balanced focus on both climate and development objectives", I think more evidence is needed to support this text. In what way or in comparison with what, does the SDM has a more balanced focus?	Noted, thanks. The relevant text in the SOD substantiates this position.	Chaewoon Oh	Green Technology Center	Republic of Korea
37653	26	33	26	33	Suggest noting that cancellation and discounting, paired with corresponding adjustments, have been identified as practical ways to deliver against this requirement in a quantified manner through the accounting system, recycling cost savings from cooperation directly into more abatement. See Schneider et al (2018) "Operationalising an 'overall mitigation in global emissions' under Article 6 of the Paris Agreement"; at https://newclimate.org/wp-content/uploads/2018/11/Operationalising-OMGE-in-Article6.pdf and Hanna Wang-Helmreich, Wolfgang Obergassel and Nicolas Kreibich (2019) Achieving Overall Mitigation of Global Emissions under the Paris Article 6.4 Mechanism at https://www.dehst.de/SharedDocs/downloads/EN/project-mechanisms/discussion-paper_bonn-2019_1.pdf?__blob=publicationFile&v=2	Taken into account. We agree that the accounting system is relevant for Article 6, although we have used a different reference as we try to rely on peer-review literature whenever possible.	Michiel Schaeffer	Climate Analytics	Netherlands
16135	26	34	26	42	This text may be dated by the time this WG report comes out. It may be wise to write it in a more time resilient way.	Accepted. We have followed your advice.	Navroz Dubash	Centre for Polcy Research	India
25323	26	36	26	42	Delete "There are entrenched differences ... of the entire regime.", as these issues are still under negotiation.	Taken into account. We have followed your advice.	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
37655	26	38	26	38	in addition to overall mitigation, should mention impact on ambition of individual Party NDCs. A useful cite here might be Mace and Hare. Climate Analytics (2019), Australia's proposed 'Kyoto carryover' - nature, scale, implications, legal issues and environmental integrity of the Paris Agreement	Accepted, in principle, within the constraints of time and space. Reference considered for inclusion in the SOD.	Michiel Schaeffer	Climate Analytics	Netherlands
38599	26	38	26	40	I find that the description which concerns Article 6 of the Paris Agreement (both content and state of play) is a fair and condensed one. In this paragraph, object of this remark, I would encourage author to check the following sentence : « whether to impose a mandatory share of proceeds on both Article 6.2 and 6.4 mechanisms to fund adaptation, as this would increase the transaction costs » It seems to me that the question is not relevant for Article 6.4 because the legal text of Paris Agreement states in its Point 6 : "The Conference of the Parties serving as the meeting of the Parties to the Paris Agreement shall ensure that a share of the proceeds from activities under the mechanism referred to in paragraph 4 of this Article is used to cover administrative expenses as well as to assist developing country Parties that are particularly vulnerable to the adverse effects of climate change to meet the costs of adaptation" To my knowledge there is a general acceptance from the Parties that credits issued from projects relevant to implementation of Article 6.4 should generate share of proceeds for adaptation. However the question is real for ITMOS relevant to implementation of Article 6.2. There is no agreement, between Parties, at this stage to wether or not to impose a share of proceeds on possible future transactions ; at least this is not stated in the legal text as for Article 6.4.	Taken into account.	Jean-Yves CANEILL	IETA	France
38601	26	38	26	40	As a consequence of comment 1, I would suggest to modify the text as follows : « whether to impose a mandatory share of proceeds on Article 6.2 mechanism to fund adaptation, as this would increase the transaction costs »	Taken into account.	Jean-Yves CANEILL	IETA	France
37657	26	40	26	40	Add: ", whether both Article 6.2 and 6.4 mechanisms should be required to deliver an overall mttigation in global emissions," as this is equally an issue debated in the negotiating process	Taken into account.	Michiel Schaeffer	Climate Analytics	Netherlands
8747	26	40	26	41	[14.4.2.10] It needs to add a phrase : "whether credits generated under Art 6.4 should be subject to accounting rules under Art 6.2 if the emission reduction of Art 6.4 is transferred to other country"	Accepted, in principle.LR	Chaewoon Oh	Green Technology Center	Republic of Korea
34847	27	8	27	24	There is a fundamental gap and inconsistency in the loss and damage (L&D) provision in the Paris Agreement (PA) that need to be addressed here. Te Article 8 of the uses the word 'support' and 'should' in order to indicate the non-binding nature of the Article. While the provision on 'support' includes financial assistance', the L&D provision lack a direct link to the financial mechanism of the PA. Conversely, the instrument establishing the Warsaw International Mechanism (WIM) consistenbtly urges to 'enhance', 'facilitate', 'mobilise' or 'provide' finance or resources for loss and damage.	Noted, but the attempt here is to represent the literature. No references are offered in support of the particular interpretation offered by the reviewer. And, constraints of time and space preclude an in-depth analysis of Article 8.	MOSTAFA MAHMUD NASER	EDITH COWAN UNIVERSITY	Australia
41295	27	17	27	18	You refer to a paper on accountability of companies. It would be natural to also mention the work in the literature on contributions by countries to warming, and assess what role this knowledge can have. (Sorry if I overlooked something in the chapter). See e.g. Skeie et a. 2017 (ERL) in ERL; Otto et al.2017 in Nature Climate change	Accepted. The SOD adds in a reference to the accountability of states, although no international court has yet been approached to establish this.	Jan Fuglestvedt	CICERO	Norway
13145	27	18	27	20	add 'and international human rights law' after 'under general international law' with reference to Wewerinke-Singh (2019) and Wewerinke-Singh & Salili (2019).	Accepted.	Margaretha Wewerinke-Singh	Leiden University; University of the South Pacific	Netherlands

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
8749	27	25	27	25	[14.4.2.12. Insertion on Warsaw Mechanism] The section 14.4.2.12 is on loss and damage. I think it seems proper to insert some explanation on the establishment and operation of Warsaw Mechanism. Particularly, in 2019, Santiago Network was established under the Warsaw Mechanism beside the existing organization of Executive Committee. I suggest the author can consider on the insertion.	Accepted. The SOD adds a reference to the Warsaw Mechanism.	Chaewoon Oh	Green Technology Center	Republic of Korea
37659	27	27	27	28	The first two lines regarding entry into force, participation and US notice of withdrawal do not belong in a box on the key features of the PA - they do not relate to the content of the treaty. If they are to be somewhere, they should be outside the box.	Accepted. The SOD moves this text out of the box.	Michiel Schaeffer	Climate Analytics	Netherlands
25325	27	31	27	32	Delete “, including its objective ... at safe levels.”, as it is unclear what safe levels means.	Accepted, in part. The SOD replaces 'at safe levles' with language from UNFCCC Article 2.	Eleni Kaditi	Organization of the Petroleum Exporting Countries (OPEC)	Austria
37661	27	32	27	32	reference to "safe" is not the right word - as even the temperature goal newly agreed under 10/CP.21 and 1/CP.21 do not aim to guarantee safety. Stick to Convention language - prevent dangerous anthropogenic interference with the climate system in referring to Convention objective. In addition, the reference to the Convention to be GHG concentrations "at a level" (singular), rather than "levels" (plural). Also the reference to "additional" goals in same line should be reconsidered - the overall objective is to be carried out through these goals - these are not distinct additional goals	Accepted. The SOD replaces 'at safe levles' with language from UNFCCC Article 2.	Michiel Schaeffer	Climate Analytics	Netherlands
37663	27	41	27	41	delete reference to "collective" peaking - language of PA is not restricted to collective peaking ("In order to achieve the long-term temperature goal set out in Article 2, Parties aim to reach global peaking of greenhouse gas emissions as soon as possible, recognizing that peaking will take longer for developing country Parties")	Accepted. The SOD reflects this change.	Michiel Schaeffer	Climate Analytics	Netherlands
25327	27	43	28	1	Delete “This is designed to reach ... to eradicate poverty.”	Rejected. This phrase occurs in PA Article 4, and the reviewer offers no reason for the deletion.	Eleni Kaditi	Organization of the Petroleum Exporting Countries (OPEC)	Austria
8751	28	4	28	32	[Box 14.1. Re-structuring] This section (Box 4.1 Key features of the Paris Agreement) is well indicative of the features of the Paris Agreement. Yet, I think that some repositioning of some sentences will better explain the key features of the Paris Agreement. My suggestion is as follows; (i) Sentence in line 30-32 (on adaptation) needs to go to line between 9 (on mitigation commitment) and 10. I think mitigation and adaptation need to be dealt with on a similarly weighted status. (ii) Sentence in line 26-29 (on voluntary cooperation for the implementation of the NDC) can go right after the afore-mentioned adaptation section. (iii) Sentence in line 24-26, dealing with the means of implementation, starts with 'for developing countries'. I think it is better to delete 'for developing countries'. Also, I think this sentence should go to line between 14 and 15. Means of implementation is a very important factor determing the efficacy of the Paris Agreement. (iv) In consideration of the afore-mentioned revision, in sentece in line 10-11, I hope that the author changes 'three additional elements' to 'four additional elements'.	Noted, and accepted in part. This suggestion was taken into account in the revision of Box 14.1, but the current structure follows the logic and layout of the Paris Agreement, which is more defensible.	Chaewoon Oh	Green Technology Center	Republic of Korea

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
4747	28	12	28	29	I would add "Voluntary additional cooperation on mitigation" (reference to Article 6 but also to Article 5) as a fourth additional goal, rather than citing it as a 'side element' (lines 26-29).	Rejected. The three goals identified are in Article 2 of the Paris Agreement, which is characterized as the 'purpose' of the Agreement in Article 3. Articles 5 and 6 do not fall in this basket.	michele stua	APE-FVG	United Kingdom (of Great Britain and Northern Ireland)
37665	28	15	28	17	replace "Parties" with "Parties' " (possessive); to "domestic constituencies" line 17 add a reference to peers, e.g., "domestic constituencies and peers"	Accepted. The SOD reflects this change.	Michiel Schaeffer	Climate Analytics	Netherlands
37667	28	22	28	23	add "communication" to the cycle, as "preparation, communication, implementation and review of NDCs	Accepted. The SOD reflects this change.	Michiel Schaeffer	Climate Analytics	Netherlands
37669	28	28	28	28	add higher ambition in their mitigation "and adaptation" actions - to track Article 6.1	Accepted. The SOD reflects this change.	Michiel Schaeffer	Climate Analytics	Netherlands
38123	28	34	28	34	14.4.2.13 - assessment of the paris agreement - In this section is clear that PA is being assessed against the given 5 criteria set in table 14.1. However, a similar assessment of the other agreements is not clear in sections 14.4.2.1 and 14.4.2.3. Hence, somehow it makes the reading of the assessment of the agreements confusing. Suggestion: To indicate that the assessment is based on the PA (answering to the scope of the assessment). Otherwise, clarity on what is being assessed should be specified at the beginning of section 14.4. And also in section 14.3.4	Accepted, in part. The SOD reorganizes the material, and has been rewritten to clarify that the UN climate regime is being assessed to the criteria identified in Chapter 13. The other regimes are being assessed as they are in the literature, but not comprehensively to the criteria identified in Chapter 13, as there is insufficient literature to support such an exercise.	Karla Solis	onu	Germany
2749	28	35	28	35	It might be valuable to find a useful dichotmous phrasing other than ex post and ex ante. Something that I would find more compelling, for example, is "expected effectiveness of commitments on paper" vs. "observed effectiveness of behaviors in practice" or something that uses more felicitous language.	Accepted, in part. The SOD takes this suggestion into account, but the literature uses these terms, and where it does, the text of the SOD reflects this.	Ronald Mitchell	University of Oregon	United States of America
45977	28	35	28	37	14.4.2.13 I do not agree with the statement that the Paris Agreement has not been evaluated. Already the SR15 comprissed a broad assessment of the NDCs with the long-term stabilization targets of well-below 2°C and 1.5°C. It clearly shows that substantially greater effort is required up until 2030 by all countries. This part of the Chapter requires strong cooperation with Chapter 3 and 4 of this report.	Noted. The SOD references the 1.5C report, and ensures consistency with Chapters 3 and 4.	Nico Bauer	Potsdam Institute for Climate Impact Research (PIK)	Germany
45289	28	43	28	43	A less proper approach and usage of words. Instead of naming any country peculiarly, the following phrase could be used: "The non-cooperation and ineffective implementation of few developed countries of global west has resulted in the mitigation gap."	Rejected. This is a subjective and overbroad assessement/opinion.	Jaimin Parikh	1. United Nations SDSN 2. European Institute of Policy Research and Human Rights 3. University of Delhi	India

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
4749	28	34	31	31	In providing a review of ex-ante analyses of the Paris Agreement, I suggest you to extend literature references. These references shall concern pessimistic, neutral and optimistic studies and shall include at least: Fujimori, S., Su, X., Liu, J-Y., Hasegawa, T., Takahashi, T., Masui, T., Takimi, M., 2016: Implication of Paris Agreement in the context of long-term climate mitigation goals. SpringerPlus 5(1620), 1-11. Streck, C., Keenlyside, P., von Unger, M., 2016: The Paris Agreement: A New Beginning. Journal for European Environmental & Planning Law 13, 3-29. Klein, D., Carazo, M. P., Doelle, M., Bulmer, J., Higham, A., 2017: The Paris Agreement on Climate Change. Oxford University Press. Stua, M., 2017: From the Paris agreement to a low-carbon bretton woods: Rationale for the establishment of a mitigation alliance. Springer International Publishing. Kiesecker, J., Baruch-Mordo, S., Kennedy, C. M., Oakleaf, J. R., Baccini, A., Griscom, B. W., 2019: Hitting the Target but Missing the Mark: Unintended Environmental Consequences of the Paris Climate Agreement. Frontiers in Environmental Science, doi.org/10.3389/fenvs.2019.00151. Mitchell, D., Allen, M. R., Hall, J. W., Muller, B., Rajamani, L., Le Quéré, C., 2018: The myriad challenges of the Paris Agreement. Phil. Trans. R. Soc. 376(2119), 1-5.	Accepted, in part. These references were considered for inclusion in the SOD	michele stua	APE-FVG	United Kingdom (of Great Britain and Northern Ireland)
45979	28	42			The word approach is unapproariate here.	Rejected. The reviewer does not indicate why it is inappropriate. Those that take an optimistic approach/view do not reach conclusions, since their view to some extent is based on speculations as to how actors will behave in response to the catalyst the PA represents.	Nico Bauer	Potsdam Institute for Climate Impact Research (PIK)	Germany
13081	29	16	29	20	You are right that the PA *potentially* covers a broader range of GHGs than the KP, but that is only because the range of GHGs is not specified. The problem is that, as you say elsewhere, NDCs "vary in terms of …scope and coverage of NDCs… with many omitting important mitigation sectors" (p.19, line 24, 27). It is therefore impossible to make a blanket statement that the PA covers a broader range of GHGs. Certainly it does by virtue of including all countries, but I don't read your point in this way - perhaps it should be rephrased as such; in any case, the role played by non-Annex A GHGs is really very small. What is more significant in terms of environmental effectiveness is that the PA covers a much wider range of countries, and therefore by definition more emissions.	Accepted. The SOD clarifies this point.	Joanna Depledge	Climate Policy Journal	United Kingdom (of Great Britain and Northern Ireland)
45291	29	16	29	20	The inclusion still remains question in few regions. The following phrase could be included: "The inclusion of various other actions is possible but it still remains a question of leadership of the respective countries that up to which extent this opportunity is utilised."	Rejected. The suggested insertion is not supported by references.	Jaimin Parikh	1. United Nations SDSN 2. European Institute of Policy Research and Human Rights 3. University of Delhi	India
11893	29	16	29	25	The text could be clearer on the coverage of gases (and components?) of the Paris Agreement compared to the Kyoto Protocol.	Accepted. The SOD takes this into consideration and seeks to be clearer.	Maria Malene Kvalevåg	Norwegian Environment Agency	Norway

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
8753	29	16	29	33	[14.4.2.13. Consideration of re-writing on environmental effectiveness] - I suggested other possible indicators to assess the enviornmental effectiveness such as i) participation scope, ii) level of commitments, and iii) compliance rates besides the scope of gases. If the author applies the other indicators as well, then, this section on the assessment of the Paris Agreement in terms of 'enviornmental effectiveness' needs ot be re-written. - What is mainly expected from environmental effectiveness is whether the Paris Agreement will attain the temperature goal of 2°C.	Noted. The criteria for assessing effectiveness in the SOD draw on the criteria developed in Chapter 13, which cover these elements.	Chaewoon Oh	Green Technology Center	Republic of Korea
45983	29	16	29	33	This part is a great disappointment. The authors discuss the importance of AFOLU within the NDCs. However, the Chapter started with the importance of energy transitions (as opposed to the regulatory approach of the Kyoto protocol, which has worked as the authors also state previously). This confirms the point made by scholars that energy transitions is interesting as a social science approach, but it is not able to provide the basis for achieving the Paris targets. Also, the assessment mentions numbers that would have been better placed in the previous sub-sub-sections. Here the reader wants to see an assessment of what policy makers have achieved and what is still necessary to done in the area of iternational cooperation to achieve the Paris targets. From what I read here, energy transitions is obviously not the tool to achieve this.	Noted. The competing narratives of energy transition versus regulatory approach is brought out more clearly in the SOD.	Nico Bauer	Potsdam Institute for Climate Impact Research (PIK)	Germany
13083	29	19	29	19	The phrase "Unlike the KP, the PA … parties may include a wide range of climate mitigation actions in their NDCs" is misleading, suggesting that the KP was actually limiting the policies that parties could implement. As you rightly state elsewhere, the KP contained obligations of result - to limit GHG emissions - but these could explicitly be taken in whatever sectors or through whatever policies parties saw fit (indeed, refer to KP Article 2 for an indicative and all-encompassing list of potential policies). Please rephrase.	Accepted. The SOD clarifies this.	Joanna Depledge	Climate Policy Journal	United Kingdom (of Great Britain and Northern Ireland)
37671	29	26	29	26	replace language "for the 2°C limit" - now misleading following adoption of a more ambitious goal under the PA. Could reference a particular likelihood of staying below 2C	Noted, however the text reflects language that is reflected in some of the literature, so changing it might change the intent/findings of the author. To the extent this is not the case, the SOD reflects a consideration of this suggestion.	Michiel Schaeffer	Climate Analytics	Netherlands
44737	29	27	29	28	I wonder whether the IPCC should really go with the term "natural climate solutions" (popularized by Griscom et al.) since calling a solution 'natural' usually serves to gain a certain comparative advantage vis-a-vis seemingly 'unnatural' approaches (see https://www.nature.com/articles/s41558-019-0661-z).	Noted. The SOD puts these terms in quotes.	Oliver Geden	German Institute for International and Security Affairs	Germany
14015	29	29	29	33	Repetition: see page 14-30 lines 12-13	Accepted. Changed in the SOD	Gonzalo Escribano	Universidad Nacional Educación a Distancia (UNED) and The Elcano Royal Institute	Spain
36807	29	38	29	41	Can this idea of signalling be expanded? What happens if some countries drop out? Will agreement still go ahead? What can we learn from other international treaties?	Noted. The SOD reflects a deepened engagement with the literature on these issues more broadly, however, a more detailed assessment of other IEAs is precluded by space constraints.	Zinta Zommers	United Nations Office for Disaster Risk Reduction	Germany

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
45293	29	39	29	40	the non-cooperation by US also reinforces the norm that other developed and developing countries have to work further. Thus following must be included: "The non-cooperation by few countries shows an irresponsible behaviour and thus mandates the rest of the developing and developed countries to work more strategically in this regard and MUST increase their efforts on the same."	Rejected. Policy prescriptive and not supported by references or argument.	Jaimin Parikh	1. United Nations SDSN 2. European Institute of Policy Research and Human Rights 3. University of Delhi	India
17381	29	41	29	43	According to discussions held during COP25 and lack of international consensus in IPCC special report on the impacts of global warming of 1.5 °C above pre-industrial levels, the mentioned texts should appear to be reviewed.	Rejected. The discussion suggest lack of political consensus not scientific disagreement. The 1.5C report was requested by COP-21.	Zeyaeyan Sadegh	Islamic Republic of Iran Meteorological Organization (IRIMO)	Iran
13085	29	46	29	47	It would be useful to make it clear that "the KP implemented the multilaterally agreed burden sharing arrangement set out in the UNFCCC, reflected in etc…"	Accepted, in principle. The language in the SOD has been nuanced to reflect this point.	Joanna Depledge	Climate Policy Journal	United Kingdom (of Great Britain and Northern Ireland)
45981	29	16			In their assessment the authors state that a great advantage of the NDC approach is that more GHG are covered than in the Kyoto Protocol. This is one of the many examples where the authors make "argument counting" rather than a rigoruos case in terms of billion tons of CO2-eq. This is the main and most important metric, not the number of GHGs. MOreover, this has also not been quantified previously.	Noted. However, the what the reviewer calls 'argument counting' is reflective of the literature we cite. Choosing one sole metric would be policy prescriptive on our part.	Nico Bauer	Potsdam Institute for Climate Impact Research (PIK)	Germany
45985	29	34			The authors highlight that the Paris Agreement does not show to induce transformative potential. This is a very surprising finding. As many scholars, such as David Victor, have highlighted, the Paris Agreement will do exactly that. Now we have the assessment that the bottom-up approach does not deliver on the targets. Actually, the authors even go one step further and state that there is not even enough data. How can that be? The idea of a bottom-up approach was always that it is a process of mutual learning. About what do the nations learn, if there is no data? What hve they done all the time? Overall, this is a very important finding and needs to be highlighted much more in the Exectuive Summary.	Noted. The assessment in the SOD has been strengthened to take into account these, among other comments.	Nico Bauer	Potsdam Institute for Climate Impact Research (PIK)	Germany
14017	29	43			Add: The limited evidence of such a rapid transition being underway begs the question of the extent to which the Paris Agreement can foster investments in disruptive technologies and whether Parties are effectively investing in basic R&D for breakthroughs. ie: Ref: Viega Benesh (2012), Forward looking workshop on Materials for Emerging Energy Technologies. European Commission. Directorate-General for Research and Innovation Directorate G – Industrial Technologies. Unit G3 – Materials. Also Biberian, J-P. (2020), Cold Fusion. Amsterdam: Elsevier.	Accepted, in principle. The SOD adds this point, if not the precise language.	Gonzalo Escribano	Universidad Nacional Educación a Distancia (UNED) and The Elcano Royal Institute	Spain
14019	29	46			Justification needed on why and what data /references support the idea that the Kyoto Protocol fares better than the Paris Agreement regarding distributive outcomes.	Accepted. The SOD reflects a deeper engagement with the equity and distributional issues than the FOD.	Gonzalo Escribano	Universidad Nacional Educación a Distancia (UNED) and The Elcano Royal Institute	Spain

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
45295	30	2	30	2	When it comes to "fairness of parties" the following must be noted: the diplomatic consensus is still underway in developing various aspects of burden sharing and evaluation of the fairness' of parties and possess a modern challenge which could prove devastating in an extreme circumstance.	Noted. The SOD reflects a deeper engagement with fairness and equity issues, but does not adopt the language suggested here.	Jaimin Parikh	1. United Nations SDSN 2. European Institute of Policy Research and Human Rights 3. University of Delhi	India
8755	30	5	30	7	[14.4.2.13. Terms on compensatory mechanisms] - On the provision of support, in case of capacity-building, there is only Paris Committee on Capacity-Building (PCCB). In case of technology development and transfer, there is the Technology Mechanism. These can be classified to so-called compensatory mechanisms. They are not just for meeting the mitigation and adaptation financing needs of developing countries. Therefore, I suggest the sentenc to be chaned to '~~compensatory mechanisms, such as the GCF, the Technology Mechanism, and the Paris Committee on Capacity-Building, to meet the mitigation and adaptation needs of develping countries'.	Noted, the SOD changes the language around these, as 'compensatory' mechanisms is a marginal framing of these mechanisms.	Chaewoon Oh	Green Technology Center	Republic of Korea
19223	30	8	30	8	In terms of provision of support, the Paris Agreement could significantly improve its perfomance by having adequate monitoring and evaluation (M&E) systems in place. This would minimize the risk of continuing to provide more support to countries with higher capacity, as assessed in some studies. See, for example, • Umemiya, C., Ikeda, M. & While, K. M. (2020) Lessons learned for future transparency capacity building under the Paris Agreement: A review of greenhouse gas inventory capacity building projects in Viet Nam and Cambodia. Journal of Cleaner Production, 245(1): 1-11.	Noted. These references were considered for inclusion in the SOD.	Chisa Umemiya	Institute for Global Environmental Strategies	Japan
8757	30	14	30	23	[14.4.2.13. Consideration of re-writing on economic perforamnce] The author suggested two indicators of cost-effectiveness and economic efficiency, with which the author made an assessment on economic performance. With this regard to this, I suggest that the author can consider the following comments. (i) In this section, assessment is made at the center of cost-effectiveness, not economic efficiency. (ii) The author wrote the the improvement of aggregate cost-effectiveness in terms of the capacity for parties to link mitigation policies, and the author mentioned the ITMOs under article 6 is a reasonable vehicle to facilitate linkage. On the basis of what I mentioned on the section 14.4.2.10, it is better to say 'voluntary cooperation under article 6', instead of specifically alluding to ITMOs.	Noted. The criteria for assessing effectiveness in the SOD draw on the criteria developed in Chapter 13, which cover these elements, and make part of the comment moot.	Chaewoon Oh	Green Technology Center	Republic of Korea
45297	30	19	30	24	It would be incorrect to doubt the environmental integrity as various tools and methods like green budget, green bonds, circular economy, adoption of the same in SEZs are already there into existence.	Rejected. The reference in the text is to the environmental integrity of market mechanisms. The tools and methods the reviewer lists are nor directly on point.	Jaimin Parikh	1. United Nations SDSN 2. European Institute of Policy Research and Human Rights 3. University of Delhi	India
39987	30	23	30	23	Insert after "Schneider et al. 2019)": "Micchaelowa et al. 2019) Michaelowa, Axel; Hermwille, Lukas; Obergassel, Wolfgang; Butzengeiger, Sonja (2019): Additionality revisited: guarding the integrity of market mechanisms under the Paris Agreement, in: Climate Policy, 19, p. 1211–1224 complements the argumentation of Scheider et al. , focusing on the key issue of additionality.	Accepted.	Axel Michaelowa	University of Zurich	Switzerland

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
43507	30	23	30	23	add reference regarding additionality: Michaelowa, Axel; Hermwille, Lukas; Obergassel, Wolfgang; Butzengeiger, Sonja (2019): Additionality revisited: guarding the integrity of market mechanisms under the Paris Agreement, in: Climate Policy, 19, p. 1211–1224	Accepted.	Matthias Honegger	Perspectives Climate Research gGmbH	Germany
38125	30	24	30	30	Why the other 4 criteria are not compared to the Kyoto Protocol in this assessment? Line 24 introduces a comparison of institutional strength between PA and KP. Suggestion: to provide a comparisson paragraph between PA and KP for the other 4 criteria otherwise the analysis might be seen incomplete.	Accepted. The SOD contains a more robust assessment of the Kyoto Protocol. For consistency and clarity, it also uses criteria developed by Chapter 13, that build on AR5.	Karla Solis	onu	Germany
8759	30	25	30	30	[14.4.2.13. Regarding broad participation] - This section is on the criterion of institutional stregnth. The author suggested indicators for this criterion, and they are i) regulative quality (giving clear guidance and signal), ii) mechanisms to enhance transparency and accountability (clear rules and standards for collective action), and iii) administrative capacity in section 14.3.3. - I think 'broad participation' does not fit to this section on institutional stregth. I mentioned that the author needs to consider the other indicators for assessment such as broad participation, level of commitments, and compliance rates besides the scope of gases. Therefore, I suggest this part (line 25-30 in p.30) should move onto the section the section on environmentla effectiveness (line 16-33 in p.29).	Noted. As indicated earlier in response to this reviewer's comments, the SOD, for consistency and clarity, uses assessment criteria developed by Chapter 13, that build on AR5.	Chaewoon Oh	Green Technology Center	Republic of Korea
45299	30	26	30	26	Figure is wrong: There are 186 parties	Noted. The figures are constantly changng. They will be updated just before going to press.	Jaimin Parikh	1. United Nations SDSN 2. European Institute of Policy Research and Human Rights 3. University of Delhi	India
45301	30	26	30	26	Figure is incorrect: There are 189 NDCs in total	Noted. The figures are constantly changng. They will be updated just before going to press.	Jaimin Parikh	1. United Nations SDSN 2. European Institute of Policy Research and Human Rights 3. University of Delhi	India
44741	30	39	30	40	If 'bridging' is supposed to mean that sub-national action can make up for the complete ambition/emissions gap caused by national governments' insufficient action then this would be an extraordinarily strong claim (whether it is backed by Hsu et al. 2019b or not)	Accepted. The language in the SOD is nuanced to reflect this.	Oliver Geden	German Institute for International and Security Affairs	Germany
44739	30	31	31	4	On climate litigation (not fitting into 14.5.8 because that section is on international courts and transnational actors): Is there any literature on the validity of popular claims that a country has to deliver certain mitigation outcomes (maybe based on its fair share of the remaining carbon budget) or at least to announce certain targets (maybe 'net zero' by a certain year) simply because it has ratified the Paris Agreement? In an increasing number of cases before national courts this argument has been central, and of course eventually it's up to national courts to decide if this connection can be made (like in the 'Urgenda' case in the Netherlands), maybe depending on different legal traditions. If there's no discussion in the international law literature on the PA, then maybe in other strands of international environmental law?	Noted. The issues raised in this comment are considered in the relevant sections of the SOD, although the PA assessment section is not the main place for elaboration of these themes.	Oliver Geden	German Institute for International and Security Affairs	Germany

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
9683	30		31		The comparison Kyoto versus Paris has some resemblance with focal versus consensus treaty, or, ambitious versus modest treaty: Barrett, S. (2002), Consensus Treaties. "Journal of Institutional and Theoretical Economics", vol. 158(4), pp. 529-547. Finus, M. and S. Maus (2008), Modesty May Pay! "Journal of Public Economic Theory", vol. 10(5), pp. 801-826. Dannenberg, A., Lange, A. and B. Sturm (2014), Participation and Commitment in Voluntary Coalitions to Provide Public Goods. "Economica", vol. 81, pp. 257–275.	Taken into account. Interesting insights here. Considered, however, much of this literature predates the Paris Agreement, and has not been drawn on in the literature on the PA. Also, in general, we focus on literature published after AR5.	Michael Finus	University of Graz	Austria
14021	30	40			Can non-state actor climate action totally make up for the insufficient ambition by Parties? Perhaps include the GHG mitigation potential for non-state actor commitments? if the gap cannot be bridge according to current non-state actor commitments, qualify/rephrase. Reference: Angel Hsu, Amy Weinfurter, Andrew Feierman, Yihao Xie, Zhi Yi Yeo, Katharina Lütkehermöller, Takeshi Kuramochi, Swithin Lui, Niklas Höhne, Mark Roelfsema (2018), Global climate action of regions, states and businesses. Research report published by Data Driven Yale, NewClimate Institute, PBL Netherlands Environmental Assessment Agency, prepared by project team.	Accepted. Qualifed in SOD.	Gonzalo Escribano	Universidad Nacional Educación a Distancia (UNED) and The Elcano Royal Institute	Spain
32233	31	1	31	2	And seem unlikely to lead to greater NDC ambition. See Weikmans, Romain, Harro van Asselt & J. Timmons Roberts (2020, forthcoming). Transparency Requirements under the Paris Agreement and Their (Un)likely Impact on Strengthening the Ambition of Nationally Determined Contributions (NDCs). Climate Policy. https://doi.org/10.1080/14693062.2019.1695571	Accepted. SOD references this.	Harro van Asselt	University of Eastern Finland	Netherlands
8761	31	5	31	23	[14.4.2.13. Overall effectiveness of the Paris Agreement]I tinnk this section is highy relevant to environmental effectiveness. I hope that the author can consider the combination of this section with the existing section on the assessment of environmental effectiveness.	Noted. The rewrite of the the PA assessment section for the SOD takes this into account.	Chaewoon Oh	Green Technology Center	Republic of Korea
26149	31	5	31	31	The review of the "climate club" literature is fairly comprehensive - given that it is a new and emerging literature, but I believe there are a couple of papers that it would be useful to add. William Nordhaus' 2015 paper on "Climate clubs: overcoming free-riding in international climate policy" in American Economic Review, is a seminal paper in this literature and establishes key properties of clubs using economic theory and emprical modelling. The contribution by Stine Aaakre et al. (2018) on "Incentives for small clubs of Arctic countries to limit black carbon and methane emissions" in Nature Climate Change is one of very few (perhaps the only) paper to quantify the economic benefits of club cooperation, and to formally analyze the (economic) incentives to cooperate in a club.	Accepted. These references considered for inclusion in the SOD.	Steffen Kallbekken	CICERO	Norway
35787	31	15	31	17	Such sub-global mitigation clubs can be an effective supplement to a global agreement and improve the situtation especially in case that a single treaty does not comprise all countries (Asheim, GB, CB Froyn, J Hovi and FC Menz (2006). Regional versus global cooperation for climate control. Journal of Environmental Economics and Management, 51(1), 93–109.; Hagen, A., & Eisenack, K. (2019). Climate clubs versus single coalitions: the ambition of international environmental agreements. Climate Change Economics (CCE), 10(03), 1-19.).	Accepted. References considered for inclusion in the SOD.	Achim Hagen	Humboldt-Universität zu Berlin	Germany

