Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
25577	2					I cannot understand why Webster et al. (2002) is categorized by the "Accelerates/Increases Mitigation Action." The paper just analyzed future GHG emission pathways with the uncertainties by different models from the IPCC SRES models, and the median of the estimated emissions was lower than the SRES case. This is not an effect by uncertainty considerations. The literature of Webster et al. (2002) should be deleted.	Accepted. In general it is difficult to extend the concept of the sign of increase or decrease of mitigation action to Monet Carlo studies, as usually you will find both effects. Hence - although some of the authors of the lit that we cite - give the impression such a link could be made-up indeed, we from now on we abstain from doing so. Accordingly, we eliminate Monte Carlo studies from that Table, and give them a seperate mentioning in our text.
25578	2					J. Oda and K. Akimoto, "An analysis of CCS investment under uncertainty," Energy Procardia, 4, 1997-2004, (2011) analyzes relationships between carbon price and CCS investment, and concluded that carbon price volatility requires higher carbon price for CCS implementation than that without volatility. The paper will be one of the paper which should be categorized to "Delays/Decreases Mitigation Action" of "Policy Response".	Accepted. We now cite that paper, however find that its appropriate place within our Chapter is not the IAM Section the reviewers suggests (that in fact deals with the social planner perspective), but rather our policy instruments Section that inter alia assesses the effects of regulation on firms
25579	2					M. Balikcioglu, P.L. Fackler and R.S. Pindyck, "Solving optimal timing problems in environmental economics," Resource and Energy Economics 33, 761-768 (2011), for example, shows quantitatively that global warming response measures would be introduced with difficulty due to possible sunk costs that may be caused under uncertainties related to warming damages and mitigation costs. Many other papers that indicate smaller investments are better when uncertainties exist seem to have been published.	Thank you, we revised this section
25580	2					Boetti et al. (2009) analyzes a hedging strategy assuming three scenarios of emission pathways, i.e., Baseline, 550 ppm CO2 only and 450 ppm CO2 only by using CEA. The optimal pathway under uncertainty of the emission targets is estimated to be emissions between the optimal emissions for deterministic targets of 550 and 450 ppm CO2 only but near to the emission for 450 ppm CO2 only. The emission is "Accelerates/Increases Mitigation Action" if it is compared with the medium emission scenario of 550 ppm CO2 only, but is "Delays/Decreases Mitigation Action" if it is compared with the lowest emission scenario of 450 ppm CO2 only. Although such a complex problem exists, why is this paper categorized to "Accelerates/Increase Mitigation Action" in Table 2.2? This categorization will be very unscientific.	Taken into account. We will not remove the Table as it delivers an overview on all the different effects that uncertainty could result in. However we will deliver a more sophisticated interpretation. The mere reporting of numbers will be replaced by a convolute of numbers and severity of differences reported.
25581	2					Some literatures shown in the table are missing in the reference list, I cannot check them whether they are appropriate to be categorized or not.	Thank you, the reference list is now complete
25582	2					In summary, Table 2.2 does not cover diversity of the related papers and very misleading. Table 2.2 is better to be removed or should be revised substantially according to my comments above. Otherwise, the IPCC report will be strongly criticized by readers.	Taken care of: This time we have foreseen an extra iteration to tackle this point.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
23548	2					I am surprised how little discussion of institutional types there is in this chapter. Certainly, accounting for perceptual biases and decision making methods (including rationales) is important, but institutional configurations are certainly key to both forming the biases and to correcting them, and different rationales operate differently depending on the kind and scale of institution involved. I worry that you are side-stepping the political and institutional design questions central to the issue of this chapter. I worry also that you are side-stepping the role of democracy in this tangle of issues -- both good and bad from the standpoint of bias.	Accepted. The text throughout the section on perceptions and biases (formerly 2.2) has been revised to take into account institutional factors, and indeed to place individuals biases and institutional biases in relation to one another.
32326	2					Sentences tend to run on and lose their grammatical structure, but I understand that this will be picked up in a final editing process.	Noted
32327	2					Apart from the errors concerning hypothesis testing (p. 11) I think that the authors did a very good job.	Noted. Thank you!
29974	2					The Chapter2 fail to consider an important issue, the influence of disinformation campaign organized by industrial lobbies on how uncertainty is considered by policymakers, and how a “manufactured uncertainty” is used as a tol to block or to delay climate mitigation policies. I strongly suggest considering this issue in the Chapter2 of the AR5-WG3, otherwise this Chapter miss an important aspect of the conection between Uncertainty and of Climate Change Response Policies.	Accepted - we now discuss in more detail what the effects of uncertainty are.
32157	2					make more concise	Noted. Thank you!
25544	2					Two recent studies also provide a detailed analysis and valuable insights on the interplay of various uncertainties. It would be nice if they could be included in this table. Reference: (1) Rogelj, J., D. L. McCollum, A. Reisinger, M. Meinshausen & K. Riahi (2013) Probabilistic cost estimates for climate change mitigation. Nature, 493, 79-83, 10.1038/nature11787. As well as (2) Rogelj, J., D. L. McCollum, B. C. O'Neill & K. Riahi (2012) 2020 emissions levels required to limit warming to below 2°C. Nature Clim. Change, advance online publication, 10.1038/nclimate1758.	Taken into account. We will cite the 1st of those 2 references as a Monte Carlo study. However we see the other article - if cited by WGIII - rather in Ch6 than in Ch2. We have transferred the ref accordingly.
34457	2					The term 'geoengineering' is not mentioned once in your chapter. You might want to think about adding a brief assessment of the emerging literature on geoengineering in the context of risk management (perhaps in section 2.1 or 2.4?).	If space available. Geoengineering is not mitigation in the sense of emissions reduction.
27074	2					An important issue not explicity discussed is that decision-makers always take decisions under uncertainty. The presence of scientific uncertainty may be considerably less important than other factors considered when taking a decision. Understanding where and when uncertainty can affect decisions would be an important discussion in this chapter.	Accepted. We have substantially revised what had been sections 2.1.1 and 2.1.2 in the SOD into a new combined section for the FD. This new section explicitly discusses the fact that decisions are made in accordance with information about the state of the world, and that state of the world is typically uncertain.
34442	2					Please contact chapter 3 CLAs because section 3.9 covers similar ground. Section leaders could clarify their division of labour.	Accepted - New Section 2.4 and Section 3.9 are now more closely coordinated.
23099	2					Forcing the Precautionary Principle into a utility-maximization framework does not do it justice. Cite for a less distorting view: Randall, A. 2009. 'We Already Have Risk Management--Do We Really Need the Precautionary Principle?'. International Review of Environmental and Resource Economics 3(1): 39-74.	Noted We do not force the PP into an expected utility framework

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
32613	2					Thsi woudl seem the natural section in whcih to bring together the points around "system / domain 3" decision making. The core point is that a limited set of major decisionmakers are typically involved in actively considering long term strategic risks, and only a limited set of decisions today have clear long term strategic consequences. For example, the UK goernment has responsibility for considering policy frameworks for long term climate risk including the setting of a national 2050 goal under the UK Climate Change Act. The government together with the regulator (Office of Gas and Electricity Markets, Ofgem) sets the regulatory conditions for investment in UK electricity, and directly regulates return on allowed transmission system investments - tens of billions of pounds of infrastructure which will do much to determine the UK's ability to tap its extensive renewable energy resources (eg. offshore wind) in coming decades. These are classic system 3 decision processes. They are not system 1 (the issues are massively debated and analysed). They are not system 2 (carbon price is largely irrelevant, cost implications are largely swamped by internicine debates about discount rates). They are strategic risk-based choices governing strategic investments to mitigate those risks. This applies even more centrally to development of European electricity system (as illustrated in Grubb et al., Planetary Economics, Chapter 10). These woudl seem to be precisely the kind of risk and uncertainty decision issues that the Chapter sets out to analyse and provide a framework for.	Taken into Account. We have modified our discussion of System 1 and System 2 in the chapter by focusing on intuitive and deliberative thinking. We will also address issues of long-term strategic thinking as appropriate in the spirit of this comment.
25575	2					The discussions are deployed by numbers of literatures which only the LAs gather without systematical treatments. This is really inappropriate. Substantial revisions are needed.	Thank you for your comment. We aknowledge that the Table reflects our best possible effort (but still incomplete) to reflect existing literature. However this is what the report is about. We cannot make research, rather we are reviewing research.
25576	2					CEA or CBA is a key for the obtained results which indicate "Accelerates/Increases Mitigation Action" or not, as described in Section 2.4.2.1. In other words, strategies to uncertainties of expected value strategy (this is near to CBA), mini-max strategy, minimum regret strategy etc., are key for timing of emission reductions. While these are the essential issues, Section 2.4.2 focuses on other factors. The discussions in this section are very misleading. Substantial revisions are needed.	We included a § on non-probabilistic criteria.
23100	2					Stating that "Integrated assessment models (IAM) are tools capable of representing" human and natural system dynamics vastly overstates their usefulness. They are highly contrived, and so full of (often dubious) assumptions that they should not be relied on in a scientific report.	Thank you for your comment
23549	2					Please see my comment 13 above about institutions.	Noted
34474	2					At the beginning of each section (or in another prominent place), please tell the reader if, where and how the evidence you assess in this section has been treated in previous Assessment Reports, in particular in the AR4. Moreover, for key findings please state how the state of knowledge evolved in comparison to the equivalent AR4 finding.	Taken into Account Where there were linkages with material in AR4 we have indicated this in different parts of the chapter as well as highlighting Sect 2.3.3 What is New on Risk and Uncertainty in AR5
34477	2					Overall, your draft improved a lot when compared to the first order draft. Thank you for your efforts. Well done!	Noted. Thank you!
34485	2					Please try to visualize key findings through the use of more tables and figures. Visualization really is very important and could deserve more attention.	Taken into Account. We have modified and added tables and figures to highlight key points

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
34486	2					Please make sure that your Final Draft complies with the outline that governments had approved for your chapter.	Accepted. Outline now complies with TSU approved version.
34487	2					Please avoid prescriptive language. For instance, it might be worthwhile to think about different terms for what you call “prescriptive analysis” (Figure 2.1) or “Guidelines for developing policies” (section 2.4.1).	Accepted - we avoid prescriptive language throughout; the only exception is the term "prescriptive models" which is a technical term used in the decision sciences for models that combine the insights of normative and descriptive models tp provide optimal decision support. Such models do not prescribe or endorse any choice option, but only optimal ways of supporting choice.
34488	2					Please ensure that your final draft complies with the page limit that governments had allocated to your topic area. It must not count more than 60 template pages (excluding title page and bibliography).	Accepted The final draft is 55 pages
34440	2					This 'Executive' Summary reads more like an Introduction. What are you key findings? Please devote more space to your key findings and leave introductory remarks to the Introduction. In your Summary, every single paragraph should state one key finding in the first sentence (in bold), qualified with an uncertainty statement, and then substantiated/qualified with relevant evidence in the paragraph body and referenced to sections at its end. Please be as concise and policy-relevant as possible. 'Executive' readers (the targeted audience according to the section title) have very limited time.	Accepted Thanks for the suggestion
34481	2					If you feel that there is a trade-off between providing details for key findings and respecting space constraints in your Summary, please focus on a small set of key findings and their details rather than provinding a paragraph on every topic that is covered in your chapter. The latter approach tends to produce assertions that are so 'comprehensive' and general that they are almost meaningless. Hence, selection seems warranted.	Accepted Thanks for the suggestion
32610	2					I suggest the Summary gets close attention from the CLAs. At present, it seems partly a summary, and partly an introduction. It claims to extend the IPCC reports in two directions, topical and disciplinary. Yet teh summary does not even mention the System 1 and 2 content of the chapter itself, which woudl seem to be an important contribution. The Exec Sum continues to have a very academic tone, the "so what's" dont really stand out. As I understand it, Chapter 2 is in part the source of the SPM conclusion that decisions have a Status Quo bias. It also follows that 'business as usual' is not optimal, and that various decision strategies could help to improve performance without necessarily incurring costs.	Taken into Account We have revised the Executive Summary to address these and related points by other reviewers
35228	2	0				This chapter fails to give a satisfactory answer to the question of how to make a right climate change policy given the occurrence of certain risks and uncertainties. Therefore, it is suggested to improve, especially add some elaboration to the risks that might be incurred by introducing mitigation policies.	Accepted - text revised (2.1.1)
22944	2	0				To shorten the chapter, a careful look could be given to the various summaries that are in the chapter. For example, pp. 13-15 and p. 42 both contain summaries that are not really necessary, given that all the material is already in the chapter. In the comments below I will make specific suggestions. But overall, simply reducing the existing summaries would go a long way to achieving the necessary shortening. Another way to reduce would be to put the appendix on metrics of uncertainty and risk at some other point in the report, or possible in the summary report, since it is relevant to all three WGs.	Accepted - text revised (streamlined throughout)
22945	2	0				Overall, the chapter is very well done, and in a way may represent the best and newest contribution of AR5 overall, namely the application of new understanding of decision-making to climate change policy. When AR5 is presented, this point could be of interest to the wider readership.	Noted. Thank you!

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
32609	2	0				I reiterate comment made on the FOD: "This is a good chapter and has potential to be extremely valuable, but to do so I think it needs to be clearer in structural approach towards different types of decisionmakers, and needs further development in two main directions: • The concepts of risk and uncertainty are applied almost entirely to climate impacts ("the nature of the problem") rather than aspects of mitigation – which is rather odd for a report on Mitigation: in more than 40 pages, for example, there is less than a page on energy efficiency despite the fact that the energy efficiency is central and the literature identifies perceptions of uncertainty, risk aversion and other behavioural dimensions as crucial to understanding; • Whilst the chapter gives intellectual clarity over "System 1 behaviour", and its distinction between that and "System 2", it then addresses a range of other issues with implication that they are hard to fit into "System 2" decision framework, but without this ever really pinned down. I think the chapter would be far clearer if it acknowledged the existence of "System 3" processes around strategic risks and deep uncertainty, including the role of security, strategic judgement, innovation and systems transformation. It would then help to clarify the boundary between these, and System 2 processes which generally aspire to quantification and work best under conditions of limited uncertainty and trade-offs at the margin. I would also suggest value in trying to find another term, since the word "System" is hugely used through the Mitigation report for many different purposes (Energy System, Economic system, Systems Transformation, Innovation Systems, etc etc). The term I have found most useful is "domain". The chapter also needs at minimum to say a bit more about the role of inertia at many levels of decisionmaking and the (physical and social) systems involved. Inertia in its broadest sense is what renders "wait and see" untenable in the face of uncertainties." I am left unclear whether the authors disagreed with these comments, but there is little sign that they have been considered - it would be helpful to know. I am particularly struck that for a Mitigation report, there remains very little actually about mitigation decision-making. It also remains very much focused on personal decision making, rather than expanding to include organsiational. In total I submitted 11 comments on the FOD and it would be reassuring to know if they were noted and considered. If the authors are interested to understand the "System 3 / Third Domain" points further, see some of my comments here particularly to Chapters 7 and 15; also the most relevant chapters (9, 10) of the book Planetary Economics (Grubb et al., 2013).	Noted - and much appreciated. We have revised large parts of Section 2.2 (now Section 2.4) to incorporate these
32611	2	0				In the context of AR4 it seems particularly important that the chapter extends (i) to include more about mitigation and (ii) includes some aspects of organisational decision-making. One brief review the authors could draw on is that covered in chapter 4 of Planetary Economics (Grubb et al, 2013)	Accepted -- text will be revised accordingly
33628	2	0				We believe that there are to little references in chapter 2. There are a lot of statements that are 'not backed' by literature, or at least do not refere to the literature. We advice you to check this and insert where needed the correct references.	Rejected -- the author team has taken great care to cite sources and literature. This comment cannot be addressed without specific instances to the contrary.