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
45303	31	23	31	23	The following phrase could be included: " This by no means is assured and the stakeholders involved in it bears the equal amount of blame and responsibility for the same."	Rejected. The suggested text is not supported by references or compelling argument.	Jaimin Parikh	1. United Nations SDSN 2. European Institute of Policy Research and Human Rights 3. University of Delhi	India
13087	31	24	31	25	There is no need to unncessarily emphasise the differences between the KP and PA. Just delete the clause " which represents…". Also delete the word "coercive". The KP's compliance system was never coercive, and indeed was itself criticised for being too weak.	Accepted. The relevant text in the SOD is nuanced.	Joanna Depledge	Climate Policy Journal	United Kingdom (of Great Britain and Northern Ireland)
32629	31	37	31	45	This topic should be elaborated, as the MP is the world's most successful environmental treaty, and the treaty that has so far done the most for climate protection as well, using mandatory controls that apply to all parties, both developed country parties and developing country parties. Its sectoral approach is a model for other sectors, as is its "start and strengthen" approach, and its robust implementation of CBDR and other international environmental law principles. Hunder, Salzman, and Zaelke, International Envoronmental Law and Policy (5th ed 2015). In 1974 Molina and Rowland published their paper describing the theory that CFCs were migrating to the stratosphere and destroying the protective ozone layer Molina M. J. & Rowland F. S. (1974) Stratospheric sink for chlorofluoromethanes: chlorine atom-catalysed destruction of ozone, Nature 249:810¬–812; the following year in 1975 Ramanathan discovered that CFCs and related chemicals also were powerful climate forcers. Ramanathan V. (1975) Greenhouse Effect Due to Chlorofluorocarbons: Climatic Implications, Science 190:50–52. While the Montreal Protocol initially focused on protecting the ozone layer, at the same time it also was providing powerful collateral protection for climate. The MP reduced greenhouse gas emissions by a net of 135 billion tons of CO2-equivalent, or 11 billion tons per year, from 1990 to 2010, delaying climate forcing by 7 to 12 years; when early voluntary and national measures to reduce ODSs are included from 1974 onwards, the delay in climate forcing is from 35 to 41 years, avoiding as much warming as CO2 is causing today (Velders G. J. M., et al. (2007) The Importance of the Montreal Protocol in Protecting Climate, Proc. Nat'l. Acad. Sci 104(12)4814–4819).	Noted, and accepted, in part. The SOD includes discussion of a concrete number of achievements of the MP.	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
32631	31	37	31	45	Phasing down HFC refrigerants, which are powerful climate pollutants but do not destroy ozone, can avoid up to 0.5C of warming by 2100 (Xu Y., et al. (2013) The role of HFCs in mitigating 21st century climate change, ATMOS. CHEM. & PHYS. 13:6083–6089, 6083 ("Here we show that avoiding production and use of high-GWP (global warming potential) HFCs by using technologically feasible low-GWP substitutes to meet the increasing global demand can avoid as much as another 0.5 ºC warming by the end of the century."). After an eight-year effort initiated by the Federated States of Micronesia, the MP parties agreed in 2016 to phase down HFCs by passing the Kigali Amendment to the MP. (Zaelke D., Borgford-Parnell N., and Andersen S. O., Primer on HFCs: Fast action under the Montreal Protocol can limit growth of hydrofluorocarbons (HFCs), prevent 100 to 200 billion tonnes of CO2-eq by 2050, and avoid up to 0.5°C of warming by 2100 (IGSD 2018). The initial phasedown schedule of the Kigali Amendment captures about 90% of this potential, avoiding up to 0.44ºC of future warming by end of century, with additional mitigation provided by the Kigali Amendment's requirement for parties to use best efforts to reduce HFC-23, a by-produce of the production of HCFC-22. See UNEP (2019) SYNTHESIS OF THE 2018 ASSESSMENT REPORTS OF THE SCIENTIFIC ASSESSMENT PANEL, THE ENVIRONMENTAL EFFECTS ASSESSMENT PANEL AND THE TECHNOLOGY AND ECONOMIC ASSESSMENT PANEL, UNEP/OzL.Pro.31/8. Additional climate mitigation of up to 39-64 Gt CO2-e is available by capturing the ODS at product end-of-life and destroying or recycling it. Velders G. J. M., et al. (2014) Growth of climate change commitments from HFC banks and emissions, ATMOS. CHEM. PHYS. 14:4563–4572; see also Dreyfus G., et al. (2020) Assessment of climate and development benefits of efficient and climate-friendly cooling ("GHG emissions can also be reduced by collecting ODSs and HFCs at the end of the useful life of products and equipment and either recycling or destroying them (see Chapter 3). If global production of HFCs were to cease by 2020, the surface temperature contribution of the HFC emissions would stay below 0.02°C for the whole 21st century. A complete elimination of production of HFCs starting in 2020, and their substitution with low-GWP	Noted, thanks. References considered for inclusion in the SOD.	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
32633	31	37	31	45	Parallel efforts to improve energy efficiency of cooling equipment during the mandated phasedown of HFCs under the Kigali Amendment can double the climate benefits of the phasedown. UNEP (2019) SYNTHESIS OF THE 2018 ASSESSMENT REPORTS OF THE SCIENTIFIC ASSESSMENT PANEL, THE ENVIRONMENTAL EFFECTS ASSESSMENT PANEL AND THE TECHNOLOGY AND ECONOMIC ASSESSMENT PANEL, UNEP/OzL.Pro.31/8; Dreyfus G., et al. (2020) Assessment of climate and development benefits of efficient and climate-friendly cooling. Decision XXVIII/3 in 2016 instructs the MP Technology and Economic Assessment Panel ('TEAP') to review energy efficiency opportunities in the refrigeration and air-conditioning sectors related to a transition to climate-friendly alternatives, and Decision XXVIII/2 in 2016 requests the Executive Committee to develop guidelines for financing the HFC phasedown, including cost guidance for maintaining and/or enhancing the energy efficiency of low- or zero-global GWP replacement technologies and equipment when phasing down HFCs (Ozone Secretariat Handbook for the Montreal Protocol on Substances that Deplete the Ozone Layer Fourteenth Edition (Ozone Secretariat Nairobi 2020) https://ozone.unep.org/sites/default/files/Handbooks/MP-Handbook-2020-English.pdf; M Seki 'Energy Efficiency in the Context of the Montreal Protocol and its Kigali Amendment' United Nations Environment Programme, Ozone Secretariat. Presentation dated 2 June 2018. Retrieved 26 February 2020 from: https://pronto-core-cdn.prontomarketing.com/449/wp-content/uploads/sites/2/2018/06/Meg-Seki-Energy-Efficiency-in-the-context-of-the-Montreal-Protocol-and-its-Kigali-Amendment.pdf.).	Noted, and accepted, in part. The SOD includes discussion of a concrete number of achievements of the MP.	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
32635	31	37	31	45	Strategies and approaches that can be transferred to from the MP to other climate treaties include the “start and strengthen” approach and the robust implementation of the principle of “common but differentiated responsibilities.” SO Andersen and K Madhava Sarma (L Sinclair (ed)), Protecting the Ozone Layer: The United Nations History (Earthscan London 2002); Hunter, Salzman, and Zaelke, International Environmental Law and Policy (5th ed. 2015). Other important elements in the success of the Montreal Protocol that can be transferred to other treaties are standing scientific, environmental effects, and technology assessment panels that are authorized to publish reports without editing by Parties (SO Andersen and K Madhava Sarma (L Sinclair (ed)), Protecting the Ozone Layer: The United Nations History (Earthscan London 2002).). The first Meeting of the Parties (MOP) in 1989 established scientific, environmental effects, and technical and economic assessment panels. Later, the technical and economic assessment panels were merged into the Technology and Assessment Panel (TEAP). The TEAP is assisted by sectoral technical options committees (TOCs). Members of the panels and co-chairs of the TOCs are nominated by the Parties. In addition, the Montreal Protocol has successfully worked with all stakeholders involved in achieving its phaseout and phasedown goals, including governments, academia, business, NGOs, and the public. Industry has been critical to the success of ozone layer protection by serving on international technology assessment panels, by developing and promoting environmentally superior alternatives to ozone-depleting substances, and by serving as informal monitors for compliance with the MP. Ad hoc industry partnerships made various pledges including phaseout before required by the MP control schedule. (RE Benedick Ozone Diplomacy: New Directions in Safeguarding the Planet (Harvard University Press Cambridge 1991) 274–75; SO Andersen K Madhava Sarma and K Taddonio Technology Transfer for the Ozone Layer: Lessons for Climate Change (Earthscan London 2007).	Noted. The influence of the MP regime on the UN climate regime ("start and strengthen" approach and the principle of CBDR), is considered, within the constraints of space, in the SOD. Some of these references, however, are too dated for inclusion.	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
32637	31	46	32	18	Given the importance of the Kigali Amendment to the Montreal Protocol, which now has 93 ratifications as of early March 2020, this section should be expanded. Phasing down HFCs, which are powerful climate pollutants but do not destroy ozone, can avoid up to 0.5ºC of warming by 2100 (Xu Y., et al. (2013) The role of HFCs in mitigating 21st century climate change, ATMOS. CHEM. & PHYS. 13:6083–6089, 6083 ("Here we show that avoiding production and use of high-GWP (global warming potential) HFCs by using technologically feasible low-GWP substitutes to meet the increasing global demand can avoid as much as another 0.5 ºC warming by the end of the century."). After an eight-year effort initiated by the Federated States of Micronesia, the MP parties agreed in 2016 to phase down HFCs by passing the Kigali Amendment. (Zaelke D., Borgford-Parnell N., and Andersen S. O., Primer on HFCs: Fast action under the Montreal Protocol can limit growth of hydrofluorocarbons (HFCs), prevent 100 to 200 billion tonnes of CO2-eq by 2050, and avoid up to 0.5°C of warming by 2100 (IGSD 2018). The initial phasedown schedule of the Kigali Amendment captures about 90% of this potential, avoiding up to 0.44ºC of future warming by end of century, with additional mitigation provided by the Kigali Amendment's requirement for parties to use best efforts to reduce HFC-23, a by-produce of the production of HCFC-22. See WMO, et al. (2019) Scientific Assessment of Ozone Depletion: 2018, Global Ozone Research and Monitoring Project-Report No. 58; UNEP (2019) SYNTHESIS OF THE 2018 ASSESSMENT REPORTS OF THE SCIENTIFIC ASSESSMENT PANEL, THE ENVIRONMENTAL EFFECTS ASSESSMENT PANEL AND THE TECHNOLOGY AND ECONOMIC ASSESSMENT PANEL, UNEP/OzL.Pro.31/8 ("Owing to the Kigali Amendment, it is projected that global average warming due to HFCs will be reduced from a baseline of 0.3°C–0.5°C to less than 0.1°C by 2100. A more rapid phase-down of HFCs than that required by the Amendment would further limit climate change from HFCs. The planned HFC phase-down under the Kigali Amendment, as well as regional regulations, are driving industry towards low-global-warming-potential HFC alternatives and innovative applications, especially with respect to refrigeration, air conditioning and foam."); see also Dreyfus	Noted, and accepted.	Durwood Zaelke	Institute for Governance & Sustainable Development	United States of America
32639	31	46	32	18	Additional climate mitigation of up to 39-64 Gt CO2-e is available by capturing the banks of HFCs at product end-of-life and destroying or recycling it. Velders G. J. M., et al. (2014) Growth of climate change commitments from HFC banks and emissions, ATMOS. CHEM. PHYS. 14:4563–4572; see also Dreyfus G., et al. (2020) Assessment of climate and development benefits of efficient and climate-friendly cooling ("GHG emissions can also be reduced by collecting ODSs and HFCs at the end of the useful life of products and equipment and either recycling or destroying them (see Chapter 3). If global production of HFCs were to cease by 2020, the surface temperature contribution of the HFC emissions would stay below 0.02°C for the whole 21st century. A complete elimination of production of HFCs starting in 2020, and their substitution with low-GWP alternatives, would avoid an estimated cumulative 53 GtCO2e emission during 2020–2060 in addition to the reductions expected from the Kigali Amendment (Figure 2.2)..").	Noted, thanks. References considered for inclusion in the SOD.	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
32641	31	46	32	18	Past refrigerant transitions mandated by the Montreal Protocol – from CFCs to HCFCs and from HCFCs to HFCs – have catalyzed improvements in energy efficiency of cooling equipment. provided opportunities to install new equipment with higher energy efficiency. See UNEP (2011) HFCs: A Critical Link in Protecting Climate and the Ozone Layer; and UNEP (2014) Low-GWP Alternatives in Commercial Refrigeration: Propane, CO2 and HFO Case Studies. The 2016 Kigali Amendment requires the MP Multilateral Fund (MLF) Executive Committee to develop cost guidelines associated with maintaining and/or enhancing the energy efficiency of low-GWP or zero-GWP technologies and equipment that will replace existing technologies and equipment (MP MOP Decision XXVIII/2 para. 22). The Amendment also provides funding to maintain energy efficiency in the servicing/end user sectors during the transition away from HFCs (MP MOP Decision XXVIII/2 para. 16). The MLF Executive Committee also is considering measures to implement MOP Decision XXX/5, which, in addition to increasing funding for low-volume-consuming (LVC) Parties (HFC baseline consumption up to 360 metric tonnes ('MT') to introduce low and zero GWP alternatives to HCFCs, would allow flexibility in use of MLF financial support provided for enabling activities that would increase energy efficiency during the HFC phasedown, such as pilot projects, updated training materials, certification of technicians, and outreach programs for minimum environmental performance standards ('MEPS'), training programs, and energy efficient refrigeration, air conditioning, heat pump ('RACHP') equipment with low- or zero-GWP refrigerants (UNEP/OzL.Pro.30/11).	Noted.	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
32643	31	46	32	18	Under the Kigali Amendment's initial phasedown schedule, HFC emissions will be reduced by 33–47 GtCO2e by 2050; and improving energy efficiency of air conditioning and refrigeration equipment could double these climate benefits by reducing black carbon and CO2 emissions from electricity and diesel used to run this equipment. WMO, et al. (2019) Scientific Assessment of Ozone Depletion: 2018, Global Ozone Research and Monitoring Project-Report No. 58. A more recent analysis by Lawrence Berkeley National Laboratory calculates that a combined effort to phase down HFCs and simultaneously improve energy efficiency of cooling equipment can provide several times more mitigation than the HFC phasedown alone. Shah N., et al. (2019) Benefits of Energy Efficient and Low-Global Warming Potential Refrigerant Cooling Equipment, Lawrence Berkeley National Laboratory ("For best-available technology (or "maximum" efficiency), total savings to 2050 are 373.0 and 257.6 GtCO2e for baseline (or static) electricity emission factors and decreasing emission factors, respectively (Fig. 1). Table S1 in the SI shows the GHG emissions for the reference case (no efficiency improvement and baseline HFC refrigerants) vs. the policy case of best-available technology (BAT) energy efficiency and low GWP refrigerants for 2030, 2040, and 2050 with static emission factors for both cases. Reference case cumulative GHG emissions are 587.1 Gt CO2e while the policy case is 214.1 Gt for an overall cumulative savings of 373.0 Gt CO2e."). Robust policies that drive the use of best available technologies for both HFCs and energy efficiency of cooling equipment can cut cumulative emissions from the stationary air conditioning and refrigeration sectors by 38–60 GtCO2e by 2030, by 130–260 GtCO2e by 2050, and by 210–460 by 2060, depending on future rates of de-carbonization of electricity generation; a quarter of the mitigation is from phasing down HFC refrigerants and switching to alternatives with low GWP, while three-quarters is from ensuring that cooling equipment uses the best available technology to improve energy efficiency and reduce the use of electricity. Dreyfus G., et al. (2020) Assessment of climate and development benefits of efficient and climate-friendly cooling.	Accepted. The SOD includes concrete numbers.	Durwood Zaelke	Institute for Governance & Sustainable Development	United States of America
45305	31	33	33	5	There is no mention of the Convention of Biological Diversity	Accepted, the SOD references the CBD.	Jaimin Parikh	1. United Nations SDSN 2. European Institute of Policy Research and Human Rights 3. University of Delhi	India
45307	31	33	33	5	The success of these agreements should be considered complete as the ratifications of the same still remains a significant challenge for signatory countries.	Rejected. Not supported by references or argument.	Jaimin Parikh	1. United Nations SDSN 2. European Institute of Policy Research and Human Rights 3. University of Delhi	India

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
45987	31	24			The authors conclude the final paragraph of their assessment of the international cooperation to achieve the Paris cliamte change stabiliaziotn with the words: "it remains to be seen whether the Paris Agreement - which represents a fundamental shift in architecture from the Kyoto Protocol - will deliver the collective ambition necessary to meet the temperature goal." This is a sobering finding. It basically means that the framework for institutional cooperation is far, far from being ready to deliver the necessary emission reductions. The authors start their Chapter with very broad and well-chosen words on energy transitions and multi-level perspectives that are suggested to be superior to the Kyoto Protocol approach of regulating the GHG emissions. Then they only refer to procedural rules and hope that institutions outside the UNFCCC would do the job of cliamte mitigation. This basically means that the political architecture for international cooperation are completely inappropriate to achieve the Paris Climiae Targets. This means that the international political system will not achieve the targets that the international community has set to achieve collectively. The authors need to clarify what it needs to achieve a system of internaitonal relations to achieve the necessary level of international cooperation.	Noted. The competing narratives, and incongruities are clarified in the SOD. However, it is not the task of the authors to suggest/construct an alternative, and be policy prescriptive, merely to report on the state of the expert views on these competing models.	Nico Bauer	Potsdam Institute for Climate Impact Research (PIK)	Germany
45309	32	1	32	1	There must be mention of ozone less instruments. Followed could be used: "After this, the awareness generated and there has been shift from ozone based to ozone less electric instruments."	Rejected. Not clear, and not referenced.	Jaimin Parikh	1. United Nations SDSN 2. European Institute of Policy Research and Human Rights 3. University of Delhi	India
39989	32	18	32	18	Insert after "Montreal Protocol": "Hoch et al. (2019) show how the early use of market mechanisms under the Paris Agreement can generate reductions in HFCs that lower the baseline and thus the entire phase-down schedule of the Kigali Amendment, thereby generating long-term GHG mitigation benefits." Hoch, Stephan; Michaelowa, Axel; Espelage, Aglaja; Weber, Anne-Kathrin (2019): Governing complexity: How can the interplay of multilateral environmental agreements be harnessed for effective international market-based climate policy instruments?, in: International Environmental Agreements,19, p. 595-613	Noted, and reference included in the SOD.	Axel Michaelowa	University of Zurich	Switzerland

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
28737	32	48	33	1	The argument “actual biodiversity co-benefits are dependent on the design and implementation of REDD+ programs (Panfil and Harvey 2016)” is based on the analysis of 80 REDD+ projects. This argument can be strengthened by adding Ehara et al. (2014) which analyzed the linkages between REDD+ project-level and program-level standards for safeguarding biodiversity and ecosystem services and their conclusion resonates with the conclusion of Panfil and Harvey (2016). Therefore, to strengthen the argument, I added this element to the sentence and changed the line as following (highlighted in red color): “REDD+ activities have been identified as a particular opportunity for achieving climate mitigation objectives while also conserving tropical forest biodiversity and ecosystem services, actual biodiversity and ecosystem service co-benefits are dependent on the design and implementation of REDD+ programs (Panfil and Harvey 2016; Ehara et al. 2014)” Added reference Ehara et al. 2014. REDD+ initiatives for safeguarding biodiversity and ecosystem services: harmonizing sets of standards for national application, Journal of Forest Research, 19:5, 427-436, https://doi.org/10.1007/s10310-013-0429-7	Accepted, in principle. References considered for inclusion in the SOD.	Makoto Ehara	Forestry and Forest Products Research Institute	Japan
4751	33	1	33	1	Typo: " Busch et al" to be changed with " Busch et al. (2011)".	Accepted.	michele stua	APE-FVG	United Kingdom (of Great Britain and Northern Ireland)
19237	33	1	33	5	The source (Bush et al 2011) that suggests that national REDD+ can offer greatest benefits for biodiversity conservation must be based on theoretical projections since there was no evidence for such benefits in 2011. Until today only very few national REDD+ programs are operating and counting emission reductions. There is little empirical evidence that these programs are working and empirical data do not necessarily show a lot of evidence. The sentence should be deleted or put in the context of relevant empirical data (such as Panfil & Harvey (2018), cited, Newton et al., 2016, Carbon, biodiversity, and livelihoods in forest commons: synergies, trade-offs, and implications for REDD+, Env Research Letters; Johnson et al., 2019, Understanding national biodiversity targets in a REDD+ context, Env Science & Policy).	Accepted. The SOD nuances this text, and considers these references for inclusion.	Charlotte Streck	University Potsdam	Germany
4753	33	9	33	10	As for what concerns the hybrid multilateralism emerged from the Paris Agreement, I suggest to add more literature references. Besides Voigt (2016) and Christoff (2016), already cited in this Chapter but useful also as a reference for this section, I suggest to add: Savaresi, A., 2016: The Paris agreement: An early assessment. Environmental Policy and Law, 46(1), 14–18.	Noted. This section has been rewritten in the SOD and now forms the introduction to section 14.5 on multi-level, multi-level governance. Additional references on assessment of the Paris Agreement are included in section 14.3.3 dealing with assessment of the Paris Agreement.	michele stua	APE-FVG	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
4755	33	28	33	40	Given the increasing relevance played by climate clubs in the international debate on climate change policy and the implementation of the Paris Agreement, I strongly suggest to significantly increase this otherwise too brief section. In doing so, I suggest you to provide much wider literature review to both the foundation of climate clubs theories and their impact on the operationalisation of the Paris Agreement in general and its Article 6 in particular. The list of suggested literature is provided in the two comments following this one.	Accepted. The SOD includes a new section specifically on climate clubs.	michele stua	APE-FVG	United Kingdom (of Great Britain and Northern Ireland)
4757	33	28	33	40	As for what concerns the climate clubs foundation, I suggest for you to include references to: Legget, J., 1994: Trends in the governmental and business response to climate change: Problems for the carbon club, opportunities for the renewable energy sector. Renewable Energy, 5(2), 1311–1313. Aldy, J. E., Stavins, R. N., Frankel, J. A., Summers, L. H., 2007: Architectures for agreement: Addressing global climate change in the post-Kyoto world. Cambridge: Cambridge University Press. Carraro, C., Egenhofer, C., 2007: Climate and trade policy: Bottom-up approaches towards global agreement. Cheltenham: Edward Elgar Publishing Limited. Prakash, A., Potoski, M., 2007: Collective action through voluntary environmental programs: A club theory perspective. Policy Studies Journal, 35(4), 773–792. Giddens, A., 2009: The politics of climate change. Cambridge: Polity Press. Naím, M., 2009: Minilateralism: The magic number to get real international action. Foreign Policy, 173, 135–136. Antholis, W., Talbott, S., 2010: Fast forward: Ethics and politics in the age of global warming. Washington, DC: Brookings Institution. Van't Veld, K., Kotchen, M., 2011: Green clubs. Journal of Environmental Economics and Management, 62, 309–322. Weischer, L., Morgan, J., Patel, M., 2012: Climate clubs: Can small groups of countries make a big difference in addressing climate change? RECIEL, 21(3), 177–192. Stewart, R., Oppenheimer, M., Rudyk, B., 2013: A new strategy for global climate protection. Climatic Change, 120, 1–12.	Noted. References considered in writing of new section on climate clubs - section 14.5.1.4	michele stua	APE-FVG	United Kingdom (of Great Britain and Northern Ireland)
4759	33	28	33	40	As for what concerns the growing impact of climate clubs literature on the operationalisation of the Paris Agreement in general and its Article 6 in particular, I suggest you to add references to: Stua, M., 2017: Climate Clubs and Their Relevance Within the Paris Agreement in:M. Stua, (ed.), From the Paris agreement to a low-carbon bretton woods: Rationale for the establishment of a mitigation alliance. Springer International Publishing. Das, K., 2015: Climate clubs: Carrots, sticks and more. Economic & Political Weekly, 50(34), 24–27. Falkner, R., 2016: A minilateral solution for global climate change? On bargaining efficiency, club benefits and international legitimacy. Perspectives on Politics, 14(1), 87–101. Sprinz, D. F., Saelen, H., Underdal, A., Hovi, J., 2017: The effectiveness of climate clubs under Donald Trump. Climate Policy 18(7), 828-838. Stua, M., 017: A Transformational Club within the Paris Agreement: A Climate-Club Perspective on Article 6. In R. Stavins and R. Stowe, R. (Eds.), Market Mechanisms and the Paris Agreement, 67-72. Harvard Project on Climate Agreements. Van den Bergh, J. C. J. M., 2017: Rebound policy in the Paris Agreement: Instrument comparison and climate-club revenue offsets. Climate Policy, 17(6), 801-813. Fuessler, J., Kohli, A., Spalding-Fecher, R., Broekhoff, D., 2019: Article 6 in the Paris Agreement as an ambition mechanism – Options and recommendations. Swedish Energy Agency. Michaelowa, A., Espelage, A., Müller, B., 2019: Negotiating cooperation under Article 6 of the Paris Agreement. European Capacity Building Initiative. Nolden, C., Stua, M., Coulon, M., 2019: Climate clubs and positive carbon pricing for a Low-Carbon Bretton Woods. Law Research Paper Series, University of Bristol.	Noted. Thank you for the references. We will include as appropriate.	michele stua	APE-FVG	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
18815	33	30	33	32	Simply drop the whole sentence beginning with "Economic theory" and ending with "(1965)". Justification: the reference to Buchanan 1965 is theoretically erroneous for two reasons: (1) Buchanan's clubs are clubs of consumers of a local excludable public good, whereas climate change is a non excludable global public good; (2) the clubs of the here mentioned theory are clubs of the producers if this same and still non excludable public good (bad, actually).The exclusion that the new theory introduces is on other, excludable, commodities. Such confusion between the consumers of the good and its producers is a mistake that the IPCC cannot afford to spread worldwide....	Taken into account, thanks. Although we keep Buchanan's reference for historical reasons, we now specify that it is a static analysis that applies to excludable goods.	Henry Tulkens	CORE, Université catholique de Louvain	75
35785	33	36	33	37	This is also found by (Lessmann, K., R. Marschinski, and O. Edenhofer (2009). The effects of tariffs on coalition formation in a dynamic global warming game. Economic Modelling 26(3), 641–649.). However, more recent findings (Böhringer, C. and T. F. Rutherford (2017). Paris after Trump: An Inconvenient Insight. Oldenburg Discussion Papers in Economics, V – 400-17; Hagen, A. and J. Schneider (2017) Boon or Bane? Trade Sanctions and the Stability of International Environmental Agreements, Oldenburg Discussion Papers in Economics V-403-17) suggest that the risk of a trade war between members of such a climate club can also decrease cooperation. They highlight that this risk, and the potential welfare-detrimental effects of a trade war should be taken into account in an evaluation of such trade penalties.	Noted. Thank for these references. We refer to these as apprpriate.	Achim Hagen	Humboldt-Universität zu Berlin	Germany
45785	33	36	33	40	Sticks being proposed under Climate Clubs also raise issues around WTO compatibility. Refer: • Das, Kasturi, 'Climate Clubs: Carrots, Sticks and More', Economic and Political Weekly, Sameeksha Trust, L no 34, 24-27, 2015.	Noted. Thanks for the reference.	Kasturi Das	1. Professor of Economics, Institute of Management Technology, Ghaziabad, India; 2. Member, Climate Strategies	India
45787	33	36	33	40	A more recent development on plurilateral cooperation on trade-climate interface is ACCTS. See for instance, • Time to ACCTS? Five countries announce new initiative on trade and climate change https://www.iisd.org/blog/time-accts-five-countries-announce-new-initiative-trade-and-climate-change	Noted. Thanks for the reference.	Kasturi Das	1. Professor of Economics, Institute of Management Technology, Ghaziabad, India; 2. Member, Climate Strategies	India
32235	33	39	33	40	To this could be added: Asselt, Harro van (2017). Climate Change and Trade Policy Interactions: Implications of Regionalism. OECD Working Paper 2017/03. Paris: Organisation for Economic Co-operation and Development, 54 pp. http://www.oecd-ilibrary.org/environment/climate-change-and-trade-policy-interactions_c1bb521e-en.	Noted. We have added.	Harro van Asselt	University of Eastern Finland	Netherlands
18817	33	40	33	40	After "... 2016)." insert the following: " The absence of agreement on the characterization of the state of the system (e.g. partial vs fully cooperative) in a worldwide club equilibrium renders the theory, as it stands, still incomplete. A conceptual basis for filling that gap exists nevertheless with the notion of partial agreement Nash equilibrium (PANE) (Chander and Tulkens 1997) and Hybrid Nash equilibrium (Yang 2008), introduced in an IAM (Eyckmans and Tulkens 2003; Yang 2008; Tulkens 2019).	Rejected. This is too much detail, especially considering that these citations predate the time period covered in this assessment cycle.	Henry Tulkens	CORE, Université catholique de Louvain	Belgium

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
18547	33	7	53	16	One element of accelerating mitigation through international cooperation seems missing or not sufficiently covered: cthat small groups of actors induce change that is then automatically picked up by others, e.g. a group supporting renewables, which are now mainstream, or a group supporting electric vehivles, which are now much cheaper. Related literature includes http://energy-transitions.org/content/accelerating-low-carbon-transition https://exponentialroadmap.org https://climateactiontracker.org/publications/transformation-points/ http://www3.weforum.org/docs/WEF_the_speed_of_the_energy_transition.pdf	Rejected. We don't see this as an issue of international cooperation, but rather related to technology diffusion, as per Ch 16.	Niklas Höhne	NewClimate Institute	Germany
34559	33		55		Section 14.5 is informative, but mostly descriptive. I wonder if the opening section could be expanded to give more analysis of the incentives and rationales for subglobal or sectoral agreements - ideally, something of a framework against which (shorter) accounts of existing actions could be assessed? WIthin this, attention to the relationship between trade and climate change. The section on trade & regional agreements is good but mainly descriptive and focused on actual agreements; mostly legal, section 14.5 could benefit from more integration with the economic discussions on clubs, and contrast the broadly punitive approach of Nordhaus et al with the more positive economic agendas of sub-global cooperation to create shared gains through multiple possible economic incentives (eg: Paroussos, L., A. Mandel, K. Fragkiadakis, P. Fragkos, J. Hinkel, and Z. Vrontisi, 2019: Climate clubs and the macro-economic benefits of international cooperation on climate policy. Nat. Clim. Chang., https://doi.org/10.1038/s41558-019-0501-1). Authors might consider a separate subjection in the 13.6 Synthesis.	Noted. This entire section has been re-organized and revised, with a much stronger trade section, in particular.	Michael Grubb	UCL - Institute of Sustainable Resources	United Kingdom (of Great Britain and Northern Ireland)
46941	33	7			Section 14.5 Institutions and instruments for sub-global and/or sectoral specific cooperation: I would suggest that supply-side treaties be devoted a sub-section here. National supply side policies are now addressed in Ch 13. However, Some of the references used in CH 13 on supply side treaties would better fit iin Ch 14, as they actually address international cooperation. The motivations, mechanisms and challenges would be different in a nation than in an international coalition, the latter perhaps included in the Paris Agreement processes. I would suggest a doordinated effort to split and refer to each other. SEE ALSO MY COMMENTS 2 AND 10.	Noted. Thanks.	Taran Fæhn	rerserach institute	Norway
14023	33	15			Add: the word ‘exclusively’. Suggestion: , which in general no longer del exclusively with multilateral negotiations…’	Noted. This section has been rewritten in the SOD and now forms the introduction to section 14.5 on multi-level, multi-level governance.	Gonzalo Escribano	Universidad Nacional Educación a Distancia (UNED) and The Elcano Royal Institute	Spain
9685	33				On this page but also in other parts you talk about R&D versus treaties on mitigation. Relevant literature would be: Sharing R&D investments in breakthrough technologies to control climate change. Santiago J. Rubio, Oxford Economic Papers, Volume 69, Issue 2, April 2017, Pages 496–521. Sharing R&D Investments in Cleaner Technologies to Mitigate Climate Change", Santiago Rubio and Abeer El-Sayed, Resource and Energy Economics, 38: 168-180, 2014.	Accepted. Thanks for the references.	Michael Finus	University of Graz	Austria

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
9687	33				On this page but also in other parts you talk about trade agreements and club goods. You hardly touch upon the literature on border tax adjustments. Many references are given in following literature: 2. Anoulies L. (2014), The Strategic and Effective Dimensions of Border Tax Adjustment. “Journal of Public Economic Theory”, vol. 17(6), pp. 824-847. Al Khourdajie and M. Finus (forthcoming), International Environmental Agreements and Carbon Border Adjustments. Bath Economic Research Papers 71/18, University of Bath Forthcoming: European Economic Review. 12. Böhringer, C, B. Bye, T. Fæhn, and K. E. Rosendahl (2017a), Output-based Rebating of Carbon Taxes in the Neighbors Backyard. “Canadian Journal of Economics”, vol. 50(2), pp. 426-455. 13. Böhringer, C. A. Lange, and T. F. Rutherford (2014), Optimal Emission Pricing in the Presence of International Spillovers: Decomposing Leakage and Terms-of-trade Motives. “Journal of Public Economics”, vol. 110, pp. 101-111. 14. Böhringer, C., A. Müller, and J. Schneider (2015), Carbon Tariffs Revisited. “Journal of the Association of Environmental and Resource Economists”, vol. 2(4), pp. 629-672, 2015.25. Eichner, T. and R. Pethig (2013), Self-Enforcing Environmental Agreements and International Trade. “Journal of Public Economics”, vol. 102, pp. 37-50. 28. Eyland, T. and G. Zaccour (2012), Strategic Effects of a Border Tax Adjustment. “International Game Theory Review”, vol. 14(3), pp. 1-22. 35. Helm, D., C. Hepburn and G. Ruta (2012), Trade, Climate Change, and the Political Game Theory of Border Carbon Adjustments. “Oxford Review of Economic Policy”, vol. 2, pp. 368-394. Hecht, M. and Peters, W. (2018). Border adjustments supplementing nationally determined carbon pricing. Environmental and Resource Economics, 73(1):93109.	Partially accepted. We agree that this is an important topic that was absent from our FOD. Several of the references suggested have been incorporated, however, due to space limitations, not all. Thank you for providing this list of relevant references.	Michael Finus	University of Graz	Austria
47707	34	1	34	10	The alternative approach proposed here seeks to replace taxes on carbon and other GHG emissions with an inherently dynamic, incentive-based strategy. This alternative proposal includes two interlocking components: 1) the first component consists of an excise duty applied on the extraction of fossil fuels and primary production of products with global warming potential (GWP) both synthetic and non-synthetic, including fluorocarbons and methane; 2) The second component involves a scalable refund that would make it possible to reclaim the excise duty levied upstream, in whole or in part. Refunds would be granted in exchange for a reduction in, or complete elimination of, emissions linked to the use of substances with a global- warming potential. Compared to the immediate sources of GHG emissions that are innumerable, there are indeed much fewer sources of extraction/production of GHG-emitting materials. Once adopted, the excise duty principle would be intrinsic in all participating countries and therefore more readily implemented.	Noted.	Jacques de Gerlache	GreenFacts	Belgium
47709	34	1	34	10	https://www.euractiv.com/section/climate-environment/opinion/mondaycop21-goals-an-alternative-path-to-success/	Taken into account.	Jacques de Gerlache	GreenFacts	Belgium
37673	34	10	34	10	Useful reference is Mace and Hare, Climate Analytics, Australia’s proposed ‘Kyoto carryover’- nature, scale, implications, legal issues andenvironmentalintegrity of the Paris Agreement	Taken into account.	Michiel Schaeffer	Climate Analytics	Netherlands
4761	34	11	34	18	Stating that the CDM 'glod rush' lasted only in between 2005 and 2011 is incorrect. By a matter of fact 2012 results being the year with the highest number of approved CDM projects (3236), almost triple of those approved in 2011 (1104). The European Union restricted the use of CDM credits from 1st of January 2013. See also the CDM registry on the UNFCCC webpage.	Accepted. Changed in the SOD	michele stua	APE-FVG	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
4767	34	11	34	37	As a general comment on the CDM it is of great importance to underline how, far from being just a market-based system, the CDM has been used also for the implementation of bilateral strategies and even for unilateral (non-market) actions, hence virtually covering all the mechanisms now included in Article 6 of the Paris Agreement. This resulted more evident in China, where the CDM was subjected to tight norms including a floor price and a taxation varying upon the types of projects (see also: Stua, M., 2013: Evidence of the clean development mechanism impact on the Chinese electric power system's low-carbon transition. Energy Policy 62, 1309–1319). Literature on the use of CDM beyond the 'market concept' shall include: Michaelowa, A., Gagnon-Lebrun, F., Hayashi, D., Salgado Flores, R., Crête, P., Krey, M., 2007: Understanding CDM methodologies. A guidebook to CDM rules and procedures. Perspectives CC and DEFRA Guidebook. Teng, F., Zhang, X., 2010: Clean development mechanism practice in China: current status and possibilities for future regime. Energy 35(11), 4328–4335. Tsang, S., Kolk, A., 2010: The evolution of Chinese policies and governance structures on environment, energy and climate. Environmental Policy and Governance 20, 180–196. Zhao, Z., Zuo, J., Fan, L., Zillante, G., 2011: Impacts of renewable energy regulations on the structure of power generation in China – a critical analysis. Renewable Energy 36, 24–30. Phillips, J., Newell, P., 2013: The governance of clean energy in India: The clean development mechanism (CDM) and domestic energy politics. Energy Policy, 59, 654–662. Chapter 6 (A Single Mechanism for the Certification of Mitigation Outcomes) In Stua, M., 2017: From the Paris agreement to a low-carbon bretton woods: Rationale for the establishment of a mitigation alliance. Springer International Publishing.	Accepted. Changed in the SOD	michele stua	APE-FVG	United Kingdom (of Great Britain and Northern Ireland)
45311	34	13	34	14	The language of the phrase could be changed because: the developing countries mentioned cannot be blamed for this as because of their "developing" status, they create more opportunity for the same Following should be added: "Instead a more positive way would be creating similar healthy environment in African subcontinent and those regions which lack the same."	Rephrased, but not in the language suggested by the reviewer.	Jaimin Parikh	1. United Nations SDSN 2. European Institute of Policy Research and Human Rights 3. University of Delhi	India
39991	34	20	34	23	Reword "In relation to … score" as follows: "While a number of early studies raise concerns about the additionality of CDM projects, more recent studies taking into account regulatory tightening and learning how to devise robust additionality tests see a more positive outcome (Michaelowa et al. 2019). This points to an initially low, but improving effectiveness score." Reason: As lead author of the quoted paper, I would like to ensure that the message of the paper is quoted correctly.	Taken into account.	Axel Michaelowa	University of Zurich	Switzerland
43509	34	20	34	23	Additionality determination has evolved and improved under the CDM, which is what the cited paper finds.	Taken into account.	Matthias Honegger	Perspectives Climate Research gGmbH	Germany

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
4763	34	23	34	26	The real contribution of CDM in terms of capacity building, technology transfer, sustainable development, private and public financial flows and other positive side-effects on host countries is often underestimated and literature focusing on such elements did not receive a full visibility. By this reason, I strongly suggest you to enhance your literature reference by including: Dechezlepretre, A., Glachant, M., Meniere, Y., 2008: The Clean Development Mechanism and the international diffusion of technologies: an empirical study. Energy Policy 36, 1273–1283. Shin, S., 2010: The domestic side of the clean development mechanism: the case of China. Environmental Politics 19(2), 237–254. Wang, B., 2010: Can CDM bring technology transfer to China? An empirical study of technology transfer in China's CDM projects. Energy Policy 38, 2572–2585. Wang, Q., Chen, Y., 2010: Barriers and opportunities of using the clean development mechanism to advance renewable energy development in China. Renewable and Sustainable Energy Reviews 14, 1989–1998. Cheng, Y., Wang, L., Zhang, X., 2011: Environmental impact of coal mine methane emissions and responding strategies in China. International Journal of Greenhouse Gas Control 5, 157–166. Bayer, P., Marcoux, C., Urpelainen, J., 2013: Leveraging private capital for climate mitigation: Evidence from the Clean Development Mechanism. Ecological Economics, 96, 14–24. Costa Martins, D. E., Bernardini Seiffert, M. E., Dziedzic, M., 2013: The importance of clean development mechanism for small hydro power plants. Renewable Energy, 60, 643–647. Crowe, T. L., 2013: The potential of the CDM to deliver pro-poor benefits. Climate Policy, 13, 58–79. Stua, M., 2013: Evidence of the clean development mechanism impact on the Chinese electric power system's low-carbon transition. Energy Policy 62, 1309–1319. Wang, C., Zhang, W., Cai, W., Xie, X., 2013: Employment impacts of CDM projects in China’s power sector. Energy Policy, 59, 481–491. Erickson, P., Lazarus, M., Spalding-Fecher, R., 2014: Net climate change mitigation of the clean development mechanism. Energy Policy, 72, 146–154. Gandenberger, C., Bodenheimer, M., Schleich, J., Orzanna, R., Macht, L., 2015: Factors driving international technology transfer: Empirical insights from a CDM project survey. Climate Policy, 16(8),	Taken into account.	michele stua	APE-FVG	United Kingdom (of Great Britain and Northern Ireland)
4765	34	26	34	28	The ‘low hanging fruit’ issue on CDM projects is a false myth. This tends to refer to the approval of project with high impacts in terms of GHGs reductions and limited side-benefits, such as in sustainable development (i.e.: the HFC23 and SF6 projects). All together these amount to only 24 out of 7758 approved projects in CDM history (0.3% of the total). Their disproportionate relevance in literature, especially among those scholars critical against the CDM, is mainly due to the fact that most of them were approved at the early stages of CDM (all 18 HFC23-related projects were approved between 2005 and 2009), hence leading to an impressive cumulative number of credits. Moreover, it is relevant to note that two of the biggest and earliest HFC23-related CDM projects (both of them approved in 2006 and hosted by China), were directly sponsored by the International Bank for Reconstruction and Development (IBRD). This strategy by the IBRD aimed at accelerating Chinese involvement in the CDM system.	Taken into account.	michele stua	APE-FVG	United Kingdom (of Great Britain and Northern Ireland)
39993	34	30	34	30	Reword "into….here" as follows: "initially only a handful of countries (China, India, Brazil). However, the introduction of the concept of Programmes of Activities widened the regional scope, especially towards Africa (Michaelowa et al. 2019). A medium score is given here". Michaelowa, Axel; Shishlov, Igor; Brescia, Dario 2019 Evolution of international carbon markets: lessons for the Paris Agreement, in: WIREs Climate Change, 10, e613, DOI: 10.1002/wcc.613	Taken into account.	Axel Michaelowa	University of Zurich	Switzerland

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
43511	34	30	34	30	Introduction of Programmes of Activities have led to a rapid increase in participation by African nations add reference to: Michaelowa, Axel; Shishlov, Igor; Brescia, Dario 2019 Evolution of international carbon markets: lessons for the Paris Agreement, in: WIREs Climate Change, 10, e613, DOI: 10.1002/wcc.613	Taken into account.	Matthias Honegger	Perspectives Climate Research gGmbH	Germany
39995	34	33	34	33	Insert after Tewari 2012: "Michaelowa (2014) shows how the CDM reduced the economic costs of domestic carbon pricing schemes." " Replace "medium" by "high", Reason: Literature clearly says CDM fulfilled its economic target. Michaelowa, Axel (2014): Linking the CDM with domestic offset markets, in: Climate Policy, 14, p. 353-371	Taken into account.	Axel Michaelowa	University of Zurich	Switzerland
39997	34	33	34	37	Replace "Finally … decisions by: "Finally with regard to institutional strength, the assessment is high as there was an extremely strong institutional apparatus built at the UNFCCC Secretariat with an unprecedented degree of transparency regarding project documentation and performance. Moreover, in host countries national approval bodies were set up and an ecosystem of consultants and auditors developed around the world. While this was costly (Michaelowa and Michaelowa 2017), it provided the basis on which greenhouse gas accounting can now be undertaken under the Paris Agreement." Michaelowa, Katharina; Michaelowa, Axel (2017): The growing influence of the UNFCCC Secretariat on the clean development mechanism, in: International Environmental Agreements, 17, p. 247-269	Taken into account.	Axel Michaelowa	University of Zurich	Switzerland
43513	34	33	34	37	The CDM has led to an institutional and personal capacity development which has proven crucial in the later development of sectoral policies (NAMAs) and national mitigation targets and policies (i)NDCs, which today represents the foundation of the Paris Agreement! I would like to strongly suggest to include this observation.	Taken into account.	Matthias Honegger	Perspectives Climate Research gGmbH	Germany
44743	34	42	34	42	EU and Switzerland already linked their systems	Accepted. Changed in the SOD.	Oliver Geden	German Institute for International and Security Affairs	Germany

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
37675	34	38	35	12	Useful here to comment on the acknowledged potential of Aticle 6 of the PA to increase environmental effectiveness - Article 6.4(d) now aims to deliver an overall mitigation in global emissions (going beyond the offsetting of the KP to now deliver net emission reductions). Proposals to operationalize this element include the cancellation or discounting of emisison reduction units at issuance or use, thereby recycling a portion of the cost savings from market transfers directly into more mitigation, by driving more projects and more abatement to deliver the same volume of units. See Schneider at al. (2018) Similarly, the requirement of a share of proceeds under Article 6.6 enables a portion of the savings by purchasers in the market to be recycled directly into adaptation funding for vulnerable developing countries. There have been calls by vulnerable developin countries for the extension of these requirements (OMGE and SOP) to Article 6.2 implementation, based on Article 6.1, whiich speaks to enhancing mitigation and adaptation ambition. Concerns about tradeoffs with economic effectiveness have been raised. But issues around distribution of benefits has also been raised in response - that recycling savings into more abatement benefits all Parties; recycling savings into adaptation benefits vulnerable countries - allowing the benefits of market participation to be spread more broadly, delivering co-benefits to cost savings. See also "Achieving Overall Mitigation of Global Emissions under the Paris Article 6.4 Mechanism" DEHST (2019)	Taken into account.	Michiel Schaeffer	Climate Analytics	Netherlands
4769	34	43	35	12	Literature on carbon markets linking requires significant improvements. I suggest adding: Haites, E., 2015: Experience with linking greenhouse gas emissions trading systems. WIREs Energy and Environment 5(3), 246-260. Borghesi S., Montini M., Barreca A., 2016: Linking Emission Trading Schemes. In: The European Emission Trading System and Its Followers. SpringerBriefs in Environmental Science. Springer, Cham. Jevnaker, T., Wettestad, J., 2016: Linked Carbon Markets: Silver Bullet, or Castle in the Air? Climate Law 6(1-2), 142–151. Mo L., Lu X., 2016: Barriers and Options for Carbon Market Integration. In: Anbumozhi V., Kalirajan K., Kimura F., Yao X. (Eds.), Investing on Low-Carbon Energy Systems. Springer, Singapore. Schneider, L., Lazarus, M., Lee C., van Asselt, H., 2017: Restricted linking of emissions trading systems: options, benefits, and challenges. International Environmental Agreements: Politics, Law and Economics volume 17, 883–898. R. Stavins and R. Stowe (Eds.), 2017: Market Mechanisms and the Paris Agreement. Harvard Project on Climate Agreements. Rose, A., Wei, D., Miller, N., Vandyck, T., Flachsland, C., 2018: Policy Brief—Achieving Paris Climate Agreement Pledges: Alternative Designs for Linking Emissions Trading Systems. Review of Environmental Economics and Policy 12(1), 172-180. Schneider, L., La Hoz Theuer, S., 2018: Environmental integrity of international carbon market mechanisms under the Paris Agreement. Climate Policy 19(3), 386-400. Rosenzweig, R. H., 2019: Global Climate Change Policy and Carbon Markets – Transition to a New Era. Springer International Publishing.	Taken into account.	michele stua	APE-FVG	United Kingdom (of Great Britain and Northern Ireland)
14025	34	18			Add a sentence reflecting the difficulty in agreeing on the rules that govern article 6 of the Paris Agreement on voluntary international cooperation. Especially as regards: environmental integrity and double counting, carryover units from Kyoto, Overall Mitigation in Global Emissions (OMGE), the share of procedes, and the inclusión of issues related to Human Rights. See Marcu, A. and Kumar Duggal, V. (2019), Negotiations on Article 6 of the Paris Agreement – Road to Madrid. ADB Sustainable Development Working Series. Nº 63. November 2019	Taken into account.	Gonzalo Escribano	Universidad Nacional Educación a Distancia (UNED) and The Elcano Royal Institute	Spain

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
25923	35	1	35	1	When putting this Section 1.5.1 in relation with the two main sections of Annex C: Scenarios and modelling methods, this reviewer has difficulty in seeing clearly the respective roles of each one of them. More precisely, it is not stated in the text the extent to which scenarios are built and computed, using models, and which ones (if any) are built otherwise. From the last three lines of the Table of contents of Annex C, however, there is a clue from which it seems that scenarios (all of them?) are built from models. While the so announced tables are not currently available, it is recommended that the text be really explicit on the role of models in the construction of scenarios. On that point, as a social scientist, I would insist that the distinction between optimization models (in fact scenarios) and other simulation models be much more emphasized, because the optimization feature expresses in its mathematics, a human choice among alternatives. Such a choice is even an interpersonal one when the objective function involves several individuals. The choice, here is, for instance, between alternative forms of cooperation: none, partial, or full -- which are of course alternative possible "scenarios" of social organization (Tulkens 2019 using CWS), i.e. of international governance! Other exampes of cooperation or non cooperation can be quoted, such as Lindahl equilibria or Nash Barganining solution (Yang 2008, using RICE). The neglect of multi-agent scenarios and modelling in both this Section 1.5.1 and in Annex C is reflected in the absence, in the references lists of either chapter, of at least one reference to the pionneer paper (Nordhaus and Yang 1996) on multi-agent Integrated Assessment Model. Most, if not all, subsequent scientific work uses it. This multi-agent optimization, an essential tool for a social science, is also the tool whereby cooperative game theory concepts can be introduced in economic reasoning. The IPCC cannot ignore that in its reporting of what social science has to offer on climate science.	Taken into account. Please take into account that our mandate is to review new developments since AR5, so that the absence of importante references, such as Nordhaus and Yang (1996), which have been considered in previous IPCC reports is justified. However, we have considered the recent paper suggested and especially whether we can develop the discussion on the role of models, and quote alternative concepts of cooperative and non-cooperative game theory.	Henry Tulkens	CORE, Université catholique de Louvain	Belgium
45315	35	1	35	12	Also a suggestion of a governing body can be made in which leadership of those countries which are exceptionally doing well in carbon neutrality could be given preferences in the 'leadership' of the body.	Noted.	Jaimin Parikh	1. United Nations SDSN 2. European Institute of Policy Research and Human Rights 3. University of Delhi	India
10939	35	3	35	3	A reference should be added here for analysis of the types of political issues that led to the breakdown of the Australia-EU link: Bailey, I. and Jackson Inderberg, T.H. (2017) Australia: domestic politics, diffusion and emissions trading design as a technical and political project, in Wettestad, J. and Gulbrandsen, L. (eds) The Evolution of Carbon Markets: Design and Diffusion, 124-144.	Accepted. Changed.	Ian Bailey	University of Plymouth	United Kingdom (of Great Britain and Northern Ireland)
45313	35	5	35	5	I disagree with the phrase 'loss of political control'. It SHOULDN'T be treated as a problem rather as an opportunity to keep political influences away from the policies.	Taken into account. Rephrased.	Jaimin Parikh	1. United Nations SDSN 2. European Institute of Policy Research and Human Rights 3. University of Delhi	India

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
45689	35	12	35	13	This section could insert a paragraph on last developments on how countries are involving to support the development of ETS before considering linking them. A new paragraph such as the following could be inserted "Faced with the fact that few ETS links are effective, and after the failure of several attempts or initiatives to establish its ETS links with others accross the world, some countries are committed to supporting the emergence of new ETS systems or for strengthening existing ETS systems. The commitment of these countries can be achieved by financial support for the implementation of these carbon pricing policies (some countries such as Australia, the European Union or the United States provide a financial contribution to the Partnerships for Market Readiness program of the World Bank which supported 19 countries in implementing their carbon pricing policies). The commitment of countries can also be concretized through capacities building (The European Union funds a project of the EU-China ETS platform in order to enhance cooperation between EU and China on climate change by establishing a regular political dialogue on emission trading and continuing to support China in building a nation-wide emission trading system that contributes to reduce its emissions). Finally, the implmentation or a proposal of a carbon border adjustment tax for products / emissions coming from countries without a compatible climate ambition (such as in California which applies a border carbon adjustment to electricity imports from neighbouring states and in Europe where the European Commission proposed in its Green Deal disclosed in December 2019 to implement this tol) can also be seen as a political and economic instrument to encourage the emergence carbon pricing policies before considering linking them."	Taken into account.	Emilie ALBEROLA	Ecoact	France
32237	35	16	35	16	"virtually any type of mitigation commitment" - this phrase suggests that the focus of sectoral agreements should be on mitigation, but what about sectoral agreements in the area of adaptation? Are these not an option? If so, I think this focus should be made explicit.	Noted. We are primarily concerned with agreements related to mitigation, consistent with the overall theme of this working group.	Harro van Asselt	University of Eastern Finland	Netherlands
4771	35	31	35	40	I believe it is necessary to specify that REDD+ addresses only intitiatives in developing countries.	Accepted. Section rewritten in SOD.	michele stua	APE-FVG	United Kingdom (of Great Britain and Northern Ireland)
14027	35	41	35	46	Perhaps include the 2015 UN Convention to Combat Desertification (UNCCD) in section 14.2.2. on Developments since AR5?	Noted. This is not included in section on Developments since AR5 but broader discussion of land use sector activities included in rewritten section of SOD on forestry and land use sector.	Gonzalo Escribano	Universidad Nacional Educación a Distancia (UNED) and The Elcano Royal Institute	Spain
45317	36	1	36	21	Also a suggestion of a governing body can be made in which leadership of those countries which are exceptionally doing well in carbon neutrality could be given preferences in the 'leadership' of the body.	Noted. This section has been rewritten in the SOD.	Jaimin Parikh	1. United Nations SDSN 2. European Institute of Policy Research and Human Rights 3. University of Delhi	India

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
10941	36	19	36	19	The statement about reduced dforestation in the Brazilian Amazon is now outdated and needs to be revised to reflect recent policy announcements by the Brazilian government. Implementation is not just slow but is being actively reversed.	Accepted. We specify that the observations were of changes prior to 2018, and note, if there is literature, what has happened since.	Ian Bailey	University of Plymouth	United Kingdom (of Great Britain and Northern Ireland)
4773	36	22	36	23	Repetition: "in 2010" is repeated twice in the same sentence.	Accepted. Oops. Thanks.	michele stua	APE-FVG	United Kingdom (of Great Britain and Northern Ireland)
17339	37	3	37	4	The emissions meant here mostly come from deforestation, what is land use change, not forestry. So it's either the sector AFOLU or the sector LULUCF.	Accepted. We've changed the section heading to reflect forestry and land-use. Of course these are interrelated.	Joachim Rock	Thuenen-Institute of Forest Ecosystems	Germany
16137	37	5	37	5	Arguably one of the more consequential, if diffuse, aspects of global governance around energy has been global influences on restructuring electricity markets, which is salient for renewable energy. The impetus for this has historically been led by the mulitlateral development banks. A good source to track this story would be https://www.worldbank.org/en/topic/energy/publication/rethinking-power-sector-reform. While you may chose to develop this is 14.5.5., it may be worth a mention here as well.	Noted. This is really interesting, and our revision reflects this.	Navroz Dubash	Centre for Polcy Research	India
38243	37	5	37	38	This section should also mention the International Energy Secretariat which manages the Energy Charter Treaty which entered into force in 1998 and aims at protecting foreign invetsments in fossil fuels by means of investor-state-dispute-settlement (ISDS) mechanism. See comments 1 & 2 for more information and references on this organisation	Accepted. Very good and important point.	Yamina Saheb	OpenExp, Ecole des Mines de Paris	France
6107	37	6	37	17	There is now a burgeoning literature on global energy governance. The best overview of this literature is found here: Van de Graaf, T., & Colgan, J. (2016). Global energy governance: a review and research agenda. Palgrave Communications, 2(1), 1-12.	Accepted. Thanks for the reference, which we cite.	Thijs Van de Graaf	Ghent University	Belgium
25329	37	13	37	13	Replace "enable them to contol oil output and prices" with "enable them to contribute to market stability."	Accepted. This is a good point.	Eleni Kaditi	Organization of the Petroleum Exporting Countries (OPEC)	Austria
6103	37	14	37	14	Contrary to what is written, the IAEA's mission was to promote nuclear energy, and not just nuclear safety.	Accepted. This has been corrected.	Thijs Van de Graaf	Ghent University	Belgium
44791	37	16	37	16	”nuclear safety non-proliferation of weapons” should be ”nuclear security non-proliferation of weapons”	Accepted. Thanks for the correction.	Daniel Westlén	Liberal party Swedish parliament	Sweden
13621	37	20	37	20	Suggest adding sentence in bold: Collectively, these developments may support the emergence of a nascent field of global sustainable energy governance, in which a broad range of global, regional, national, sub-national and non-state actors, in aggregate, shape, direct and implement the low carbon transition through climate change mitigation activities, which produce concomitant societal benefits (Bruce 2020). Full citation: Bruce, S., 2020: Global Energy Governance and International Institutions, 12-13. In W. Filho et al (eds), Encyclopedia of the UN Sustainable Development Goals. Affordable and Clean Energy (Springer). DOI: https://doi.org/10.1007/978-3-319-71057-0_71-1. (Bruce assesses the role and function of selected international organisations on global energy and climate governance)	Noted. We include references where appropriate, and within our space constraints.	Stuart Bruce	Wilmer Cutler Pickering Hale and Dorr LLP	United Kingdom (of Great Britain and Northern Ireland)

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
6105	37	20	37	22	This is not entirely accurate. The IEA started to adapt and broaden its mission much earlier than 2005. In the early 1990s, it already adopted the so-called Shared Goals. For more information, see: Van de Graaf, T., & Lesage, D. (2009). The International Energy Agency after 35 years: Reform needs and institutional adaptability. The Review of International Organizations, 4(3), 293-317.	Accepted. Thanks for pointing this out. Revised.	Thijs Van de Graaf	Ghent University	Belgium
38241	37	20	37	22	Contrary to what is stated in these lines, energy conservation has always been one of teh pillar of the IEA. However, in 1997, in its shared goals document, the IEA shifted from energy conservation to energy efficiency. The former reduces at the same time energy demand and energy consumption while the latter reduces only energy consumption. The year of 2005 refereed to in this section must be the first year where the IEA introduced its 450 scenrio and/or the 2°C scenario	Accepted. Thanks for this correction. Text revised.	Yamina Saheb	OpenExp, Ecole des Mines de Paris	France
39745	37	25	37	29	Need to remove the sentence "Nevertheless, … established in 2009" since it contains incorrect information. IEA has served as a global agency in promoting clean energy transitions, and one of its main objejctives is promoting low-carbon energy technologies and accelerate clean energy transition. In addition, it is not true that IEA member states push for a creation of IRENA to underplay the potential role of renewable technologies. Even though some member countries were involved in the creation of IRENA, it cannot be described in this way implying there is any correlation between the two organisations. They are two independent organisations, with own distinctive features such as membership, structure, and etc.	Noted. Thank you for this insider information. At the same time, we are refering to perception, rather than necessarily fact.	Jinsun Lim	International Energy Agency (IEA)	France
4775	37	30	37	30	Typo: "could has" to be changed with "could have".	Accepted. Thanks.	michele stua	APE-FVG	United Kingdom (of Great Britain and Northern Ireland)
4777	37	33	37	33	Typo: "to promote" to be changed with "promoting".	Accepted.	michele stua	APE-FVG	United Kingdom (of Great Britain and Northern Ireland)
2751	37	39	37	39	In discussing other efforts in terms of alternative energy, the 2016 Framework Agreement for establishing International Solar Alliance certainly deserves some mention and discussion. See http://isolaralliance.org/FrameworkAgreement.aspx	Noted. ISA included in the SOD.	Ronald Mitchell	University of Oregon	United States of America
6111	37	5	38	16	What is missing in this overview of governance arrangements in the energy sector is the Powering Past Coal Alliance. This is a very promising initiative involving state actors, subnational governments and private actors. It is one of the first international clubs that focuses on phasing out a particular fossil fuel. For more background on the PPCA, see: Blondeel, M., Van de Graaf, T., & Haesebrouck, T. (2020). Moving beyond coal: Exploring and explaining the Powering Past Coal Alliance. Energy Research & Social Science, 59, 101304.	Accepted. Thanks for pointing this out. Revised.	Thijs Van de Graaf	Ghent University	Belgium

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
9455	37	5	38	16	The Energy Charter Treaty (ECT) is a significant form of international cooperation in the energy sector that I suggest to include in this analysis and discuss its adverse impact on climate policies, in particular those to phase-out fossil fuels. The ECT contains Investor-State Dispute Settlement (ISDS), which energy firms can use to challenge regulations that harm their investment and demand compensation. A recent example (Sep 2019) is that a German utility company Uniper is threatening the Netherlands with a compensation claim for their decision to phase-out the use of coal for electricity production by 2030. Such threats create legal and fiscal uncertainty for policy makers, which could hinder them to take decisions in favour of a swift transition to renewable energy. For further discussion of the problems associated with the ECT, please see: Kyra Bosa, Joyeeta Gupta (2019). Stranded assets and stranded resources: Implications for climate changemitigation and global sustainable development. Energy Research & Social Science, Volume 56, October 2019, p. 8. // Tienhaara, Kyla (2018). Regulatory Chill in a Warming World: The Threat to Climate Policy Posed by Investor-State Dispute Settlement. Transnational Environmental Law, 7:2 (2018), pp. 229–250. // OpenExp (2019). The Energy Charter Treaty (ECT). Assessing its geopolitical, climate and financial impacts. September 2019.	Accepted. Included in the SOD.	Cornelia Maarfield	Climate Action Network (CAN) Europe	Germany
45319	37	5	38	16	The most recent development seems to be missed - The International Solar Co-operation in which India is proving its leadership potential SHOULD also be mentioned.	Noted. Reference to the ISA included in the SOD.	Jaimin Parikh	1. United Nations SDSN 2. European Institute of Policy Research and Human Rights 3. University of Delhi	India
14029	37	30			Typo: take out the word could at the beginning of the sentence.	Accepted. Thanks.	Gonzalo Escribano	Universidad Nacional Educación a Distancia (UNED) and The Elcano Royal Institute	Spain
14031	37	35			Where it says 'Finally, there have emerged a number of transnational…' Suggested change: 'Finally, a number of transnational organizations and activities have emerged'	Accepted. Better wording.	Gonzalo Escribano	Universidad Nacional Educación a Distancia (UNED) and The Elcano Royal Institute	Spain
43623	37	39			This is an important point. See also Chapter 15 p19 l. 12 ff. That could be cross-referenced. Could be expanded upon and elevated to ES. See also literature by Jan Steckel and Hirth and the relevance of financing and Creutzig et al 2017 Nature Energy	Noted. Thanks for the reference.	Felix Creutzig	MCC Berlin	Germany
10943	38	3	38	7	A cross-reference should be added in this section to the chapter on Energy related to international cooperation on energy grids for countries to supply each other with renewable energy to offset seasonal fluctuations in supply, for example, of solar and wind.	Noted. Considered for the SOD.	Ian Bailey	University of Plymouth	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
13623	38	3	38	7	Suggest amending paragraph as follows: Despite improvements in the international goverance of energy in recent years, and the growing number of structures, programes and organisations that have a mandate relating to the governance of energy and its externalities, in reality they form a plural, multilayered and piecemeal array of initiatives (Sovacool and Florini 2012). One reason for this situation is the dearth of binding international law related to sustainable energy, and the growing preponderance of any form of such international regulation to be founded on non-binding or "soft" international law, such as the UN Declaration on Sustainable Energy for All. Helpful though they are to set strategic targets and guide global efforts, they do not create binding obligations on states to decarbonise or ensure that a percentage of their domestic energy supply is generated by renewable energy (Bruce 2013). It also appears that a great deal of energy governance is still concerned with promoting further development of fossil fuels. For example, Gallagher et al. (2018) examine the role of national development finance systems, focusing in particular on China. They find the majority of finance devoted to projects associated either with fossil fuel extraction or with fossil fuel-fired power generation. Full citation: Sovacool, B.K., Florini, A., (2012): Examining the Complications of Global Energy Governance. J Energy Nat Res Law 30(3):235; Bruce, S., 2013: 'International Law and Renewable Energy: Facilitating Sustainable Energy for All' 14 Melbourne Journal of International Law 18-53.	Noted. Some of the ideas included.	Stuart Bruce	Wilmer Cutler Pickering Hale and Dorr LLP	United Kingdom (of Great Britain and Northern Ireland)
13625	38	3	38	7	Suggest adding paragraph (after the above paragraph) as follows: Bruce (2020) suggests that international energy governance has not yet matured to a deliberate, cohesive, coordinated, and integrated set of mechanisms or processes jointly pursued by governments and non-state actors to address global energy imperatives and collective action problems (despite well-established legal regimes existing for certain types of energy sources, such as oil and gas). At present, international energy governance is, conceptually and practically, the aggregation of those disparate and diffuse factors, along with their concomitant challenges. It is also a landscape, particularly regarding global sustainable energy governance, dominated by international norms rather than binding obligations. Considerable research and policy development remains to be done within the field of global energy governance to advance both SDG 7 and global decarbonization within the required timelines established by scientific consensus to avoid the worst impacts of climate change (Sovacool and Delina 2018). Full citation: Bruce, S., 2020: Global Energy Governance and International Institutions, 4. In W. Filho et al (eds), Encyclopedia of the UN Sustainable Development Goals. Affordable and Clean Energy (Springer). DOI: https://doi.org/10.1007/978-3-319-71057-0_71-1; Sovacool BK, Delina L (2018) Of Temporality and Plurality: An Epistemic and Governance Agenda for Accelerating Just Transitions for Energy Access and Sustainable Development. Curr Opin Environ Sustain 34(1):1–6.	Noted. Thanks for the reference. Ideas brought in as appropriate.	Stuart Bruce	Wilmer Cutler Pickering Hale and Dorr LLP	United Kingdom (of Great Britain and Northern Ireland)

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
25331	38	3	38	7	Delete "Despite improvements in the international governance … fossil fuel fired power generation", as this argument is subjective.	Rejected. Yes, it is subjective, but that is the nature of these kinds of evaluations.	Eleni Kaditi	Organization of the Petroleum Exporting Countries (OPEC)	Austria
25333	38	11	38	16	Delete "The latter is primarily associated with … renewable energy development.", as this argument is subjective.	Rejected. We are making subjective evaluations in this chapter, and are clearly indicating that these are such. We improve the clarity with respect to this latter point in the SOD.	Eleni Kaditi	Organization of the Petroleum Exporting Countries (OPEC)	Austria
32645	38	18	38	28	More traffic within the Arctic and global climate because increased tourism or shipping will lead to increased pollution, including that of GHGs and SLCPs including black carbon that can further enhance warming in the region that is already warming twice the global average. Declining sea ice is already increasing shipping and tourism within the delicate Arctic region, where increased pollutants—including emissions of black carbon that can decrease the reflectivity of the surface in the region when it lands on snow and ice, which allows greater warming—could further endanger the Arctic, and as such, policies should be developed that will limit and minimize climate impacts in the Arctic. Given the current climate emergency, continued warming in the Arctic will continue to deplete sea ice—to which, if all of the sea ice is lost, it would be like adding an additional trillion tons of CO2 to the atmosphere—and thaw permafrost, which will also amplify warming through its release of stored carbon dioxide and methane; all together, these and other feedbacks will lead to a hothouse Earth. Stephenson S. R., et al. (2018) Climatic responses to future trans-Arctic shipping, GEOPHYSICAL RESEARCH LETTERS 45:9898–9908; Arctic Council Secretariat (2017) EXPERT GROUP ON BLACK CARBON AND METHANE: SUMMARY OF PROGRESS AND RECOMMENDATIONS 2017, 17 (“Arctic shipping currently accounts for about 5 percent of black carbon emissions within the Arctic; absent emission controls, shipping emissions within the Arctic could double by 2030 under some projections of Arctic vessel traffic.”); Arctic Monitoring and Assessment Programme (AMAP) (2017) ADAPTATION ACTIONS FOR A CHANGING ARCTIC: PERSPECTIVES FROM THE BARENTS AREA, 1 (“Changes in climate will have direct impacts on snow and ice, as well as on terrestrial, freshwater and marine ecosystems. In addition to climate change, the region’s ecosystems are also influenced by several other impacts of human activities, such as chemical pollution, invasive species, and increased shipping and industrial developments. The end result is cumulative and cascading impacts on ecosystems and societies in the area.”); Qian Y., et al. (2014) Light-absorbing Particles in Snow and Ice: Measurement and Modeling of Climatic and Hydrological impact, ADVANCES IN ATMOSPHERIC SCIENCES 32:64–91;	Noted. The chapter cannot be policy-prescriptive i.e. discussing policies that should be developed. Discussion of studies/actions by Arctic Council have been included in this section.	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
32859	38	18	38	28	More traffic within the Arctic and global climate because increased tourism or shipping will lead to increased pollution, including that of GHGs that can further enhance warming in the region that is already warming twice the global average. Declining sea ice may tempt people to increase shipping and tourism within the delicate Arctic region, where increased pollutants—including emissions of black carbon that can decrease the reflectivity of the surface in the region when it lands on snow and ice, which allows greater warming—could further endanger the Arctic, and as such, policies should be developed that will limit and minimize climate impacts in the Arctic. Stephenson S. R., et al. (2018) Climatic responses to future trans-Arctic shipping, GEOPHYSICAL RESEARCH LETTERS 45:9898–9908; Arctic Council Secretariat (2017) EXPERT GROUP ON BLACK CARBON AND METHANE: SUMMARY OF PROGRESS AND RECOMMENDATIONS 2017, 17 (“Arctic shipping currently accounts for about 5 percent of black carbon emissions within the Arctic; absent emission controls, shipping emissions within the Arctic could double by 2030 under some projections of Arctic vessel traffic.”); Arctic Monitoring and Assessment Programme (AMAP) (2017) ADAPTATION ACTIONS FOR A CHANGING ARCTIC: PERSPECTIVES FROM THE BARENTS AREA, 1 (“Changes in climate will have direct impacts on snow and ice, as well as on terrestrial, freshwater and marine ecosystems. In addition to climate change, the region’s ecosystems are also influenced by several other impacts of human activities, such as chemical pollution, invasive species, and increased shipping and industrial developments. The end result is cumulative and cascading impacts on ecosystems and societies in the area.”); Qian Y., et al. (2014) Light-absorbing Particles in Snow and Ice: Measurement and Modeling of Climatic and Hydrological impact, ADVANCES IN ATMOSPHERIC SCIENCES 32:64–91; World Bank & International Cryosphere Climate Initiative (2013) ON THIN ICE: HOW CUTTING POLLUTION CAN SLOW WARMING AND SAVE LIVES, 2 (“Climate benefits for cryosphere regions from black carbon reductions carry less uncertainty than they would in other parts of the globe and are sometimes very large. This is because emissions from sources that emit black carbon—even with	Rejected. These are all important issues, but not having to do with international sectoral cooperation.	Kristin Campbell	Institute for Governance & Sustainable Development	United States of America
42843	38	20	38	22	It is not correct to link responsibility/effectiveness of policy action to the allocation methodology/location of emissions. Countries can invest in alternatives to international aviation (e.g. rail services like Eurostar in Europe) and charge taxes and fees for airports/fuel to avoid flights and shift air passengers to alternative modes - these are essential parts of national transport climate mitigation strategies. Countries also need to stimulate investment in new aircraft and fuels - improe startegies.	Rejected. This seems to be policy-prescriptive which is beyond the scope of IPCC assessment. In international law terms, the responsibility of countries for emissions is determined based on the location of the emissions.	Mark MAJOR	Partnership on Sustainable Low Carbon Transport	Spain
42841	38	22	38	28	As elswhere in the report this section must mention that the climate impact of the aviation is 2-4 times the impact of the CO2 emissions alone due to indirect effects (IPCC AR 4). The CO2 emission figures alone give a misleading impression of the climate impacts.	Accepted. Revision made.	Mark MAJOR	Partnership on Sustainable Low Carbon Transport	Spain
16797	38	26	38	28	The presentation of the share of aviation emissions in 2050 should be changed to the Paris Agreement ‘well below 2°C’ and 1.5°C target, not a 2°C pathway.	Accepted. Revisions made.	Dennis van Berkel	Urgenda	Netherlands
42845	38	29	38	29	Developed Countries is a broader and less defined term than "Annex I Countries"	Accepted. Revision made.	Mark MAJOR	Partnership on Sustainable Low Carbon Transport	Spain
42847	38	40	38	48	To aid the reader and promote understanding it should be made clear that ICAO has not yet agreed on any binding target or mandatory measures to reduce international aviation emissions in line with the PA objectives.	Accepted. Discussion of ICAO measures and CORSIA has been revised.	Mark MAJOR	Partnership on Sustainable Low Carbon Transport	Spain