24555	2	0				"Fat tails" are mentioned throughout chapter 2, but are not defined and are not treated consistently (sometimes with quotation marks, sometimes not). Suggest replacing with a less expert-specific term to describe graphs curvature and/or more clearly defining fat tails at their first mention (p.7 line 6). Other references to fat tails, which may need a clearer definition: p.7 line 33; p.10 line 24; p.29 line 18; p.33 line 12 and 14; p.45 line 12; and p.59 line 3.	Taken into account. We now explicitly point to the definition of fat tails in Annex A.II.5.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
21587	2	0				Overall, this is a good comprehensive chapter which takes a more interdisciplinary, psychological and behavioural approach to understanding risk than the "rational human" apporach used in AR4. It may simply be that an individual's or group's psychological response to risk cannot be modelled.	Noted - Thank you!
19425	2	0				I recommend reduce Section 2.4.3, 2.4.4, 2.4.5 to keep the requested size of this chapter.	Thank you. We have done our best to preserve the interdisciplinary character, and pay attention to the distinction to modelling results and empirical analysis, in the final revisions.
25304	2	0				The chapter has 446 references, out of which 72 are from the chapter authors.	This is an exercise to review the relevant and related literature. It was not intentional to have this fraction, 16%, of the authors referenced. Moreover, the authors have made a lot of contributions to literature on this topic. Lastly, in counting the number of authors on these publications, it is evident that the authors make less than 0.1% of the authorship of the papers referenced.
25305	2	0				Out of these 446 references, only 10 are on developing countries. It is suggested that a more balanced approach could be adopted.	It is difficult to achieve a balanced mix of recent references from the developed and developing countries on this chapter for reasons ranging from literature coverage, mitigation vs. adaptation, the range of methods and tools that have been discussed to address uncertainty and risk in climate change policy, prior coverage by earlier reports . Nonetheless, we have included more relevant/related developing countries
25306	2	0				A quick check on the total universe of articles in peer-reviewed journals since AR4 (2007) indicates that there are almost 6000 in journals of Science Direct, 1600 in Francis and Taylor, 4000 in Springer Link, 5000 in Wiley and 550 in JSTOR totaling to around 17000 articles in all. The chapter has captured almost 2.6% of existing literature	This comment is well-noted. However, we wish to stress that since this is an exercise that targets related/relevant articles on the topic of risk and uncertainty assessment of climate change response policies, the proportion of literature we have covered adequately represents references on this topic. Thus, we have only referenced the appropriate articles within this domain.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
25307	2	0				Out of total 17000 articles mentioned as above, almost 11000 are on developing countries and issues related to them (60%). It indicates that there is a large enough pool to pick up articles on developing countries to be cited in this chapter. The authors may like to take a look at it.	In addition to the response on line 13 above, the number of articles referencing developing countries within the context of this chapter is even much lower because a significant number of the articles mentioned are significantly on adaptation.
21077	2	0				There is very little mentioning of indigenous peoples issues in this chapter while it is mentioning local risks to climate change. Especially in the context of mitigation and REDD+, are local nature-dependent peoples the ones that are doing risk-assessment and taking subsequent action. Understanding the local context is therefore very important for understanding participation, as has been addressed by the UN University: UNU. (2012). Climate change mitigation with local communities and indigenous peoples: Practices, lessons learned and prospects. Workshop Meeting Report Institute of Advanced Studies: Traditional Knowledge Initiative. Cairns, Australia: United Nations University. Retrieved from: http://www.unutki.org/default.php?doc_id=226	Some of these references are not peer-reveiwed and do not meet the requirement by the TSU.
35635	2	0				Little use is made of the social amplification framework (See page 24). More integrated analysis is needed throughout the chapter (See Table 2.2, pages 44-45 does not do it).	Accepted, text revised: there is now a much longer section (2.4.5) on linkages between different levels of decision making
35636	2	0				The discussion about uncertainty needs to present an overall sufficient taxonomy. The current discussion is not adequate (See especially Sections 2.1.1 and Section 2.4.5.3, page 57-58).	We have done our best to take this comment into account in the redrafting of the chapter. Most significantly, we have improved upon some of the introductory material, now finding a home in section 2.3. There, we have provided a clearer taxonomy of the types of systems in which uncertainty may be found. Our reading of the post AR4 literature suggests that there are a great many interesting findings, particularly on the issue of regulatory risk. What we have paid less attention to in comparison with previous assessment reports is in drawing a distinction between different sources of uncertainty in each of these systems, such as from insufficient data, or lack of adequate theory. Our interpretation of the post-AR4 literature is that there is very little new of interest on this issue.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
35637	2	0				The authors should think about which decisions they want most to facilitate. Most examples within this draft chapter are either at the household level (energy efficiency) or the national government scale (policies). As Table 2.1 points out, decisions are made at many levels. Most climate decisions seem likely to be made somewhere in the middle at the sub-national level" presumably by industries responding to signals from households, customers, and investors.	We consider decision making at all levels (see locus of decision making -- Figure on p. 9 of SOD).
35638	2	0				This chapter aims to provide an overview of how risk and uncertainty interact with climate mitigation policies and targets. Its basic conceit is that climate change poses a special type of risk management problem because it is inevitably incompletely understood along levels ranging from the basic drivers to impacts and technologies. The chapter emphasizes how people actually handle risk when making decisions, focusing on how their actions can deviate from the expected utility framework. It then describes several frameworks, including cost-effectiveness and robust decision-making, that might be more appropriate to situations of deep uncertainty. It concludes by describing how uncertainty affects citizens' and firms' responses to policy instruments and affects their support for policy. The strength of this chapter is in synthesizing several strands of literature, especially regarding cost-effectiveness, expert elicitations, and studies of investment as a real options problem. Its weakness is in almost completely ignoring much of the economics literature on some topics while presenting an unbalanced view of the literature on other topics. The chapter describes its main advance on AR4 as presenting behavioral views of risk and uncertainty. There is much to be learned from this literature but the framing device in this chapter is unhelpful. First, the extensive descriptions of various behavioral anomalies and features present the results as being far less ambiguous than they actually are. More importantly, the link to this chapter's role in advising climate policymakers is unclear. Who is demonstrating these non-textbook decision-making patterns? If it's supposed to be the policymaker, then what is the point of all the description? Are these facts then supposed to affect how results are communicated to policymakers? If so, then whose goals are sensitive to how policymakers respond to risk framing? In contrast, if the decision-makers are meant to be the citizens who respond to potential mitigation policies, then the heuristics and biases are important descriptive facts that could affect policy outcomes but are not clearly important to the choice of mitigation target. While the chapter does begin to touch on policy responses near the end, most of the material is not designed for that context.	Accepted - text has been revised at multiple locations, mostly in Section 2.4, but also 2.1, providing a more balanced view of the value of different modeling approaches, including both different normative and several descriptive ones. Here are some answers to the reviewer's questions: it's mostly the general public who are described as showing the "non-textbook" behavior patterns, though not exclusively. And no, we do not see this literature to be relevant to the choice of mitigation targets, but instead as relevant to the choice of policy instruments and their fine tuning and implementation. In particular, the descriptive models show more accurately how people respond to policy instruments.
35639	2	0				The Risk Communication challenges section (2.2.2) should also discuss the issues identified by Somerville and Hassol on communicating climate science in non-jargon terms (Improving How Scientists Communicate about Climate Change, EOS) DOI: 10.1029/2008EO110002 The authors of this chapter will find some material of value in the America's Climate Choices: Informing an Effective Response to Climate Change report, which has extensive discussions on different kinds of decision makers (26-27) framing (p. 29+) and decision making.	Accepted - Section 2.2.2 has now been revised to include this important literature.
35640	2	0				The authors should seek to ensure that chapter read like more of an integrated piece, right now it reads like a set of separate sections written by different authors, with limited integration between the different sections or their sub-elements.	Accepted. We have revised Sect 2.1 to highlight how the chapter integrates the descriptive and normative aspects of dealing with risk and uncertainty.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
35641	2	0				The discussion of energy efficiency in this chapter is significantly one-sided and does not adequately reflect the literature. In fact, the existence and size of an "energy efficiency gap" reflecting non-economic decision-making by consumers is controversial. See, for example, Allcott and Greenstone "Is There an Energy Efficiency Gap?" NBER Working Paper No. 17766 as a recent example of this extensive literature. This discussion needs to be more robust and representative of the literature.	Rejected. Outside the scope of the chapter. The discussion of energy efficiency highlights behavioral challenges in getting individuals to adopt these measures and there is an extensive literature supporting this point as note in Section 2.5.4.3. The paper noted by the reviewer has not been published so cannot be cited in the report.
35642	2	0				While sections 3 and 4 are written as a more traditional literature review, section 2 reads like an advocacy piece full of conjecture and not grounded in empirics. Acknowledging the importance of behavioral economics for explaining how different agents make decisions under uncertainty is important to understanding the effects of policy and in turn optimal (or at least better) policy design at any level of decision making. Making the point that information is also a control variable in policy/programs at various levels is an important one. But advocating its use in specific ways is outside the scope of this chapter and potentially the document as a whole. This section should be completely rewritten to provide a technical description of the literature, and be robust in providing a full explination of the literature. In many of these topics the literature is not setteled on a single explination, though in such cases this section chooses to ignore the ongoing debate and present a single explination as the truth.	Accepted - Section 2.4 (previously 2.2) has been edited throughout to remove any policy prescription. Only material that provides review of empirical literature on how climate change information and policy options can be presented in different ways and the effects of these variations in framing have been retained, as they describe tools, not policy prescription.
35643	2	0				The Chapter, at times, appears very technical and dense style. Clearly to some extent this may come with the territory, because of the need to be "correct" - but parts could have been more cleanly and crisply written there was a tendency for the reader at times to have a hard time seeing the forest for the trees at times. More schematic, tables or diagrams might help. It was surprising the the entire text contained no "distribution" figure of any type - which would have been ideal to introduce what are mean't by "fat" and thin tails - where clearly are part of the story.	Thanks for the comment. Authors take note of suggestions when chapter is rewritten. It appears to be better to give enough references where especially difficult concepts are better explained than in a chapter that is limited to certain pages.
35644	2	0				There should be consistency in the use of the term "risk and uncertainty" Thoughout the text when the ideas are being referred to joi?ntly sometimes the text says "uncertainty and risk" and sometimes "risk and uncertainty". I would still to "convention" of "risk and uncertainty"	There is a good definition of risk and uncertainty at the beginning of tha chaper (perhaps clarifying thast risk is related to a positive value of a bad result)but text should be consistent with chapter tittle. We offer a case-by-case check. Both terms mean something different, and by definition there cannot be a simple rule whether to use both or only 1 of them.
35645	2	0				Locus/Loci may confuse some readers - maybe could use more commonplace words like source or origin.	Thank you, edit has been effected.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
35646	2	0				The chapter consistently confuses time perception with risk and uncertainty. The authors should go through the chapter an ensure that these issues are being handled correctly.	Taken into account - Chapter 2 defines the terms risks and uncertainty in its introduction, but also discusses a range of other behavioural phenomena, including non-normative time discounting and present bias.
35647	2	0				The behavioral literature is described with much sympathy and detail, even to the point of being normative. Expected utility is only introduced after an extended presentation of the strengths of behavioral findings, where extended focus was placed on one particular form of behavioral framing (``Systems 1 and 2''). The paragraph on expected utility briefly mentions the existence of underlying axioms, but it makes them seem the object of intense debate without explaining to the reader why this model has been the normative and descriptive benchmark: “EU theory is based on a set of axioms that are claimed to have normative rather than empirical validity. Based on these axioms a person's subjective probability and utility functions can be determined by observing preferences in structured choice situations. These axioms have been debated, strengthened and relaxed for several generations: paradoxes have been generated and debated, empirical studies performed and alternatives elaborated. Nonetheless these axioms remain the basis for parsing decision problems in terms of probability and utility and seeking solutions that maximize expected utility. [2.3.1.1]” A scientific assessment of risk and uncertainty should describe expected utility for those unfamiliar with the model's grounding and delve into the rich literature on its implications for climate policy. This assessment does neither. What are these axioms? Why are they thought to be normatively appealing? In what ways does climate change not fit them cleanly? All of these questions are relatively straightforward and should precede a discussion of non-standard approaches or behavioral biases. Further, there is a rich economics literature extending these axioms to cases of deep uncertainty like those the authors wish to consider. These ``non-standard'' models aim to have normative bite and might motivate later parts of the chapter. Many of these models have been applied to important problems in finance and to climate change. Summarizing them and evaluating their aptness for climate change would be a useful service that affirms the IPCC's role of synthesizing diverse strands of science. I would like to see the chapter organized on something like the following lines. First introduce the expected utility framework and its key axioms. Then describe, via reference to the axioms, why this framework may be challenged by climate change. Next summarize frameworks that, for instance, weaken the Independence Axiom to allow for ambiguity aversion or the maxmin-type behavior that the authors currently describe. Touch on the behavioral literature with reference to questions about normative attractiveness vs descriptive power. Summarize decision support tools, including cost-effectiveness frameworks and robust decision-making. Describe how integrated assessment models address uncertainty, what they find, and why their results should not be read too strictly (e.g., unknowable damage functions). Outline theoretical and empirical literature on policy design in light of how firms respond to uncertainty when making investment and R\&{}D decisions. Finally, outline empirical literature on how behavioral biases influence people's response to policies and describe implications for mitigation policy.	Taken into account in part and rejected in part- The proposed reorganization of the chapter in a way to puts expected utility in the center is a matter of taste. We provide a more balanced view of the distinction between normative and descriptive models and discuss in greater detail the optimal combination of these different modeling approaches. SInce the addition of a behavioral perspective is one of the main major innovations of AR5, we find it preferable to feature those models as the more central element, rather than to retell the often told tale of EU axioms and their gradual relaxation to fit empirical data.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
35648	2	0				There is also a rich economics literature analyzing the implications of uncertainty for climate change using the expected utility framework \citep{kelly_bayesian_1999,leach_climate_2007,crost_risk_2010,jensen_growth_2011,cai_dsice:_2012,lemoine_watch_????}. Yet there is no discussion of stochastic integrated assessment models for cost-benefit analyses, despite these being an important line of research since AR4. In fact, the discussion around Table 2.2 never clearly separates stochastic IAMs from Monte Carlo analyses and even misclassifies models. It fails to synthesize the rich literature on the implications of learning. And it reduces the implications of uncertainty to whether it brings forward or delays policy, which is primarily relevant in a real options context. Instead, the main contribution of these models has been to assess which types of uncertainty are crucial for the magnitude of ``welfare-maximizing'' policy. They have indeed generally found that uncertainty makes near-term policy stronger but these effects are much larger for some types of uncertainties than others and depend on how risk and time preferences are modeled. Summarizing this literature and describing the underlying intuition should be a primary focus of a review of risk and uncertainty for mitigation policies.	We do cite CBA-work in that 2.4.2. We will indicate clearer in the Table, which of those are performed by CBA. Furthermore, we include some of the additional literature the reviewer suggests. Furthermore, we now also indicate which papers utilize MC analysis and are grateful for this hint. Due to an editing error, the markers had gone lost. However we disagree with the referee's view expressing that the effect of uncertainty on the timing of mitigation were not of primary importance for AR5. As most IAM results in the community are derived by neglecting uncertainty, we regard it very important to elaborate on how the timing would be changed if a more inclusive analysis had been performed. Of course one could have reported also a ranking of the importance of different sources of uncertainty. However, due to space constraints we stack to the classification as given in Table 2.2 as here the literature was most informative.
35649	2	0				The chapter places strong emphasis on how ``fat tails'' and ``catastrophes'' invalidate cost-benefit analysis without explaining what these concepts are or why they do so. In fact, most economists would disagree with this conclusion. There are indeed results about how fat-tailed damages can make one infinitely willing to pay to transfer the first sure unit of consumption into the future \citep{weitzman_modeling_2009}. This technical result is primarily a point about utility functions, and it's not clearly relevant to analyses of optimal policy (which presumably go beyond the ``first'' unit of consumption). More broadly, the underlying moral of this line of research is that fat tails can make cost-benefit analyses sensitive to arbitrary assumptions about, for instance, the value of civilization. This is an ``empirical'' position that depends on the structure of uncertainty and on the scope for learning, and numerical models have thus far not offered firm support for it.	Taken into account. We will now explicitly point to the definition of fat tails in Annex A.II.5.
35650	2	0				A large amount of discussion considers how non-textbook responses could affect adaptation, which is clearly important insofar as it is descriptive. But we fail to see why this discussion has such an outsized role in a chapter on mitigation. This section should be scaled back to reflect its importance for the topic of the chapter.	Accepted - text has been revised at multiple locations to provide a more balanced discussion of adaptation and mitigation examples

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
35651	2	0				The chapter has an overly one sided view in favor of a behavioral model of human behavior. Let me say at the outset that the evidence is clear that some behavioral biases exist. However, if the IPCC is going to consider behavioral biases, then standard critiques of behavioral models need to be included as well. First, for every behavior, both rational and behavioral explanations exist. Consider, for example, the lack of widespread adoption of CFLs, despite their long run cost advantage. This behavior is certainly consistent with a behavioral bias (an overly short term focus). But rational explanations also exist: many complain that CFLs provide poor lighting quality and use mercury. An IPCC report needs to clearly state both possible explanations. Page 26, lines 42-47, states only the behavioral explanations. Similarly, building near coastlines, not investing in hurricane proof windows, and failure to buy flood insurance are consistent with some behavioral biases. But they are also consistent with rational explanations, such as moral hazard. Government policies which reimburse disaster victims decrease incentives to insure. Page 26, lines 30-41, consider only behavioral explanations. Second, laboratory based tests of behavioral biases have the advantage of being controlled experiments. Nonetheless, many behavioral biases that are well documented in the experimental settings fail in the field, especially where large dollars are at stake (see for example, Voors, et. al., Economics Letters, 114(3):308-311, 2012; Levitt and List, Journal of Economic Perspectives, 21(2):153-174, 2007). Further, market forces tends to encourage rational behavior, even if participants have behavioral biases (List, Journal of Political Economy, 114:1â€“37, 2006). For example, if energy efficient air conditioners are not selling well due to up front costs, their price will decline, increasing consumption to some degree. In addition, sellers have strong incentives to come up with more favorable financing arrangements. The chapter should treat with caution papers that report behavioral biases in laboratory settings (e.g. page 27, line 38; page 28, lines 40-46).	Accepted - Section 2.4 (previously 2.2) has been revised to provide a more balanced view and the provided references have been added.
35652	2	0				The most relevant critique is that if indeed people have behavioral biases, then they will certainly elect leaders with similar biases, who will in turn appoint UN representatives with similar biases. The chapter agrees that heads of state will have behavioral biases. However, the chapter takes the point of view that scientists and the UN have no such biases, and can be counted on to act in a perfectly rational manner, and develop policies which optimally account for the biases in the general population For example, sections 2.2.2 and 2.4.5 frequently degenerates into a perspective that presents scientists and the UN as omniscient, rational thinkers that must save an emotional public from irrationally acting against their own best interest. This potential contradiction needs to be addressed.	Accepted - the apparent contradiction is now addressed and resolved in Section 2.4
35653	2	0				It is not clear why the IPCC, which provides scientific background for international climate policy, should be interested in behavioral issues at the individual level. At best, one could say that behavioral biases may prevent some individuals from investing in adaptations which lessen the impact of climate change. Failure to adapt increases the cost of climate change, and would therefore be of some minor concern for a chapter on impacts. This chapter should do a better job of relating behavioral biases related to risk and uncertainty to national/international policies or other climate change related programs.	Accepted - a better connection between behavioral biases and risk and uncertainty issues and responses is now provided in Section 2.4
35654	2	0				We would like to see much more focus on the basic principles of uncertainty, risk and decision-making under uncertainty. There is far too much superficial treatment of a wide variety of issues without providing a foundation for understanding risk and uncertainty.	Accepted. We have provided a broader foundation for risk and uncertainty in the revised sections Metrics of Uncertainty and Risk (Sect 2.2) and Risk and Uncertainty in Climate Change (Sect 2.3).

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
35655	2	0				Lots of the chapter does not concern uncertainty and risk per se but decision making. For instance, the treatment of hyperbolic discounting. Or the discussion of 2.4.4.3 on behavioral change. Many instances. The chapter should focus more on uncertainty and less on covering all topics that can be illuminated by psychology or economics.	Taken into account in part and rejected in part- The "behavioral" section (now 2.4 has been extensively revised and streamlined, making the list of topics covered more cohesive and showing their relevance to mitigation and adaptation decisions more clearly, but does not restrict itself solely to issues related to risk and uncertainty. Consultation with the TSU encouraged us to cover behavioral phenomena and models more broadly, with Chapter 2 being the most appropriate place to do so.
35656	2	0				It would be helpful to rely on the variety of literatures that address this topic and to rigorously treat these literatures. For the most part, the treatment seems to be from the perspective of psychology and sociology. That's fine but what about statistics and economics? There is a bit of economics in the chapter but the literature is far richer, deeper and broader than is suggested (including the recent experimental literature).	Taken into Account. The material in Tools and Decision Aids for Managing Risk and Uncertainty (Sect 2.5) discusses models from economics and decision analysis complementing material in Chap. 3.
35657	2	0				There is a great deal of the relevant literature does not concern climate but is easily extended to climate (eg how farmers learn when faced with change (perhaps technological) is highly relevant to how they may change when confronted with a changed climate). We suggest a de-emphasis on literature that is purely climate and an expansion to a richer relevant literature. In fact, some of the best parts of the chapter are when the authors do exactly that (eg, p 18 and p 20).	Accepted - text has been revised at multiple locations accordingly, e.g., in a new section on the acceptance of new technology
35658	2	0				There is a good deal on the psychology of behavioral "anomalies" in the chapter. This is interesting stuff but some of it is unrelated to uncertainty. We recommend that this should be de-emphasized in the discussion.	Taken into account in part and rejected in part- The "behavioral" section (now 2.4 has been extensively revised and streamlined, making the list of topics covered more cohesive and showing their relevance to mitigation and adaptation decisions more clearly, but does not restrict itself solely to issues related to risk and uncertainty. Consultation with the TSU encouraged us to cover behavioral phenomena and models more broadly, with Chapter 2 being the most appropriate place to do so.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
35659	2	0				There are scattered references to vulnerability and even less to resilience through the chapter. The chapter should make sure to include the appropriate cross-reference to relevant WG2 chapters for reader who desire more information.	Thanks for the suggestion. Vulnerability and resilience are good established concepts of WG 2 and adaptation terminology. Chapter 2 of WG review U & R concepts related to adaptation.
35660	2	0				The current state of the chapter seems to provide a perspective of the chapter authors rather than an in depth treatment of relevant issues. A reader is often left wondering if a statement is the opinion of the authors or is something rooted in the literature. We encourage the others to ensure that an statement made as fact has a relevant citation.	Correct. Of course redaction of reports always has an emphasis from author's perspectives.
35661	2	0				The chapter contains many normative statements, that include statements of what "needs to be done" to reduce greenhouse gas emissions or achieve the MDG or some other goal. The report should not be providing prescpretive statements. We suggest carefully going through entire chapter and make the text is neutral regarding the urgency of accomplishing climate goals.	We have carefully addressed all the instances that contain prescriptive statements.
35662	2	0				The chapter should expand on the basis of expected utility and how climate change challenges its axioms, and inserting a new section on stochastic integrated assessment models, with subsections on Monte Carlo results and the role of learning. A box on the difference between Monte Carlo analyses and stochastic programming would be a valuable service to the broader field. Also, a section on how uncertainty affects the choice of policy instrument (such as cap-and-trade versus a carbon tax) seems firmly within the remit of this chapter.	Taken into account. Further expanding on the basis of EU is not possible due to space constraints. We outline the basis of EU in our 'tools' section and explain the difficulties with that criterion in the same section under the sub-section on cost effectiveness analysis. From our point of view no common understanding has emerged yet whether (and if so: which) von Neumann Morgenstern Axioms would have to be dropped in order to better accommodate the populations preference order in view of the existing information structure. Regarding stochastic integrated assessment models we do not see why we would need a new section as this is exactly what 2.4.2 is about. We will spend more space in clearer explaining the difference of MC and stochastic programming. □
35663	2	0				The report "Informing an Effective Response to Climate Change" would likely be informative for the chapter's authors (http://www.nap.edu/catalog.php?record_id=12784) and readers of this report.	Thank you. We found it interesting, and it has informed our thinking. This is especially the case with respect to Chapter 2 of that report, which has framed our new version of the introduction to this chapter.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
35664	2	0				In the discussion of decision management frameworks the chapter should mention how the various tools would be adeqaute for incoprorating the loss of cultures that could occur as a result of climate change (e.g., as the result of the loss of some small island nations)	Accepted - we now provide the loss of small island nations as an example of catastrophic loss.
35665	2	0				What would be particularly useful for the readers is to provide examples where the different decision making frameworks are applied by the various types of actors discussed in the chapter and what the outcomes have been	Thank you. We now discuss in greater detail the implications of different decision frameworks. However we do not discuss the impplication of applying them to different types of actors as the vast majority of the literature either consider a social planner (discuss largely in the section on integrated assessment models) or firm, discussed in the devoted sections. We do point out the lack of literature better covering the implications for different actors and the presence of a gap in the research field.
35666	2	0				This document refers to what it calls "the precautionary principle." (See, e.g., section 2.3.5.) As the United States has affirmed on many occasions, there is no such thing as "the precautionary principle." Precaution is an approach or tool which is context-specific, used differently in different international fora, and cannot be reduced to a single formulation, let alone considered a "principle." In particular, we disagree strongly with the idea that precaution (let alone the Rio Declaration formulation of it) shifts the burden of proof, as described on page 35, line 7. To the extent this document refers to precaution, it is critically important that it refer to "a precautionary approach" (not "the precautionary principle" or a "principle" of precaution listed in the UNFCCC, the Rio Declaration, or elsewhere). See also our similar comment regarding its use in chapter 13. This issue applies regardless where precaution is referenced in this assessment.	Rejected The precautionary principle is used in Europe and we feel it is important to indicate what it implies and show how robust decision making can address the PP in a more meaningful manner. See Sect 2.5.5 in final version
35667	2	0				The inclusion of research from behavioral economics and science is most certainly warranted and is an improvement from AR4. When governments and institutions are designing mitigation or adaptation policies/programs and using on the design frameworks discussed in the chapter it is critical that they understand how individuals will respond in reality. Therefore the behavioral research has an important role in this report and in this chapter when they pertain to decision making under risk and uncertainty. This point is not really laid out explicitly in the chapter but would be a significant contribution to the report. Also the material in Section 2.2 is relevant for policy makers in that it demonstrates how individuals and different organizations may have incomplete information and this may be a relevant control variable for policy/decision makers. Understanding how that fits into an efficient mitigation/adaptation policy/program portfolio is highly relevant and would represent a real contribution. That being said, it seem like the chapter would have a much better flow if the decision frameworks discussed in section 2.3 are introduced first and then as currently applied they may not be capturing some of these behavioral aspects which may be problematic in using them to design policy/program portfolios. Followed naturally by a discussion of research that has attempt to integrate some of them and what more can be done in the future.	Rejected - order of these two sections was discussed extensively by chapter team; decision was made that the current order works better.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
35668	2	0				We recommend that all references to System 1 vs. System 2 behavior should be deleted. This discussion and framework is convoluted and does not add a useful dichotomy in which to discuss the issue of the chapter.	Taken into Account In the final version we have indicated the basis for System 1 and 2 but then indicated the need to understand intuitive thinking and complement it with deliberative thinking.
35669	2	0				Much of section 2.2 and 2.4.5 can come across as prescriptive, condescending and rife with value judgments. There is a place for a report on recent advances in behavioral economics, but they must be presented in a descriptive, non-valuative manner. However, it's not at all clear why a chapter on risk assessment should include a discussion of behavioral economics. The IPCC report is not and should not be an advocacy document on how one can convince the masses to accede to climate policies. Sections 2.2 and 2.4.5 appear to significantly trespass on that line.	Accepted - the old indicated sections (section numbering has been revised) have been carefully edited to remove any evaluative or policy-prescriptive language.
35670	2	0				We recommend that the author teams of Chapters 2 and 3 coordinate with each other to ensure that material is not duplicated. There is currently a large overlap between Section 2.2 and Section 3.9. Only behavioral issues that relate to uncertainty should remain in Chapter 2 and others should be relegated to Chapter 3. For example behavioral responses not included in traditional modeling that explain energy efficiency adoption are well discussed in Chapter 3. The only reason it would be relevant in Chapter 2 would be to discuss the literature (e.g., Hassett and Metcalf [1993], Metcalf [1994], and subsequent work) that describe how uncertainty in value of future energy savings could lead to what appears to be a higher than expected discount rate in a deterministic net present value framework.	Accepted - references have been added and chapter sections more closely coordinated.
19176	2	1				Since there us no evidence that greenhouse gases harm the climate the risk is almost zero and the effort should be to calm down those who believe otherwise	Rejected - this comment is inconsistent with the results of WG1
22751	2	1	1	66	28	This chapter should inform the policy-makers how to deal with the risks and uncertainties related to climate change policy thus to make policy decision firmly. However, the drafting of this chapter hasn't provided these views, thus need improvement, especially the risk from mitigation efforts should be raised.	Noted We have modified the chapter to address this point
19575	2	1	1	88		All the capital and small letter of the titles should be consistent for the whole chapter 2.	Noted.