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
39999	38	44	38	44	Insert after "… after 2020": "(Hoch et al. 2019). Reason: Hoch et al. discuss issued related to CORSIA. Hoch, Stephan; Michaelowa, Axel; Espelage, Aglaja; Weber, Anne-Kathrin (2019): Governing complexity: How can the interplay of multilateral environmental agreements be harnessed for effective international market-based climate policy instruments?, in: International Environmental Agreements,19, p. 595-613	Accepted. Reference included.	Axel Michaelowa	University of Zurich	Switzerland
43515	38	44	38	44	Add reference to: Hoch, Stephan; Michaelowa, Axel; Espelage, Aglaja; Weber, Anne-Kathrin (2019): Governing complexity: How can the interplay of multilateral environmental agreements be harnessed for effective international market-based climate policy instruments?, in: International Environmental Agreements,19, p. 595-613	Accepted. Reference included.	Matthias Honegger	Perspectives Climate Research gGmbH	Germany
14033	38	7			Include a sentence/paragraph on the Belt and Road Initiative and the impact on international climate governance and norms? Given the size and type of mainly fossil fuel) investments the Belt and Road Initiative is fostering its impact should be considered as a factor that can drive/slow down international climate action. References: (1) Ascensão, F. et al. Laurance and Henrique M. Pereira (2018), Environmental challenges for the Belt and Road Initiative. Nature Sustainability; (2) L. Zhou, S. Gilbert, Y. Wang, M. Muñoz Cabre, and K.P. Gallagher (2018), "Moving the Green Belt and Road Initiative: From Words to Actions." Working Paper. Washington, DC: World Resources Institute.	Noted. Considered for the SOD.	Gonzalo Escribano	Universidad Nacional Educación a Distancia (UNED) and The Elcano Royal Institute	Spain
37677	38	27			of the total global emissions consistent with a 2°C pathway - update this figure for consistency with a 1.5 pathway.	Accepted. Revision made.	Michiel Schaeffer	Climate Analytics	Netherlands
42849	39	1	39	17	To aid the reader and promote understanding it should be made clear that IMO has not yet agreed on any binding target or mandatory measures to reduce international shipping emissions in line with the PA objectives.	Accepted. Revision made.	Mark MAJOR	Partnership on Sustainable Low Carbon Transport	Spain
25335	39	14	39	17	Delete "Overall, the IMO strategy … (Doelle and Chircop 2019).", as this is a prescriptive statement.	Rejected. This statement summarised the findings from the cited literature.	Eleni Kaditi	Organization of the Petroleum Exporting Countries (OPEC)	Austria
2753	39	17	39	17	It may deserve mention that a growing share of global energy use is related to IT technology related to webservices (now accounting for 2-3% of global electricity use, or thereabouts). Although not regulated yet, certainly multinationals like Google and Facebook are attending to this. perhaps worth a footnote.	Noted. This point is better addressed in the sectoral chapter on the energy sector.	Ronald Mitchell	University of Oregon	United States of America
8763	39	18	40	40	[14.5.3. Differentiation with the Chapter 16' section 16.6 on international cooperation] - This section of 14.5.3 regards 'international cooperation in science, technology, and innovation' under chapter 14, while there is a separate section of 16.6 on international cooperation under chapter 16 of 'innovation, technology development and transfer'. - This section rather focuses on science-based collaboration.	Noted. Yes, your observation is correct.	Chaewoon Oh	Green Technology Center	Republic of Korea
36365	39	18	40	40	IPCC and IPBES should processes should be presented here	Accepted. You are right. Although briefly.	Youba Sokona	South Centre	Switzerland
35779	39	19	40	40	The Global Environment Outlook 6 states that "existing knowledge is sufficient to mobilize action now" however, it will add value to this section if you mention the importance of the data revolution particularly the citizen science and ways to engage citizens in scientific research (Kobori et al. 2016) as cited in GEO-6 Report.	Noted. We are not sure that this fits the issue of international cooperation.	Ahmed Abdelrehim	Centre for Environment & Development for the Arab Region and Europe - CEDARE	Egypt

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
45321	39	19	40	40	The role of upcoming technologies specifically AI and 5G should be deliberately discussed with respect to Climate Change	Rejected. That doesn't have a place in this chapter.	Jaimin Parikh	1. United Nations SDSN 2. European Institute of Policy Research and Human Rights 3. University of Delhi	India
45323	39	19	40	40	Another important aspect is the Space Debris which is seemed as a Space Pollution which might affect various phenomena in future.	Rejected. We don't see a role for that in this chapter, even though it is an interesting issue.	Jaimin Parikh	1. United Nations SDSN 2. European Institute of Policy Research and Human Rights 3. University of Delhi	India
43035	40	12	40	25	Béatrice Cointe, Christophe Cassen, Alain Nadaï. 2019,Organising Policy-Relevant Knowledge for Climate Action: Integrated Assessment Modelling, the IPCC, and the Emergence of a Collective Expertise on Socioeconomic Emission Scenarios. Science & Technology Studies,32(4) analyse the role of the IAM (Integrated Assessment Model) community in the production of socioeconomic emission scenarios for AR5;	Noted. Thank you for the reference.	christophe cassen	CNRS-CIRED	France
3273	40	42	40	42	The sub-chapter "Global governance of solar radiation modification and associated risks" is principally welcome; it is a very important topic. However, the assessment is not yet comprehensive enough and needs further development. See the comments below.	Noted. Section on SRM significantly edited, but significant space contraints apply	Klaus Radunsky	retired from Umweltbundesamt	Austria
13511	40	42	40	42	The heading should not emphasize SRM's risks when the evidence indicates that its judicious use would decrease climatic and other environmental risks. CDR, adaptation, and mitigation carry risks as well, but their headings do not emphasize this.	Taken into account - new section heading takes out the "risks" but the assessment itself still focuses on the risks. Potential benefits are covered in WGI ch4 and the new xWG box on SRM (currently only in WG2, ch16)	Jesse Reynolds	University of California, Los Angeles	Netherlands
48131	40	42	40	42	The title only talks about risks, when SRM presents potential risks and potential benefits and this is how it should be introduced.	Taken into account - new section heading takes out the "risks" but the assessment itself still focuses on the risks. Potential benefits are covered in WGI ch4 and the new xWG box on SRM (currently only in WG2, ch16)	Andrew Lockley	Andrew Lockley	United Kingdom (of Great Britain and Northern Ireland)
40001	40	43	40	43	Please use the definition of SRM applied in the IPCC SR1.5	Accepted, SOD now uses glossary definition	Axel Michaelowa	University of Zurich	Switzerland
43435	40	43	40	43	This is a new and inaccurate definition; why not use the definition as used in the SR15 Glossary?	Accepted, SOD now uses glossary definition	Matthias Honegger	Perspectives Climate Research gGmbH	Germany
30	40	43	40	44	The definition of SRM should be consistent with the definition in WG1 Chapter 4 SRM section and the IPCC Glossary	Accepted, SOD now uses glossary definition	Govindasamy Bala	Indian Institute of Science	India
13513	40	43	40	44	The definition of SRM given here does not perfectly align with past reports. For example, AR5 and SR15 speak of modification of the Earth's shortwave radiative budget. "Shortwave" typically includes near infrared, which is not visible. Furthermore, consider a definition in the glossary instead of here.	Accepted, SOD now uses glossary definition	Jesse Reynolds	University of California, Los Angeles	Netherlands

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
47435	40	47	40	47	Since AR5, there have been a number of developments relevant to consideration for international cooperation in Solar Radiation Modification that may merit mention here. Research efforts have emerged in China (MIT Tech Review 2017), the United States (NAS 2015, 2018), India (Bala, 2019), Germany, Australia (NPR, 2018) and across the Global South through a program to sponsor researchers in support of equitable access to information and development of expertise (DECIMALS, 2019). Small scale field experiments are pending in the United States and Australia (Wanser, 2019). The United States provided the first ever formal funding for assessment research in SRM in its primary weather safety agency, the National Oceanic and Atmospheric Administration (NOAA) (Mcnerney 2019), and advanced a legislative proposal that included a mechanism for reporting oversight for field experiments (science.house.gov 2020). The Scientific Assessment Panel of the Montreal Protocol approved a decision to include assessment of stratospheric aerosol injections in the 2022 Ozone Assessment (UNEP, 2019), a decision approved by nearly all countries, including the United States. Local and regional SRM and aerosol-based weather modification efforts to mitigate impacts have grown substantially, overlapping with SRM in some objectives, characteristics and governance considerations. These include a large-scale effort in China to increase precipitation in the Tibetan Plateau (Forbes 2018), a substantial rain-making fund in the United Arab Emirates (uaerep.ae 2018), an effort in Indonesia to reduce flooding by inducing off-shore precipitation through the injection of salt particles into clouds (BBC 2020) and a significant effort in Australia to explore marine cloud brightening as a means of cooling ocean water to protect the Great Barrier Reef (NPR 2018). (Forbes (2018), "China Is Launching Weather-Control Machines Across an Area the Size of Alaska", Forbes, https://www.forbes.com/sites/trevornace/2018/05/10/china-is-launching-a-massive-weather-control-machine-the-size-of-alaska/#19e9b8286315)	Taken into account - but suggestions rejected, since the given information is not on international governance, except for the Monreal Protocol Assessment, which is potentially interesting but we do not want to report single decisions here and it is unclear how significant the SAI part will be in the overall 2020 Ozone Assessment	Kelly Wanser	SilverLining	United States of America
36809	40	47	40	48	Note AR6 WGII Chapter 16-18 may also discuss this so worth coordingating with thier CLAs or mentioning the the topic may be discussed there as well.	Noted - ch14 CA is part of the author group that produces WGII CCB on SRM (for SOD, ch16)	Zinta Zommers	United Nations Office for Disaster Risk Reduction	Germany
41283	40	47	40	48	Very good that you refer to WGI here. Please check WGI SOD if there are other places in the report with relevant information. Please also check WGII. This xWG coordination will help secure consistency and form the basis for treatment of this in SyR (see approved outline of SyR).	Noted - ch14 CA is part of the author group that produces WGII CCB on SRM (for SOD, ch16) and also member of the SYR CWT	Jan Fuglestvedt	CICERO	Norway

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
43443	40	41	41	39	Overall the section is already quite strong in describing governane questions around SRM. It however is missing discussion of research governance, including in particular how academics, funding agencies and other relevant actors can cooperate to enable (inter- and transdisciplinary) research on important scientific, social and political questions to go forward, while remaining mindful of fears of displacing other measures and the overall question regarding appropriate levels of public engagement in research. Conducting research in a way that allows to answer interlinked questions of prospective benefits and adverse impacts under various conditions for instance appears increasingly urgent; see for example: Honegger, M., Derwent, H., Harrison, N., Michaelowa, A., & Schäfer, S. (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. Thiele, L. P. (2019). Geoengineering and sustainability. Environmental Politics, 28(3), 460-479.	Taken into account - SOD includes now research governance as a dimension, but given space constraints is not able to 'discuss' it	Matthias Honegger	Perspectives Climate Research gGmbH	Germany
3275	40	42	41	39	It is noted that the literature cited is not comprehensive; several publications that are relevant have not been addresses. Examples are: 1) Bond, T. C., et al. (2013), Bounding the role of black carbon in the climate system: A scientific assessment, J. Geophys. Res. Atmos., 118, 5380–5552, doi:10.1002/jgrd.50171 2) Burns, L., Keith, D., Irvine, P., Horton, J., and Belei, B. (2019;https://geoengineering.environment.harvard.edu/files/sgrp/files/belfer_factsheet_on_solar_geoengineering.pdf); 3) Visioni et al., (2017); Sulfate geoengineering: a review of the factors controlling the needed injection of sulfur dioxide. Atmospheric Chemistry and Physics, 17(6), 3879–3889;4)Trisos et al. (2018); “Potentially dangerous consequences for biodiversity of solar geoengineering implementation and termination”, Nature Ecology & Evolution, 2(3), 475–482; 5) Lawrence, Mark G.; Schäfer, Stefan et al. (2018); Evaluating climate geoengineering proposals in the context of the Paris Agreement temperature goals, Nature Communications	Rejected - this section cannot give a comprehensive overview on SRM as such , but only on (international) governance. In describing SRM methods, FOD mainly drew on Text from SR1.5 (including exemplary studies - which include 2 of the 5 suggested by the reviewer here), SOD is based on dimensions assessed in WGI SOD (ch4 & 5) without referencing individual studies	Klaus Radunsky	retired from Umweltbundesamt	Austria
3279	40	42	41	39	The text does not inform where the development of SRM stands. According to my knowledge Harvard university is planning a field test in the first quarter of 2020, testing injection of aerosol into the stratosphere albeit at small scale and monitoring of injected areosol in the atmosphere. Furthermore ISO is considering a New Work Item proposal on radiative forcing management since June 2019 and in preparing members of the Working Group for consideration for this task an open workshop has been conducted that informed about plans to implement SRM starting in the year 2030 with the goal to avoid global warming above 1.5 degrees C above pre-industrial level. So called "peak shaving scenarios" have already been described in 2018 (Honegger et al., C2G2 report).	Rejected - Harvard ScopEx field tests have been announced since 2017, but not happend so far (if they would, it would of course be mentioned - there might be a mechanical test of the delivery equipment in Sweden in 2021, but that's not the experiment yet). Internal ISO negotiations are not an issue for an IPCC report (if negotiations about a 'radiative forcing standard' including SRM would be concluded - the latter being unlikely - , we would certainly mention it), neither are speculations voiced at ISO workshops	Klaus Radunsky	retired from Umweltbundesamt	Austria

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
3281	40	42	41	39	Given that climate change impacts such as sea level rise and wildfires as well as melting down of permafrost in the Arctic region turn out to be more severe than expected pressure will grow further to stop global warming by means such as SRM. It is therefore a matter of greatest urgency to develop a governance on SRM in order to link it strongly with CDR as SRM can only be considered a temporary, short and medium term solution which has to be linked to CDR by all means. This could mean: SRM can only be deployed at scale if the money has been deposited at a bank account to finance CDR at the scale required to shut down SRM again. In this context the ongoing programmes in China and India to remove SO2 emissions from their coal fired power plants contributes to enhanced warming given the masking effect of those emissions.	Rejected - this is a policy prescriptive proposal, and there's no literature mentioned	Klaus Radunsky	retired from Umweltbundesamt	Austria
3285	40	42	41	39	A more comprehensive consideration of the risks of SRM is missing. It might be beyond the scope of this subchapter 14.5.4.1 but need to be included at the appropriate part of AR6. Otherwise this chapter on governance lacks the appropriate basis. One option might be to include in this chapter a box describing which risks have been described in the literature related to SRM and which need to be addressed by the governance as also identified by Nicholson.	Rejected - this is indeed outside the scope of this section, which is on international governnace of SRM. Risks and potential benefits are assessed in WGI, ch 4 & 5, WGII, ch 16 (from SOD).	Klaus Radunsky	retired from Umweltbundesamt	Austria
13507	40	42	41	39	This is overall a solid review of the SRM governance, particularly given the space constraint. Please consider my suggestions here as constructively intended in a context of praise	Noted	Jesse Reynolds	University of California, Los Angeles	Netherlands
13509	40	42	41	39	The subsection does not address the shorter-term governance needs and opportunities of SRM research, which are arguably more urgent. Perhaps it should. At the same time, the heading is "global governance," and most governance of research will be by national, subnational, or nonstate actors.	Noted	Jesse Reynolds	University of California, Los Angeles	Netherlands
31669	40	42	41	39	A new article "Governing the Sun - The Challenges of Geoengineering" (by Klaus Radunsky and Tim Cadman) will be published in the International Journal of Social Quality, Volume 9, Issue 2, Winter 2019; 19-34; ISSN: 1757-0344 (Print); ISSN: 1757-0352 (Online) Berghahn Books; doi: 10.3167/IJSQ.2019.090203	Noted - but not included	Klaus Radunsky	retired from Umweltbundesamt	Austria
36	40	43	41	6	A sentence on what is assessed in this section would be useful to the readers.	Taken into account - this is now explicitly mentioned in the opening paragraph. Also, the cross-referencing is done there so this section comes much earlier to what it aims to do	Govindasamy Bala	Indian Institute of Science	India
17383	40	47	41	2	According to discussions held during COP25 and lack of international consensus in IPCC special report on the impacts of global warming of 1.5 °C above pre-industrial levels, the mentioned texts should appear to be reviewed.	Rejected. We don't understand the comment's relevance to this section.	Zeyaeyan Sadegh	Islamic Republic of Iran Meteorological Organization (IRIMO)	Iran
15161	40	48	41	2	More precise than SRM "has been suggested" by xy, would be "has been discussed". The texts cited do not come to a final conclusion that SRM is a realistic option to be recommended in a given situation.	Taken into account - although a suggestion is not a final conclusion we now go with discussed since we broadened the literature base beyond pieces that do not 'suggest' but 'analyze' such proposals	Dana Ruddigkeit	German Environment Agency	Germany
15175	40	41	42	8	humanities do have more monograhphies and differentiated argumentation: thus pages should be indicated as part of the citation	Rejected - while this is mostly true for the Humanities (and partly for the Social Sciences, where most of the cited literature originates from), referencing here has to follow uniform IPCC standards, and cannot follow informal conventions in certain strands of the literature	Dana Ruddigkeit	German Environment Agency	Germany

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
15179	40	41	42	8	Priority of emission reduction has to be mentioned. The Governnance design has to ensure this priority. See e.g. Markusson et al. 2018; Christine Merk, Gert Pönitzsch & Katrin Rehdanz (2018): Do climate engineering experts display moral-hazard behaviour?, Climate Policy; German Environment Agency, Policy Brief: Governance of Geoengineering, 2019	Taken into account, text adjusted ("as a supplement to") but for a different reason, reflecting that is is usually a starting point of the SRM (governance) literature	Dana Ruddigkeit	German Environment Agency	Germany
37679	40	41	42	8	Consideration should be given to spliting these two elements (SDR and CDR) into two distinct sections (not sub-headings within the same section) on governance as they are quite different topics. From SR1.5 we know we will need CDR to meet the 1.5C temperature limit and we have CDR options that are known and currently being applied under established international governance (UNFCCC, KP, PA) See Mace, Fyson, Schaeffer, Hare, Governing large-scale carbon dioxide removal: are we ready? (2018) https://climateanalytics.org/media/c2g2-2018-cdr-governance-1_1_1.pdf (piece in Climate Law forthcoming). The same is not true of SRM. Could explain that this section addresses CDR options not addressed under UNFCCC and related treaty processes and then name those. Otherwise the CDR section must be more comprehensive (ocean fertilisation is an outlier).	Taken into account. We see the confusion that arises from our treatment here, we now explain in the opening paragraph what we do (and what to find elsewhere), and that this is not meant to indicate that SRM and CDR "belong together" or have the same effects on the climate system. In the intro, we use language very similiar to WGI ch4&5, which also treat SRM & CDR in the same section	Michiel Schaeffer	Climate Analytics	Netherlands
45031	40	41	42	8	I find it unhelpful and in fact inappropriate to combine a discussion of international governance of SRM with governance of CDR. The main reason for this is that by definition, CDR delivers a global climate benefit (it removes CO2 from the global atmosphere), whereas SRM invariably delivers a regionally highly differentiated climate outcome, with either known or a high potential for adverse climatic outcomes in non-target regions. This means that SRM INHERENTLY has to deal with a transboundary reconciliation of competing interests. By contrast, CDR only has to deal with this if there are trans-boundary adverse NON-CLIMATE side-effects. But in that regard, CDR is no different from transboundary effect of e.g. large-scale hydropower (e.g. three-gorges dam on the Mekong). So CDR does not in itself require international multilateral management regimes, in contrast to SRM. It makes CDR sound worse and more risky than it is (planting a hectare of trees is CDR and delivers a global climatic benefit, but surely does not need an international treaty to manage this!?) So I strongly recommend to separate those two sections, and to expand the discussion around CDR into those areas where there is a known potential for transboundary non-climatic adverse side-effects under large-scale implementation (such as on food prices, water availability etc). Clarify that ocean fertilisation is a rather specific subset of CDR - rather than to imply that ALL CDR regardless of type and scale has to grapple with these issues. Also ensure to cross-reference chapter 12 which is assessing the risks and potentials of different CDR approaches from a mitigation perspective (this is currently missing entirely from this section), including of large-scale bioenergy for food systems; also chapter 7 AFOLU as far as the revised draft will deal with biomass supply and large-scale afforestation for CDR specifically.	Taken into account. We see the confusion that arises from our treatment here, we now explain in the opening paragraph what we do (and what to find elsewhere), and that this is not meant to indicate that SRM and CDR "belong together" or have the same effects on the climate system. In the intro, we use language very similiar to WGI ch4&5, which also treat SRM & CDR in the same section	Andy Reisinger	NZAGRC	New Zealand
40	40	41	42	9	The discussion of SRM and CDR governance appear very shallow. It is hard to see key message emerging here. Why are risks and legal, ethical and moral issues not discussed here? Are they not within the scope of this assessment?	Taken into account - this chapter is not the place to dive into these technologies and their associated risks, only the international cooperation aspects. We made note of the existence of a wider literature on these, and cross referenced other IPPC reports and chapters.	Govindasamy Bala	Indian Institute of Science	India

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15163	41	1	41	2	Please do not put SRM into one box with mitigation and adaptation. There are very important differences that must not be ignored. Those wordings would imply that the priority of emission reduction has been given up-- alternatively it could be stated here: "as an response option that could supplement mitigation of climate change and adaptation".	Taken into account, text adjusted ("as a supplement to")	Dana Ruddigkeit	German Environment Agency	Germany
32	41	3	41	4	SRM research is not in infancy. The first modeling study was published in 2000 and even prior to that US NAS had assessed geoengineering in one of its reports in 1992. A report to the US President in 1965 suggested increasing the ocean albedo to counter global warming.	Taken into account - we skipped that time dimension ("early") by referring directly to the fact that research is mainly based on modelling studies, but also mentioning that we have MCB experiments now in Australia. Also integrated Caldeira/Bala 2017 some lines prior to this, to give some sense of the long history on SRM research	Govindasamy Bala	Indian Institute of Science	India
40003	41	3	41	4	Please add after "... MacMartin 2018.": ", or to reduce the rate of warming (Keith and MacMartin 2015)." Keith, D. W., & MacMartin, D. G. (2015). A temporary, moderate and responsive scenario for solar geoengineering. Nature Climate Change, 5(3), 201-206.	Accepted, included	Axel Michaelowa	University of Zurich	Switzerland
43437	41	3	41	4	Temperatur overshoot is only one potentiall use of SRM; slowing the rate of warming is the other primary potential use that could potenitally reduce impact significantly. Keith, D. W., & MacMartin, D. G. (2015). A temporary, moderate and responsive scenario for solar geoengineering. Nature Climate Change, 5(3), 201-206.	Accepted, included	Matthias Honegger	Perspectives Climate Research gGmbH	Germany
41281	41	4	41	6	This formulation gives too little weigth to important studies carried out outside this MIP. A slight reformulation would help.	Accepted, changed "first and foremost" into "for example"	Jan Fuglestvedt	CICERO	Norway
47437	41	4	41	6	Review of recent literature suggests an array of new sources of analysis beyond GEOMIP, including both modeling and machine learning (in the case of marine cloud brightening) techniques and new models and model inter-comparison efforts. A forthcoming National Academy of Sciences assessment is likely to make reference to more recent efforts including the GLENS effort at the National Center for Atmospheric Research and the Geoengineering Modeling Research Consortium and related studies. See for example Tilmes, Simone, Jadwiga H. Richter, Ben Kravitz, Douglas G. MacMartin, Michael J. Mills, Isla R. Simpson, Anne S. Glanville et al. "CESM1 (WACCM) stratospheric aerosol geoengineering large ensemble project." Bulletin of the American Meteorological Society 99, no. 11 (2018): 2361-2371. https://doi.org/10.1175/BAMS-D-17-0267.1, and Morrow, D.R., 2019. A mission-driven research program on solar geoengineering could promote justice and legitimacy. Critical Review of International Social and Political Philosophy, pp.1-23.	Accepted, introduction of GeoMIP is changed form "first and foremost" into "for example". If other modelling intercomparison projects literature project gain similar reputation then they will either be mentioned explicitly, or none at all ("for example in the context of large modelling intercomparison projects"). GeoMIP included in CMIP6, therefore it stands out	Kelly Wanser	SilverLining	United States of America
13515	41	7	41	9	The first sentence regarding SRM's effects should not emphasize SRM's risks when the evidence indicates that its judicious use would decrease climatic and other environmental risks. (Indeed, the fact that "it could potentially be deployed uni- or mini-laterally and alter the global mean temperature much faster than any other climate policy measure" could be an advantage, depending on the circumstances.) I suggest a first sentence to this effect, such as "Current evidence indicates that the judicious use of SRM could decrease climatic and other environmental risks."	Taken into account, by changing the intro to this paragraph and later treating risks and benefits more evenly, but still sticking to the initial mandate for this chapter to assess the governance of SRM and its risks. In general, it is now highlighted that risks and benefits (both political and geophysical are highly dependent on assumed deployment schemes)	Jesse Reynolds	University of California, Los Angeles	Netherlands

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
48133	41	7	41	9	The first sentence here speaks only of risks when the available evidence consistently indicates that SRM could reduce climate impacts. A more balanced approach would be to note potential risks and benefits with equal prominence, pointing out that SRM has the potential to significantly reduce climate impacts but might also introduce risks of its own.	Taken into account, by changing the intro to this paragraph and later treating risks and benefits more evenly, but still sticking to the initial mandate for this chapter to assess the governance of SRM and its risks. In general, it is now highlighted that risks and benefits (both political and geophysical are highly dependent on assumed deployment schemes)	Andrew Lockley	Andrew Lockley	United Kingdom (of Great Britain and Northern Ireland)
19269	41	7	41	10	The benefits and risks of SRM are totally dependent on scenarios (Sugiyama et al. 2018, http://dx.doi.org/10.1080/14693062.2017.1323721; Kravitz and MacMartin 2020, https://doi.org/10.1038/s43017-019-0004-7). This point should be clarified because there is (almost) nothing inherently beneficial or riskly in SRM. Irvine et al. (2019) didn't show inherent benefits of SRM; they showed a certain deployment scenario (cancelling half of warming) would be quite beneficial.	Accepted. An excellent point. SRM "effects" depend on method and deployment scheme, and on the latter we only have scenarios. Now mentioned at the end of the first paragraph	Masahiro Sugiyama	University of Tokyo	Japan
40005	41	7	41	11	Please revise "Stratospheric ... Reynolds 2019" as follows: "Stratospheric aerosol injection (SAI) – the most researched SRM method – could potentially be deployed uni- or minilaterally due to relatively low cost and alter the global mean temperature in a uniform manner much faster than any other climate policy measure (Irvine et al. 2019, MacMartin et al. 2018). It thus poses significant governance challenges (Parson 2014; Sugiyama et al. 2018; Nicholson et al. 2018; Reynolds 2019)." Reason: The narrow focus on risk seems inappropriate New references: Irvine, P., Emanuel, K., He, J., Horowitz, L. W., Vecchi, G., & Keith, D. (2019). Halving warming with idealized solar geoengineering moderates key climate hazards. Nature Climate Change, 9(4), 295-299; MacMartin, D. G., Ricke, K. L., & Keith, D. W. (2018). Solar geoengineering as part of an overall strategy for meeting the 1.5 C Paris target. Philosophical Transactions of the Royal Society A: Mathematical, Physical and Engineering Sciences, 376(2119), 20160454.	Taken into account, by changing the intro to this paragraph and later treating risks and benefits more evenly, but still sticking to the initial mandate for this chapter to assess the governance of SRM and its risks. In general, it is now highlighted that risks and benefits (both political and geophysical are highly dependent on assumed deployment schemes)	Axel Michaelowa	University of Zurich	Switzerland
43439	41	7	41	11	The narrow focus on risk in this encompassing statement about potential effects from SAI application seems inappropriate in light of consistent findings of significant climate change impact/risk reduction in recent studies applying moderate amounts of SAI in a globally well-distributed manner. The conflation of multiple (only in part related) risk dimensions and governance challenges is confusing rather than offering much needed clarification. Irvine, P., Emanuel, K., He, J., Horowitz, L. W., Vecchi, G., & Keith, D. (2019). Halving warming with idealized solar geoengineering moderates key climate hazards. Nature Climate Change, 9(4), 295-299. MacMartin, D. G., Ricke, K. L., & Keith, D. W. (2018). Solar geoengineering as part of an overall strategy for meeting the 1.5 C Paris target. Philosophical Transactions of the Royal Society A: Mathematical, Physical and Engineering Sciences, 376(2119), 20160454. also see this summary for further references: https://heep.hks.harvard.edu/files/heep/files/sg_technical_summary_for_policy_workshop_final.pdf	Taken into account, by changing the intro to this paragraph and later treating risks and benefits more evenly, but still sticking to the initial mandate for this chapter to assess the governance of SRM and its risks. In general, it is now highlighted that risks and benefits (both political and geophysical are highly dependent on assumed deployment schemes)	Matthias Honegger	Perspectives Climate Research gGmbH	Germany

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9933	41	7	41	16	Questions related to SRM governance can be grouped into four clusters: 1- questions about discussing SRM: risks of moral hazard. 2- questions about governance of research: understandings of the precautionary approach; risks of capture; public reactions and political consequences of outdoor experiments. 3- Near-term questions about deployment: Prevention of unilateral or mini-lateral moves until collective agreements are reached. Architecture and information sharing for monitoring solar geoengineering activities. Pathways for engaging discussions in formal fora. 4- Long-term questions about a hypothetical deployment: Forms of global governance, institutions, and decision-making. Liability and compensation questions. Management of the termination risk. International security concerns.	Noted - very good suggestions, we (and the assessed literature) cover many of these elements, but we cannot change the basic structure of this section, due to space constraints	Adrien ABECASSIS	Harvard Kennedy School of Government	United States of America
34	41	8	41	9	"faster" may quantied as 5 years in the case of SRM. A reference may be provided to the WG1 Chapter 4, section 4.6.3.1 Climate system response to mitigation could be on the order of multiple decades.	Taken into account, reference to WGI ch4 made	Govindasamy Bala	Indian Institute of Science	India
13517	41	11	41	12	The three given adverse geophysical effects are uncertain and may not manifest, depending in part on the SRM deployment regime. Precipitation might be brought closer to pre-industrial at almost all locations (Irvine et al 2019). Crops [Pongratz, J., Lobell, D. B., Cao, L. & Caldeira, K. Crop Yields in a Geoengineered Climate. Nat. Clim. Change 2, 101–105 (2012); Xia, L. et al. Solar Radiation Management Impacts on Agriculture in China: A Case Study in the Geoengineering Model Intercomparison Project (GeoMIP). Journal of Geophysical Research: Atmospheres 119, 8695–8711 (2014)] and biodiversity [McCormack, C. G. et al. Key Impacts of Climate Engineering on Biodiversity and Ecosystems, with Priorities for Future Research. Journal of Integrative Environmental Sciences 13, 103–128 (2016)] could benefit. The ozone layer might be insignificantly affected, or even benefit [Keith, David W., Debra K. Weisenstein, John A. Dykema, and Frank N. Keutsch. "Stratospheric solar geoengineering without ozone loss." Proceedings of the National academy of Sciences 113, no. 52 (2016): 14910-14914.] Thus, "adverse geophysical effects... will be unevenly distributed" is inaccurate. Consider "any geophysical risks would be unevenly distributed."	Taken into account - we deleted the primary literature and the examples given there (risks were largely taken from SR1.5) and now highlight deployment scheme/scenario dependence and refer to results found by WGI. In this way we can avoid being drawn into struggles about issues that we - as social scientists - are not comptent to assess	Jesse Reynolds	University of California, Los Angeles	Netherlands
48135	41	11	41	12	Four impacts are presented here as inherent "adverse geophysical effects", but this portrayal is very inaccurate. Anything but extreme application of SRM is projected to reduce climate disruption to precipitation (Irvine et al 2019) and modelling has found that use of SAI would reduce climate impacts on agriculture with varying efficacy. Stating categorically that impacts of SRM will be "unevenly distributed" is not supported by the evidence, which largely finds the opposite. Studies have found that moderate use of SRM would be expected to reduce the uneven distribution of climate impacts (eg Irvine et al), not increase it	Taken into account - we deleted the primary literature and the examples given there (risks were largely taken from SR1.5) and now highlight deployment scheme/scenario dependence and refer to results found by WGI. In this way we can avoid being drawn into struggles about issues that we - as social scientists - are not comptent to assess	Andrew Lockley	Andrew Lockley	United Kingdom (of Great Britain and Northern Ireland)
37683	41	12	41	12	"would be", rather than "will be"	Accepted	Michiel Schaeffer	Climate Analytics	Netherlands