35712	2	10	10	10	11	These "different interpretations" are not the result of climate system uncertainties. The IPCC is very confident that climate change is mostly due to human causes. This is not a good example of a climate system *uncertainty* that affects policy choices. The different interpretations are not being driven by uncertainties in the understanding of the climate system. Some decision makers may perceive uncertainty about this fact, but that's different kind of problem. This needs to be clarified.	Accepted. We have completely revised the section, and this error has been taken into account.
35713	2	10	18	10	22	This paragraph doesn't fit with the ones that prcede or follow it. It seems out of place. Also in the taxonomy being discussed, and presented in table 2-1, climate system uncertainty, as is being discussed in this example, doesn't appear to affect loci below the international. That doesn't make a lot of sense since of course climate system uncertainty will have an effect on decision making at other resolutions (e.g., local adaptation planning). Very confusing. This taxomny is not correct and should be dropped from the chapter.	Noted. We have substantially revised the taxonomy, and the descriptive text, responding to many comments that it was unclear. Wer we now clarify is that the table captures one aspect of the literature on mitigation and uncertainty.
30754	2	10	2	10	3	Change "this taxonomy" to "the taxonomy of Table 2.1".	Accepted. We have revised the descriptive text, and no longer make this mistake.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
35714	2	10	21	10	21	We are unclear what the usage of "predict" is in this sentence. Their actions? Or "project" or "understand"? Please edit the sentence to clarify what is meant.	Noted. This sentence has been dropped as part of the general revision to this section.
35715	2	10	24	10	25	You need to define what a "fat tail" is for many readers. Please provide a definition and appropriate references.	Noted. This sentence has been dropped as part of the general revision to this section.
35716	2	10	24	10	25	Why do "fat tails" having some influence mean we must turn to other strategies? Skewdness does not necessarily invalidates CBA. The chapter's discussion of "fat tails" is incomplete and needs to be expanded to provide a more robust presentation that notes the problem with "fat tails" relates to the formulation of the utility functions, along with the numerous arguments and literature that shows this may not be an issue in the climate change discussion (Newbold and Diagnult, Yorman and Roe, etc.)	Noted. This sentence has been dropped as part of the general revision to this section.
25926	2	10	27	11	3	References about the consequences of uncertain technology outlook: • Labriet, M., A. Kanudia and R. Loulou. 2012. Climate mitigation under an uncertain technology future: a TIAM-WORLD analysis. Energy Economics, Vol.34, Supplement 3, pp.S366-377. Available online 10 March 2012. http://dx.doi.org/10.1016/j.eneco.2012.02.016, • Loulou, R., A. Kanudia and M. Labriet. 2012. Effectiveness and efficiency of climate change mitigation in a technologically uncertain World. Climatic change, Special Issue on EMF27. Submitted.	Noted. This sentence has been dropped as part of the general revision to this section.
24558	2	10	28	10	31	The length of this sentence confounds meaning. Suggest split into two sentences, after 'negative emissions;'	Noted. This sentence has been dropped as part of the general revision to this section.
35717	2	10	32	10	40	This seems to mix policy choice with uncertainty, a common issue in the chapter. Policy choice (without uncertainty) would seem to belong elsewhere. This chapter should be scrubbed to only include policy desgin issues associated with uncertainty and other discussion of policy design should be left to chapters 3 and 15.	Accepted. The particular sentence is now gone. More generally, throughout the chapter, we have sharpened our focus on the issue of uncertainty, as we as the closely related issue of decision-making biases and processes.
27078	2	10	33	10	35	There also is literature on uncertainties around deployment, specifically whether technologies can come online fast enough.	Noted. This sentence has been dropped as part of the general revision to this section.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
35718	2	10	37	10	40	Germany has already scaled back it's solar price guarantees. The problem with such guarantees is that they might not be viewed as credible, especially since most governments are facing budget issues. In general, the issue of credibility is overlooked in many policies recommended in the chapter. The chapter should better discuss the importance of credibility of such programs which is directly related to uncertainty.	Noted. This sentence has been dropped as part of the general revision to this section. As far as we could find, the issue of credibility appears in the literature primarily in the context of trading systems, where it is unclear whether the government will maintain a high carbon price into the future. We do cover that. We don't know of literature on the issue of credibility in the context of price guarantees. In the German case, anecdotally, it has not been an issue, since there has been no sign that policy makers would invalidate existing contrtacts between FIT recipients and the TSOs. The scaling back, rather, affects future contracts, although again it appears clear that the scaling back has closely tracked falling costs for REN technologies. In the case of Spain there was an invalidation of contracts, and so here the issue of credibility might be an issue. But we don't know of any papers that have examined this factor in the Spanish case.
33639	2	10	38			typo: must be 'incentives by guaranteeing'	Noted. This sentence has been dropped as part of the general revision to this section.
20771	2	10	39	10	40	specify when	Noted. This sentence has been dropped as part of the general revision to this section.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
35719	2	10	42	10	43	We're not sure this assertion is entirely correct "The decision to support new technological development is normally made by the national government" Industry and the market make many of these decisions independently. This taxomy appears incorrect and should be removed.	Noted. This sentence has been dropped as part of the general revision to this section. We have substnatially revised the taxonomy, and also presented a new set of explanatory text. What we now clarify is that we mean the Figure to be capturing one aspect of what we assess in the final sections of this chapter, namely that the types of uncertainties that have appeared most prominently in the literature are somewhat related to the type of choice, and the geographic scale of that choice, that is under consideration. We are now quite clear that the Figure does not capture all aspects of different choices.
20772	2	10	45	10	47	please refourmulate question in affermative	Noted. This sentence has been dropped as part of the general revision to this section.
22958	2	10	6	11	3	Could eliminate all of this, material is covered in section 2.1.2	Noted. This sentence has been dropped as part of the general revision to this section.
25925	2	10	8	10	13	References about the consequences of the uncertain climate sensitivity: • Labriet M., Loulou R. and A. Kanudia, 2009. Modeling Uncertainty in a Large scale integrated Energy-Climate Model. In: Environmental Decision Making under Uncertainty, J.A. Filar and A.B. Haurie (eds), pp.51-77. 10.1007/978-1-4419-1129-2_2 • Loulou, R., M. Labriet and A. Kanudia. 2009. Deterministic and Stochastic Analysis of alternative climate targets under differentiated cooperation regimes. Energy Economics, Volume 31, Supplement 2, International, US and EU Climate Change Control Scenarios: Results from EMF22, p.S131-143. http://dx.doi.org/10.1016/j.eneco.2009.06.012	Noted. This sentence has been dropped as part of the general revision to this section.
25545	2	10	8	10	13	As currently mainly the achievement of targets with relatively low chance is discussed in policy circles (50% chance, or >66% chance) the tail of the distribution of carbon cycle uncertainty might actually have a relatively limited effect on choices whether or not to impose a carbon tax. In a recent study, we show that irrespective of carbon cycle and climate uncertainties (and thus irrespective of the tail) mitigation action (translated into a carbon tax) is required for limiting warming below 2°C. Reference: Rogelj, J., D. L. McCollum, A. Reisinger, M. Meinshausen & K. Riahi (2013) Probabilistic cost estimates for climate change mitigation. Nature, 493, 79-83, 10.1038/nature11787.	Noted. This sentence has been dropped as part of the general revision to this section. We have included a reference to this paper later in the chapter.
35711	2	10	9	10	10	Again the tail of the distribution is mentioned without any explanation of what it is or why it should matter, and how. This discussion should be exapnded.	Noted. This sentence has been dropped as part of the general revision to this section.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
19664	2	10	22	10	25	Surprisingly, the mentioning of an important decision tool for climate policy planning is completely missing from this paragraph, namely multi-criteria decision analysis (MCDA) tools. MCDA is being increasingly applied in climate decision-making as an alternative to CBA and CEA approaches, and its ability to capture a wide range of stakeholders' views and to deal with non-monetary impacts (thus eliminating some uncertainties when translating non-market impacts into monetary equivalents as done for instance by standard CBA tools) needs to be acknowledged. Some reference to studies using MCDA in climate-policy making are as follows: Bell ML, Hobbs BF, Ellis H (2003) The use of multi-criteria decision-making methods in the integrated assessment of climate change: implications of IA practitioners. Socio-Economic Planning Sciences 37: 289-316; Konidari P, Mavrakis D (2007) A multi-criteria evaluation method for climate change mitigation policy instruments, Energy Policy 35: 6235-6257; Solomon DS, Hughey KFD (2007) A proposed multi criteria decision support tool for international environmental policy issues: a pilot application to emissions control in the international aviation sector, Environmental Science & Policy 10: 645-653; UNEP (2011) A Practical Framework for Planning Pro-Development Climate Policy. UNEP report, Scrieciu S, Bristow S, Puig G (lead authors), United Nations Environment Programme, online at http://www.mca4climate.info	Rejected. Treatment of MCDA is completely tangential to this section. Tools such as MCDA are treated later in the chapter, in a complete section devoted to them.
26410	2	11	1	11	1	investment choices by firms including their understanding of the risk-return tradeoffs of choosing to invest in mitigating climate change or choosing to not mitigate climate change. Firms approach investment choices from a portfolio management point of view, where collectively all investments (internal and external) must exceed a specific internal rate of return for a given unit of risk. This cost curve must be bent to promote financing climate change mitigation activities. To do this in a manner that is scalable requires engaging global capital markets to develop apply available financial instruments and develop new financial instruments to fund climate change mitigation at the scale required to meet 450 PPM thresholds.	Noted We have revised the discussion of the taxonomy (Fig 2.2) and do not mention investment choices by firms
30755	2	11	12	11	16	This could be simplified as follows: "For example, climate scientists have conflicting views on the possible short- and long-term effects of climate drivers on the Greenland and Antarctic ice sheets, making prediction of eventual outcomes on sea level rise (SLR) more difficult than previously believed (Bamber and WP Aspinall, 2012)."	Noted We have eliminated a discussion of the possible short- and long-term effects of climate drivers on the Greenland and Antarctic ice sheets
20773	2	11	13	11	14	not correct: experts do not have different views on climate drivers and possible evolution of ice sheets. Climate drivers are clear and the response of ice sheets is not yet understood because different studies show different results and the observed ice sheet response to global warming (eg. Greenland Ice Sheet) has been faster than what was predicted (eg. in IPCC AR4)	Thanks for this comment, but I beg to differ. Pls consult Bamber and Aspinall 2013 for a recap of expert differences. The role of ice sheets was perhaps the least successful aspect of AR4. You may enjoy: the recent webcast "Ice sheets on the Move":http://www.rff.org/Events/Pages/Ice-Sheets-on-the-Move.aspx
30756	2	11	13			An acronym for "sea level rise" (SLR) is introduced but is not carried forward in remaining of the chapter. Suggest reviewing for consistency.	Noted. This point has been dropped as part of the general revision to this section.
22755	2	11	16	11	35	The audience is not interested in these textbook-like theories and guidelines, and these paragraphs didn't reflect the updated research findings after IPCC AR4, thus, should be deleted.	Noted. This point has been dropped as part of the general revision to this section.
35720	2	11	16	11	21	The definition of type I and type II errors is not clear and should be improved.	Taken into Account. We have removed a discussion of Type I and Type II errors.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
22959	2	11	17	11	21	This discussion is confused - shouldn't line 20 say "does not" rather than "actually"?	Accepted - this section has now been significantly revised.
32322	2	11	17	11	20	The description of a Type I error is wrong. The authors say "An example of a Type I error in the context of climate change would be that scientists hypothesize that climate change occurs because of anthropogenic emissions of greenhouse gases (GHGs) when this hypothesized causal relationship actually exists." 1. A Type I error can only be associated with a decision or conclusion, not with a hypothesis ("... scientists hypothesize..."). 2. A Type I error is a false rejection of the null hypothesis. Here that would mean schientists conclude there is a causal relationship when in fact it DOES NOT exits. What the authors describe would be a correct conclusion, no error.	Accepted - this section has now been significantly revised.
27079	2	11	17	11	20	As many others will note, the definition of a Type I error is missing a "not".	Noted
33641	2	11	17	11	20	The example of Type I errors is incorrect. The sentence does not display any errors, it is completely valid. So do you mean: '… when this hypothesized causal relationship does not exists.'?	Accepted - this section has now been significantly revised.
24559	2	11	17	11	21	Accuracy - remove "An example of a Type I error in the context of climate change would be that scientists hypothesize that climate change occurs because of anthropogenic emissions of greenhouse gases (GHGs) when this hypothesized causal relationship actually exists. A Type II error would occur if scientists assume no such causal relationship exists, when, in fact, it does." and replace with: "A type II error is the failure to reject a false null hypothesis” Citation: Sheskin, David (2004). Handbook of Parametric and Nonparametric Statistical Procedures. CRC Press, Florida, USA.	Accepted - this section has now been significantly revised.
35722	2	11	17	11	17	How is this a Type I error? It's not an error as currently written. Also, I don't think this is a good example to use - it's a hypothetical example, but could be perceived as raising questions about a relationship that is one of the main conclusions of WG1. It would be better to use a different example that doesn't potentially undercut a primary conclusion of the IPCC.	Taken into Account. We have removed a discussion of Type I and Type II errors.
35721	2	11	17	11	35	We find the discussion of Type I and Type II too simplistic. Most decisions be in between these and that is where the challenge lies. We recommend improving the examples, or clearly characterize it as a spectrum.	Taken into Account. We have removed a discussion of Type I and Type II errors.
30757	2	11	18	11	19	This should read "An example of a Type I error would be that scientists hypothesize that climate change occurs because of anthropogenic emissions of greenhouse gases (GHGs) when this hypothesized causal relationship actually does not exist." (I.e. it would be an incorrect rejection of the null hypothesis)	Taken into Account. We have removed a discussion of Type I and Type II errors.
33961	2	11	20			“exists” is “does not exist”	Taken into Account. We have removed a discussion of Type I and Type II errors.
32323	2	11	20	11	20	"conclude" would be a a better verb than "assume" when talking about a eror (see previous comment).	Taken into Account. We have removed a discussion of Type I and Type II errors.
27449	2	11	20	11	20	Please modify: "… relationship actually does not exist."	Taken into Account. We have removed a discussion of Type I and Type II errors.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
32324	2	11	22	11	35	The wording and grammar of this paragraph is wrong with respect to the logic of hypothesis testing. A Type I / Type II error is never associated with a hypothesis but with the decision to adopt or reject a hypothesis. Phrases like "scientists hypothesize" (Line 25) should be replaced with something like conclude, postulate, etc. Further, the probability of a Type I / Type II error is NOT the probability of a hypothesis being true or not true (Lines 28 and 31), it is the conditional probability of making a wrong decision GIVEN THAT the hypothesis is true. Frankly, I find it hard to believe that I see such mistakes in this expert report. This is very basic text book knowledge which I teach my first year students. Such mistakes undermine the credibility of the report and lay it open to attack by skeptics.	Taken into Account. We have removed a discussion of Type I and Type II errors.
24560	2	11	22	11	25	The length of this sentence confounds meaning. Suggest removing the definition of Type I error (from 'in characterizing' to 'not exist,') as this is already defined above (p.11 lines 17-20), and because this makes the sentence consistent with the fact that there is no further definition of a Type II error given	Taken into Account. We have removed a discussion of Type I and Type II errors.
30758	2	11	23	11	25	This sentence does not make sense as stated. Perhaps reword as: "A Type I error (characterizing a causal relationship in the climate system which does not exist), is likely to lead to overinvestment in climate mitigation measures whereas a Type II error would likely result in under-investment."	Taken into Account. We have removed a discussion of Type I and Type II errors.
35723	2	11	25	11	25	What "above" example? The example follows this sentence. Please edit the text to reflect where the example is.	Taken into Account. We have removed a discussion of Type I and Type II errors.
35724	2	11	25	11	32	The example adds little here nor do the rhetorical questions are silly. We recommend that it should be deleted.	Taken into Account. We have removed a discussion of Type I and Type II errors.
30759	2	11	28	11	29	Suggest inserting "what are" in front of "the consequences"	Noted. This point has been dropped as part of the general revision to this section.
30760	2	11	31	11	32	Suggest inserting "what are" in front of "the consequences"	Noted. This point has been dropped as part of the general revision to this section.
32325	2	11	33	11	33	I assume the authors mean the likelihood of consequences, not of strategies?	Noted. This point has been dropped as part of the general revision to this section.
27080	2	11	36	11	44	This would be a good place to introduce the rationale for iterative management, instead of focusing on current practice.	Noted. This point has been dropped as part of the general revision to this section. We should also note that the issue of iteratuve management comes up in the section on Adaptive Management, under tools, as this is one of the ways that policy makers deal with uncertainty and the possibility of substantial learning.
33640	2	11	4			typo: 'key uncertainties and risks…'	Noted. This point has been dropped as part of the general revision to this section.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
29540	2	11	4			There is additional unavoidable uncertainty associated with the inability to predict structural changes in economic, social, and technological systems. These systems, unlike physical systems, can change their structure over time, but modelers usually assume the economy's structure (as embodied in elasticities and other parameters estimated based on historical experience) remains constant over time. This is a critical problem making accurate forecasting of such systems impossible. There are also pivotal events (like September 11th) whose occurrence can't be predicted, adding additional complexity. Koomey, Jonathan G., Paul Craig, Ashok Gadgil, and David Lorenzetti. 2003. "Improving long-range energy modeling: A plea for historical retrospectives." The Energy Journal (also LBNL-52448). vol. 24, no. 4. October. pp. 75-92. Scher, Irene, and Jonathan G. Koomey. 2011. "Is Accurate Forecasting of Economic Systems Possible?" Climatic Change. vol. 104, no. 3. February 1. pp. 473-479. [http://www.mediafire.com/file/icaktx41gt119dx/Scher_Koomey_Final042710-wproofedits.pdf] Also see Chapter 4 in Koomey, Jonathan G. 2012. Cold Cash, Cool Climate: Science-Based Advice for Ecological Entrepreneurs. Burlingame, CA: Analytics Press. [http://www.analyticspress.com/cccc.html]	Accepted. This is an interesting point. We have added the following text, with the citation to one of the papers you highlight:" For example, there is literature highlighting the challenge for policy-makers of predicting structural changes to economic or technological systems (Scher & Koomey 2011)."
35725	2	11	45	12	34	This whole section is confusing to me. Altough there are four bullets, there seem to be five areas, which is the beginning of my confusion. It is not clear why the taxonomy has been chosen. This section could be revised to provide a clearer presentaion.	Accepted: we have dramatically revised the entire section.
24561	2	11	49	12	2	It is unclear what comparison is being made between the current range of impact analysis and 'previously considered' impact analysis. If this is comparing with the analysis made in AR4, specifically note this by changing to: 'More generally, one needs to examine a wider possible range of potential climate impacts when developing risk management strategies compared to those that were covered in AR4'	Noted. This point has been dropped as part of the general revision to this section.
30307	2	11		13		In general requires more good examples from the real ground to show some good evidence based cases	Accepted. We have followed this advice in substnatially revising the section. For example, we have used the example of designing the EU ETS, and the uncertainties to which that is sensitive and not.
32394	2	11	12	11	14	Please be more precise wrt these statements, dynamics of GIS and AIS are very different. Please refer to WGI Ch04 for more details.	Noted. This sentence has been dropped as part of the general revision to this section.
19665	2	11	17	11	20	The formulation of type I error seems wrong here: it should read that type I error occurs when scientists hypothesise that climate change occurs because of anthropogenic action when in fact this relationship does NOT actually exist instead of "…when this hypothesised causal relationship actually exists".	Accepted We have removed a discussion of Type I and Type II errors
19666	2	11	45	12	34	There is no mention in uncertainties related to future developments in socioeconomic conditions at the macro-level, for example assumed future population growth rates or future trend in oil prices and other energy prices - surely such future trends and their related uncertainties can affect climate policy-making. I assume these may come under "market uncertainties" though they need to be spelt out more clearly.	Accepted. The uncertainties fall primarily under market uncertaint, and we have now spelled this out.
19604	2	11	5	11	35	The authors wrote a lot on the Typle I and Type II errors, which are quite different from the definitions in traditional statistics and bear weak relationship with their major conclusions. I recommend the two paragraghs be deleted.	Accepted. We have removed a discussion of Type I and Type II errors for the reasons indicated.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
27081	2	12	11	12	11	Or whether they will be available in time (CCS, for example, may not be able to be scaled up as fast as IAMs assume).	Accepted. We raise this issue in presenting the issue of technological uncertaintiy, with availability being one of the factors.
22961	2	12	14	12	15	With high enough emissions, the state of the environment is in fact likely to be determined by climate rather than other factors. The economics may well be driven by climate, since society is not preparing in any adequate way.	Noted. To some extent this point is tangential to our chapter. We do however note the difficulty of forecasting discontinuities, which would include causal discontinuities like those you mention here.
33642	2	12	14	12	20	Layout is incorrect. There has to be a bullet because it is the third bullet.	Noted. We have substnatially revised the whole section, and this has been fixed.
19146	2	12	14	12	14	Uncertainty in the carbon cycle? I do not follow this. Every year plants capture the equivalent of about 2ZJ of CO2 and every year this is released back into the atmosphere. It is a case of use it or lose it. What is the uncertainty?	Noted. As we point our later in the text, one of the critical issues is uncertainties with respect to national sources and sinks, highly relevant for policy design issues, espeically in the international context.
35726	2	12	22	12	24	The sentence starting with "Climate policy for adaptation" is awkward and should be rewritten.	Noted. We have substnatially revised the whole section, and this has been fixed.
35727	2	12	25	12	25	Tax policies have been around for centuries. Gas taxes and permit markets for other pollutants have been in place for decades. For example, the winter 2013 issue of the Journal of Economic Perspectives gives a number of review articles detailing the lessons learned from permit markets, including carbon markets. We know a lot more than is indicated in these lines. This discussion should be updated to reflect this fact.	Noted. We have substnatially revised the whole section, and this has been fixed.
33643	2	12	29			typo: 'behaviour of the system'	Noted. This point has been dropped as part of the general revision to this section.
27082	2	12	30	12	34	The real issue is the extent to which national interests trump international needs.	Noted. This point has been dropped as part of the general revision to this section.
33644	2	12	30	12	34	layout is incorrect. The bullet has to be removed as there are only four bullets and not five.	Noted. We have substnatially revised the whole section, and this has been fixed.
35728	2	12	38	12	46	We understand this dichotomy, but the use of the terms descriptive, prescriptive, and normative in this manner seems at odds with their standard use within the economics literature. This should be clarified.	Rejected. As we point out in the Introduction, the terms normative, descriptive and prescriptive are utilized in the decision sciences and decision analysis fields. These terms are now being utilized in Chapter 3 of WGIII in their final version so there is consistency in terminology across disciplines.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
35729	2	12	46	12	46	Whose ``desired outcomes"? Please clarify.	Taken into Account. We have removed the phrase and having them achieve their desired outcomes.
21592	2	12	16	12	20	The socio-economic pathways are mentioned here, but they are not frequently referred to in other chapters (e.g. Ch. 5 and 6).	Noted. This point has been dropped as part of the general revision to this section.
20695	2	12	1	13	32	There is no 'meat' here providing evidence of some of the absurdities underlying such issues as ethical considerations, claimed co-benefits, and adverse side-effects. Why does the UK planning system claim the simple burning of palm oil in proposed power stations is a use of renewable energy - while disregarding evidence placed before it of associated carbon emissions, deforestation, habitat and species loss? Why are subsidies provided by electricity customers under some regimes so generous that it pays to put up wind turbines where there is little wind, or solar PV roof panels - and larger schemes - where there is little Sun? Why is there no provision for compensation to those adversely affected under some regimes - where are the ethics in that? Let us have some real examples - not superficial half-true statements.	Accepted: we have dramatically revised the entire section, and have done our best to stick to meatier examples.
27083	2	13		13		Congratulations on taking a problem-based approach. This is a helpful framework for understanding the iterative nature of climate change risk management.	Noted.
22962	2	13	11	13	17	This paragraph could be eliminated - it and the three below simply summarize later material	Taken into Account. We have condensed the discussion of the boxes in Fig 2.1 and integrated the text with the Storyline for the Chapter.
30761	2	13	11	13	13	As written this does not make sense; suggest deleting "characterized" before "risk governance" on L 13.	Accepted.
35730	2	13	13	13	13	Why introduce the term "risk governance" here? It seems superfluous to the discussion being had within this paragraph. It seems to only add confusion by adding a new term that is not necessary and is not well described in the current context. The term should be deleted or better defined.	Accepted.
27085	2	13	18	14	8	The short-term nature of much decision-making is well known, so it could be more interesting to include an example where the longer-term was considered, such as some of the road reconstruction after Hurricane Katrina.	Taken into Account. We discuss the challenges in long-term thinking in Sect 2.4.
20774	2	13	3	13	4	sentence can be cut	Accepted
27084	2	13	5	13	17	Another question is what part of the problem needs to be addressed in this step and what issues can be postponed under an iterative management framework?	Rejected. Outside the scope of this section.
33962	2	13	7			“decisions s”	Accepted - the s has now been deleted.
33645	2	13	7			typo: 'The decisions can be taken…'	Noted
22963	2	14	1	14	8	This paragraph could be eliminated	Rejected - the paragraph clarifies and short-term and long-term view and is very relevant to our discussion.
35732	2	14	1	14	3	The text reads as if this example was meant to show how individuals and groups can make decisions in a manner that doesn't match optimal decision modeling in the face of full information. However, nothing in this one sentence example suggests that this delay is not optimal by the standards of such models. This example should be deleted.	Taken into account. The example has been modified so it is clear why behavior is non-optima
35731	2	14	1	14	8	The tone of this paragraph should be edited to provide a balanced perspective on the literature. The use of words like "unduly" should be deleted because they reflect a value judgment.	Accepted. The word unduly has been deleted.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
22964	2	14	16	14	24	This paragraph could be eliminated	Taken into account. We have condensed the discussion of the boxes in Fig 2.1 and integrated the text with the Storyline for the Chapter.
35735	2	14	16	14	23	We feel that this paragraph is prescriptive and should therefore be revised. The use of the phrase "justify their positions" is particularly problematic.	Accepted. The phrase justify their positions has been deleted and the example modified so it is less prescriptive.
27087	2	14	25	14	31	It would be important to re-emphasize the iterative nature of managing the risks of climate change.	Taken into Account. We highlight the iterative nature of climate change via the feedback loop in Figure 2.1 and provide examples of this in the text.
35736	2	14	30	14	30	``Decision aids'' are positive not normative. Are we focusing on policymakers for a population with behavioral responses, or on behavioral policymakers who need decision aids? This text needs to be clarified.	Taken into Account. In Sect 2.5 we indicate the positive role decision aids can play in improving behavior.
22965	2	14	32	14	41	This paragraph could be eliminated	Taken into account. We have condensed the discussion of the boxes in Fig 2.1 and integrated the text with the Storyline for the Chapter.
35737	2	14	32	14	41	We think what is being suggested here is that educational programs that result in better informed agents should be viewed as a potential control variable within the overall scope of climate change policies due to their ability to influence agent behavior. If our understanding is correct, we think it would be useful to explicitly state this to the reader. Providing information changes behavior -> changes in behavior affect the climate change problem -> ergo information transfers might be a useful policy lever. As written now the point seems a little convoluted. We recommend revision.	Taken into Account. The importance of providing information to improve decision-making is discussed in Sect 2.4 and Set 2.5. this is an important point.
27088	2	14	33	14	33	I thought Figure 2.1 showed that iterative risk management, not just a feedback loop. This should be clarified.	Accepted. We show that the feedback loop is a form of iterated risk management.
20775	2	14	42	14	27	section can be shortened	Noted
35738	2	14	42	15	27	The road map for the remainder of the section is a repeat of what has already been offered. If the authors need to cut space, eliminating this type of repetition would be certainly be possible without any loss of readability.	Taken into account. We have condensed the discussion of the boxes in Fig 2.1 and integrated the text with the Storyline for the Chapter.
27089	2	14	49	14	49	Bias means different things to different scientific disciplines and to the public. It would be helpful to define exactly how bias is meant in this chapter.	Accepted. We define bias explicitly in the chapter.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
35734	2	14	6	14	6	Here there is no justification given in this SLR example as to why such decision making is irrational as was suggested in the previous paragraph. If this discussion is retained, it needs to be supported with citations.	Rejected. The example is designed to highlight the behavioral aspects related to climate change and sea level rise illustrates how the data may not be considered due to behavioral biases. We do not need citations on SLR to explain this behavior.
35733	2	14	6	14	7	This concept of a "threshold level of concern" should be defined.	Accepted. The term threshold level of concern is now more explicitly defined in the context of probability.
27086	2	14	9	14	24	This would be an excellent place to introduce co-benefits and how they can modify the cost-effectiveness of particular mitigation policies.	This paragraph was deleted from the final draft of the paper
19667	2	14	9	14	24	Same as comment 17 above: surprisingly, the mentioning of an important decision tool for climate policy planning is completely missing from this paragraph, namely multi-criteria decision analysis (MCDA) tools. MCDA is being increasingly applied in climate decision-making as an alternative to CBA and CEA approaches, and its ability to capture a wide range of stakeholders' views and to deal with non-monetary impacts (thus eliminating some uncertainties when translating non-market impacts into monetary equivalents as done for instance by standard CBA tools) needs to be acknowledged. Some reference to studies using MCDA in climate-policy making are as follows: Bell ML, Hobbs BF, Ellis H (2003) The use of multi-criteria decision-making methods in the integrated assessment of climate change: implications of IA practitioners. Socio-Economic Planning Sciences 37: 289-316; Konidari P, Mavrakis D (2007) A multi-criteria evaluation method for climate change mitigation policy instruments, Energy Policy 35: 6235-6257; Solomon DS, Hughey KFD (2007) A proposed multi criteria decision support tool for international environmental policy issues: a pilot application to emissions control in the international aviation sector, Environmental Science & Policy 10: 645-653; UNEP (2011) A Practical Framework for Planning Pro-Development Climate Policy. UNEP report, Scrieciu S, Bristow S, Puig G (lead authors), United Nations Environment Programme, online at http://www.mca4climate.info	Taken into Account We have now noted the relevance of MCDA in Sect 2.5.3
26195	2	143	1	143	2	Could be shortened to Chapter 2 Risk and Uncertainty Assessment	Taken into Account We need to follow the plenary outline for section headings but will modify other headings as appropriate given these suggested changes.