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
40007	41	12	41	12	Reword "Potential adverse ..unevenly distributed." as follows: "Adverse global, regional or local geophysical effects (e.g. on precipitation patterns, crop growth, biodiversity or the ozone layer) have been suggested by Pitari et al. (2014); Visioni et al. (2017) and Trisos et al. (2018). Honegger et al. (2018) discuss overall characteristics of SAI with regards to sustainable development goals. Careful design of SAI could result in a global improvement of all key climate variables without global or regional adverse impacts (Irvine et al. 2019, MacMartin et al. 2018, Pongratz et al. 2012, Xia et al. 2014, Keith et al. 2016, McCormack et al. 2016)." Reason: the current wording is not reflecting the fiull literature. New references: Honegger, M., Derwent, H., Harrison, N., Michaelowa, A., & Schäfer, S. (2018). Carbon Removal and Solar Geoengineering: Potential implications for delivery of the Sustainable Development Goals. Carnegie Climate Geoengineering Governance Initiative, New York; Irvine, P., Emanuel, K., He, J., Horowitz, L. W., Vecchi, G., & Keith, D. (2019). Halving warming with idealized solar geoengineering moderates key climate hazards. Nature Climate Change, 9(4), 295-299.; Keith, David W., Debra K. Weisenstein, John A. Dykema, and Frank N. Keutsch. (2016). "Stratospheric solar geoengineering without ozone loss." Proceedings of the National academy of Sciences 113, no. 52: 14910-14914; MacMartin, D. G., Ricke, K. L., & Keith, D. W. (2018). Solar geoengineering as part of an overall strategy for meeting the 1.5 C Paris target. Philosophical Transactions of the Royal Society A: Mathematical, Physical and Engineering Sciences, 376(2119), 20160454; McCormack, C. G. et al. (2016). Key Impacts of Climate Engineering on Biodiversity and Ecosystems, with Priorities for Future Research. Journal of Integrative Environmental Sciences 13, 103–128; Pongratz, J., Lobell, D. B., Cao, L. & Caldeira, K. (2012). Crop Yields in a Geoengineered Climate. Nat. Clim. Change 2, 101–105 (2012); Xia, L. et al. (2014): Solar Radiation Management Impacts on Agriculture in China: A Case Study in the Geoengineering Model Intercomparison Project (GeoMIP). Journal of Geophysical Research: Atmospheres 119, 8695–8711	Taken into account - we deleted the primary literature and the examples given there (risks were largely taken from SR1.5) and now highlight deployment scheme/scenario dependence and refer to results found by WGI. In this way we can avoid being drawn into struggles about issues that we - as social scientists - are not comptent to assess	Axel Michaelowa	University of Zurich	Switzerland

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
43441	41	12	41	12	This sentence is incorrect and severely misleading. The stated outcomes are not inherent to SAI, but tied to particular application scenarios. (Un-)even distribution of outcomes is a function of design; studies consistently find that with different design choices (than the ones cited) would result in a global improvement of all key climate variables and reduction of impacts; the resulting climate state would resemble much more closely pre-industrial conditions (more so than any other climate state with GHG-levels corresponding to e.g. 2°C or more without such SAI application). Examples given below: Irvine, P., Emanuel, K., He, J., Horowitz, L. W., Vecchi, G., & Keith, D. (2019). Halving warming with idealized solar geoengineering moderates key climate hazards. Nature Climate Change, 9(4), 295-299. MacMartin, D. G., Ricke, K. L., & Keith, D. W. (2018). Solar geoengineering as part of an overall strategy for meeting the 1.5 C Paris target. Philosophical Transactions of the Royal Society A: Mathematical, Physical and Engineering Sciences, 376(2119), 20160454. Pongratz, J., Lobell, D. B., Cao, L. & Caldeira, K. (2012). Crop Yields in a Geoengineered Climate. Nat. Clim. Change 2, 101–105 (2012); Xia, L. et al. Solar Radiation Management Impacts on Agriculture in China: A Case Study in the Geoengineering Model Intercomparison Project (GeoMIP). Journal of Geophysical Research: Atmospheres 119, 8695–8711 (2014)] McCormack, C. G. et al. (2016). Key Impacts of Climate Engineering on Biodiversity and Ecosystems, with Priorities for Future Research. Journal of Integrative Environmental Sciences 13, 103–128.	Taken into account - we deleted the primary literature and the examples given there (risks were largely taken from SR1.5) and now highlight deployment scheme/scenario dependence and refer to results found by WGI. In this way we can avoid being drawn into struggles about issues that we - as social scientists - are not comptent to assess	Matthias Honegger	Perspectives Climate Research gGmbH	Germany
19271	41	13	41	14	There are some studies that compared perceptions across countries (Sugiyama et al. 2020, https://doi.org/10.1080/17524032.2019.1699137, and references therein), which might be useful. I am not sure if they fit with the scope of the section, though.	Noted, but rejected - simple survey studies are problematic since there are many methodological issues with these, e.g. they usually measure reactions to proposals/technologies respondents had never heard of before the survey. To my knowledge there are no meta-studies on this problem	Masahiro Sugiyama	University of Tokyo	Japan
13519	41	14	41	15	It is not certain whether "Premature deployment triggered by perceived climate emergencies would create international tensions." It might not, and it might reduce them. For example, perceived climate emergencies could create international tensions, and SRM might reduce these perceptions and the resulting tensions. Consider removing this sentence, as the previous one captures this. Alternative, consider "could create" or "might create".	Accepted, changed to "could create"	Jesse Reynolds	University of California, Los Angeles	Netherlands

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
43445	41	14	41	15	The qualification 'premature' is not very specific; the type of deployment that could be most problematic for international relations would be 'uncoordinated' or 'in the absence of a robust international understanding/decisionmaking capacity'. The converse could be true under several circumstances: Rapid, internationally well-coordinated application could in fact reduce international conflict potentials (in case of unexpected acceleration of warming due to e.g. degradation of key methane-holding ecosystems or similar).	Accepted, "premature" changed into "uncoordinated"	Matthias Honegger	Perspectives Climate Research gGmbH	Germany
47439	41	14	41	15	Replace "would" with "could" for more accurate representation.	Accepted, changed to "could create"	Kelly Wanser	SilverLining	United States of America
48137	41	14	41	15	It is inaccurate to categorically define SRM deployment in response to perceived climate emergencies as "premature". Deployment prompted by perceptions of a climate emergency could be premature, but it could also be timely or overdue - it all depends on the circumstances and on perceptions of those circumstances. "Premature" should therefore be removed. Also deployment of SRM in response to a perceived climate emergency would not inevitably increase tensions - it might reduce them. We just don't know at this stage and this should be reflected in more balanced text	Accepted, "premature" changed into "uncoordinated"	Andrew Lockley	Andrew Lockley	United Kingdom (of Great Britain and Northern Ireland)
286	41	14	41	16	Rather than "premature deployment" leading to international tensions, better to say "deployment in the absence of wide agreement"--lack of agreement may be due to perceptions that it is premature and/or lots of other reasons. Similarly lack of agreement may or may not be related to an emergency framing; again, it's one of many possible concerns.	Accepted, "premature" changed into "uncoordinated"	Joshua Horton	Harvard University	United States of America
47441	41	14	41	16	These statements are speculative rather than highly evidence based and could use modifiers. Further study is warranted on the drivers for international cooperation and coordinated response induced by rapidly unfolding crises of the commons such as those manifested during disease outbreaks. These dynamics may not be adequately represented in literature on SRM. See for example (Kamradt-Scott, A. and McInnes, C., 2012. The securitisation of pandemic influenza: framing, security and public policy. Global Public Health, 7(sup2), pp.S95-S110.) The words "premature" and "perceived" are presumptive and judgmental in several respects. First, an SRM deployment may be justified before dramatic climate harms are experienced, both as a matter of saving lives and as a matter of technical feasibility. Second, "perceived" climate emergencies may be correctly experienced as current and ongoing by some (often already vulnerable) communities - a significant contributor to climate injustice. In this context, timeliness of SRM deployment may not be objectively determinable, a fact that indeed would be a likely cause of tension - but justifiably and reasonably so.	Taken into account, and partly accepted by substituting "premature" with a "uncoordinated", but "perceived" staya to highlight that perceptions are what matters, regardles of the extent to which they are substantiated	Kelly Wanser	SilverLining	United States of America

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
15165	41	17	41	19	It is wrong to say "There is a broad aggreement … that emerging and potentially disruptive SRM technologies should not be governed through comprehensive institutional architectures designed well in advance".- The word "comprehensive" is misleading here. The majoritiy of literature agrees that there should be an international governance that governs all forms of SRM (thus in a sense there is agreement on "comprehensiveness"). Insofar some of those authors point out that there has to be flexibility, this is a criteria for all good normative regimes -. One way to ensure this flexibility and "regulatory fine tuning" is to have a general rule and to provide for exemptions under specific circumstances.Or there is general rule or general principle and the possibility of deviation (lex specialis and lex posterior) (E.g. Bodle/Oberthür, 2014, p.135. The flexibility issue has no connection with the comprehensiveness of a regime. - PLEASE ADD INSTEAD: "There is a broad agreement in the literature, that there should be a comprehensive international governance regime on SRM, that covers all SRM techniques. (e.g. Bodle/Oberthür, Options and Proposals for the International Governance of Geoengineering, Climate Change 14/2014, page 171) -	Noted, and partly accepted - the introduction to this paragraph has been entirely rewritten, the "broad agreement" sentence cut out, and the "broad agreement" statement been linked to the need for anticipatory governance	Dana Ruddigkeit	German Environment Agency	Germany
13521	41	17	41	20	There is a chance that "comprehensive institutional architectures designed well in advance" could be effective and legitimate. Consider something like "There is risk that comprehensive institutional architectures designed too far in advance would prove either too restrictive or too permissive in light of subsequent developments".	Partly accepted	Jesse Reynolds	University of California, Los Angeles	Netherlands
43447	41	17	41	20	There is no broad agreement of the kind described here at all. Gradually built up, thoughtful "Comprehensive institutional architectures designed well in advance" could potentially be the only effective and legitimate form of governance on SRM. I'd suggest something like: The literature identifies numeros opportunities to start building up institutional capacities for decisionmaking on various governance dimensions of SRM in a polycentric, yet coordinated manner that allows for continuous learning and correction to prevent becoming either too restrictive or too permissive in light of evolving situations.	Noted, and partly accepted - the introduction to this paragraph has been entirely rewritten, the "broad agreement" sentence cut out, and the "broad agreement" statement been linked to the need for anticipatory governance	Matthias Honegger	Perspectives Climate Research gGmbH	Germany
9935	41	17	41	21	To state that SRM should not be governed through comprehensive architecture designed well in advance holds true only as long as there are so many uncertainties. There is no evidence that when the effects of SRM are better understood, the best governance options are not a comprehensive framework set up well in advance of a possible deployment.	Noted - but rejected. Reviewer's argument is valid but text explicitly says that this applies to "emerging" technologies. Once SAI would be a "mature" technology this doesn't apply anymore, but we are nowhere near to this state	Adrien ABECASSIS	Harvard Kennedy School of Government	United States of America
3283	41	17	41	33	This paragraph seems to miss the necessary balance: it mentions governance as suggested by Bodansky ("forms of club governance") but does not mention the Carnegie Climate Governance Initiative (https://www.c2g2.net/governing-emerging-climate-technologies/. In order to provide a comprehensive information reference to this initiative should ALSO be included and its main objectives be mentioned.	taken into account, by adding reference to transnational non-state actors based on an article (Horton(Koremos 2020) that covers as on of its examples. We don't name C2G explicitly in the text, though	Klaus Radunsky	retired from Umweltbundesamt	Austria
15185	41	17	41	33	The literature suggests that there should be a general prohibition for SRM, whereas exemptions can be foreseen if several crieria are fulfilled, eg. impact assessemnts, braod consensus, monitoring, termination plan. Bodle/Oberthür, Options and Proposals for the International Governance of Geoengineering, Climate Change 14/2014, pp. 136, 171; Bodansky 2013, p.542; Williamson, P., & Bodle, R. (2016). Update on Climate Geoengineering in Relation to the Convention on Biological Diversity: Potential Impacts and Regulatory Framework. Technical Series No.84. Secretariat of the Convention on Biological Diversity,	Noted - and partly integrated in the sentence on anticipatory governance. The "general prohibition" position (here misrepresented as the consensus in the literature) is covered by "wanting to restrict" in Gupta et al's (2020) excellent typology of governance proposals [note: same comment from the same author is 151675]	Dana Ruddigkeit	German Environment Agency	Germany

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
19273	41	17	41	33	This section does an excellent job of reviewing the relevant litearture but a little more discussion on technical dimensions would be useful since technology and governance will co-evolve. . Because governance is likely to co-evolve with technology, some papers would be useful (e.g., MacMartin and Kravitz 2019, https://doi.org/10.1073/pnas.1811022116).	Taken into account, but rejected to expand on this, due to space constraints	Masahiro Sugiyama	University of Tokyo	Japan
32647	41	17	41	33	SRM may be the only known way to cool the earth in just a few years. See excerpt from the Climate Science Special Report, Fourth National Climate Assessment (NCA4), Volume I (2017) ("14.3. The role of climate intervention in meeting ambitious climate targets SRM approaches offer the only known CI methods of cooling Earth within a few years after inception. An important limitation of SRM is that it would not address damage to ocean ecosystems from increasing ocean acidification due to continued CO2 uptake. SRM could theoretically have a significant global impact even if implemented by a small number of nations, and by nations that are not also the major emitters of GHGs; this could be viewed either as a benefit or risk of SRM.").	Noted - no action proposed	Durwood Zaelke	Institute for Governance & Sustainable Development	United States of America
32649	41	17	41	33	Michael B Gerrard and Tracy Hester, CLIMATE ENGINEERING AND THE LAW, CAMBRIDGE UNIVERSITY PRESS (2018) lays out four principles to follow before the deployment of geoengineering. Although two of the principles can be easily incorporated into the principles discussed in this section, two add further depth to the governance approach. The four principles are: Tailor governance to the risks and opportunities of specific technologies, Distinguish governance of research and small-scale field tests from management of larger deployments, Craft governance that can respond on regional and local scales as well as globally, and Governance should assure that climate engineering remains reversible and additive to other climate change responses. In 2009, the Oxford Geoengineering Program developed the Oxford Principles, an initial set of guiding principles on the governance of geoengineering, endorsed by the UK government. They include: Geoengineering to be regulated as a public good; public participation in geoengineering decision-making; disclosure of geoengineering research and open publication of results; independent assessment of impacts; and governance before deployment. See also Oliver Morton, The Planet Remade: How Geoengineering Could Change the World.	Rejected because there's a lot of overlap with Nicholson et al. 2018 which has the advantage of being only on SRM, and not on CDR. furthermore, Gerrard/Hester is an edited volume.	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
32651	41	17	41	33	It would be important to note that SRM proposal that would use sulfate emissions to cool the planet risk destroying stratospheric ozone. WMO, et al. (2019) Scientific Assessment of Ozone Depletion: 2018, Global Ozone Research and Monitoring Project-Report No. 58, 6.16 ("Column ozone changes as the result of stratospheric aerosol geoengineering therefore depends on the injection amount, timing (ODS loading), and injection strategy (influencing aerosol size and location; Appendix 6A). Relatively small and constant injections of 2.5–4 Tg S yr−1 between 2020 and 2070, which would result in 0.5°C of surface cooling, are calculated to lead to an approximately 4% reduction in the global stratospheric column ozone for 2020 and only 1% reduction by 2070 (Pitatry et al., 2014; Xia et al., 2017). Much larger injection amounts that would lead to a surface temperature cooling of around 2°C in 2040–2050, based on a single model study, would result in reductions in column ozone of 28–40% in October over Southern Hemisphere (SH) high latitudes and 8–18% for NH high latitudes in March, with varying values depending on the injection altitude (Tilmes et al., 2018). Injections closer to the tropopause cause a stronger dynamical response and could result in up to an 8% increase in column ozone in NH winter mid- and high latitudes. A single modeling transient simulation based on RCP8.5 greenhouse gas forcings with continuously increasing SO2 injections between 2020 and 2099 and decreasing ODSs would result in approximately constant change in column ozone in high polar latitudes (20–23% in October over the SH and 10–12% in March over the NH polar latitudes) and slightly larger (3–5%) column ozone values compared to non-geoengineering conditions for tropics and winter northern mid-latitudes by the end of the 21st century (Richter et al., 2018).”).	Rejected since this being dealt with by WGI ch4 (and it depends on the deployment scheme and the material used instead of sulfate aerosols, as noted in the section now)	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
32653	41	17	41	33	In contrast with atmosphere-wide SRM, immediate support is warranted for promising albedo modification projects that are scalable and reversible — sometimes referred to as “soft” geoengineering. See, e.g., Leslie Field et al., Increasing Arctic Sea Ice Albedo Using Localized Reversible Geoengineering, Earth’s Future (May 2018) (describing a process to slow the melting of the polar ice caps through the deployment of floating sand, made of silica, that floats atop polar ice, increases its albedo, and is designed to degrade over time). Other researchers propose using wind power to pump water to the surface of the Arctic. They calculate that adding about 1 meter of thickness over 10% of the Arctic Ocean, at an estimated cost of $50 billion/year, would offset decreases in ice thickness observed since 2000. “Our analysis so far shows that artificial thickening of the ice can counteract a roughly 1°C temperature increase across the Arctic.” Desch et al., Arctic Ice Management, Earth’s Future (19 December 2016). Another group of scientists have proposed slowing melting through geoengineering polar glaciers. See Moore et al., Geoengineer polar glaciers to slow sea-level rise (Comment), Nature (14 March 2018). They propose three methods to achieve this: A) removing the subglacial stream under Antarctica that acts as a lubricant to speed up flow of the ice into the ocean, B) blocking warm water from reaching glaciers by constructing 100-meter-high walls with sloping sides at its edge, and C) artificially pinning ice shelves that hold back glaciers by constructing berms and islands. The authors note that more research is needed to establish the scientific validity of these projects. A strategy to stabilize the West Antarctic Ice Sheet would use massive amounts of energy to pump nearby seawater, produce snow, and deposit the snow around the Pine Island and Thwaites glaciers. The plan would utilize an estimated 12,000 wind turbines to generate 145 GW of power needed to save the ice sheet, and thereby avoid 3 meters of sea level rise. See Johannes Feldmann et al. (2019), Stabilizing the West Antarctic Ice Sheet by surface mass deposition, Science Advances.	Noted, but rejected since methods and their potential benefits/risks are being dealt with in WGI ch4	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
32655	41	17	41	33	Marine cloud brightening (MCB) is another geoengineering technique, designed to increase the albedo of marine clouds by spraying seawater particles generated at or near the ocean surface into such clouds to increase their cloud droplet concentration, and thereby their albedo. The technique was first proposed by John Latham in 1990 but remains relatively understudied, in part due to uncertainties in modeling clouds. Depending on scientific developments, MCB could either be broadened for atmosphere-wide cooling or localized to help protect glaciers and ice sheets. Modeling shows the potential for MCB to provide between 0.96 to 1.21°C of cooling from 2020-2069. See Camilla W. Stjern et al., Response to marine cloud brightening in a multi-model ensemble, Atmospheric Chemistry and Physics (2018) ("All models predict a statistically significant temperature decrease with a median of (for years 2020–2069) −0.96 [−0.17 to −1.21] K relative to the RCP4.5 scenario, with particularly strong cooling over low-latitude continents."). Preliminary research into regional applications of MCB suggest that it may provide positive benefits towards polar sea-ice maintenance or restoration, hurricane weakening, and/or reducing coral bleaching. See John Latham et al., Marine cloud brightening: regional applications, Philosophical Transactions of the Royal Society (2014). Similar to its framework for stratospheric aerosol injection geoengineering, GeoMIP provides a framework for MCB modeling research. In Kravitz et al., Sea spray geoengineering experiments in the geoengineering model intercomparison project (GeoMIP): Experimental design and preliminary results, Journal of Geophysical Research: Atmospheres (2013), the scientists propose three climate modeling experiments to test sea spray geoengineering.	Noted - MCB now mentioned in SOD (but extensively assessed by WGI ch4, as noted in opening para and beginning of SRM section)	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
32657	41	17	41	33	Although not branded as an MCB geoengineering experiment, one experiment in 2011 – the Eastern Pacific Emitted Aerosol Cloud Experiment (E-PEACE) – studied the cooling effect of smoke from ships, due to their emission's effect on brightening clouds and found that brighter clouds from smoke produce a cooling effect 2 to 50 times greater than warming effect from carbon emissions from ships. See Russell et al., Eastern Pacific Emitted Aerosol Cloud Experiment, Bulletin of the American Meteorological Society (May 2013). "We use the 15% cloud brightening measured for the smoke on 16 July (Fig. 5) for both tracks to find 2-nK cooling for the cargo ship and 0.4-nK cooling for the smoke—that gives us ratios of cooling to warming (i.e., a cooling efficiency) of ~2 for the cargo ship and ~50 for the smoke generator. Although this is a very simplified calculation, we find that, if half of the open-ocean transit days of a cargo ship result in tracks that are on average 15% brighter than the surrounding clouds and cover 2,500 km2, then cargo ship transit (for consumables only) could be considered "carbon neutral" (in the sense of having no net warming effect) transportation. Further, we find that smoke generators on board smaller ships (that require less than 2% of the fuel per transit mile) could provide a net cooling effect, which could be used to offset some of the warming caused by ship CO2 emissions." The Marine Cloud Brightening Project, supported in part by the University of/ Washington, aims to serve as a collaboration between atmospheric scientists to develop field research. The Australian government is funding feasibility studies of three proposals to manipulate regional environments around barrier reefs to reduce coral bleaching events. See McDonald et al., Governing geoengineering research for the Great Barrier Reef, Climate Policy (April 2019) ("Funding has been awarded for feasibility studies of three geoengineering technologies to protect the reef: (1) a 'floating sunshield' of reflective surface film made of calcium carbonate to reflect sunlight and lower water temperatures; (2) marine cloud brightening; and (3) water mixing.").	Noted - no action required in ch14 (Australian MCB experiments will be dealt with in WGII CCB on SRM in ch16, we now have one sentence, with a reference to governance literature)	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
39577	41	17	41	33	As stated below in this same section, all SRM techniques are based on theories and modelling and therefore speculative. However, if deployed, they could carry very significant negative impacts, unequally distributed and affecting mainly countries in the Global South, in Africa and Asia (Robock, 2016). Furthermore, the "termination shock" that would come if it is interrupted would have significant impacts on biodiversity and therefore create long term dependency from countries (Trisos et all 2018). Therefore, on the contrary of what is stated in this paragraph, (line 17 to 33) there is a strong controversy and there is no agreement (much less a broad agreement) on the kind of governance that SRM would demand. The authors quoted in the paragraph are strongly biased toward advancement of SRM research and open air experiments, and thefore advocate for weak, non-binding, and decentralized (or "polycentric") governance. All these arrangements would be totally inappropriate for high-risk technologies like SRM that can be deployed by one or few countries, that would imply strong military involvement, and can be weaponized. (Ribeiro, 2018) Because of this, the only possible governance for SRM would have to be a strong democratic, full participatory global United Nations mechanism, that can take into account the perspectives and participation of all countries, specially the potentially most affected. Some scientists consider that because of the complexities and paradox implied in a system of SRM governance (very long term and high demand for international coherence, without geopolitical conflicts, impossibility of eliminate uncertainties and high risk unequally distributed) , SRM should be banned (Winter, 2011). A very broad alliance of civil society organizations, including environmental, women, indigenous and peasant organizations strongly advocate for a ban too. (HOME, 2019) - References: Ribeiro, Silvia (2018) Who will control the Earth Thermostat? Magazine Science for the People , Special Issue on Geoengineering, Summer 2018 [online] Available at https://magazine.scienceforthepeople.org/geoengineering/control-earth-thermostat/#easy-footnote-23-1269 Robock, A. (2016), Albedo enhancement by stratospheric sulfur injections: More	Noted - but no action needed since no clear proposal being made here but in related comment (39579)	SILVIA RIBEIRO	ETC Group	Mexico
39579	41	17	41	33	For the reason explained above, we suggest deletion of this whole paragraph	Rejected, since we are assessing the research literature here. The related comment (39577) is more of a political statement. The research literature cited relates mainly to risks of (certain forms of) SRM deployment, which is assessed by WGI, ch4 & 5.	SILVIA RIBEIRO	ETC Group	Mexico

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
40345	41	17	41	33	This section is very biased towards enabling SRM, both in terms of substance and in authors cited. The majority of references are from authors that are known to be open to SRM or openly advocate SRM (MacMartin, Irvine, Kravitz, Bodansky, Reynolds...). There is a lack of references to positions that call for restrictive forms of SRM governance, both from international civil society (e.g. ETC Group/Biofuelwatch/Heinrich Böll Foundation 2018: The Big Bad Fix) and from academia, e.g. Winter, G. (2011) Climate Engineering and International Law:Last Resort or the End of Humanity?, RECIEL 20 (3) 2011. ISSN 0962 8797; which argues that solar radiation management should be prohibited from the outset due to inescapable uncertainty regarding its effects. It follows that, unlike what is maintained in the draft section, that there is clearly no consensus that governance arrangements should co-evolve with respective SRM technologies. Also, work from feminist authors like Tina Sikka (2018) Climate Technology, Gender, and Justice: The Standpoint of the Vulnerable, or work on notions of equity in SRM research (Flegal/Gupta 2017 Evoking equity as a rationale for solar geoengineeringresearch? Scrutinizing emerging expert visions of equity) are being ignored here. Furthermore, the work of Biermann/Möller (2019: Rich man's solution? Climate engineering discourses and the marginalization of the Global South) analyses how climate engineering discourses, including those on governance, is dominated by experts from just a small set of countries in the Global North, and marginalises the Global South. The IPCC would be well-advised not to reproduce and reiterate this problematic bias, both politically if it seeks broad acceptance and legitimacy, and from a perspective of scientific balance and integrity.	Taken into account, by adding the global equity dimension, referring to some of the literature suggested here (Flegal/Gupta). We don't rely on NGO reports in our assement, though. Calls for restricitve governance are mentioned, and covered by the reference to Gupta et al. 2020	Linda Schneider	Heinrich Boell Foundation	Germany
45325	41	17	41	33	An important suggestion which Could be added is about setting a time limit and objectives for the SRM technologies with a comprehensive pact/framework.	Noted - but since there's no mention of literature there's nothing we can assess here	Jaimin Parikh	1. United Nations SDSN 2. European Institute of Policy Research and Human Rights 3. University of Delhi	India
47443	41	19	41	20	"subsequent developments" should be unpacked into climactic and technical elements. Bodansky 2013 notes uncertainty in which emissions pathway will be realized, as well as the unknown "efficacy, risks and costs of different geoengineering approaches".	Accepted, with different wording (4 adjectives)	Kelly Wanser	SilverLining	United States of America
47445	41	21	41	21	"Governance arrangements should co-evolve with respective SRM technologies". Replace "should" with "could" or "might," to avoid being prescriptive.	Accepted, went with "would"	Kelly Wanser	SilverLining	United States of America
3277	41	21	41	22	The statement: "Accordingly, governance arrangements should co-evolve with respective SRM technologies, aiming to be at least one step ahead of research, development, demonstration, and—potentially—deployment" sounds very reasonable. However, this text gives the impression that we can still follow this option; this might have been true in 2014 when this publication has been made. However, it is not true in 2020, knowing, that an attempt to pass a resolution on CDR and SRM at the UN Environment Assembly (UNEA) that would have, among others, mandated an assessment of future global governance options, failed - as correctly informed. The authors should thus inform where the development and research of SRM stands (see also the comment below) and how long it might take to develop governance.	Noted - but suggestion rejected (not the least because it cannot be based on existing literature)	Klaus Radunsky	retired from Umweltbundesamt	Austria

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
288	41	23	41	27	Nicholson et al. 2018 is not a literature review and does not claim to be. Rather it is a specific near-term governance proposal grounded in one particular conceptual framework, polycentricity. The way Nicholson et al. 2018 is presented here may suggest that there is a community consensus behind this proposal when in fact there is not, although there is general support for the four objectives they identify and you cite (though not specifically in the context of their paper).	Accepted, slightly reworded for SOD	Joshua Horton	Harvard University	United States of America
47447	41	23	41	27	The sentence suggests more consensus than exists about the “core objectives for near-term polycentric SRM governance”. For example, Bodansky 2013 suggests that governance might not merely enable research but actively promote it. Reword as follows: “A recent literature review identifies four possible objectives for near-term polycentric climate governance, although some researchers have proposed others.”	Taken into account, slightly reworded for SOD to avoid impression that this is the one and only consensus (these are useful principles, still)	Kelly Wanser	SilverLining	United States of America
15173	41	27	41	28	PLEASE DELETE: "Ensure that SRM is considered only as a part of a broader portfolio of responses to climate change." Even if Nicholson does make this statement, this is no core objective distilled from all governance literature.This formulation implies that there is no priority of emission reduction. This is contrary to the core principles of UNFCCC and the governance literature.	Taken into accounted, partly reworded (making the mitigation priority clear) but not completely deleted	Dana Ruddigkeit	German Environment Agency	Germany
43449	41	27	41	30	This needs to contain separate statements regarding governance of research and governance of potential deployment. The literature very clearly identifies very different requirements for these two classes (e.g. Reynolds, 2919 or Nicholson et al., 2018).	Noted, sentence has been deleted (for different reasons) and it is unclear why such a distinction would be needed, since research has not been mentioned	Matthias Honegger	Perspectives Climate Research gGmbH	Germany
48139	41	27	41	30	This sentence blurs the lines between governance of SRM research and governance of deployment. This is an important distinction and most scholars think the governance needs are very different. Many people think that existing governance arrangments are sufficient for governing research that does not have trounsboundary impacts and this should be noted	Rejected - it is unclear why such a distinction would be needed, since research has not been mentioned in the (now shifted) sentence	Andrew Lockley	Andrew Lockley	United Kingdom (of Great Britain and Northern Ireland)
9937	41	30	41	33	It could be specified that, in the long term, the institutionalization of SRM governance needs to be particularly robust, given the risk of a termination shock: SRM would likely be one of the longest-lasting human interventions on climate systems.	Rejected - it is unclear why such a distinction would be needed, since research has not been mentioned in the (now shifted) sentence	Adrien ABECASSIS	Harvard Kennedy School of Government	United States of America
15191	41	30	41	33	Please mention more and more relevant proposals: ADD: Proposals reach from CBD as having a central role in Geoengineering Governance (Bodle/Oberthür, Options and Proposals for the International Governance of Geoengineering, Climate Change 14/2014; 158),...Some authors stress that SRM or CDR governance must not be integrated into UNFCCC Bodle /Oberthür, 2014, 160), since it could create perverse incentives for emission reduction.	Taken into account, and partly accepted by integrating Bodle/Oberthür on the role of the CBD	Dana Ruddigkeit	German Environment Agency	Germany
47449	41	32	41	32	Bodansky 2013 did not “propose" club governance. It merely suggested that, if the function of governance is to ensure adequate levels of research, then governance might be exercised by a relatively small group of countries.	Accepted, by changing "proposals" into "options"	Kelly Wanser	SilverLining	United States of America

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
43451	41	33	41	33	It would seem important to not create the impression that these proposals are exclusive from one-another; suggest to add: Most identify opportunities for complementary processes of various degrees of formality within several fora, while maintaining a high degree of coordination across them (Nicholson et al., 2018) https://stanleycenter.org/publications/pdb/AssessingGlobalClimateEngineeringGovernancePDB915.pdf Governance of the Deployment of Solar Geoengineering. Edited by Robert N. Stavins and Robert C. Stowe. Cambridge, Mass.: Harvard Project on Climate Agreements, February 2019. https://www.belfercenter.org/sites/default/files/files/publication/harvard_project_sg_governance-briefs_volume_feb_2019.pdf	Taken into account, and partly taken up by changing "proposals" into "options". Some authors suggest that their preferred choice is exclusive, or that there is at least a strong sense of priority	Matthias Honegger	Perspectives Climate Research gGmbH	Germany
13523	41	34	41	34	As defined in the glossary, "governance" includes nonstate and nonbinding action as well. As such, there is targeted [global] governance of SRM, such as the Oxford Principles and CBD decisions, although these mechanisms also include CDR. Consider "there is no targeted international law concerning SRM," or similar.	Accepted	Jesse Reynolds	University of California, Los Angeles	Netherlands
290	41	34	41	37	With regard to invocation of the Montreal Protocol and ENMOD, these and some other agreements could cover parts of SRM, but whether they do or not has not been resolved.	Noted and partly accepted (ENMOD goes out, Vienna Convention stays since SRM will be assessed unter Montreal Protocol)	Joshua Horton	Harvard University	United States of America
15171	41	34	41	37	The normative regime decided for in dec. X/33 of the CBD is comprehensive, it covers all forms of SRM. What is a "targeted" regime? May be better "detailed"? International regimes are rarely very detailed. This is not neceassrily problematic. Conrete Decisions may be taken later or at the national level.	Accepted. Indeed paragraph W of the X/33 does in fact deal with all aspects of "geo-engineering," and yet it lacks detail or clarity on most issues, and hence does not really say much of anything. We now make note of this reference to geoengineering in the CBD, but do not devote signifivcant space to it, given space constraints.	Dana Ruddigkeit	German Environment Agency	Germany
15187	41	34	41	37	Decision X/33 of the CBD schould be mentioned and explained. This decision is the sole multilateral and almost universal agreement for SRM. Whether binding or not, it has to be explained in a text on the international governance of geoengineering.	Accepted. Indeed paragraph W of the X/33 does in fact deal with all aspects of "geo-engineering," and yet it lacks detail or clarity on most issues, and hence does not really say much of anything. We now make note of this reference to geoengineering in the CBD, but do not devote signifivcant space to it, given space constraints.	Dana Ruddigkeit	German Environment Agency	Germany
13525	41	37	41	39	If word space is tight, consider removing this sentence, as the UNEA outcome (1) will likely become decreasingly relevant in upcoming years, and (2) tells the reader little in this brief passage.	Noted. Our space indeed becomes tight, that's why we dropped it	Jesse Reynolds	University of California, Los Angeles	Netherlands
47451	41	37	41	39	A decision in the Montreal Protocol to include stratospheric SRM in the 2022 Ozone Assessment recently passed with near-unanimous support. (UNEP, 2019)	Noted, that's why we mention the Vienna Convention, we now also mention its Montreal Protocol explicitly, but not this decision about the inclusion in the future Ozone assessment, of which we don't know how comprehensive it will be	Kelly Wanser	SilverLining	United States of America
15189	41	39	41	39	The resolution text was not adopted. Please delete "failed". And : This fact does not need to be cited by scientific literature.	Noted. We dropped it	Dana Ruddigkeit	German Environment Agency	Germany