26200	2	143	10	143	10	2.1.4 Storyline for the Chapter could be shortened to 2.1.4 Storyline	Taken into Account We need to follow the plenary outline for section headings but will modify other headings as appropriate given these suggested changes.
26201	2	143	11	143	11	2.1.5 What is new on risk and uncertainty in AR5 could be shortened to 2.1.5 risk and uncertainty in AR5	Taken into Account We need to follow the plenary outline for section headings but will modify other headings as appropriate given these suggested changes.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
26202	2	143	12	143	12	2.2 Perceptions and behavioural responses to risk and uncertainty could be shortened to 2.2 Perceptions and behavioural responses	Taken into Account We need to follow the plenary outline for section headings but will modify other headings as appropriate given these suggested changes.
26203	2	143	34	143	34	2.3 Models and Decision Aids for improving choices related to climate change could be shortened to 2.3 Models and Decision Aids for improving choices	Taken into Account We need to follow the plenary outline for section headings but will modify other headings as appropriate given these suggested changes.
26196	2	143	4	143	4	Could be shortened to Chapter 2 Risk and Uncertainty Assessment	Taken into Account We need to follow the plenary outline for section headings but will modify other headings as appropriate given these suggested changes.
26197	2	143	7	143	7	2.1.1 A Taxonomy for Framing Decision Making Loci and Types of choices could be shortened to 2.1.1 A Taxonomy for Framing Decision Making	Taken into Account We need to follow the plenary outline for section headings but will modify other headings as appropriate given these suggested changes.
26198	2	143	8	143	8	2.1.2 Key uncertainties and risk that matter for climate change response policies could be shortened to 2.1.2 Key uncertainties and risk	Taken into Account We need to follow the plenary outline for section headings but will modify other headings as appropriate given these suggested changes.
26199	2	143	9	143	9	9 2.1.3 A Risk Management Framework for Structuring the Chapter could be shortened to 2.1.3 Risk Management Framework	Taken into Account We need to follow the plenary outline for section headings but will modify other headings as appropriate given these suggested changes.
26204	2	144	1	144	1	2.3.1.2 How can expected utility improve decision making 1 under uncertainty? could be shortened to 2.3.1.2 Applications of the theory	Taken into Account We need to follow the plenary outline for section headings but will modify other headings as appropriate given these suggested changes.
26207	2	144	11	144	11	2.3.4.2 How can CEA improve decision making under uncertainty? could be shortened to 2.3.4.2 Applications of the theory	Taken into Account We need to follow the plenary outline for section headings but will modify other headings as appropriate given these suggested changes.
26208	2	144	15	144	15	2.3.5.2 How can RDM and the PP improve decision making under uncertainty? could be shortened to 2.3.5.2 Applications of the theory	Taken into Account We need to follow the plenary outline for section headings but will modify other headings as appropriate given these suggested changes.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
26209	2	144	19	144	21	19 Elements 20 How can this tool improve decision making under uncertainty? 21 Advantages and limitations of structured expert judgment could be deleted	Taken into Account We need to follow the plenary outline for section headings but will modify other headings as appropriate given these suggested changes.
26210	2	144	23	144	24	Elements of the theory Advantages and limitation of scenario and ensemble analyses could be deleted	Taken into Account We need to follow the plenary outline for section headings but will modify other headings as appropriate given these suggested changes.
26211	2	144	27	144	27	2.4.2 Optimal or efficient stabilization pathways (social planner perspective) under uncertainty . could be shortened to 2.4.2 Efficient stabilization pathways under uncertainty .	Taken into Account We need to follow the plenary outline for section headings but will modify other headings as appropriate given these suggested changes.
26212	2	144	28	144	28	2.4.2.1 Analyses predominantly addressing climate or damage response uncertainty could be shortened to 2.4.2.1 Analyses predominantly damage response uncertainty	Taken into Account We need to follow the plenary outline for section headings but will modify other headings as appropriate given these suggested changes.
26205	2	144	4	144	4	2.3.2.2 How Can Decision Analysis can Improve Decision-Making under Uncertainty? could be shortened to 2.3.2.2 Applications of the theory	Taken into Account We need to follow the plenary outline for section headings but will modify other headings as appropriate given these suggested changes.
26206	2	144	7	144	7	2.3.3.2 How can CBA improve decision making under risk and uncertainty could be shortened to 2.3.3.2 Applications of the theory	Taken into Account We need to follow the plenary outline for section headings but will modify other headings as appropriate given these suggested changes.
35739	2	15	11	15	11	What are "integrated assessment models"? The term should be defined here for the reader if it does not already appear in the AnnexII.	Accepted - the box has been revamped as per your and other's observations
22968	2	15	22	15	27	Could delete all of this.	Noted. This entire section has been substnatially revised.
22969	2	15	29	17	40	There seems to be a lot of duplication in Box 2.1 and FAQ 2.2. Could shorten both, or eliminate one of these	The section has been shortened and the duplication in the box and the FAQ has been addressed by removing the FAQ.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
20776	2	15	29	16	14	it seems that box 2.1 could be cut as it deals more with adaptation and, as stated by the authors, other boxes in the report focus on LDC issues. Also, the box seems to repeat the following FAQ.	(1) There are very few relevant literatures on mitigation from an LDC perspective. (2) The instances/examples we have provided share the properties of both adaptation and mitigation. (3) We will decide in AA on what to keep, and what to expunge.
35741	2	15	29	15	35	This box seems to be all over the place in terms of the ideas being conveyed. The box discusses: institutional failures in LDC's that make the implementation of various programs difficult, the fact that energy is needed for development and this is associated with conventional pollutants and GHG's, the fact that agents/organizations/governments in such nations may not understand the risks/impacts associated with future changes in climate and how that will effect the outcome of current policies. We are not sure that this chapter is the appropriate location to discuss the problems with implementing policies/programs in LDC's. This is a much broader problem that is not associated only with climate change policies/programs. Furthermore it doesn't appear to be directly related to decision making under uncertainty except in the fact that the optimal policies/programs will be determined based on the risks faced. Also the fact that non-climate policies/programs and even adaptation programs should be developed using a baseline that includes potential climate change and all the uncertainty and risks associated with that. The box is not particularly relevant for this chapter and likely should be deleted, but if it is kept the discussion needs to be more clear that what is really being argues for is a better development of the baseline when evaluating policy/program alternatives.	We agree with most of these comments, and we have edited the box accordingly. Particularly, it is important to note that it is difficult to make a clear distinction between general development hurdles and climate change mitigation challenges in LDCs because they are inextricably interwoven. Nonetheless, we have re-written the box to capture more of the policy oriented decisions that LDCs have to make under conditions of risks and uncertainties.
35740	2	15	29	17	14	It is not clear that this section has much to do with uncertainty. The authors should clarify the link or delete the section.	There are several instances in the edited box that illustrate the influence of risk and uncertainty on mitigation/adaptation responses/strategies by LDCs. We have retained the box in line with the mandate for this chapter.
22966	2	15	3	15	6	The sentence beginning "The section … climate change." could be eliminated	We have edited the respective sentence.
30762	2	15	36	17	14	Box 2.1 is too long and should be shortened, especially considering content redundancy between the box and the following FAQ.	The box has been shortened.
27450	2	15	36	16	7	Please delete the two passages because they are not specific for the issues of this chapter.	We have re-written the entire box.
35742	2	15	39	15	39	You should cite some of the voluminous work by Mendelsohn (see for example, ``Adaptation And Climate Change Impacts: A Structural Ricardian Model Of Irrigation And Farm Income In Africa,'' Climate Change Economics, 2(2):149-174), which estimates the impacts of climate change in developing countries.	We did come across this reference, but again as the title suggests, it is more of adaptation than mitigation.
35743	2	15	40	15	49	This section is too loosely written. What is a dysfunctional weather pattern? Why are all changes adverse? Why are the MDG's relevant? The authors should ensure that the discussion in this section is fully reflective of the literature and that specific termonology is better defined and utilized.	Addressed!
22970	2	15	42			"dysfunctional" is an odd word to use here. Do you mean "chaotic" or "anomalous"?	Noted
30763	2	15	45	15	45	Suggest inserting "to" in front of "achieving"?	Section has been re-written.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
29959	2	15	47	16	7	There are some publications that stress a more modest role in electricity access in development, that seem useful to refer to. Examples are Kooijman-van Dijk, A.L., 2012. The role of energy in creating opportunities for income generation in the Indian Himalayas. Energy Policy 41, 529-536 and van Ruijven, B.J., Schers, J., van Vuuren, D.P., 2012. Model-based scenarios for rural electrification in developing countries. Energy 38, 386-397.	Addressed!
22967	2	15	9	15	14	Could delete starting with "These tools…" to "…addressing different problems."	Addressed!
19147	2	15				This box mentions the larger impact of global warming in LDC's. This is why more efforts have to made in LDCs. Especially the promotion of biomass use.	Accepted
20696	2	15	3	15	37	This Box is again written at too general/superficial a level. For example, it is claimed that in the UK onshore wind energy developments achieve an average capacity factor of 30%, with a range of 20% to 50%. The avergae has never got near 30% (except in Scotland), and in the England has been as low as 18%. In England, in 2010, nearly 60% of developments failed even to achieve 20%. This is culpable dishonesty - the data are provided by the operators themselves to Ofgem (the official authority) - so there is no excuse.	Accepted - the box has been revamped as per your and other's observations
35744	2	16	1	16	7	The discussion needs to be clarified. Virtually any centralization of electricity production will produce the described benefits. But building new coal fired power plants is not what most people think of as ``green growth.'' Similarly, page 16, lines 49-50 describe large scale investments in natural gas as ``counter-productive'', when in fact they produce all the benefits in lines 1-6.	The section has been re-written
35746	2	16	16	16	17	It is unclear in the current context what type of risk and uncertainty is being referred to. Please clarify this in the text.	Addressed!
21593	2	16	18	16	40	The chapter labours the fact that studies of developing countries are missing and repeats this unnecessarily.	Addressed!
35747	2	16	18	16	41	This entire paragraph (starting with "In developing countries") borders on condescending in tone and should be reconsidered/rewritten.	Addressed!
22971	2	16	20	16	22	This is a very obvious point that doesn't add to the discussion	Addressed!
21078	2	16	29	16	30	Additional literature exists on how probabilistic information is also better understood by tribal/local communities when presented with visuals or scenarios. References: Sheppard, R. S., A. Flanders, D. Burch, S. Wiek, A. Carmicheal, J. Robinson, J. Cohen, S. (2011). Future visioning of local climate change: A framework for community engagement and planning with scenarios and visualisation. Futures, 43, 400-412. Petheram, L., Stacey, N., Campbell, B. & High, C. (2012). Using visual products derived from community research to inform natural resource management policy. Land use Policy, 29, 1-10.	Thank you for these additional references!
30765	2	16	30	16	30	"and discussed in" is redundant so suggest deleting.	Addressed!
22972	2	16	40	16	41	The point about water management in the Himalayan region seems out of place here - too specific - there will be water management issues globally	That was just citing an example, BUT point well noted!
27090	2	16	42	16	46	Yes, but there are concerns about whether NERICA has the same nutrient content, particularly micronutrients. If not, then NERICA could exacerbate the very high levels of micronutrient deficiencies in Africa.	Addressed!
35748	2	16	43	16	46	The sentence starting with "In this regard" reads like advertising, and the citation does not appear to be part of the peer-reveiwed literature and does not appear in the bibliography. The sentence should probably be deleted.	Addressed!
30766	2	16	46	16	46	Suggest deleting "such as" or elaborate on what kinds of "disaster" are being anticipated.	Addressed!

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
35749	2	16	49	17	3	This discussion of how a policy/business decision based on reducing near term mortality risk and reducing transportation costs and their variability may also result in climate disbenefits seems out of place here. Even when considering such additional GHG emissions (if their is a net increase there is no discussion of the baseline here) may still be an optimal policy. This discussion does not seem to be robust or tie in to the rest of this section in a relevant way. The discussion needs to be revised to reflect these facts.	Addressed!
25308	2	16	50	17	3	The example of CNG use in Delhi causing higher GHG emissions is higly contentious. There is no evidence of methane high losses contributing to higher GHG emissions due to shift to the use of CNG in public vehicles. The statement that this is 'likely to occur' itself shows that the conclusion is hypothetical and does no represent reality In addition this issue has little to do with risk and uncertainty theme. The mentioned lines do not connect with the theme at all. The lines 50 (page 16) to lines 3 (page 17) should be dropped.	Agreed! We have removed this example from the edited box.
22756	2	16	8	16	10	The institutional and governance factors are not the only obstacles to climate change risk management, and they are not only happen in developing countries. Thus this sentence needs to be changed to "A number of factors stand in the way of effective climate change risk management, including social, economical, institutional and governance factors."	Noted!
30764	2	16	9	16	11	While it may be true in some developing countries, this statement seems to imply that it is required in all of them - this this what was intended? A similar statement appears in the Executive Summary.	Noted!
35745	2	16	9	16	11	The sentence starting with "There is a need" is prescriptive and should be edited or deleted.	Noted!
27091	2	17		17		How does the funding from the GEF, other donors, and NGOs affect decision-making? In many countries, large sums are being provided to encourage proactive risk management.	The process of managing risks is preceded by decision-making, right? The section has been revised
30767	2	17	10	17	10	"others at risk see the new for this form of protection, more data gathering and storage capabilities will be critical for developing countries to hedge against climate change risks." This does not make sense.	Accepted and addressed!
30769	2	17	16			Should this be FAQ 2.1?	We have expunged the FAQ section to removed duplications with the box
30768	2	17	16	17	40	This material repeats a lot of what is mentioned in the text on pp. 15 and 16. Suggest deleting the FAQ or leave it in and refer to it in the main text, and delete the redundant material.	We have expunged the FAQ section to removed duplications with the box
22973	2	17	18			Better to say "Developing countries are especially vulnerable today because of their excessive dependence on resources…"	Acccepted!
30770	2	17	18	17	20	This sentence does not read well and should be revised. Agriculture, fisheries and other sectors are examples of resources not changes in climate, as is how the sentence currently reads. The next sentence starts with "these changes", however "these changes" are not elaborated on in the previous sentence and it is not clear it is referring to changes in climate or changes in resource dependence.	Accepted!
35750	2	17	18	17	40	This discussion on LDC's seems tailored to the chapter at hand and might seem reasonable to include, though it is a weak link to the relevance of this chapter. But the box above seems convoluted and out of place. Since space is an issue I would recommend cutting the box and keeping these three brief paragraphs (if any part of this discussion is to be kept).	The box has been revised.
19148	2	17	27	17	28	It is stated that electrification will reduce forestry and agriculture emissions. Explain how this occurs? Even with increased consumption of products from agriculture and forestry the biomass should remain sustainable.	That was not stated. We explained that there are synergies between rural electrification, poverty alleviation.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
19605	2	17	29	17	32	This sentence is very arbitary, which is just a copy from BOX2.1. This paragraph should be revised: "A number of institutional and governance factors stands in the way of effective climate change risk mangement both in the developing countries and in the developed countries. This could change if these countries develped a more transparent, predictable and effective civil service to stimulate investment in climate change mitigation and adaptation. "	Accepted!
24563	2	17	30	17	32	Effective climate change risk management in developing countries is likely to involve a portfolio of civil service actions, including but not limited to investment in renewable energy generation. This sentence implies that the only option is investment in renewables, whereas an earlier section where it is discussed in more depth (p.17 lines 5-7) gives investment in renewables as one example. Suggest reframing to: 'There is a need for these countries to institute a more transparent and effective civil service to foster mitigation efforts such as foreign investment in renewable energy.'	Accepted!
22757	2	17	4	17	5	The institutional and governance factors are not only happen in developing countries. Thus this sentence needs to be changed to "In summary, countries need to improve their institutional management and governance that will help the effective management of climate change risks."	Noted!
27092	2	17	41	18	22	Another change is the AR4 conclusion on iterative risk management as a framing for adaptation and mitigation decisions, and something this chapter should explore.	Accepted. Sentence added. See also 2.3.6 and FAQ 2.3
22974	2	17	42	17	48	Could drop this paragraph - and focus on what's new here.	Taken into account.
35751	2	17	45	17	45	What characterizes a (source of) uncertainty as "deep"? And then what is meant by "precaution", how is "risk hedging" to be done, and how does one go about preventing crises? The text needs to be clarified.	Accepted. References added.
20777	2	17	46	17	46	please remove parenthesis	Editorial – copyedit to be completed prior to publication
24562	2	17	9	17	12	Meaning is unclear. Suggest reword to 'New insurance initiatives coupled with an education process so that farmers and others at risk see the need for this new form of protection…'	Accepted!
30771	2	18	11	18	17	Much of this paragraph appears verbatim in the Executive Summary. It could potentially be shortened in the Summary.	Accepted - the Executive Summary has been modified.
40555	2	18	2	18	3	"in Fukushima"must be deleted in the part written down below and replaced with "in nuclear desasters"because this part is in the context of general effect and risks of nuclear disasters, and there is no needs to specify it to Fukushima. "Regarding technological risks, the adverse impact of bio fuels on food prices, the nuclear disaster in Fukushima."	Accepted - text revised.
35754	2	18	25	18	25	The tone of the phrase "the strengths and limitations of decision makers" is potetntially problematic. Please consider a more neutral phrasing.	Rejected - it is an empirical fact that human decision makers have strengths and limitations.
35755	2	18	27	18	27	The tone of the phrase "more informed choices" is potentially problematic. We recommend rephrasing with more neutral language.	Accepted - text revised.
33963	2	18	28			“and needs” is “and need”	Accepted - text revised.
27093	2	18	29	18	30	There is rich body of literature on the importance of cognitive and motivational behaviors, so suggest dropping everying after "important".	Accepted - text revised.
22975	2	18	3			I don't think the facts support the statement that the risks of shale gas extraction are comparable to the Fukushima nuclear disaster	Accepted - text revised.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
35756	2	18	33	18	38	The distinction between what here are called "System 1" and "System 2" is not clear, and it recurs throughout the chapter, as if it were a fundamental concept or distinction, when in fact it may not be. The concepts should be removed from the chapter.	Accepted - revised section 2.4 (previously 2.2) now defines System 1 and 2 in a table, but refers afterwards to the more general and meaningful distinction between intuitive and deliberative decision processes.
30772	2	18	39	18	43	This could be deleted with no significant loss of information.	Noted - not clear what section was referred to here, but the whole chapter has been streamlined
22759	2	18	39	19	30	The audience is not interested in these textbook-like theories and guidelines, and these paragraphs didn't reflect the updated research findings after IPCC AR4, thus, should be deleted.	Noted and in part rejected - the introduction of behavioral models of human judgment and choice is an important innovation in AR5, endorsed by many reviewers. The revision of this section makes it less academic and points more to its application for policy makers.
35757	2	18	39	18	39	This essentially says that system 1 and 2 operate sometimes together or sometimes distinctly and there is no obvious way to tell them apart in brain regions. Therefore, the theory offers no testable predictions and is therefore useless. Further, we cannot see any relevance to the discussion of risk and uncertainty in climate change. We would recommend that the authors delete this section and the references to it.	Noted and in part rejected - the revision makes the importance of this distinction and the relative importance of deliberative and intuitive decision processes more clear, but keeps the discussion and distinction.
22977	2	18	41			Who argues here? Not clear.	Accepted - text revised.
35758	2	18	44	18	46	As written this seems to imply that system 2 would not take into account expectations of the decision maker or their goals. We would assume the system 2 would also take these into account and if the decision maker was well informed there expectations would equal those of the analytical model being described as system 2. Are you suggesting that there exists a bias or lack of information that differentiates the expectations and goals that enter into system 1 and system 2 decision making? As written this example/definition is potentially confusing for the reader and should be clarifed if the system 1/2 distinction is significantly strengthened and maintained.	Accepted - revision in 2.4.2 makes it clearer that use of expectations by intuitive System 1 processes does not mean that they are not used by System 2. They are used differently and for somewhat different purposes.
22758	2	18	7	18	10	These paragraphs are not related to risk nor uncertainty, thus needs to be deleted.	Rejected - see answer to comment 36.
26416	2	18	2	18	2	It´s not completeley clear the adverse impact of bio fuels on food prices. I suggest deleting this statement.	Accepted
30308	2	18		29		In general requires more good examples from the real ground to show some good evidence based cases	Accepted - old section 2.2 (now 2.4) has been thoroughly revised and more examples added.
22976	2	18				Here the discussion of System 1 approaches bounces back and forth between state/policy level decision processes and individual/family/tribe processes. This may be intentional, that senior policy makers are subject to System 1 biases and can benefit from augmentation from more structured models. If so, that should be pointed out. The chapter comes very close to doing this anyway in the discussion of motivated cognition on p. 22	Accepted - the introduction to revised section 2.4 (previously 2.2) now makes the point that behavioral models/heuristics and resulting cognitive biases apply to decision making at all levels.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
35752	2	18	23			Overall comment about section 2.2 - it's very cognitive psychology heavy. A very useful lens, no doubt, but limited primarily to what happens between people's ears or at the individual level. With the very slight exception of 2.2.2.3 (Social Amplification), there's little to no discussion or synthesis of the many other relevant disciplines and literatures that have been published on climate change risk perceptions, behaviors, or policies - such as communication, media analysis, or the political, social and economic factors and structures that shape perceptions, behaviors and policy support. Even within the psychological realm, there's little discussion of framing effects and how these play out in climate policy debates, with the exception of a few references to Kahneman and Tversky's seminal work.	Accepted - New Section 2.4.5 now talks at greater length about Linkages between different levels of decision making. Also Section 2.4.3.1 covers framing more extensively.
35753	2	18	23			What is the goal? Why are we doing this? Why do we start so heavily with one particular framework?	The goal is to introduce a framework that has previously been entirely missing from the IPCC coverage.
29775	2	18	39	18	43	Subject missing for this sentence	Accepted - text revised.
27094	2	19	10	19	16	These processes also can be problematic for assessing risks of extreme weather and climate events (see SREX).	Accepted and noted - text revised.
35759	2	19	14	19	14	Is Taleb 2007 really about System 1 or about bad inference? One can easily misconstrue the full range of outcomes while using System 2. We recommend that the authors use historical frequencies, like observed white swans. This is representative of the problem with the system 1 and system 2 dichotomy and why they should be removed from the discussion.	Accepted - the Taleb, 2007 reference has been replaced.
35760	2	19	17	19	23	This is a poor example. There are many reasons why consumers might appear to have high discount rates when making energy efficiency investments, but in fact due to other reasons which may include market failures. Furthermore there is the inherent negative externality issue which may make the investment level look suboptimal from a societal perspective. We would suggest that the authors use an example where the evidence isn't so mixed as to why the discount rate appears high on the surface.	Noted - we kept the example but made it clear that there are a variety of other explanations. There are not a lot of climate change mitigation responses that have been examined from a psychological perspective, and present bias almost certainly plays a role in failures to invest in energy efficiency, which deserves further study.We now also point to an example from Chapter 8, people's reluctance to buy more initially expensive fuel-efficient cars
35761	2	19	20	19	23	The phrases "too much on" and "future savings sufficiently" and "not enough on long-term improvements" are value judgments. The text should be re-phrased.	Accepted - text revised.
22978	2	19	23	19	29	This is an excellent statement summarizing the whole chapter. Could be used in the overall summary for AR5	Noted
35762	2	19	28	19	30	The phrase "that have a chance of being implemented today by recognizing and counteracting the human tendency to focus on more immediate consequences" is characteristic of an advocacy document and should be removed in favor of a more neutral and non-prescriptive discussion of the biases.	Accepted - statement has been removed.
29906	2	19	31	19	38	The paragraph is not making a balanced discussion and it is making subjective judgement about preferred methods without much evidence. Also note that CBA that is not recommended in the first sentence is also one of the tools presented in section 2.3, therefore the paragraph is making a contradictory argument.	Accepted - text revised.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
35763	2	19	31	19	38	We believe that this paragraph is out of place. The potential limitations associated with cost benefits analysis in the presence of potential "catastrophes" is not related to the biases of system 1 decision making as being described in this subsection. If the authors do believe that to be the case they would need to make a much more detailed argument, though we suspect that it would amount to an argument for improvements in the way cost benefit analysis of climate policies are performed. There are real issues associated with cost benefit analysis in the context of climate change and in some cases these are related to the potential for "catastrophic" impacts. These should be discussed but this is not the place within the chapter.	Accepted - paragraph has been removed
35764	2	19	31	19	38	This discussion presents arguments against cost-benefit analysis, calling it ``incapable." The authors, however, do not explain why some believe it is incapable, nor do they present any of the many counter-arguments in the literature. In fact, cost benefit analysis is perfectly capable of dealing with potential catastrophes. As Weitzman (2009) correctly argues, the issue is how big is the utility loss from a catastrophe. If it is potentially infinite, then households are willing to spend their entire wealth to avoid it. This contradicts reality, where households do accept low probability catastrophic risks all the time. The issue is therefore not cost benefit analysis itself, but simply understanding how households perceive a catastrophic loss. This discussion needs to be expanded to provide a more robust and complete exposition of the issue.	Accepted - text revised.
20778	2	19	33	19	38	please refoumulate: sentence is too fragmented and unclear.	Accepted - text revised.
27095	2	19	39	20	29	What role does risk aversion play?	Accepted, an excellent quesiton with a really long answer, but we added a reference to a paper that provides this answer in Section 2.4.3.1.
20779	2	19	40	19	41	first sentence can be cut	Accepted - text revised.
35765	2	19	44			This section oversimplifies the issue. Why not simply go into the normative literature? The current section is oddly selective and not highly useful, whereas a survey of decision theoretic results would be.	Rejected - while oversimplification is an unfortunate consequence of space constraints for any topic in this report, the addition of behavioral or descriptive models of human judgment and choice is an important innovation of AR5 that has been endorsed by many reviewers. Ignoring the fact that human response often differs from the normative models of statistical and economic decision theory is an oversimplification that has had serious negative consequences for climate change policy implementation.
22979	2	20	24	20	26	A very good point that should be emphasized.	Noted - thanks.
35766	2	20	3	20	4	Risk is not a statistic. The sentence should be reworded.	Accepted - text revised.
22760	2	20	30	22	6	The content of the subsection didn't talk about statistical description, thus the words "vs. statistical description" need to be deleted.	Accepted - text revised.
35769	2	20	39	20	39	The phrase "under-concern about low-probability" is a value judgment and should be rephrased.	Accepted - text revised.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
35771	2	20	42	20	44	Why is there polling being reported in this chapter? A single poll certainly cannot be evidence of the "volatility" described earlier in the paragraph. The reference should be removed or bolstered with additional references.	Accepted - text revised.
35770	2	20	42	20	47	We do not feel that this Pew poll result is not a good example of how the public overweights recent events. American public (mis)understanding of the widespread agreement among climate experts is driven by a range of other factors, including ideology, media effects, and an active disinformation campaign - not recent events. A better example would be the documented tendency to overweight recent hot days or hot season in making judgements about the reality of global warming.	Accepted - text revised.
35772	2	20	45	20	45	What "similar variability in concern over time"? The prior example is a single snapshot in time. This should be clarified or corrected.	Accepted - text revised.
35774	2	20	48	20	49	We suggest that the authors be more careful with terminology. Climate is the distribution of weather. The climate mean and climate variability are the first and second moments (at the simplest level) of the distribution.	Noted - the sentence has been shortened to avoid disagreement about the nuances of defining weather and climate.
35773	2	20	48	21	4	We believe the discussion misunderstands the link between weather and climate and should be corrected. Since climate is the average weather, one can estimate the climate by observing weather realizations and Bayesian updating (Kelly and Kolstad, Journal of Economic Dynamics and Control, 23(4):491-518, 1999; Leach, Journal of Economic Dynamics and Control, 31:1728-52, 2007). According to Bayes rule, beliefs about the degree of climate change should fall during cold periods and increase during warm periods. Page 21, line 21-28, one cannot assume no learning exists because of lack of investment in hurricane loss reduction. Households are insured from large losses, and the government has exacerbated the moral hazard problem by offering relief to hurricane victims (Kelly et. al., {\em Journal of Economic Behavior and Organization}, 81(2):644-683, 2012). Therefore, households have little incentive to invest in loss prevention. We would also cite Hallstrom and Smith, Journal of Environmental Economics and anagement, 50:541-561 (2005), who show housing prices respond to increases in hurricane risk, which indicates that households do respond in some ways to changes in risk.	Following a disaster there is limited disaster relief in the form of loans. There is considerable empirical evidence that individuals do not invest in protective decisions because they expect relief. Rather their decisions are based on misperceptions of the risk, simplified decision rules and myopic behavior, points that are discussed in this section on Risk Perception and Response to Risk and Uncertainty.
35767	2	20	7			The most productive assessment of risk involves elicitation of probabilities, for which there exist formal methods, which the chapter does not even broach. For example, the Sheffield Ellicitation Framework (SHELF) developed by Anthony O'Hagan and collaborators. The chapter should relate itself to this information.	Rejected - this is not the topic of this section
30172	2	20	43	21	2	This section is very good. I especially like the inclusion of System 1 & System 2 bhaviours. The sections could be strengthened by include comments on Risk Thermostats and Perceptual FiltersPaper for conference on The risk of Freedom, Inst. of US Studies, Senate House, 6.10.98 Published in The Risk of Freedom: individual liberty and the modern world, Institute of United States Studies, 1999. See Also Adams, J. and Thompson, M. (2002). Taking Account of Societal Concerns about Risk: Framing the Problem, Health and Safety Executive, Research Report 035. Available online at http://www.hse.gov.uk/research/rrpdf/rr035.pdf This can provide useful information about five different ways of organizing (i.e. ways of life) based on cultural biases, social relations and behavioural strategies.	Noted - it is a very interesting reference, though appears to fall into the grey literature realm, which IPCC reports try to avoid.