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
38	41	41	41	41	What is CDR? It should be defined or the section that defines CDR in this report should be cited. Some CDR approaches could be also discussed briefly.	Accepted - we now use the glossary definition, reference to CDR treatment in WGI ch4 & 5 and WGIII ch 12 (as focal point) and section 12.7 (on governance) already given in new opening paragraph	Govindasamy Bala	Indian Institute of Science	India
292	41	44	41	47	The CBD has not "imposed" a moratorium--the resolution to which you refer is legally non-binding. And to describe the LC/LP's resolutions as "moratoria" (a term the LC/LP doesn't use) both oversimplifies its regulatory apparatus and is not accurate strictly speaking.	Noted. Indeed paragraph W of Dec. X/33 does in fact deal with all aspects of "geo-engineering," and yet it lacks detail or clarity on most issues, and hence does not really say much of anything. We now make note of this reference to geoengineering in the CBD, but do not devote signifivcant space to it, given space constraints.	Joshua Horton	Harvard University	United States of America
4779	41	45	41	45	Does the CBD acronym refer to the Convention on Biodiversity? If so, then better explain it by reporting its full meaning.	Noted but not changed here, since the acronoym is already used some lines above, at the end of the SRM subsection	michele stua	APE-FVG	United Kingdom (of Great Britain and Northern Ireland)
37619	41	21	42	20	A useful reference for this section could be: Hermwille et al 2019 (Climate Policy) on elements for an effective global stocktake	Accepted. Added in SOD	Michiel Schaeffer	Climate Analytics	Netherlands
3287	41	40	42	8	CDR is becoming more and more important given that without overshooting there are no scenarios reported in literature that allow to meet the 1.5 degrees C goal and almost all scenarios to meet the 2 degrees goal also overshoot. However, the subchapter 14.5.2 seems to limit CDR technologies to ocean fertilization only. However, more technologies that allow to address overshooting because they can produce negative emissions have been identified in the literature. Given the importance of this topic thois chapter should be expanded to address all those approaches related to CDR that have been identified as being potentially relevant. Such information would also be relevant for all organisations that want to become carbon neutral and which have to compensate residual emissions by deploying CDR technologies. Chapter 3.4.7.2 mentions the following CDR technologies: afforestation, bioenergy and BECCS, and DAC).	Noted. We initially included CDR technologies perceived as carrying major risks, in conformance with our mandate from the IPCC Plenary to look at SRM risks. Now the new introductory paragraph makes clearer that the CDR subsection is only about international governance, and that most of CDR governance (which tends to be national) is assessed in ch12.7. International governance tends to be focused on MRV issues (via UNFCCC) and treaties/conventions regulating the global commons, in the case of CDR there's therefore a focus on LP/LC and CBD	Klaus Radunsky	retired from Umweltbundesamt	Austria
37613	41	40	42	8	A reference that could be useful here for exisitng international governance regimes and their applicability for CDR is: Mace et al 2018, governing large-scale carbon dioxide removal: are we ready? https://www.c2g2.net/wp-content/uploads/C2G2-2018-CDR-Governance-1.pdf	Accepted, we refer to this report in the SOD	Michiel Schaeffer	Climate Analytics	Netherlands

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
37681	41	40	42	8	May wish to question a governance focus on ocean fertilisation. Note recent study questioning efficacy of ocean fertilisation. See Lauderdale et al, (2020) Microbial feedbacks optimize ocean iron availability, PNAS March 3, 2020 117 (9) 4842-4849; first published February 18, 2020 https://doi.org/10.1073/pnas.1917277117 (adding more iron may not improve the ability of the oceans to absorb CO2). See also Williamson, P., 2012, Ocean fertilization for geoengineering : A review of effectiveness , environmental impacts and emerging governance, Process Safety and Environmental Protection 90(6):475-488DOI: 10.1016/j.psep.2012.10.007((the maximum benefits of ocean fertilization as a negative emissions technique are likely to be modest)	Noted. We initially included CDR technologies perceived as carrying major risks, in conformance with our mandate from the IPCC Plenary to look at SRM risks. Now the new introductory paragraph makes clearer that the CDR subsection is only about international governance, and that most of CDR governance (which tends to be national) is assessed in ch12.7. International governance tends to be focused on MRV issues (via UNFCCC) and treaties/conventions regulating the global commons, in the case of CDR there's therefore a focus on LP/LC and CBD. Efficacy of methods is not assessed here, as stated in opening paragraph	Michiel Schaeffer	Climate Analytics	Netherlands
41285	41	40	42	8	I am surprised that this section on CDR is so short - given all the issues and questions related to role of CDR and its governance in a international context.	Noted. We initially included CDR technologies perceived as carrying major risks, in conformance with our mandate from the IPCC Plenary to look at SRM risks. Now the new introductory paragraph makes clearer that the CDR subsection is only about international governance, and that most of CDR governance (which tends to be national) is assessed in ch12.7. International governance tends to be focused on MRV issues (via UNFCCC) and treaties/conventions regulating the global commons, in the case of CDR there's therefore a focus on LP/LC and CBD	Jan Fuglestvedt	CICERO	Norway
41287	41	40	42	8	I suggest the authors insert references to where this is treated in WGI (as was done for SRM in the previous section).	Accepted (WGI ch4 & 5 and WGIII ch12 as focal point, in the opening paragraph preceding SRM governance)	Jan Fuglestvedt	CICERO	Norway
41289	41	40	42	8	I suggest inserting a clear reference to Art 4 of the PA since CDR has a potenially important role for achieving this goal.	Accepted	Jan Fuglestvedt	CICERO	Norway

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
43453	41	40	42	9	This section needs to state what the primary governance concern with CDR is: A factual need of its large-scale application and a mandated use via the text of both the UNFCCC and the Paris Agreement on the one hand, and a near-complete absence of dedicated planning and policy coordination that would see any meaningful application beyond present-day natural sinks, not even in countries that have committed to reaching net-zero emissions. Honegger, M., & Reiner, D. (2018). The political economy of negative emissions technologies: consequences for international policy design. Climate Policy, 18(3), 306-321. Cox, E., & Edwards, N. R. (2019). Beyond carbon pricing: policy levers for negative emissions technologies. Climate Policy, 19(9), 1144-1156. McLaren, D. P., Tyfield, D. P., Willis, R., Szerszynski, B., & Markusson, N. O. (2019). Beyond 'Net-Zero': A case for separate targets for emissions reduction and negative emissions. Frontiers in Climate, 1, 4. Bellamy, R. (2018). Incentivize negative emissions responsibly. Nature Energy, 3(7), 532-534. For a detailed explanation how the UNFCCC and the Paris Agreement legally ask Parties to pursue CDR, see also: Honegger, M.; Michaelowa, A.; Poralla, M. (2019): Net-zero emissions: The role of Carbon Dioxide Removal in the Paris Agreement. Policy Briefing Report. Perspectives Climate Research, Freiburg.	Noted. We initially included CDR technologies perceived as carrying major risks, in conformance with our mandate from the IPCC Plenary to look at SRM risks. Now the new introductory paragraph makes clearer that the CDR subsection is only about international governance, and that most of CDR governance (which tends to be national) is assessed in ch12.7. International governance tends to be focused on MRV issues (via UNFCCC) and treaties/conventions regulating the global commons, in the case of CDR there's therefore a focus on LP/LC and CBD	Matthias Honegger	Perspectives Climate Research gGmbH	Germany
32659	41	41	42	8	Governance gaps exist on four key CDR issues: the scale and speed of implementation, the incentives needed to scale-up CDR, the tradeoffs between Sustainable Development Goals and CDR implementation, and the risks if CDR options are not implemented. See Climate Geoengineering Governance Initiative (C2G2), Governing large-scale carbon dioxide removal: are we ready? (2018). See also Zaelke D. J., How to save the Arctic's moderating role on global warming, Bulletin Atomic Scientists (1 April 2019).	Noted, and suggestion partly accepted (Carnegie 2018 is Mace et al. 2018, now included)	Durwood Zaelke	Institute for Governance & Sustainable Development	United States of America
40347	41	41	42	8	The London Protocol of the London Convention has prohibited Ocean Fertlization (other than legitimate scientific research, for which criteria and thresholds are well-defined). It is unclear why this is not stated explicitly in the draft section.	Noted. We do not do this given the degree of generality in the LP, and our space constraints.	Linda Schneider	Heinrich Boell Foundation	Germany
45327	41	42	42	8	Following phrase could be used: "any authoritarian response to the oceans beyond the certified international water boundaries should be prevented in order to have a proper check on CDR."	Noted, but rejected - this is probably reasonable but the formulation is policy prescriptive	Jaimin Parikh	1. United Nations SDSN 2. European Institute of Policy Research and Human Rights 3. University of Delhi	India

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
45329	41	42	42	8	Following phrase could be used: " the developing countries must take responsibilities I their ocean policy"	Noted, but rejected - this is probably reasonable but the formulation is policy prescriptive	Jaimin Parikh	1. United Nations SDSN 2. European Institute of Policy Research and Human Rights 3. University of Delhi	India
45331	41	42	42	8	Following phrase could be used: "deep ocean mining should also be restricted to the best plausible extent"	noted, but rejected - this would need to be supported by literature, and does likely not fall within the scope of this section	Jaimin Parikh	1. United Nations SDSN 2. European Institute of Policy Research and Human Rights 3. University of Delhi	India
15177	41	30			Please mention more and more relevant proposals: ADD: Proposals reach from CBD as having a central role in Geoengineering Governance (Bodle/Oberthür, Options and Proposals for the International Governance of Geoengineering, Climate Change 14/2014; 158),...Some authors stress that SRM or CDR governance must not be integrated into UNFCCC Bodle /Oberthür, 2014, 160), since it could create perverse incentives for emission reduction.	Rejected here, but partly accepted above on SRM governance, by integrating Bodle/Oberthür on the role of the CBD [this is the same comment as 15191]	Dana Ruddigkeit	German Environment Agency	Germany
48141	41	32			Does not consider distributed governance models, eg Lockley, A. Distributed governance of Solar Radiation Management geoengineering: A possible solution to SRM's "free-driver" problem?. Front. Eng. Manag. 6, 551–556 (2019). https://doi.org/10.1007/s42524-019-0055-y	Rejected, since the article mentioned does not deal with real-world governance but only offers a thought experiment based on an analogue metaphor	Andrew Lockley	Andrew Lockley	United Kingdom (of Great Britain and Northern Ireland)
15169	41	39			The resolution text was not adopted. Please delete "failed". And : This fact does not need to be cited by scientific literature.	Taken into account, due to space constraints, the text on the UNEA resolution is cut out	Dana Ruddigkeit	German Environment Agency	Germany
15167	41				The literature suggests that there should be a general prohibition for SRM, whereas exemptions can be foreseen if several crieria are fulfilled, eg. impact assessemnts, braod consensus, monitoring, termination plan. Bodle/Oberthür, Options and Proposals for the International Governance of Geoengineering, Climate Change 14/2014, pp. 136, 171; Bodansky 2013, p.542; Williamson, P., & Bodle, R. (2016). Update on Climate Geoengineering in Relation to the Convention on Biological Diversity: Potential Impacts and Regulatory Framework. Technical Series No.84. Secretariat of the Convention on Biological Diversity,	Noted - and partly integrated in the sentence on anticipatory governance. The "general prohibition" position (here misrepresented as the consensus in the literature) is covered by "wanting to restrict" in Gupta et al's (2020) excellent typology of governance proposals [note: same comment from the same author is 15185]	Dana Ruddigkeit	German Environment Agency	Germany
294	42	2	42	5	I don't understand this sentence--why should the use of NETs in climate models discourage facilitating experiments?	Noted. We have removed this statement in the course of our extensive edits of this section.	Joshua Horton	Harvard University	United States of America
37685	42	2	42	5	Could add: it could also be questioned whether a substantial investment in governance is worthwhile, as studies have questioned the efficacy of ocean fertilisation. See Williamson et al., 2012; Lauderdale et al. 2020,	Rejected, since we do not assess the efficacy of CDR methods here (for marine CDR, this is done in ch12, as mentioned in new opening paragraph)	Michiel Schaeffer	Climate Analytics	Netherlands
296	42	5	42	8	The meaning of this sentence is unclear as well--do you mean to suggest that stringent mitigation policy should exclude CDR? If so, why?	Noted. We have removed this statement in the course of our extensive edits of this section.	Joshua Horton	Harvard University	United States of America

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
45335	42	17	42	22	There is a low confidence on Success of the measures	Noted. However, this sentence is not making an assessment.	Jaimin Parikh	1. United Nations SDSN 2. European Institute of Policy Research and Human Rights 3. University of Delhi	India
36811	42	17	42	24	You may also wish to mentioned problems tracking finance. e.g . OECD has advocated for use of tracking but governments are not always applying these indicators to their budgets or repor ts. See for example Sendai Framework and problems getting governments to report on Target F. Additionally you may wish to look at the issue of broader development funding and how funding is given for climate change but also to support coal or oil sectors, thereby undermining other forms of bilateral assistance related to climate change.	Noted. This is a valid observation on the Rio markers usage. In the new section on finance, while quoting OECD data for bilateral assistance, this observation will be cited as a caveat, based on existing literature critiquing OECD DAC reporting.	Zinta Zommers	United Nations Office for Disaster Risk Reduction	Germany
40009	42	19	42	19	Insert after "… and assistance.": "However, the assessment whether projects actually contribute to mitigation has been deeply flawed and influenced by political considerations, at least in the 2000s (Michaelowa and Michaelowa 2011)". Michaelowa, Axel; Michaelowa, Katharina (2011): Coding Error or Statistical Embellishment? The Political Economy of Reporting Climate Aid, in: World Development, 39, p. 2010–2020	Noted. This is being considered in the context of revisiting this section especially related to bilateral assistance (see comment response 36811 above).	Axel Michaelowa	University of Zurich	Switzerland
43517	42	19	42	19	There are severe problems in the execution of assessments as to whether these activities actually reduced any CO2 emissions; add reference to Michaelowa, Axel; Michaelowa, Katharina (2011): Coding Error or Statistical Embellishment? The Political Economy of Reporting Climate Aid, in: World Development, 39, p. 2010–2020	Noted. This is being considered in the context of revisiting this section especially related to bilateral assistance (see comment response 36811 above).	Matthias Honegger	Perspectives Climate Research gGmbH	Germany
19225	42	25	42	25	In addition to the increasing amount of bilateral support, how it is distributed should be discussed. Bilateral support in transparency-related capacity building, has traditionally given greater support to countries with higher existing capacity, by a factor of five, than countries with higher needs. One of the causes for this unfavorable distribution is due to lack of adequate monitoring and evaluation (M&E) system on a global scale.See Umemiya, C., Ikeda, M. & While, K. M. (2020) Lessons learned for future transparency capacity building under the Paris Agreement: A review of greenhouse gas inventory capacity building projects in Viet Nam and Cambodia. Journal of Cleaner Production, 245(1): 1-11.	Noted. In the context of international cooperation, bilateral finance flows are improtant. The fact that there may be distributional preferences is well known, which could be due to historical factors or other reasons. On the other hand, there are explicit preferences also for SIDs and LDCs by some donors. In the balance this chapter is focusing on cooperation and as such role of bilateral flows in that context is the primary objective.	Chisa Umemiya	Institute for Global Environmental Strategies	Japan
36813	42	33	42	45	This is a very superficial review of UN agencies activities. I would either expand it to be comprehensive and mention more agencies or cut and discuss problems facing development institutions and actors - e.g. lack of funding, coordination etc.	Accepted. This sub-section on multilateral financing support is being significantly revised and attempting to take a broader view of UN system support to climate action.	Zinta Zommers	United Nations Office for Disaster Risk Reduction	Germany
45333	42	33	43	14	Following MUST be added: "An approach to the Regional Action Plan of Climate Change is required which would further enhance the possibilities of inter-regional frameworks and co-operation with regards to the same."	Rejected. With a rewrite of this section and a focus on financing this comment is redundnat as the inter-regional frameworks for cooperation are not the major conduits of financing.	Jaimin Parikh	1. United Nations SDSN 2. European Institute of Policy Research and Human Rights 3. University of Delhi	India

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
45337	42	33	44	33	There is no mention of the potential of the developing countries from South Asian region which are leading world economies at present and their groupings (SAARC, BIMSTEC, etc.)	As per 45333 above, rejected. Also, one needs to distinguish between multilateral/bilateral financial assistance and regional cooperation which may largely focus on technical assisatnce and knowledge transfer.	Jaimin Parikh	1. United Nations SDSN 2. European Institute of Policy Research and Human Rights 3. University of Delhi	India
38245	43	1	43	33	Here, reference should be made to the new European Investment Bank lending policy which phase-out financing of fossil fuels by 2021. See: https://www.eib.org/attachments/strategies/eib_energy_lending_policy_en.pdf	Noted. Section rewrite, which captures all MDBs (and not focusing on only one MDB) will help address this comment.	Yamina Saheb	OpenExp, Ecole des Mines de Paris	France
4781	43	15	43	33	Given that the US represent th most relevant financial resource for the World Bank budget, it may worth reporting/citing the clashes between the incumbent US administration and the World Bank as for what concerns this latter one's activities in the field of Climate Change. These have not yet hindered World Bank actions on Climate Change (at least officially), yet increasing tentions between the two parts are registered.	Noted. With a rewrite of this section wherein MDBs and their recent actions and commitments are being addressed as a collective, this comment focusing only on the World Bank is not relevant	michele stua	APE-FVG	United Kingdom (of Great Britain and Northern Ireland)
16139	43	15	43	33	Echoing an earlier comment, the World Bank's most significant impact is less from its explicitly carbon or climate actions, and more from the extent to which it has internalised climate change in its broader project and policy lending. It is worth making ths point explicitly, on which there is quite some literature under the 'mainstreaming' label. THe financing of oil and gas limitations as also coal, fall in this category. Also, the Bank's role in stimulating electricity market reform, and more broadly shaping electricity institutions is worth noting. The most recent comprehensive review is: https://www.worldbank.org/en/topic/energy/publication/rethinking-power-sector-reform. My own work on this is now far too old to cite, but is available at http://pdf.wri.org/powerpolitics_all.pdf	Noted, as above for 4781	Navroz Dubash	Centre for Polcy Research	India
8741	43	24	43	24	[14.5.5.2: Typo] There is a typo: Jim Yong Kim.	Noted, as above for 4781 which will render this comment redundant.	Chaewoon Oh	Green Technology Center	Republic of Korea
22923	43	24	43	33	Jim Kim is no longer WB president, would be interesting to see included here reference to David Malpass and his plans/stances regardung the WB and climate finance/development.	Notes, as above for 4781; further to assess/refer an individual's role may not be appropriate in an IPCC report .	Kelsey Ross	The Center for Global Development	United States of America
19227	44	14	44	14	It's important and fair to mention that evidence suggests that multilateral agencies has no adequate evaluation systems for meauring the effectiveness of its interventions linked with the level of outomes/impacts. * See, for example, Umemiya, C., Ikeda, M. & While, K. M. (2020) Lessons learned for future transparency capacity building under the Paris Agreement: A review of greenhouse gas inventory capacity building projects in Viet Nam and Cambodia. Journal of Cleaner Production, 245(1): 1-11.	Noted. The text was referring to GCF's effectivemess in leveraging private financing; with rewrite of this section exclusive focus on certain institutions will not exist. Further, at least some multilateral agencies do report on their development effectiveness and have elaborate monitoring for results as also independent evaluations of the same.	Chisa Umemiya	Institute for Global Environmental Strategies	Japan
1453	44	34	45	43	Liu et al. (2017) explored prospects for south–south cooperation for large-scale ecological restoration, which is an important solution to mitigate climate change. Emphasis is given to experience and expertise sharing, cofinancing, and codevelopment of new knowledge and know-how for more effective policy and practice worldwide, especially in developing and newly industrialized countries. Liu J., Calmon M., Clewell A., Liu J., Denjean B., Engel V.L., Aronson J., 2017. South- south cooperation for large-scale ecological restoration. Restoration Ecology 25 (1): 27-32.	*Accepted. Reference included.	JUNGUO LIU	Southern University of Science and Technology	China

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
45339	44	35	45	43	Following could be added: "however it would be interesting to see if SSC is able to pave results at grassroots and would be too early to comment on its achievements."	Accepted, in principle, to the extent supported by literature. Not the exact language.	Jaimin Parikh	1. United Nations SDSN 2. European Institute of Policy Research and Human Rights 3. University of Delhi	India
45341	45	10	45	20	The potential of India-EU partnership has not been discussed. This SHOULD be added: "European Union is playing a mentor cum friend role to the developing nations, particularly India, in dealing with environmental problems and Climate Change crisis."	*Rejected. The chapter text refers to a papers finding on wind energy sector where EU partnership with China and India has inreasingly become South led. The generic statement/opinion by the reviewer (unsupported by references) does not supplement the argument, rather it talks of a NS relationship rather than SSC which is the focus of this section.	Jaimin Parikh	1. United Nations SDSN 2. European Institute of Policy Research and Human Rights 3. University of Delhi	India
45343	45	14	45	14	A grammatical error: "extent" should be replacing "extend".	*Accepted	Jaimin Parikh	1. United Nations SDSN 2. European Institute of Policy Research and Human Rights 3. University of Delhi	India
25337	45	46	46	2	Delete "Universal tariff reduction … , Griffin et al. 2019).", as undefined terms such as "environmentally destructive products" are used.	Accepted. Sentence deleted, as the underlying source also does not provide clarity.	Eleni Kaditi	Organization of the Petroleum Exporting Countries (OPEC)	Austria
9457	45	44	48	11	The section starts with a brief discussion on the adverse effects that trade and trade agreements can have on climate mitigation. However, this is only the first two paragraphs and afterwards the section discusses trends in including climate provisions within trade agreements. I suggest to develop the arguments in the first two paragraphs further and provide more evidence. Along the lines of my comments for the Executive Summary, I suggest to look at the following aspects of trade and climate: 1) Trade and investment rules can impede climate policies: certain climate policies might not be conform with existing trade rules (i.e. need to reform trade rules or ensure that they rank lower than international climate agreements; Note that trade rules currently trump climate rules. Even the Paris Agreement states that climate policies must not pose a barrier to international trade (Article 3(5)); certain trade rules can be used to challenge climate policies (regulatory cooperation; Investor-State Dispute Settlement). 2) Measures that increase international trade irrespective of the climate-impact of the traded goods lead to higher GHG emissions. 3) The Paris Agreement excepts trade from emission reductions: Countries are not obliged to reduce the imported emissions, so there is no incentive to reduce overconsumption; Emissions from international transportation are not accounted for.	Taken into account. The section now begins by discussing the available evidence on the role of trade and investment agreements in either (potentially) driving or hindering climate change action, including also a discussion of "regulatory chill". This addresses the first two aspects listed here. The aspect of international transport is discussed in Section 14.5.2.3.	Cornelia Maarfield	Climate Action Network (CAN) Europe	Germany

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
45765	45	44	48	11	1. The discussion on trade agreements have bypassed multilateral trade agreements under the World Trade Organization completely. This is a huge miss. Notwithstanding the current challenges confronting the WTO Dispute Settlement System etc., one cannot deny importance of the multilateral trade governance framework in the context of international cooperation for facilitating climate action. 2. The issues around WTO Dispute Settlement system and recent surge in climate-related WTO disputes may be touched upon. Refer Das, Kasturi, Harro van Asselt, Susanne Droege and Michael Mehling, Making the International Trade System Work for Paris Agreement: Assessing the Options, Vol.49: 6, 10553-80 Environmental Law Reporter, Environmental Law Institute, Washington, DC, USA, 2019.	Accepted. The section now includes a dedicated discussion on the role of the WTO, including literature on relevant trade-climate disputes (in the area of renewable energy and biofuels). The suggested source is included and used for this discussion.	Kasturi Das	1. Professor of Economics, Institute of Management Technology, Ghaziabad, India; 2. Member, Climate Strategies	India
45767	45	44	48	11	The literature referred in the trade section may be updated further. The Trade-Climate literature is growing fast as the area is assuming increasing importance. Some recent literature on trade-climate interface that cover WTO, RTAs and the most relevant issue areas currently relevant are provided below for ready reference.	Accepted. Further literature (including some recent contributions) on trade and investment agreements and climate change are included.	Kasturi Das	1. Professor of Economics, Institute of Management Technology, Ghaziabad, India; 2. Member, Climate Strategies	India
45345	45	45	48	11	There is no discussion on Regional Economic Comprehensive Partnership which has recently came into existence and is bound play an important role in the Asia-Pacific.	Taken into account. The section now includes a short discussion of mega-regional trade agreements and climate change, including RCEP.	Jaimin Parikh	1. United Nations SDSN 2. European Institute of Policy Research and Human Rights 3. University of Delhi	India
34561	45		48		Note my comment to Chapter 11 in area of International trade spillover effects and competitiveness "....: one specific suggestion is that the authors collectively consider more deeply how to approach the issues around carbon leakage, investment and 'border adjustments'. First, this could usefully be coordinated with Chapters 12 (discusses leakage estimation) and 13 (which has a section on BCAs) and/or 14. In Ch.11 it is located in a section on carbon pricing, which indeed is how almost all the literature addresses it, though the issue could arise from other policies which may raise costs on mobile production activities. It would be useful to clearly distinguish the principles, notably, consumption-based measures and border carbon levelling, which are in principle non-discriminatory, vs potentially discriminatory trade measures. It could be useful if possible to set in wider context of trade and climate relationships. Pleased to see reference to Mehling et al, worth checking and citing the development of this work as now published in leading law journal: Mehling, M., Van Asselt, H., Das, K., Droege, S., & Verkuijl, C. (2019). Designing Border Carbon Adjustments for Enhanced Climate Action. American Journal of International Law, 113(3), 433-481. doi:10.1017/ajil.2019.22 It may be worth raising at WG-III level how AR6 should approach this issue across chapters." See also specific to this chapter, my final comment/suggestion	Taken into account. A brief discussion of the aspects of border carbon adjustments and other measures to address carbon leakage in relation to trade agreements, citing relevant literature including Mehling et al., has been included.	Michael Grubb	UCL - Institute of Sustainable Resources	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
29511	46		29		In the discussion on Border Tax Adjusments, please consider the recently published paper: Al Khourdajie, A. and M. Finus, 2020, Measures to enhance the effectiveness of international climate agreements: the case of border carbon adjustments. European Economic Review.(Accepted and in press at the time of providing this comment): https://www.sciencedirect.com/science/article/pii/S0014292120300374	Accepted (though included in section on climate clubs, 14.2.2).	Alaa Al Khourdajie	IPCC WGIII TSU	United Kingdom (of Great Britain and Northern Ireland)
13631	46	1	46	8	Comment: On 4 March 2020, the EU opened up public consultation on its proposed Carbon Border Adjustment Mechanism (CBAM) to address carbon leakage. If implemented, CBAM would become a major new trade regulation with significant consequences and raise questions about its effectiveness and compliance with international trade regimes. It may be worthwhile referring to CBAM in a later draft of APR6, once its contours and content are better understood. That discussion could also be situated between lines 25-39 on p. 46.	Accepted. A very brief mention of the CBAM is now included to set the context for the discussion on border carbon adjustments and trade agreements.	Stuart Bruce	Wilmer Cutler Pickering Hale and Dorr LLP	United Kingdom (of Great Britain and Northern Ireland)
38247	46	1	46	48	This section must reference the Energy Charter Treaty which is a multiletral trade and investment agreement which protect foreign investments in supply side only (mainly fossil) by means of ISDS mechansim. See https://www.energycharter.org/fileadmin/DocumentsMedia/Legal/ECTC-en.pdf And also references mentioned in comments 1 & 2 to capture the lock-in effect of the this ecocide trade agreement	Taken into account. The section now discusses the role of trade and investment agreements in potentially promoting or hindering climate action. A reference to the Energy Charter Treaty is included in section 14.	Yamina Saheb	OpenExp, Ecole des Mines de Paris	France
38253	46	1	46	48	The section on trade agreements should include an assessment of the regulatory chill and its potential impact on delaying climate action as most trade agreements over-empower investors who can use ISDS to sue governments in private arbitration (parallel justice system) which do not take into account protection of communities and biodiversity. See: https://www.cambridge.org/core/services/aop-cambridge-core/content/view/C1103F92D8A9386D33679A649FEF7C84/S2047102517000309a.pdf/regulatory_chill_in_a_warming_world_the_threat_to_climate_policy_posed_by_investorstate_dispute_settlement.pdf And for illustration of the effect of ISDS on delaying climate action you could use teh Energy Chrater Treaty which is mentioned in comments 1 & 2	Accepted. The section now include a more general discussion on the role of trade and investment agreements, including the role of regulatory chill (with reference to among others the source provided by the reviewer).	Yamina Saheb	OpenExp, Ecole des Mines de Paris	France
4783	46	2	46	14	Some considerations concerning the WTO-compatibility with the Paris Agreement objectives can be found in Chapter 8 (A Hybrid Model to Govern the Mitigation Alliance) of: Stua, M., 2017: From the Paris agreement to a low-carbon bretton woods: Rationale for the establishment of a mitigation alliance. Springer International Publishing.	Taken into account. The source is a specific proposal for an international climate coalition, and it discusses a few aspects of WTO compatibility of aspects such as border carbon adjustments, liberalization of environmental goods and services, and renewable energy subsidies, which are now briefly discussed.	michele stua	APE-FVG	United Kingdom (of Great Britain and Northern Ireland)
32241	46	5	46	5	One of the few academic contributions on "response measures" should be cited here: Chan, Nicholas (2016). The 'New' Impacts of the Implementation of Climate Change Response Measures. Review of European, Comparative & International Environmental Law 25(2), 228-237.	Accepted. Reference included in context of "response measures".	Harro van Asselt	University of Eastern Finland	Netherlands

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
45789	46	5	46	8	Given the importance of Investor State Dispute Settlement issue in the context of Bilateral Investment Treaties or wider RTAs, this controversial issue may be discussed in at least one paragraph. See for instance: • Regulatory Chill in a Warming World: The Threat to Climate Policy Posed by Investor-State Dispute Settlement https://www.cambridge.org/core/journals/transnational-environmental-law/article/regulatory-chill-in-a-warming-world-the-threat-to-climate-policy-posed-by-investorstate-dispute-settlement/C1103F92D8A9386D33679A649FEF7C84	Accepted. The role of investment agreements is now discussed, and this source included.	Kasturi Das	1. Professor of Economics, Institute of Management Technology, Ghaziabad, India; 2. Member, Climate Strategies	India
13627	46	7	46	7	Suggest additional text in bold: Equally, while investment agreements may facilitate flows of foreign investment to support green technology development, more commonly these agreements, particularly older agreements drafted in broad and general terms, have protected investor rights at the expense of host countries' environmental and renewable energy policies (Miles 2019). More contemporary investment agreements (and model agreements), including those being negotiated now, tend to be more detailed, prescriptive and tightly drafted, often attempting to clarify and better balance the rights and obligations of foreign investors and host states. Increasingly, those instruments are requiring foreign investors to comply with certain standards regarding CSR, environmental, labour and human rights issues, among others, to fully benefit from the protections offered under international law (UNCTAD June 2019). Full citation: UNCTAD, June 2019: Taking Stock of IIA Reform: Recent Developments <https://unctad.org/en/PublicationsLibrary/diaepcbinf2019d5_en.pdf>.	Accepted (subject to editorial revisions).	Stuart Bruce	Wilmer Cutler Pickering Hale and Dorr LLP	United Kingdom (of Great Britain and Northern Ireland)
45769	46	9	46	10	It says: "Trade policies can have an impact on the climate change mitigation efforts of countries, just as 10 policies for addressing climate change can influence trade among countries." The trade-climate nexus may be spelt out more clearly. See for instance, Das, Kasturi, Harro van Asselt, Susanne Droege and Michael Mehling, Making the International Trade System Work for Paris Agreement: Assessing the Options, Vol.49: 6, 10553-80 Environmental Law Reporter, Environmental Law Institute, Washington, DC, USA, 2019, p.0554.	Taken into account. The relationship between trade policies and climate change, and trade agreements and climate change is now discussed in more detail. The reference provided is incorporated.	Kasturi Das	1. Professor of Economics, Institute of Management Technology, Ghaziabad, India; 2. Member, Climate Strategies	India
32243	46	9	46	14	For more recent (and more exhaustive) discussions of the options on how to improve the trade-climate relationship, see Das, Kasturi, Harro van Asselt, Susanne Droege & Michael Mehling (2019). Making the International Trading System Work for Climate Change: Assessing the Options. Environmental Law Reporter 49(6), 10553–10580; and Droege, Susanne, Harro van Asselt, Kasturi Das & Michael Mehling (2017). The Trade System and Climate Action: Ways Forward under the Paris Agreement. South Carolina Journal of International Law and Business 13(1), 195–276.	Accepted. Both sources now included.	Harro van Asselt	University of Eastern Finland	Netherlands
9459	46	15	46	18	Can you please include examples for early RTAs and more recent RTAs with "precise and enforceable obligations"? Please include evidence that recent RTAs are indeed more stringent on environmental obligations. From 15 years of experience working on EU trade policy, I can only see a trend to include non-binding references to the environment and climate change. Such provisions are usually vaguely worded and written into a Trade and Sustainable Development Chapter that is excluded from the enforcement mechanism, which applies to the rest of the agreement. Climate provisions in EU trade agreements are therefore neither precise nor enforceable.	Taken into account. The section on RTAs is now rewritten to take into account recent literature on RTAs and climate change. Language about enforceability has been nuanced.	Cornelia Maarfield	Climate Action Network (CAN) Europe	Germany

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
32245	46	24	46	24	"Yet, the contribution of RTAs to climate governance remains undexplored". Agreed, but the authors should at the very least check: Morin, Jean-Frédéric & Sikina Jinnah (2018). The untapped potential of preferential trade agreements for climate governance. Environmental Politics 27(3), 541-565.	Accepted. Source included, along with others, to substantiate the discussion on RTAs and climate change.	Harro van Asselt	University of Eastern Finland	Netherlands
4785	46	25	46	39	Some additional findings concerning border tariffs adjustments can be found in Stua, M., 2017: A Hybrid Model to Govern the Mitigation Alliance) and Stua, M., 2017: Excludable Benefits Resulting from the Mitigation Alliance) both of which available in: M. Stua (Ed.), From the Paris agreement to a low-carbon bretton woods: Rationale for the establishment of a mitigation alliance. Springer International Publishing.	Rejected. The relevant chapters were checked, but beyond a few brief points about the WTO/GATT in Chapter 8 (which are in part based on literature cited now in the chapter), the chapters do not contain specific findings concerning border carbon adjustments and trade agreements.	michele stua	APE-FVG	United Kingdom (of Great Britain and Northern Ireland)
45775	46	28	46	33	For more recent discussion on various areas of trade-climate interaction, refer: • Droege, Susanne, Harro van Asselt, Kasturi Das and Michael Mehling, 'The Trade System and Climate Action: Ways Forward under the Paris Agreement', South Carolina Journal of International Law & Business, South Carolina School of Law, USA, 195-262, 2017. • Global Rules for Mutually Supportive and Reinforcing Trade and Climate Regimes, E15 Expert Group on Measures to Address Climate Change and the Trade System – Policy Options Paper, E15Initiative, Geneva: International Centre for Trade and Sustainable Development (ICTSD) and World Economic Forum, 2016.	Accepted. Both sources are now included in the discussion of the relation between the WTO and climate change, and options for reform.	Kasturi Das	1. Professor of Economics, Institute of Management Technology, Ghaziabad, India; 2. Member, Climate Strategies	India
25339	46	28	46	39	Delete "Mattoo and Subramanian (2013) … Paris Agreement obligations", as this is a policy prescriptive analysis.	Accepted.	Eleni Kaditi	Organization of the Petroleum Exporting Countries (OPEC)	Austria
18369	46	29	46	29	The European Commission is considering the introduction of a 'carbon border tax' and it is a very relevant topic of this section. It should be elaborated more. Pros and cons of border tax adjustments may be necessary information to understand the policy.	Taken into account - in combination with response to comment 13631.	Kazuhiko Hombu	Graduate School of Public Policy, The University of Tokyo	Japan
45771	46	29	46	29	It mentions "border tax adjustments related to carbon content". It's better to use "border carbon adjustments". For a detailed analysis of debates and discussions including WTO compliance and design issues refer, • Mehling, Michael A., Harro van Asselt, Kasturi Das, Susanne Droege and Cleo Verkuijl, "Designing Border Carbon Adjustments for Enhanced Climate Action", American Journal of International Law (AJIL), American Society of International Law and Cambridge University Press, 113:3, 433-81, 2019. • Mehling, Michael, Harro van Asselt, Kasturi Das and Susanne Droege (2018), "Beat protectionism and emissions at a stroke", Nature, Springer Nature, 559, 321-324.	Accepted. The terminology has been changed to border carbon adjustment, and the discussion now refers to both sources.	Kasturi Das	1. Professor of Economics, Institute of Management Technology, Ghaziabad, India; 2. Member, Climate Strategies	India
15129	46	34	46	34	example for conditionalized tariff is EU's GSP+	Rejected. The relevant sentence is not about conditionalised tariffs, and while the GSP+ indeed offers such a conditionalised tariff, it is not relevant in the context of the discussion of Nordhaus' article.	Bettina Rudloff	German Institute for foreign and security affairs (SWP)	Germany

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
45773	46	36	46	39	For a more recent discussion on what can be done in short, medium and longer run to align trade and climate regimes, refer: • Das, Kasturi, Harro van Asselt, Susanne Droege and Michael Mehling, Making the International Trade System Work for Paris Agreement: Assessing the Options, Vol.49: 6, 10553-80 Environmental Law Reporter, Environmental Law Institute, Washington, DC, USA, 2019. • Das, Kasturi, Harro van Asselt, Susanne Droege and Michael Mehling, Towards a Trade Regime that Works for the Paris Agreement, EPW, December 21, 2019, 25-30. Also refer: • Global Rules for Mutually Supportive and Reinforcing Trade and Climate Regimes, E15 Expert Group on Measures to Address Climate Change and the Trade System – Policy Options Paper, E15Initiative, Geneva: International Centre for Trade and Sustainable Development (ICTSD) and World Economic Forum, 2016.	Accepted, in line with response to comment 45775.	Kasturi Das	1. Professor of Economics, Institute of Management Technology, Ghaziabad, India; 2. Member, Climate Strategies	India
32247	46	37	46	37	The option of a "climate waiver" (discussed in much greater detail by James Bacchus in https://www.cigionline.org/sites/default/files/documents/NEWEST%20Climate%20Waiver%20-%20Bacchus.pdf and https://www.cigionline.org/sites/default/files/documents/Paper%20no.204web.pdf) is put forward without considering other options. In other work, the climate waiver is discussed as one option out of many, and discussed also with regard to its feasibility. This section should do a better job in presenting options systematically. See Das, Kasturi, Harro van Asselt, Susanne Droege & Michael Mehling (2019). Making the International Trading System Work for Climate Change: Assessing the Options. Environmental Law Reporter 49(6), 10553–10580; and Droege, Susanne, Harro van Asselt, Kasturi Das & Michael Mehling (2017). The Trade System and Climate Action: Ways Forward under the Paris Agreement. South Carolina Journal of International Law and Business 13(1), 195–276.	Accepted. The suggestion for a "climate waiver" is now included in a broader discussion of options for reform, with reference among others to the literature suggested here.	Harro van Asselt	University of Eastern Finland	Netherlands
45777	46	40	46	43	This part mentions measures by the European Commission taken in 2018. In 2019-2020, a very important development in the context of trade-climate interface is the European Commission's proposal on Green Deal which includes proposals on Border Carbon Adjustments. See for instance: • Michael Mehling, Harro van Asselt, Kasturi Das, Susanne Droege (2019), What a European 'carbon border tax' might look like. Available at: https://voxeu.org/article/what-european-carbon-border-tax-might-look	Taken into account - in combination with response to comment 13631.	Kasturi Das	1. Professor of Economics, Institute of Management Technology, Ghaziabad, India; 2. Member, Climate Strategies	India
45347	46	42	46	42	The phrase "Trump administration" should be replaced by "the present US administration" or "the US administration of 2020."	Accepted. The relevant sentence has been deleted.	Jaimin Parikh	1. United Nations SDSN 2. European Institute of Policy Research and Human Rights 3. University of Delhi	India

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
9463	46	43	46	44	1) The TTIP negotiations between the EU and US failed in 2016. Since July 2018, a new trade deal that is more limited in scope is being negotiated between the EU and US. While the previous sentence is referring to these new negotiations with the Trump administration, the next two sentences refer to the former TTIP negotiations. This makes it seem like you don't distinguish between these separate negotiations that are in fact quite different in scope and nature. 2) Holzer and Cottier (2015) only look at one very specific aspect of the TTIP agreement, which is how harmonising regulations of car emission standards could benefit the climate. It is misleading to derive from such a narrow focus the claim that the TTIP negotiations on the whole opened a window of opportunity for advancing action on climate change. In particular, it disregards the dangers for climate regulations posed by two instruments proposed in TTIP, regulatory cooperation and Investor-State Dispute Settlement (ISDS). Since regulatory cooperation and investment protection (usually in the form of ISDS or the EU's reformed Investor Court System ICS) have become aspects that are included in almost all "new generation"/ "comprehensive" trade agreements (such as CETA, TPP etc.), I suggest you include an analysis of these mechanisms on climate policies in your report. As CAN Europe we are particularly concerned about the regulatory chill effect of such provisions because attempts to regulate or phase-out fossil fuels can be challenged in private arbitration courts, which have the power to direct states to pay an uncaped sum in compensation, for actual and even future losses of an investor. This poses the risk to slow down the transition to clean energy and to make policies unaffordable for poorer countries.	Taken into account. In part, this is addressed by a more general discussion of trade and investment agreements and climate change, and in part by updating the discussion on TTIP in the context of a paragraph on the role of mega-regional trade agreements.	Cornelia Maarfield	Climate Action Network (CAN) Europe	Germany
13629	46	43	46	44	Section 14.5.7 on trade agreements and regional economic communities is quite dated, inaccurate and would benefit from comprehensive updating from an international trade expert. A number of the papers cited to illustrate recent developments are over five years old, in an area that is changing rapidly. By way of example, negotiations for the Trans-Atlantic Trade and Investment Partnership (p 46, line 43-44) have been abandoned, rendering the comment "the TTIP opens windows of opportunity for advancing action on climate change" and 2015 citation inaccurate.	Accepted. This section has been updated, and papers reflecting older developments have been omitted or placed in context.	Stuart Bruce	Wilmer Cutler Pickering Hale and Dorr LLP	United Kingdom (of Great Britain and Northern Ireland)
32249	46	43	46	44	"the TTIP opens" - the TTIP doesn't exist, and that should be acknowledged as such.	Accepted, and clarified in line with response to comment 13629.	Harro van Asselt	University of Eastern Finland	Netherlands
45779	46	43	46	46	It mentions TTIP. However, the literature cited may be updated, as TTIP has long since been stalled. See: https://www.france24.com/en/20190314-european-parliament-deals-setback-eu-us-trade-talks	Accepted, and clarified in line with response to comment 13629.	Kasturi Das	1. Professor of Economics, Institute of Management Technology, Ghaziabad, India; 2. Member, Climate Strategies	India
9461	46	18	47	19	Please include an example or quote for such innovative climate provisions that are more specific and enforceable than provisions in the Kyoto Protocol or Paris Agreement.	Taken into account: this sentence has been rephrased to clarify the findings from the original source (Morin and Jinnah 2018).	Cornelia Maarfield	Climate Action Network (CAN) Europe	Germany

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
14035	46	8			Again, mentioning the BRI seems adequate here.	Rejected - outside the scope of the section.	Gonzalo Escribano	Universidad Nacional Educación a Distancia (UNED) and The Elcano Royal Institute	Spain
2755	47	1	47	47	This discussion of various and sundry international agreements that have some relevance to climate change might be better framed by having each paragraph have a lead sentence that mentions "Many treaties addressing X increasingly involve commitments that have implications for climate change." And then go into a few examples, recognizing that the examples being presented are anecdotal. In each of the sets of cases mentioned here (whether FTAs or otherwise), the examples given are only a small subset of all the treaties that meet these conditions. So, I would frame the arguemnt a bit more broadly. The same can be said for the sections that follow on civil society and MNC cooperative efforts to address climate change -- frame the broad principle and frame the examples as merely examples of a broader class of phenomena.	Taken into account, now indicating examples of provisions included in FTAs.	Ronald Mitchell	University of Oregon	United States of America
38249	47	1	47	47	The EU position regarding its new trade agreements does not match teh EU position regarding the Energy Charter Treaty. In fact, the EU did not propose, as part of the modernisation of the Energy Charter Treaty, to phase-out protection of foreign investments in fossil fuels. See for more details: https://www.youtube.com/watch?v=4Z6PKIdL-2Q	Rejected. Although the section now includes a discussion on the role of trade and investment agreements in climate action, including the Energy Charter Treaty, the claim made here is a political one, which is not within the scope of the IPCC's work.	Yamina Saheb	OpenExp, Ecole des Mines de Paris	France
45783	47	10	47	13	It talks about NAFTA. This may be updated, as NAFTA has been renegotiated to give birth to USMCA. See for instance: • 5 Reasons Many See Trump's Free Trade Deal as a Triumph for Fossil Fuels https://insideclimatenews.org/news/24012020/trump-trade-usmca-nafta-climate-change-oil-gas	Accepted, and updated accordingly.	Kasturi Das	1. Professor of Economics, Institute of Management Technology, Ghaziabad, India; 2. Member, Climate Strategies	India
13633	47	10	47	16	Section 14.5.7 on trade agreements and regional economic communities is quite dated, inaccurate and would benefit from comprehensive updating from an international trade expert. A number of the papers cited to illustrate recent developments are over five years old, in an area that is changing rapidly. By way of example, the NAFTA was renegotiated in 2018; the new instrument is referred to as the United States–Mexico–Canada Agreement. The implications of that renegotiation, based on more recent commentary, should be considered for inclusion.	Accepted, and updated accordingly, including more recent sources on the USMCA.	Stuart Bruce	Wilmer Cutler Pickering Hale and Dorr LLP	United Kingdom (of Great Britain and Northern Ireland)
32251	47	10	47	43	This section consists too much of description (much of it drawn from Gehring et al.), and does not look like a systematic discussion of the ways in which RTAs (could) contribute to climate governance.	Accepted. The discussion on RTAs has been revised to include a more systematic discussion of ways in which RTAs (could) contribute to climate governance.	Harro van Asselt	University of Eastern Finland	Netherlands
32253	47	46	47	46	The "TPP" as such no longer exists - it is now the Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP).	Accepted, and updated accordingly.	Harro van Asselt	University of Eastern Finland	Netherlands

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
9465	47	45	48	2	The TPP was still being negotiated at the time of the cited publication (Meltzer 2013). It later became clear that even though TPP had "presented an opportunity" to address the issues named here, this opportunity was largely missed. That's why the sentence suggests a rather possitive assessment of the TPP, whereas this is not based on an actual analysis of the final agreement but rather on a hypothetical scenario.	Accepted, and updated and clarified accordingly, in line with response to comment 32253.	Cornelia Maarfield	Climate Action Network (CAN) Europe	Germany
13635	47	45	48	2	Section 14.5.7 on trade agreements and regional economic communities is quite dated, inaccurate and would benefit from comprehensive updating from an international trade expert. A number of the papers cited to illustrate recent developments are over five years old, in an area that is changing rapidly. By way of example, the initial Trans-Pacific Partnership Agreement was abandoned, rendering the comment "the Trans-Pacific Partnership Agreement (TPP) presents an important opportunity to address a range of environmental issues..." and 2013 citation inaccurate. The TPP was replaced by the similar but distinct Comprehensive and Progressive Agreement for Trans-Pacific Partnership, which entered into force for most members in 2018, and excludes the US from its membership.	Accepted, and updated and clarified accordingly in combination with responses to comments 13633 and 32253.	Stuart Bruce	Wilmer Cutler Pickering Hale and Dorr LLP	United Kingdom (of Great Britain and Northern Ireland)
22925	47	45	48	2	Should mention that the US left TPP.	Accepted, and updated and clarified accordingly, in line with response to comment 32253.	Kelsey Ross	The Center for Global Development	United States of America
45781	47	46	48	2	It mentions TPP. This needs updation, as TPP does not exist anymore after President Trump withdrew USA from the agreement. The remaining members continued negotiations and came up with an updated version of the agreement called CPTPP. See for instance: • CPTPP outcomes: Environment https://www.dfat.gov.au/trade/agreements/in-force/cptpp/outcomes-documents/Pages/cptpp-environment	Accepted, and updated and clarified accordingly, in line with response to comment 32253.	Kasturi Das	1. Professor of Economics, Institute of Management Technology, Ghaziabad, India; 2. Member, Climate Strategies	India
32255	48	7	48	11	While I understand this is addressed in Chapter 13, I was surprised that there was not even a mention here of the notion of carbon border adjustments in light of international trade law. A crossreference would be good, at a minimum.	Taken into account, in line with response to comment 34561.	Harro van Asselt	University of Eastern Finland	Netherlands

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
45687	48	11	48	12	This section could insert a paragraph on last developments on carbon border tax adjustment accross the world and specially with the European proposal in 2019. Carbon border tax adjustment can be also see as a diplomatic tool to encourage the implementation of carbon pricing scheme or to increase the ambition of the implemented carbon pricing policy. A new paragraph such as the following could be inserted : " When RTA are not an option, carbon border tax adjustment can be a choice implemented by some countries to incentivizing their economic partners for carbon pricing consideration. Carbon border tax adjustment can be see as a diplomatic tool to encourage the implementation of a first carbon pricing scheme or to increase the ambition of the implemented carbon pricing policy. In December 2019, in its Communication on the European Green Deal, the European Commission stated that it will propose a carbon border adjustment mechanism, for selected sectors, to reduce the risk of carbon leakage, should differences in levels of ambition worldwide persist. Such border carbon adjustments would be a novelty. Indeed, despite much extensive legal and economic analyses (e.g. Boehringer et al. 2012, Holzer 2014, Nordhaus 2015), and policy proposals on both sides in Europe and USA, there is a scarce evidence on how a border carbon adjustment would work in practice. California's emissions trading system – which applies a border carbon adjustment to electricity imports from neighbouring states – is the only instance where the idea has been put in practice, albeit with mixed results (Pauer 2018). One of the main issues with its operational application is its compatilibilty with WTO principles. Properly designed and implemented, and with the right messaging and process, a border carbon adjustment has strong prospects of being found compatible with WTO disciplines (Mehling et al. 2019). In March 2020, the European Commission officially launched the policymaking process to enact a new tax on products from countries that aren't working to reduce their emissions". [Mehling, M, H van Asselt, K Das, S Droege and C Verkuijl (2019), "Designing border carbon adjustments for enhanced climate action", American Journal of International Law 113(3): 433–81.].	Taken into account, in line with response to comment 34561.	Emilie Alberola	Ecoact	France
16141	48	12	48	12	Is this section only about 'movements' or is it also intended to look at civil society more broadly? If this is the only location for discussion of civil soceity, it may be worth broadening its scope. For example, it does seem a little curious to not even have passing reference to the Climate Action Network with multiple nodes around the world and continuous functioning since 1990! The mainstream environmental groups, from Greenpeace (perhaps less mainstream) to WWF and EDF/NRDC/WRI etc are all extremely active too. It may be worth categorising these movements, with mobilising and opinion shaping movements on the one hand, and more insider, lobbying and advocacy movements on the other. While the recent movements are certainly the most exciting and have grabbed attention, for a chapter of this sort, treatment should be a bit more encompassing.	Accepted. The section has been revised to focus on international cooperation in civil society more broadly.	Oliver Geden	German Institute for International and Security Affairs	Germany

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
44747	48	37	48	50	Comparing your number to those mentioned in ch13, it seems that you rely on turnout numbers given by the organizers. It's highly likely that these are exaggerated, at the same time, public officials tend to downplay attendance numbers. So maybe you just shouldn't mention an exact number? Maybe "millions" would do? Furthermore, I'm not sure about the classification "focus on children". Is this about communication or about the groups participating in demonstrations? And what is the age threshold for children/young adults? There's one survey on FFF Germany (only in German, see https://protestinstitut.eu/wp-content/uploads/2019/08/ipb-working-paper_FFF_final_online.pdf) showing that 'only' half of participants are in the age group 14-19, and at least at the national level. FFF is led by university students. So maybe simply go with "young people" or something similar?	Accepted. Specific numbers removed and elaboration on age groups.	Jaimin Parikh	1. United Nations SDSN 2. European Institute of Policy Research and Human Rights 3. University of Delhi	India
45349	48	43	48	43	"climate emergency" is growing but considering the geo-political realities, it is an unlikely concept at present and hence its usage should be avoided in formal terms however its suggestion can be made in the report	Noted. The term has been put in quotes but it is used by some groups e.g. in their demands so has been retained for accuracy.	Gonzalo Escribano	Universidad Nacional Educación a Distancia (UNED) and The Elcano Royal Institute	Spain
14037	48	10			Typo: a full stop is needed after the word ‘level’.	Accepted	Thijs Van de Graaf	Ghent University	Belgium
6109	49	9	49	12	The way this paragraph is written seems to imply that all divestment decisions are driven by the transnational divestment campaign (such as the one by 350.org), whereas there is increasing evidence that major divestment decisions (like the one by Norway's sovereign wealth fund) have nothing to do with moral imperatives, but are just taken on business grounds. See: Blondeel, M., Colgan, J., & Van de Graaf, T. (2019). What Drives Norm Success? Evidence from Anti–Fossil Fuel Campaigns. Global Environmental Politics, 19(4), 63-84.	Noted. This paragraph has been revised to provide a balanced assessment of the evidence of the role of the divestment movement in shaping change.	Eleni Kaditi	Organization of the Petroleum Exporting Countries (OPEC)	Austria
25341	49	9	49	12	Delete "Although the direct impacts … (Bergman, 2018).", as this is a subjective conclusion.	Rejected. This statement summarises the findings in the cited literature.	Stuart Bruce	Wilmer Cutler Pickering Hale and Dorr LLP	United Kingdom (of Great Britain and Northern Ireland)
13637	49	16	49	16	Suggesting adding sentence: This circumstance is largely due to the restrictive procedural and jurisdictional rules in international courts and tribunals (other than human rights courts), where individuals and groups affected by the consequences of climate change typically do not have standing to bring claims against states or non-state actors for causing those injuries. Historically, states have also preferred to limit international judicial review of domestic climate change, energy and other policies deemed to be of national sovereign concern (Bruce 2013). Reform to the rules and procedures of international courts and tribunals, including international commercial and investment arbitration tribunals, to better accommodate contemporary environmental and climate change concerns is an area for further exploration (Bruce 2021). Full citations: Bruce, S., 2013: ‘International Law and Renewable Energy: Facilitating Sustainable Energy for All’ 14 Melbourne Journal of International Law , 23-25, 18-53; Bruce, S., 2021: 'The Rule of Law and Investment Arbitration: Integrating Environmental Considerations'.	Noted. The suggested additional sentence has not been included but the paragraph expands on options for climate litigation in international courts and tribunals and barriers in this regard.	Stuart Bruce	Wilmer Cutler Pickering Hale and Dorr LLP	United Kingdom (of Great Britain and Northern Ireland)

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
13639	49	19	49	20	Suggest deletion of "or" before "bringing a case to the International Tribunal for the Law of the Sea" and addition of ", or whether creating a new international environmental court or tribunal would be feasible and of benefit (Bruce 2016). Full citation: Bruce, S., 2016: 'The Project of a World Environment Court'. In Tomuschat, C., Mazzeschi, R.P., and Thürer, D. (eds), The OSCE Court of Conciliation and Arbitration (Brill).	Rejected. This suggested addition is policy prescriptive rather than an assessment of the existing literature.	Jaimin Parikh	1. United Nations SDSN 2. European Institute of Policy Research and Human Rights 3. University of Delhi	India
45351	49	23	49	33	It might be too early to comment on the success but it is surely making a positive result and this shouldn't be neglected in the final report.	Noted. This statement has been revisited to provide an assessment of progress to date.	Jaimin Parikh	1. United Nations SDSN 2. European Institute of Policy Research and Human Rights 3. University of Delhi	India
45353	49	23	49	33	The following phrase could be added: "the voice of these institutions in country policy making should be distinctly analysed."	Rejected. Extends beyond the scope of this chapter which is focused on international cooperation.	michele stua	APE-FVG	United Kingdom (of Great Britain and Northern Ireland)
4787	49	36	49	36	The World Bank is not a UN agency, please rectify.	Accepted. Changed.	Gonzalo Escribano	Universidad Nacional Educación a Distancia (UNED) and The Elcano Royal Institute	Spain
14039	49	12			Add: Actions and alliances by investors to foster the reallocation of capital to meet climate goals.	Noted. The role of such actions and alliances is considered in section 14.5.4 on transnational business partnerships and initiatives rather than this one which is focused on civil society and social movements.	Gonzalo Escribano	Universidad Nacional Educación a Distancia (UNED) and The Elcano Royal Institute	Spain
14041	49	19			Add reference: Setzer, J. and Vanhala, L. C. (2019), Climate change litigation: A review of research on courts and litigants in climate governance. WIREs CLimate Change. 1-19: DOI10.1002/wcc.580	Accepted. The section has been revised in the SOD to include additional, more recent literature.	michele stua	APE-FVG	United Kingdom (of Great Britain and Northern Ireland)
4789	50	5	50	13	The Networked Carbon Markets initiative has been virtually inactive since 2017.	Accepted. Clarified in the SOD.	michele stua	APE-FVG	United Kingdom (of Great Britain and Northern Ireland)
4791	50	25	50	25	Repetition: change "system transformation systems" with "transformation systems".	Accepted. Clarified in the SOD.	michele stua	APE-FVG	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
4793	51	10	51	19	The acronym "PPP" requires an explanation at its first use in the Chapter. As the acronym refers to public-private-partnerships, the acronym should eventually be introduced in line 1 of page 50.	Accepted.	Eleni Kaditi	Organization of the Petroleum Exporting Countries (OPEC)	Austria
25343	51	31	51	31	Delete "such as fossil fuel extraction projects."	Rejected. Changing this would be misleading as to what we mean here.	Michiel Schaeffer	Climate Analytics	Netherlands
37687	51	33	51	33	replace "in line with the 2°C target" with a reference to in line with pursuit of a limit in the 1.5C target limit the temperature increase to 1.5 °C above pre-industrial levels	Accepted. Changed accordingly.	Stuart Bruce	Wilmer Cutler Pickering Hale and Dorr LLP	United Kingdom (of Great Britain and Northern Ireland)
13641	51	37	51	37	Change "its effectiveness" to "their effectiveness".	Accepted. Changed accordingly.	michele stua	APE-FVG	United Kingdom (of Great Britain and Northern Ireland)
4795	51	37	52	24	As for what concerns the shape, role and effects of possible PPPs under the umbrella of the Paris Agreeement, I suggest you to include findings from: Stua, M., 2017: A Hybrid Model to Govern the Mitigation Alliance, and Stua, M., 2017: Excludable Benefits Resulting from the Mitigation Alliance, both in: M. Stua (ed.), From the Paris agreement to a low-carbon bretton woods: Rationale for the establishment of a mitigation alliance. Springer International Publishing.	Noted.	Gonzalo Escribano	Universidad Nacional Educación a Distancia (UNED) and The Elcano Royal Institute	Spain
14043	51	27			Add the Institutional Investors Group on Climate Change (IIGCC)	Accepted. Changed.	Axel Michaelowa	University of Zurich	Switzerland
40011	52	8	52	8	Insert after "… development goals": "Michaelowa and Michaelowa (2017) assess 109 trans-national partnerships and alliances based on four design criteria: existence of mitigation targets; incentives for mitigation; definition of a baseline; and existence of a monitoring, reporting, and verification procedure. About half of the initiatives do not meet any of these criteria, and not even 15% satisfy three or more." Michaelowa, Katharina; Michaelowa, Axel (2017): Transnational Climate Governance Initiatives: Designed for Effective Climate Change Mitigation?, in: International Interactions, 43, p. 129-155	Accepted. Reference will be added.	Eleni Kaditi	Organization of the Petroleum Exporting Countries (OPEC)	Austria
25345	52	41	52	41	Delete "Paris"	Accepted. Thanks.	Martin Kesternich	ZEW – Leibniz Centre for European Economic Research	Germany
28195	52	44	52	47	Is there any (empirical)evidence on the relationship (substituttability, complementarity,…) between state actors and non-state actors mitigation efforts?	Thanks. Looked into it.	Renee van Diemen	WG III TSU	United Kingdom (of Great Britain and Northern Ireland)
25695	52	25	53	16	It might be helpful to link this section to Chapter 13 Section 13.3.2 on Landscape o actors and actions, which also discusses transnational networks such as C40 and ICLEI. A link to 13.3.4 can also be made, which has very similar findings to this section in Chapter 14 and also concludes that non-state actors are important in informal ways ('subnational actors' performance derives from indirect effects that, while difficult to quantify, also catalyse action')	Accepted. Cross-reference added.	michele stua	APE-FVG	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
4797	52	39	53	5	When discussing about 'Hybrid Multilateralism" and 'policentric governance', I suggest for you to include findings from: Stua, M., 2017: A Hybrid Model to Govern the Mitigation Alliance, in: M. Stua (ed.), From the Paris agreement to a low-carbon bretton woods: Rationale for the establishment of a mitigation alliance. Springer International Publishing.	Noted. Thank you for the suggestion.	Gonzalo Escribano	Universidad Nacional Educación a Distancia (UNED) and The Elcano Royal Institute	Spain
14045	52	41			Typo: take out the word Paris	Noted.	Axel Michaelowa	University of Zurich	Switzerland
40013	53	1	53	1	Insert after "(Chan et al. 2016)" Effectiveness of sub-national transnational partnerships is doubtful due to the absence of incentives for mitigation and monitoring, reporting and verification in many of them (Michaelowa and Mihaelowa 2017)." Michaelowa, Katharina; Michaelowa, Axel (2017): Transnational Climate Governance Initiatives: Designed for Effective Climate Change Mitigation?, in: International Interactions, 43, p. 129-155	Noted, and referenced. It is important to note that a great deal of mitigation policies have nothing to do with regulating emissions, and hence the value of monitoring and verification is different.	Matthias Honegger	Perspectives Climate Research gGmbH	Germany
43519	53	1	53	1	Insert after "(Chan et al. 2016)" Recent literature has however put into question whether sub-national activities are reliably producing the claimed effects in the absence of consistent monitoring, reporting and verification add references to: Chan, Sander, Idil Boran, Harro van Asselt, Gabriela Iacobuta, Navam Niles, Katharine Rietig, Michelle Scobie et al. "Promises and risks of nonstate action in climate and sustainability governance." Wiley Interdisciplinary Reviews: Climate Change 10, no. 3 (2019): e572. Michaelowa, Katharina; Michaelowa, Axel (2017): Transnational Climate Governance Initiatives: Designed for Effective Climate Change Mitigation?, in: International Interactions, 43, p. 129-155	Noted. Referenced in the SOD. It is important to note that a great deal of mitigation policies have nothing to do with regulating emissions, and hence the value of monitoring and verification is different.	michele stua	APE-FVG	United Kingdom (of Great Britain and Northern Ireland)
4799	53	7	53	9	Even though of regional (European) structure, I would include also the Covenant of Mayors, given its magnitude, structure similarity to the other listed organisations (voluntary and non-hierarchical) and effectiveness in involving large numbers of local communities	Accepted. We include this in the SOD.	Klaus Radunsky	retired from Umweltbundesamt	Austria
3271	53	23	53	23	It is suggested to provide further clarification on "changing geo-politics".	Taken into account. We have followed your advice.	Yamina Saheb	OpenExp, Ecole des Mines de Paris	France
38251	53	37	53	39	The Treaty for Non-Proliferation of Fossil fuels would fit here as an international agreement which would lead signatories to develop roadmaps to phase-out fossil fuels. See: •https://www.youtube.com/watch?v=4Z6PKIdL-2Q	Noted. Examples of this kind are included in the section on civil society action and movements.	Eleni Kaditi	Organization of the Petroleum Exporting Countries (OPEC)	Austria
25347	53	41	53	41	Delete "and sectoral" as this is not aligned with Paris Agreement provisions.	Rejected. A great deal of interntional cooperation, outside of Paris, takes place at the sectoral level.	christophe cassen	CNRS-CIRED	France
43029	53	46	53	47	remove , after And	Editorial. Revised.	Gonzalo Escribano	Universidad Nacional Educación a Distancia (UNED) and The Elcano Royal Institute	Spain

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
14047	53	17			Add: line or paragraph on the Global Action Agenda and the Non-State Actor Zone for Climate Action (NAZCA platform)?	Noted. Taken into account.	Gonzalo Escribano	Universidad Nacional Educación a Distancia (UNED) and The Elcano Royal Institute	Spain
14049	53	36			Acknowledge however that from COP 15 in Copenhagen onwards it was clear that the architecture of the successor to the Kyoto was going to be different. From the classic top down to a hybrid model.	Taken into account.	michele stua	APE-FVG	United Kingdom (of Great Britain and Northern Ireland)
4801	54	5	54	19	Given its increasing relevance in international climate change debate, further demonstrated by its dominant role in past COP25, I would refer also to the part of the Paris Agreement (Article 6) devoted to establishing mechanisms for higher mitigation ambitions through international cooperation.	Accepted. We agree that Article 6 is relevant. The new version of our chapter refers to Article 6 in two parts, sections 14.3.2.10 “Article 6 Cooperative approaches” and 14.4.4.1 “Cooperative mechanisms and markets in UN climate regime, including and beyond Paris”.	michele stua	APE-FVG	United Kingdom (of Great Britain and Northern Ireland)
4803	54	20	54	25	Your analysis of the the public 'goods literature on club goods' is insufficient and lacks of any reference to the most recent (2017-2020) literature aimed at linking clubs to the Paris Agreement, hence your final judgment in line 25 is incorrect, or at least not founded on a complete and overall understanding of the related argumentations. To complete your analysis and draw your judgment I suggest you to refer to my comments (and and literature review) expressed for lines 28 to 40 for page 33 of this Chapter.	Accepted. We have developed the part devoted to linking clubs to the Paris Agreement. See section our new section 14.5.1.4 “Climate clubs”.	Axel Michaelowa	University of Zurich	Switzerland
40015	54	30	54	30	Insert after "… in place": Fourth, most trans-national partnerships of non-state and sub-state actors are unlikely to be effective due to the absence of concrete mitigation targets, incentives for mitigation and absence of a monitoring, reporting, and verification procedure." Evidence: Michaelowa and Michaelowa (2017) assess 109 trans-national partnerships and alliances based on four design criteria: existence of mitigation targets; incentives for mitigation; definition of a baseline; and existence of a monitoring, reporting, and verification procedure. About half of the initiatives do not meet any of these criteria, and not even 15% satisfy three or more. Michaelowa, Katharina; Michaelowa, Axel (2017): Transnational Climate Governance Initiatives: Designed for Effective Climate Change Mitigation?, in: International Interactions, 43, p. 129-155	Accepted. We have followed your advice.	Matthias Honegger	Perspectives Climate Research gGmbH	Germany

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
43521	54	30	54	30	The absence of specific mitigation targets and absence of a monitoring, reporting, and verification would suggest that only activities are implemented, which would be pursued anyways for other political priorities. Of 109 trans-national partnerships and alliances a vast majority missed mitigation targets; incentives for mitigation; definition of a baseline; and existence of a monitoring, reporting, and verification. Michaelowa, Katharina; Michaelowa, Axel (2017): Transnational Climate Governance Initiatives: Designed for Effective Climate Change Mitigation?, in: International Interactions, 43, p. 129-155 other recent literature is also substantially more critical and finds great risk in reliance of subnational actors: Chan, Sander, Idil Boran, Harro van Asselt, Gabriela Iacobuta, Navam Niles, Katharine Rietig, Michelle Scobie et al. "Promises and risks of nonstate action in climate and sustainability governance." Wiley Interdisciplinary Reviews: Climate Change 10, no. 3 (2019): e572.	Partially accepted. We have followed your advice. However, we only included one of the references that you suggested due to space limitations.	Oliver Geden	German Institute for International and Security Affairs	Germany
44745	54	35	54	37	If 'bridging' is supposed to mean that sub-national action can make up for the complete ambition/emissions gap caused by national governments' insufficient action then this would be an extraordinarily strong claim (whether it is backed by Hsu et al. 2019b or not)	Accepted. We agree that sub-national action cannot make up for the complete ambition/emissions gap caused by national governments' insufficient action. We have modified the text accordingly.	Karla Solis	onu	Germany
38127	54	38	54	39	Suggestion: to specify the scope of the assessment? Is it general or solely focused on the PA? as from the text is not clear. It seems to be focused on PA but still it is unclear why. Also further background on how the assessment was carried out. Is it only based on literature review? Would experts' opinions be deem as robust?	Accepted. Clarified in the SOD.	Karla Solis	onu	Germany
38129	54	39	54	40	Suggestion: to include section [14.3.4] after; Earlier in this chapter [14.3.4] we identify….	Noted. However, the SOD has been reorganized, and no longer identifies its own assessment criteria, but relies on those developed by Chapter 13, based on AR5. So this suggestion is moot.	Ian Bailey	University of Plymouth	United Kingdom (of Great Britain and Northern Ireland)
10945	54		54		A range of contentions are made in section 14.6.2 that need to be supported by adding references to relevant research.	Taken into account. Please note that section 14.6.2 is a synthesis section, the references can be found in the chapter. In any case, we have tried to include new references in our text, but taking into account the space constraint.	michele stua	APE-FVG	United Kingdom (of Great Britain and Northern Ireland)
4805	54	38	57	13	Given the significant number of substantive comments, I strongly recommend reviewing the whole section 14.6.3, with this taking into account of my reccomendations expressed in the previous comments.	Accepted. The section assessing International Cooperation, as well as the assessment of the PA has been revised substantively in light of comments, including from this reviewer.	Ian Bailey	University of Plymouth	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
10947	54	38	57	13	I would question the appropriateness of the rating scale used in the overall assessment of the effectiveness of international cooperation (14.6.3). The use of strong positive, weak positive, no effect and negative effects may be applicable within narrowly defined boundaries to more traditional measures of policy effectiveness, such as cost-effectiveness (when applied only to the short-term cost-effectiveness of policies and technologies). However, the scale gives misleading impressions in relation to emissions reduction that do not accurately reflect the conclusions of WGs I and II on the causes and impacts of climate change. Different levels of effect should instead be regarded as adequate or inadequate in relation to the overall goal of the UNFCCC process and the Paris Agreement of restricting increases in global mean temperatures to within 2C, or more likely 1.5C, of pre-industrial levels and my concern about the use of the weak positive effect terminology in particular is that it will send a signal to Paris Agreement and UNFCCC parties that existing measures are adequate at the present time because some progress is being made, or will provide a pretext for such an interpretation. This section needs to give a stronger message that although there are positive elements to the way the Paris Agreement is designed and the commitments made so far under it, there needs to be very significant advances in key areas, such as revised NDCs, national and sub-national policies to support their achievement, and finance and technology transfer to assist developing countries in enhancing their mitigation and adaptation capabilities for the agreement to demonstrate convincing hallmarks of adequacy in relation to the challenges created by climate change. My preferred revision would be to amend the scale to: adequate; inadequate, highly inadequate in order to make this message unambiguous but if the current scale is retained (and I can understand the rationale for its use), it should be accompanied by stronger, but nonetheless well-evidenced, statements concerning the adequacy of existing and current prospective measures in order to avoid complacency among UNFCCC and Paris Agreement parties.	Accepted, in principle. The rating scale has been recalibrated for the SOD.	Felix Creutzig	MCC Berlin	Germany
43625	54	20			The climate good incremenetal approach is rightly emphasized. There are specific proposal of further development, taking both the carbon finance and the need for technology transfer perspective jointly into account. This could be more explored. See for example Creutzig "mitigation trinity" in One Earth 2019.	Accepted. We have followed your advice. Our new text develops further the analysis of the incremental approach.	Karla Solis	onu	Germany
38133	55	1	2	3	Suggestion: to title it as 'Assessment of the Effectivesness of Internation Cooperation' Here, still it is not clear whether the assessment is only carried out for the PA as the text in section 14.6.3 mentions the Montreal Protocoal, and others, which makes the analysis confusing.	Accepted. Clarified in the SOD.	Navroz Dubash	Centre for Polcy Research	India
16143	55	1	55	1	The item: "Differentiation in favour of developing countries" categorised weak positive is unexplained in the text, and will surely require careful explanation. I imagine that many who see Paris as a retreat from differentiation will take issue with this.	Accepted. Addressed in the SOD.	Ronald Mitchell	University of Oregon	United States of America
2757	55	2	55	2	Figure 14.1 suggests far more confidence and precision about these conclusions of different types of effectiveness than I believe is warrnated or supportable.	Accepted. Nuanced in the SOD.	Navroz Dubash	Centre for Polcy Research	India

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
16145	55	8	55	13	In my view, this is a very hard conclusion to justify that administrative capacity is strongly positive as a result of intl cooperation. It is unclear if this statement is about administrative capacity for international cooperation or at all levels of climate governance induced by international cooperation. IF the latter (as the text which also refers to municipal scales, suggests) then I do not think this is justified. In Ch 13.2 we examine institutions for climate governance and find relatively thin institutional forms certainly at national level and also at sub-national levels in 13.3. This is a topic we should discuss across chapters.	Accepted. Coordinated conclusions on this with Chapter 13.	Chisa Umemiya	Institute for Global Environmental Strategies	Japan
19229	55	13	55	13	Bilateral development agreements "have also focused" on building capacity doesn't mean it had a strong positive effect, as this paragraph describes. Whether those agreements had effects should be determined whether they made changes in outcomes/impacts of the environment.	Accepted. Language nuanced in the SOD.	Axel Michaelowa	University of Zurich	Switzerland
40017	56	25	56	25	Reword "mechanisms (14.5.1).... 14.4.2.13) as follows: "mechanisms under the Kyoto Protocol (14.5.1) and the Paris Agreement (14.4.2.13)" Reason: both these are market mechanisms…	Accepted. Language clarified in the SOD.	Karla Solis	onu	Germany
38131	57	15	57	16	Section 14.7 provides the context on the gaps in knowledge and data. In overall I would suggest to enhance the assessment by identifying/introducing a framework tools to assess such Multicriteria Decision Analysis or other; by elaborating further on the types of indicators in order to come out with objectives ways of measuring effectiveness of international cooperation and such an agreement (PA, KP or others); carrying out a standard assessment to defined/selected agreements in the same way; then to compare the results of effectiveness of international cooperation between the agreements. Providing measurements to the indicators would allow comparing between agreements. The measure/grading given for each indicator should be justified by the evidence captured in the chapter.	Noted. All of this would be amazing to be able to do, but is simply way beyond what is possible. For example, an MCDA at a global level would be impossible, because you would have so many different perspectives on the weighting of factors, and no appropriate foundation for reconciling them. We simnply have to live with an absence of "objective" means of evaluating effectiveness, and instead go with subjective evaluations, attempting to be as transparent as possible.	Chisa Umemiya	Institute for Global Environmental Strategies	Japan
19231	57	22	57	22	Sentences to summarize to what extent "the only remaining possibility" has scientifically been tested. In my view, partly because of methodological difficulty in assessing the effectiveness of international cooperation, available evidence is limited to clearly link international cooperation and the desired outcomes as effects. With the Paris Agreement, such effors must be massively increased so that we can with confidence whether and to what extent international cooperation has made differences in achieving the goals of the Paris Agreement.	Accepted. We highlight that the assessments of the Paris Agreement that we have reviewed does exactly what we suggest in this sentence, namely conduct a theory-based counterfactual.	Zinta Zommers	United Nations Office for Disaster Risk Reduction	Germany
36815	57	23	57	35	But can you look at other agreements outside of climate change/ Paris Agreement and see if any are similar (voluntary in nature, etc) and identify what worked?	Noted. We have tried to do this in earlier sections of this chapter, devoted the theory based on many observations of different kinds of agreements.	Ahmed Abdelrehim	Centre for Environment & Development for the Arab Region and Europe - CEDARE	Egypt
35781	57	15	58	8	The title of this section implies that it will discuss the gaps in data that might lead to knowledge gap. However, there is little reference to what was stated in PA on "Recognizing the need for an effective and progressive response to the urgent threat of climate change on the basis of the best available scientific knowledge. This section could highlight the tools to "Strengthening scientific knowledge on climate, including research systematic observation of the climate system and early warning systems". It might be helful to refer to Part D of GEO-6 REMAINING DATA AND KNOWLEDGE GAPS	Rejected. The reference in the PA to knowledge gaps is generally knowledge about climate and its impacts. That is not the subject of this chapter.	Nico Bauer	Potsdam Institute for Climate Impact Research (PIK)	Germany

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
45993	57	5			It is completely uncler what the net effect is and how that is computed. The assessment must be very transparent. What the authors do here is to aggregate over various indicators. However, this aggregation is a political thing.	Accepted. Text revised to provide greater clarity about the expert judgment, and to a large extent qualitative, nature of the overall assessment.	Gonzalo Escribano	Universidad Nacional Educación a Distancia (UNED) and The Elcano Royal Institute	Spain
14051	57	14			Add a sentence or paragraph discussing the potential effect on international cooperation should Carbon Border Taxes were to be implemented. See for instance China's warning about this. Reference: Ministry of Ecology and Environment of the People's Republic of China (2019), China's Policies and Actions for Addressing Climate Change. November 2019.	Accepted. Border tax adjustments discussed in greater depth and length in the SOD, and will be reflected in this section as well.	Michiel Schaeffer	Climate Analytics	Netherlands
37689	58	44	58	44	statement of temperature goal is imcomplete - refer to entirety of goal, which includes pursuit of 1.5. See UNFCCC decisions 10/CP.21; see decision 1/CP.21 adopting PA	Accepted. SOD reflects this change	Henry Tulkens	CORE, Université catholique de Louvain	Belgium
18821	60	2	90	26	Bréchet, T., Gerard, F. and Tulkens, H. 2011, "Efficiency vs. stability in climate coalitions: A conceptual and computational appraisal", The Energy Journal, 32, 49–75. Chander, P. 2017, "Subgame-perfect cooperative agreements in a dynamic game of climate change", Journal of Environmental Economics and Management 84, 173-188. Chander, P. and Tulkens, H. 1997, "The core of an economy with multilateral environmental externalities", International Journal of Game Theory 26, 379-401. Eyckmans, J. and Tulkens, H. 2003, "Simulating coalitionally stable burden sharing agreements for the climate change problem", Resource and Energy Economics 25 299-327. Germain, M., Toint, P., Tulkens, H. and de Zeeuw, A. 2003, "Transfers to sustain dynamic core-theoretic cooperation in international stock pollutant control", Journal of Economic Dynamics and Control 28: 79–99. Germain, M., Tulkens, H. and de Zeeuw, A. 1998, "Stabilité stratégique en matière de pollution internationale avec effet de stock : le cas linéaire", Revue Économique (Paris) 49, 1435-1454. Malinvaud, E. 1972, Lectures on Microeconomic Theory, revised edition, North Holland, Amsterdam. Nordhaus, W. and Yang, Z. 1996, "A Regional Dynamic General-Equilibrium Model of Alternative Climate-change Strategies", American Economic Review 86, 741-763. Tulkens, H. 2016, "COP 21 and economic theory: Taking stock", Revue d'Économie Politique 126, 471-486. Tulkens, H. 2019, Economics, Game Theory and International Environmental Agreements, World Scientific Publishing Co., Singapore. Yang, Z. 2008, Strategic bargaining and cooperation in greenhouse gas mitigations: an integrated assessment modeling approach, The MIT Press, Cambridge, MA.	Taken into account. Thanks for these suggestions. We now reference several of the articles mentioned in the revised version.	KANAKO MORITA	Forestry and Forest Products Research Institute	Japan
16723	92	22	92	23	UN Convention on Biological Diversity (UNCBD) is not correct. Different from UNFCCC, Convention on Biological Diversity (CBD) does not have UN in front of the word, because it is under the UNEP.	Accepted. Thanks.	Masami Nakata	Shiga University	Japan

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
34787	94				I would like Chapter 14 to elaborate more about the negative impacts of existing agreements, which are currently hampering global efforts for achieving the Paris Agreement goals. In page 94, “there is a widespread perception that many trade agreements stand in the way of both national and global level progress on climate mitigation.” In my understanding, not only existing trade agreements but also existing investment protection agreements/treaties, which were created (long) before Paris Agreement or even Kyoto, have been serious obstacles for decarbonization of energy systems or human activities. I want to request this Chapter to indicate/explain/analyze/re-evaluate those agreements using concrete examples. For instance, it is almost unknown among Japanese taxpayers that Japan is a member state and the “biggest” donner of the Energy Charter Treaty, which was drafted in 1991 and still exists with no modification in articles since. People don’t know that they unknowingly contribute to something that contradicts their effort to combat CC. They don’t know that it has been criticized by EU countries that it prevents states from aligning their energy policy to the Paris Agreement because the treaty protects Fossil Fuel investment only. Without AR’s explicit mention of the treaty, it is impossible that the Japanese government takes any action to modify the treaty or re-evaluate the treaty. This is just one example. This Chapter should mention those agreements/treaties because it probably is much easier and faster to act on revising or ending those agreements than to create new ones, and because of AR’s significant influence on governments’ awareness and actions.	Noted, and accepted, the trade and investment section of the SOD engages in a more robust engagement with the issues you raise.	Ahmed Abdelrehim	Centre for Environment & Development for the Arab Region and Europe - CEDARE	Egypt
35749	14-3	11	14-3	11	Consider using the term "low carbon economy"	Noted. Considered for the SOD. The reason for speaking of technologies, instead of the economy, was that the former can operate somewhat independent of the latter.	Ahmed Abdelrehim	Centre for Environment & Development for the Arab Region and Europe - CEDARE	Egypt
35751	14-3	18	14-3	19	the term "Climate investment" was not used in Paris Agreement. You may instead use the term " Climate finance"	Rejected. We are referring to investments, and not finance. Investments casn depend on other factors as well, such as transparency.	Ahmed Abdelrehim	Centre for Environment & Development for the Arab Region and Europe - CEDARE	Egypt
35753	14-3	29	14-3	29	Consider adding the word impact to be "dangerous climate change impacts"	Noted. We believe that impacts is implicit, but will consider it.	Ahmed Abdelrehim	Centre for Environment & Development for the Arab Region and Europe - CEDARE	Egypt
35755	14-4	1	14-4	7	You may also mention the "international cooperation on adaptation efforts" as stated in Article 7 point 6 of Paris Agreement	Rejected. We are deliberately avoiding reference to adaptation, as any reference may confuse our readers that it is a subject that we deal with.	ANNA LAURA PISELLO	DEPARTMENT OF ENGINEERING - UNIVERSITY OF PERUGIA, ITALY	Italy
9427					ok chapter 14	Noted.	Michael Finus	University of Graz	Austria

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
9677					I appreciate that this report stresses less the game-theoretic analysis of IEAs (international environmental agreements) but I think it would not harm to include some of the most recent and interesting developments in the field. I will list those below with some references, which would allow you to find further references on the subject.	Taken into account, and references considered for SOD.	Michael Finus	University of Graz	Austria
9679					Apart from that I think the chapter is well written, in particular the sections on the Paris Accord and the relation to the governance structure which has changed compared to the Kyoto Protocol. Well done!	Noted, and thank you!	Michael Finus	University of Graz	Austria
9681					There is an interesting literature on the strategic interaction between mitigation and adaptation and what this means for the success of climate agreements. Basak Bayramoglu, Michael Finus, and Jean-François Jacques. Climate Agreements in a Mitigation-adaptation Game. Journal of Public Economics, 165:101_113, 2018. Klaus Eisenack and Leonhard Kähler. Adaptation to climate change can support unilateral emission reductions. Oxford Economic Papers, 68(1):258_278, 2016. Alan Ingham, Jie Ma, and Alistair Ulph. Can Adaptation and Mitigation be Complements? Climatic Change, 120(1-2):39_53, 2013. Santiago J. Rubio. Self-Enforcing International Environmental Agreements: Adaptation and Complementarity. Fondazione Eni Enrico Mattei, Working Paper 029.2018.	Taken into account, and references considered for SOD. However, please take into account that due to space limitations we may not be able to incorporate all the references suggested.	Michael Finus	University of Graz	Austria
9689					A central element of cooperation is diversity across countries. There is a literature showing that diversity may actually be an asset and not an obstacel for cooperation. Examples: Carraro, C., J. Eyckmans and M. Finus (2006), Optimal Transfers and Participation Decisions in International Environmental Agreements. “Review of International Organizations”, vol. 1(4), pp. 379-396. Finus, M. and McGinty, M. (2019), The Anti-Paradox of Cooperation: Diversity May Pay.Journal of Economic Behavior and Organization, vol. 157, 2019, pp. 541-559. Fuentes-Albero, C. and S.J. Rubio (2010), Can International Environmental Cooperation Be Bought? “European Journal of Operational Research”, vol. 202, pp. 255-264. Pavlova, Y. and A. de Zeeuw (2013), Asymmetries in International Environmental Agreements. “Environment and Development Economics”, vol. 18, pp. 51-68. Weikard, H.P. (2009), Cartel Stability under Optimal Sharing Rule. “Manchester School”, vol. 77(5), pp. 575-93.	Taken into account, and references considered for SOD. However, please take into account that due to space limitations we may not be able to incorporate all the references suggested.	Ian Bailey	University of Plymouth	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
10949					Overall, this chapter provides a solid analysis of the evolution of, current initiatives in, and the effectiveness of international cooperation on climate change. I have highlighted some specific areas where the chapter would benefit from further revision but would also welcome more analysis in at least two areas. First, more detailed evaluation is needed of the withdrawal of the United States from the Paris Agreement, both in terms of the likely implications of this withdrawal for the net effect of current NDCs on global emissions and temperature increases if research has been conducted on this. Second, further appraisal would be useful on the recent declaration of climate emergencies and net-zero carbon plans by some national and sub-national governments and other types of organisation, and also by the EU in its most recent climate strategy. Although these initiatives fall primarily outside the scope of international cooperation and can be examined more extensively in Chapter 13, some initial analysis of the potential implications of this recent trend in relation to polycentric international cooperation would be beneficial. Initiatives within this category are very recent, so there is limited empirical evidence so far of their nature and scale but I think there is value in noting them as an emerging phenomenon within climate governance, highlighting the potential for transnational cooperation and learning, and flagging them up as an area for more detailed future analysis.	Noted, within the constraints of space, the SOD engages in a deeper assessment of the PA. However, we are reluctant to devote too many words to analyzing the US withdrawal, it may even be reveresed soon. The national net zero plans are relevant, as you suggest, but will be picked up by Chapter 13.	Sarah Connors	IPCC WGI TSU	France
25539					Please take care not to use value-judgement terms such as 'important', 'significant' and also prescriptive terms such as 'need' and must'. Some readers will interpret these statements as policy prescriptive.	Noted, thanks.	Sarah Connors	IPCC WGI TSU	France
25573					As a reader who isnt familiar with all the topics being discussed in your chapter, it might help many Exectutive Summaries to include subheadings to cluster the statements by topic or overarching chapter themes.	Noted, thanks.	Paul Rouse	Carnegie Climate Governance Initiative	United Kingdom (of Great Britain and Northern Ireland)
28819					Section 14.4.4 The discussion of SRM in the text only references one form of SRM, Stratospheric Aerosol Injection (SAI). SRM, Solar Radiation Modification, encompasses several other techniques that should also be addressed here, not least Marine Cloud Brightening and Cirrus Cloud Thinning. The range of sources used to inform the Stratospheric Aerosol Injection (SAI) SRM governance discussion is very limited, calling heavily on Nicholson, Reynolds and Parsons, a significant proportion of the papers referenced are 5+ years old. The discussion does not reference justice, ethics or risks issues nor the current state of research and knowledge, both of which are important factors in the governance agenda. There is a vibrant literature about SAI governance which is missing from this discussion, leaving some important non-Western perspectives on governance absent – sources of the literature can be found, for example, here https://www.c2g2.net/wp-content/uploads/c2g_evidencebrief_SRM.pdf https://ceassessment.org/academic-library/ https://geoengineering.environment.harvard.edu/publications	noted, and partly accepted. Focus is on SAI because of the international governance focus. Literature will be expanded to non-Western research literature, for which the given URLs provide a good resource	Paul Rouse	Carnegie Climate Governance Initiative	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
28821					Section 14.5.4.2. Whilst the inadequacies of current governance frameworks for CDR are noted and the potential for some novel or new approaches to be developed are flagged, the text focuses on ocean fertilization only with no reference to DACCS or other potentially important techniques. This wider suite of potentially effective approaches should be included here.	Noted. We initially included CDR technologies perceived as carrying major risks, in conformance with our mandate from the IPCC Plenary to look at SRM risks. Now the new introductory paragraph makes clearer that the CDR subsection is only about international governance, and that most of CDR governance (which tends to be national) is assessed in ch12.7. International governance tends to be focused on MRV issues (via UNFCCC) and treaties/conventions regulating the global commons, in the case of CDR there's therefore a focus on LP/LC and CBD	Paul Rouse	University of Eastern Finland	Netherlands
32239					Comparing the different sections on sectoral cooperation, it is notable that the Chapter's criteria are not being consistently discussed.	Accepted, thanks. We've reorganized the chapter, and have applied criteria (drawn from Chapter 13) more consistently in the SOD.	Edris Alam	Rabdan Acadmey	United Arab Emirates
33113					Over the last decade I observed that many regional experts found that IPCC report are wordy and not easy to understand. It would be highly appreciated if final version can reduce jargons and apparently present different concepts and implications. There are limited direction how end users such as individuals and households who may be significant stakeholders in one way or other, get involve and be part of climate change mitigation and adaptation. Primary level school curriculum should include basic and fundamental concept of climate change, mitigation and adaption particularly individual behaviour and awareness in relation to agriculture, forestry and other land uses (AFOLU), demand, services and behaviour aspects of mitigation, urban system and settlement, building construction, transport, industry, emission and mitigation pathways.	Noted. We attempt to make the chapter accessible, although, inevitably it will not be to school children. We are also not mandated to provide policy prescriptive advise to stake holders.	Ahmed Abdelrehim	Centre for Environment & Development for the Arab Region and Europe - CEDARE	Egypt
35757					The executive summary does not include any text about adaptation measures or the needs of developing country	Noted. This report is about mitigation and not adaptation. We do address the role of international cooperation being to support developing countries.	Francisco Javier Hurtado Albir	European Patent Office	Germany
42085					For the whole Chapter 14. As already indicated for chapter 1, at international level and considering the international legal framework, it appears that an effort of "downgrading" high-level agreements to more concrete regional and/or sectoral regulations is necessary, in order to ease the implementation of these important high-level international agreements. This issue could be explored in this chapter.	Noted. The SOD has been reorganized to separate out means of implementaion, and multi-level/multi-actor governance, from the UN climate change regime. This enables a more targeted consideration of issues raised here.	Antonethe Castaneda	UNESCO CONT E ECT	Guatemala
43151					General comment: international cooperation must be approached from the sharing of knowledge between States, for example: South-South cooperation, in such a way that it is not only the mobilization of resources, but this exchange between countries and regions to strengthen successful experiences. Calling for interdisciplinarity is not just about diplomats, but about science-based climate policies, considering budgets, regions and the scope of international cooperation.	Noted, thanks, and considered in the section on south-south cooperation.	Nico Bauer	Potsdam Institute for Climate Impact Research (PIK)	Germany
45937					The authors are very much recommended to ask how far the interventions of the intenrational climate policies are in comparison with other international treaties. It should be pointed out where the Paris Agreement is relatively weak and where it is relatively strong as ocmpared to other international cooperation treaties.	Noted, thanks. The SOD attempts to do this, within the constraints of space and time.	Nico Bauer	Potsdam Institute for Climate Impact Research (PIK)	Germany

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
45943					14.3.1. The framing contrasts two very different approache to influence emissions and the author seems to have very distinct opinion that the one is better than the other. The sub-section very much highlights the idea of energy transitions as opposed to the emission regulation approach. This is not an assessment, this is an advertisement for a research program. I share the idea that the two concepts should be compared, but it needs a full redrafting. The sub-section needs to highlight: First, are the two approaches complementary or do they substitute each other. It must be much clearer what the two approaches can achieve regarding various mitigation options. The reader gets the impression that both approaches are alternatives that basically could achieve the same outcome in terms of emissions, but this is something that requires a thorough assessment. Second, the framing focuses too much on energy related emissions only. However, for achieving the Paris climate targets alos the land-use emissions have to be included. Third, the literature mentioned in this sub-section that suggests that energy transitions are effective, are only qualitative. None, of the references provides a quantification. On the other hand, references supporting the effectiveness of the regulatory approach are not mentioned to same degree, although they provide a great body of quantifications. Regarding this point it requires a close coordination with Ch. 3 and 4. Fourth, the references mentioned here supporting the energy transition approach are generally not addressing the issue of international cooperation. The references are mostly conceptual and mostly focus on sectors, or single region perspectives.	Noted. We regret that this seemed like an advertisement. That was not the intent. We do plan to redraft this section. The aim, however, is to highlight that there are at least two different theoretical approaches to framing climate mitigation, and they lead to the identification of somewhat different priorities for regulation and policy. This can help us to understand why Paris makes sense to some people, but not to others. If we frame mitigation as a global commons problem, then the Paris architecture is fundamentally flawed. If we frame it as a transition problem, where lock-in and learning effects are more important than external costs and benefits, then Paris might make sense.	Nico Bauer	Potsdam Institute for Climate Impact Research (PIK)	Germany
45945					In the context of the energy transition approach, it is important to discuss the multi-level perspective and in how far a top-down approach changes the broader landscape variables that trigger enregy transitoin dynamics. The authors seem to assume that the most important land-scape variables relate to technology costs, but for triggering transitions also top-down regulations are important. The authors should ask the question in how far the international cooperation on emission regulations can trigger the necessry changes at the lower levels. Here, also the question of fragmented and multi-speed policies (core-periphery diffusion and leakage) are playning out.	Noted, thanks. Interesting point, considered in the SOD. In general the SOD attempts to clarify and sharpen the alternative narrative framings underpinning different sets of literature.	Nico Bauer	Potsdam Institute for Climate Impact Research (PIK)	Germany
45947					The chapter must pay more attention on the free rider issue. How can the strength be measured? What are the most important determining factors motivating free rider behaviour? how can this be overcome?	Noted. This is a theoretical issues that has been covered in previous assessment reports. We note the issue briefly in the section on alternative framings, and that within the global commons framing this is seen as an important issue, but not within the transitions framing.	Nico Bauer	Potsdam Institute for Climate Impact Research (PIK)	Germany
45951					Emission reduction in the land-use sector and in particular the agricultural sector has to be seriously discussed (not necessary to talk about bioenergy here).	Noted. Oit's not our job to discuss the emissions reductions, but rather to attribute these to the effects of international cooperation. We do this.	Nico Bauer	Potsdam Institute for Climate Impact Research (PIK)	Germany
45953					Table 14.1: The table mentions solar radition management in an odd way. But it does not mention carbon removals. Paris agreement talks about emisiosns and removals throughout	Noted. We did that because the IPCC plenary told us we had to look at SRM, but not CDR.	Nico Bauer	Potsdam Institute for Climate Impact Research (PIK)	Germany
45955					Table 14.1: first there is hardly anothing about AFOLU, but energy transitions. Then table distinguished between AFOLU and non-AFOLU. This is not stringent.	Noted. Good point. We are revising the table substnatially.	Nico Bauer	Potsdam Institute for Climate Impact Research (PIK)	Germany

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
45957					Table 14.1. There is nothing about transfers and conditoinality of mitigation efforts provided the mitigation efforts of other countries. Though transfers are mentioned on page 13, line 33.	Rejected. We don't see these as indicators of effectiveness.	Nico Bauer	Potsdam Institute for Climate Impact Research (PIK)	Germany
45967					Table 14.2, row "Targets". The Kyoto targets were comparable because they were stated in a harmonized format. The problem was that the mechanisms to implement them have been negotiated latter, which resulted in loopholws. The Paris Agreement instead features a huge diversity of measures, targets and way to formulate. For this reason it was necessary to agree on the Rule Book that occupied large part of a COP.	Noted.	Nico Bauer	Potsdam Institute for Climate Impact Research (PIK)	Germany
45971					14.4.2.5 The part on the global stocktake does not evaluate how this bottom-up system can be transitioned towards a more comprehensive top-down regime that is necessary to achieve the Paris stabilization target of well-below 2°C and 1.5°C.	Noted. This section does not do this, but the text is a reflection of the literature that largely does not engage in this exercise. To the extent that it does, it is reflected in section 14.3.3, the PA assessment section.	Nico Bauer	Potsdam Institute for Climate Impact Research (PIK)	Germany
45973					14.4.2.8 for an improved discussion of this issue it would be useful to improve the data oveview especially on cost data in the energy chapter of this report. There I have only seen global average numbers for example for solar PV.	Noted. This comment seems to relate primarily to another chapter of the report.	Nico Bauer	Potsdam Institute for Climate Impact Research (PIK)	Germany
45975					14.4.2.8 the text mentions the TEC and the CTCN, which are responsible for the important task of technology transfer. Is there a review available that analyzed the effectiveness of both instutions. I have looked though the document, but I have not found the acronyms TEC and CTCN across the document. I am surprised that the authors of the chapter are very positive about the energy transition approach for international cooperation in climate change, but then I would expect that the authors would have available in depth analysis of the effectivenss in quantative terms what the contribution of these instiutions is. With quantiative analysis of effectivness I definitely talk about the reduction of emissions via technology transfer projects. There must be some study that has evaluated this and this is what I expect from the authors to review.	Accepted. Technology section revised in liaison with ch 16 and divided into section focused on Paris Agreement and one on technology development in broader UN climate regime. The latter includes analysis of effectiveness of TEC and CTCN	Nico Bauer	Potsdam Institute for Climate Impact Research (PIK)	Germany
45989					The Chapter requires a complete revision. The authors follow the overall scepticism that an international agreement for climate change could be achieved at all. The basic conclusion that the reader receives from the draft text is, that the UNFCCC is a very bad basis for trying to build international cooperation for achieving cliamte change stabilization. At best it is a vehicle to pledge some measures that cannot be compared, but we know that they are insuffient to achieve targets of climiate change stabilization. They built a neice narrative of energy transitoins for which the authors provide no empirically relevant quantification of what its importance is. The international technology transfer that is institutionalized since many years has, as the authors state, not even produced the data on which it could be evaluated. The authors do not enough to clearly point out the gaps that are ery obviously there. They follow the bad practice in international relations to pull out endless lists with issues that all sound nice, but it is not structured and it is not ranked. The authors should clearly point out what is missing, what is needed to overcome the deadlock in which the international policy is to achieve collective targets by international cooperation.	Noted. The chapter has been restructured, the analysis deepened across the sections, and more references included. However, there are limits to what we can do, given constraints of space, and time, and our mandate. We are true to the literature we cite. Apologies to have disappointed you.	Nico Bauer	Potsdam Institute for Climate Impact Research (PIK)	Germany

Comment ID	From Page	From Line	To Page	To Line	Comment	Response	Reviewer Name	Reviewer Affiliation	Reviewer Country
45991					Where in the text is the backing that the Paris agreement is economically efficient? I have not seen that. How i economic efficiency defined here? Is this related to a target? Please note that the Paris targets are failed and it would be very, very costly to repair the failure of the Paris international cooperation by stronger and deeper emissions reductions latter, in order to achieve the long-term stabilization targets. Thight copperation with Ch. 3&4 is required.	Noted. We address this in the SOD.	Nico Bauer	Potsdam Institute for Climate Impact Research (PIK)	Germany
45995					Figure 14.1 what non-AFOLU emissions of other Kyoto Gases. This is complete miricale to me. Be clear, also if this basically energy CH4 and SF6, this is not so super large.	Noted. This is referring to the results of the Montreal Protocol and sbsequent agreements.	Nico Bauer	Potsdam Institute for Climate Impact Research (PIK)	Germany
45997					Ifigure 14.1 it is unclear what the figure wants to communicate to the reader. I thought it is about the indicators where the international cooperation in the Paris agreement is having a positive impact on achieving the targets of the Paris agreement. However, then text starts to talk about the Minamata Mercury COnvention and others. This is confusing, becuase these are other agreements, not the Paris Agreement.	Accepted. The SOD clarifies what is being assessed.	Nico Bauer	Potsdam Institute for Climate Impact Research (PIK)	Germany
45999					Figure 14.1: the text above says that cannot be quantified what the transformational potential is. Here in the summarizing figure it has a positive effect on things like infrastructure expansion and investment flows. It is also a bit disturbing that it has so many positive effects, but the effect on emissions is, finally only small.	Noted. The SOD is qualified and nuanced in response.	Nico Bauer	Potsdam Institute for Climate Impact Research (PIK)	Germany
46001					The authors should be very clear what is required to overcome the free rider problem. What I mean is not a discussion about the free-rider problem in the context of the present state of sovereign nation states. I want to know what is necessary in order to overcome it for achieving the Paris Climiate targets. It must be clear whther the free rider problem can be solved within the system of sovereign nation sates or not. It is also interesting to now, how important costs of reducing emissions are in this context.	Noted, and we attempt to address some of these issues in the SOD, to the extent that the literature picks up on these. However, we need to stay true to the literature we cite, and reflect the state of the knowledge on these issues rather than offering our preferred solutions to the problems at hand.	Valérie Masson-Delmotte	CEA, IPSL/LSCE	France
48087					ES : section on reductions in emissions of GHG arising from other conventions => coordination with WGI could be relevant to provide a common (quantitative) message on the benefits of these reductions.	Noted. We have liased with WG1.	Valérie Masson-Delmotte	CEA, IPSL/LSCE	France
48089					The final ES statement on solar radiation modification is quite surprising as formulated. What about interational cooperation in the sectors of aviation and shipping? What about cooperation in the sector of standardization (e.g. ISO standards)?	Noted. We had this as an example to back up a general statement about some sectors lagging.	Nico Bauer	Potsdam Institute for Climate Impact Research (PIK)	Germany