35775	2	20				Section 2.2.1.1 is too long. It does not require this much text to get the points across and can be paired down.	Accepted - text revised.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
35768	2	20	30			We are puzzled as to why discussion is in a chapter about mitigation? This appears to be about adaptation. The relevance to Working Group III should be clarified or the discussion removed.	Noted - the revised text has a better balance between mitigation and adaptation, though similar to the answer to Comment 36, the discussion of behavioral issues in this chapter applies more broadly.
22981	2	21	10			Not just indigenous communities - garden clubs all over the USA recognize changing climate and hardiness zones	Noted - thanks.
35778	2	21	15	21	18	The sentence starting with "Farmers who" reflects correlation and not causation. The text should be revised.	Noted - however, since farmers in this area all experienced the same weather events, it is not possible that their (different) experiences influenced their beliefs.
22982	2	21	17	21	20	Sentence doesn't make sense	Accepted - text revised.
35776	2	21	2	21	2	It is incorrect to say they have little experience with "climate" - everyone has experience with climate. It would be correct to say they have little experience with "climate change."	Accepted - text revised.
20697	2	21	21	21	33	Given the above comments on wind energy in the UK,plus the fact that barely 50% of the wind power generated in Denmark can be used by the Danish electricity consumer (the rest is exported - so Norway cuts back on its hydro; Sweden on its hydro and nuclear); the overstatement of solar in Spain - Carlos Conti, Pedro Prieti; various Australian authors should be drawn on to make the points here sharper and more specific.	Taken into Account. We have moved our discussion on energy efficiency measures from this section to the old Sect 2.4 in the SOD.
35779	2	21	21	21	36	We feel that the authors should consider focusing more broadly on learning, bringing in the significant literature on learning about uncertainty in non-climate contexts (eg, ag or manufacturing).	Noted - though space constraints prevent us from additional coverage
24564	2	21	29	21	32	The length of this sentence confounds meaning. Suggest split into two sentences: '…to reduce greenhouse gas emissions. Samples of individuals were taken from those who had and had not recently experienced flooding in their local area.'	Accepted - text revised.
22980	2	21	3			This confound as?	Accepted - text revised.
30773	2	21	3	21	3	This sentence ("This confound…") does not make sense. Suggest clarifying.	Accepted - text revised.
35781	2	21	32	21	36	The sentence starting with "Concern about climate change" reflect correlation and not causation. The text should be revised.	Noted - we see nothing that suggests otherwise.
30774	2	21	37	21	38	Suggest that this sentence should be attached to the end of the previous paragraph. Suggest the next sentence be revised to something like: "Some researchers have found that personal experience….	Accepted - text revised.
22983	2	21	46	21	49	Another very good point	Noted - thanks.
21079	2	21	46	21	49	It is believed that place-based strategies for local nature-dependent communities need to include different modes of learning because they rely on traditional ecological knowledge (TEK). This knowledge is embedded in value-institutions and belief systems related to historical modes of experientation. TEK has a transfer mode from generation to generation, which requires non-western modes of learning. References: Berkes, F. (2008). Sacred Ecology (2nd ed.). New York, NY: Routledge. Pierotti, R. (2011). Indigenous knowledge, ecology, and evolutionary biology. London, UK: Routledge.	Accepted - reference has been added.
35782	2	21	46	21	49	The sentence starting with "The authors conclude" has the tone of an advocacy document. The authors should revise it.	Accepted - sentence has been cut.
35777	2	21	7	21	11	The authors might citing the Arctic Climate Impact Assessment here. The assessment explicitly includes the observations of indigenous people.	Accepted - reference has been added.
35780	2	21	26			This section oversimplifies the issue. Why not simply go into the normative literature? The current section is oddly selective and not highly useful, whereas a survey of decision theoretic results would be.	Rejected - see answer to comment 36.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
19565	2	22	1	22	6	The role of indigenous knowledge and its contribution here should be expanded to cover multi-dimensionality of the time-spaces of the Indigenous lifeworld, and the morals and ethics embedded in many Indigenous cultures. Ie. Indigenous knowledge is a system of knowledge on its own, not only a source of data for observations or mitigation. On the worldview, please use Sheridan, J., and R. D. Longboat. The Haudenosaunee Imagination and the Ecology of the Sacred. Space and Culture 9 (4): 365–381, 2006.	Noted - but space constraints prevent more indepth treatment.
35783	2	22	10			Fully rational Bayesian learning is also consistent with an increase in the subjective probability of a low probability extreme event following the extreme event. The probability is low, yet the extreme event occurred. Therefore, perhaps the extreme event is not so unlikely after all. This should be revised.	Rejected - Bayesian updating cannot account for the magnitude and time dynamics of these belief revisions.
30776	2	22	13	22	16	Some grammatical errors here. Should read as follows: "...before they occur, and their overestimation after an extreme event has occurred. The resulting availability bias can explain why individuals purchase insurance after a disaster has occurred but cancel their policies several years later...:"	Accepted - text revised.
30777	2	22	21	22	21	Suggest deleting "with their finite processing capacity".	Accepted - text revised.
30778	2	22	35	22	37	Suggest rewording. E.g., "Experts often disagree in their predictions, which can give rise to a feeling among non-experts that climate change is an uncontrollable risk.	Accepted - section has been deleted.
22984	2	22	36			The discussion of vested interests opposed to dealing with climate change could be expanded here.	Noted - but space constraints prevent more indepth treatment.
35784	2	22	38	22	40	The sentence starting with "This desire to deny the existence" has the tone of an advocacy document. The authors should revise it.	Accepted - section has been deleted.
30779	2	22	40	22	42	This seems like conjecture on an important policy question, supported by only a single reference. Suggest rewording this as: "Dietz et al. (2013) suggest that providing the public with better advice on ways to mitigate and/or adapt to climate risks is an important policy function that can reduce the tendency to deny and ignore the risks."	Accepted - section has been deleted.
30780	2	22	43	22	47	These two sentences may fit better if they were moved up and inserted after the sentence that ends with "(Oreskes and Conway 2010"). This would merge the two paragraphs. However, that last sentence about advice on mitigation/adaptation could then begin the next paragraph, on "Mitigation or adaptation responses....."	Accepted - section has been deleted.
31205	2	22	45	22	47	Is there any research which uses cognitive dissonance as another factor influencing the perception of climate change risk? See e.g. on page 3 of Evens Salies, 2010, "Penalizing Consumers for Saving Electricity", Economics Bulletin, Vol. 30, No. 2, pp. 1144-1153.	Accepted - section has been deleted.
30781	2	22	48	23	4	Suggest splitting this sentence as follows: "Mitigation or adaptation responses that provide solutions to existing or future climate risks, such as whether to continue use of familiar and reliable energy sources or to invest in energy efficient technologies, require tradeoffs with respect to individual and social goals. Alternative transition pathways have differing impacts, on [the amount and timing of] economic growth and development, on reductions in GHG emissions and associated climate change, and on changes in livelihood and lifestyle--the types of choices listed in Table 2.1.	Accepted - section has been deleted.
30775	2	22	7	22	10	This term "availability" may be puzzling to those who have not encountered its use like this before. Suggest this section be moved up closer to the beginning so that readers are not left wondering what it means. Possibly it could be placed in a sidebar or FAQ section?	Noted - but moving the section up did not fit into the overall flow of topics.
35785	2	23	1	23	3	This statement is correct and should most definitely be included within the chapter to denote the complexities of the decisions at hand. But we're not sure the last component "types of choices specified in Table 2.1" is appropriate here. At the vey least, the sentence would need to be reworded to include it.	Accepted - section has been deleted.
27096	2	23	15	23	15	Presumably the nation referred to is the US?	Accepted - text revised.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
35786	2	23	20	23	28	We fee that this paragraph oversimplifies the issue. The difference between negative and positive uncertainty is more complicated when one takes into account irreversibility of investment, uncertainty over future changes in mitigation costs, and the ability (or potentially lack thereof) to adjust policy. We recommend that the authors provide a more robust discussion.	Accepted - section has been deleted.
35787	2	23	20	23	28	Since climate change is ``unfavorable uncertainty'', it should raise concern, but according to the chapter climate change does not raise concern among large portions of the population. The authors should clarify this contradition.	Accepted - section has been deleted.
35788	2	23	23	23	23	``incorrectly believe global warming will have only moderately negative impacts.'' In fact, many studies (e.g. Nordhaus, Proceedings of the National Academy of Sciences, 107(26):11721-6) find that climate change has only moderately negative impacts. This phrase should be deleted or revised to strike the term "incorrectly" to reflect the uncertainty in the literature.	Accepted - text revised.
35789	2	23	26	23	28	Few people connect climate change and human health risks not because of uncertainty, or a focus on short-term outcomes, but because they've never heard of the health risks - at least based on studies conducted in the US. This is an information issue and should be clarified. This entire section should be careful to ensure it is clear when talking about imperfect information issues and how they relate to uncertainty.	Accepted - section has been deleted.
35790	2	23	31	23	31	We recommend that the authors insert a phrase after (IPCC, 2012) along the following line: "including the United States (U.S. National Climate Assessment, 2009), leading a large majority."	Accepted - text revised.
35791	2	23	37	23	37	The notion that this could be caused by a "differences in cognitive abilities" is incorrect and is highly offensive. We believe what the authors are refering to are differences in education, information, etc. This sentence should be modified.	Accepted - text has been revised. Apologies, previous version was not meant to come across as racist or otherwise offensive
35792	2	23				Section 2.2.2 is supposed to be about the risks and uncertainties in the scientific assessment of climate change, not about public relations. We feel that this section should be revised substantially to reflect the outline or deleted.	Rejected - risk communicationand the communication of mitigation options and their consequences are important issues that should not be dismissed as "public relations."
22985	2	24	1			affect-rich terms?	Accepted - sentence has been cut.
27097	2	24	13	24	13	What IPCC scenarios? The RCPs/SSPs are not being developed by the IPCC, but rather by the "scientific community."	Accepted - text revised.
22986	2	24	16			Moser reference is incomplete, should refer to WIRES Climate Change, Vol 1, Jan/Feb 2010	Accepted - text revised.
22987	2	24	19			This can be confusing when the experts get their results from models which disagree	Noted
30782	2	24	2	24	3	"Individuals are likely to neglect time when it is factored into the likelihood judgment when the characterization of a person's possessions were in affect-rich terms". The meaning of this sentence is not clear. Also it does not seem to connect with either the previous or the next sentence. Perhaps it is not needed?	Accepted - sentence has been cut.
27098	2	24	20	24	21	There are many more sources of uncertainty, starting with data, understanding of processes, etc.	Noted - section has been cut.
35797	2	24	22	24	22	These different sources are not necessarily ``equivalent from a normative perspective,'' whether Bayesian or not, and it's not even clear how the chapter can be talking about ``a normative perspective'' without having described it. We recommend that the authors provide clarification in the text.	Accepted - section has been deleted.
30783	2	24	26	24	26	"whereas model-based uncertainty is more likely to be seen as a reason to take action now." Suggest changing the emphasis for this as "whereas model-based uncertainty is less likely to be seen as a reason to delay action."	Accepted - section has been deleted.
27099	2	24	27	24	45	To what extent does this apply to developed and developing countries?	Accepted - section has been deleted.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
21594	2	24	27	24	45	There is little if any discussion of the role of the media in determining what people think is risky, yet the media often tells people what they should worry about, climate change being a good example.	Accepted - there is discussion of the role of the media in the social amplification of risk section.
35798	2	24	28	24	33	We feel that it would useful for the authors to provide the reader with a historic example of risk amplification that has clearly led to such behavioral changes.	Accepted - example and reference has been added.
35793	2	24	3	24	3	The sentence including the phrase "characterization of a person's possessions" should be explained in greater detail for the lay reader.	Accepted - text revised.
35794	2	24	3	24	3	Please elaborate on this concept and what is meant by "affect-rich terms."	Accepted - text revised.
22988	2	24	36	24	37	In the USA, lobbying public officials for climate change mitigation policies is not rare, but common. But the public is still somewhat apathetic, if that is what is meant here.	Accepted -sentence has been deleted.
35799	2	24	38	24	39	The phrase "To date[,] climate change advocacy, such as lobbying public officials for climate change mitigation policies, [stet] is relatively rare" is factually incorrect and should be deleted.	Accepted - sentence has been cut.
35800	2	24	38	24	39	The sentence "green groups in the US (e.g. Sierra Club) lobby very intensely for action on climate change. Groups such as Greenpeace conduct large protests" should be deleted.	Accepted - sentence has been cut.
35795	2	24	9	24	10	The desire to characterize best and worst cases often distorts the assessment and perception of risk. To be done well, especially in situations where the scenarios are defined by multiple attributes (that is, are multivariate), is very challenging, and requires considerable ingenuity and creativity, both to do the characterization, and to communicate it. This very important topic would have deserved a much more elaborate treatment.	Accepted - this paragraph was moved to the Tools section of the chapter and received broader treatment there.
35796	2	24	9	24	13	These two sentences appear to be contradictory. The first sentence recommends translating probabilistic forecasts into scenarios. The second recommends translating IPCC scenarios into probabilistic forecasts which contradicts the previous conclusion. We recommend that the authors clarify their intent here.	Accepted - text revised. The first statement was deleted (for space reasons and fit, after moving the paragraph to a different section). There was no contradiction before either though, as the second statement talked about a closer link, not a translation. that latter term was added by the reviewer.
20698	2	24	7	24	20	The assumption that governments will adopt needed inceentives in ways which are highly credible is, as this section recognises, open to doubt. An opportunity to provide examples of 'The Law of Unintended Consequences' from inappropriate wind, solar and biofuel developments.	Noted - though space constraints prevent us from additional coverage
31206	2	25	15	25	23	It's unclear from this example why Loss aversion explains real wrold examples that deviate from EU theory.	Noted - a more detailed explanation of this point in the text is not feasible due to space constraints. We did, however, add a more general point (now this section I is in 2.4.3.1) about the relationship between these prospect theory parameters and the single EU individual difference parameter.
35801	2	25	15	25	15	This has also been shown to be explained simply by irreversibility in the investment and uncertainty over future savings within an expected utility framework. The tone of this sentence should be revised to account for the fact that such behavior may also be explained within expected utility theory.	Noted - see answer to Comment 449.
35802	2	25	15	25	15	Loss aversion should also bias the public towards climate action, since climate change is about losses. The authors need to review this section for contradictory statements and revise as necessary.	Accepted - an excellent observation, now addressed.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
22990	2	25	17			Missing information about Greene et al. (2009) in References	Accepted - text revised.
30784	2	25	20	25	23	Is the uncertainty here really about "future energy savings" or is it more about "future cost savings"? Most consumers are motivated by savings in costs.	Accepted - text revised.
22761	2	25	28	26	25	The audience is not interested in these textbook-like theories and guidelines, and these paragraphs didn't reflect the updated research findings after IPCC AR4, thus, should be deleted.	Noted and in part rejected - see answer to Comment 36.
35803	2	25	30	26	7	Why is hyperbolic discounting but in chapter 2? It doesn't seem to us like it is an uncertainty issue particularly. There is an important link between uncertianty and discounting (e.g., Newell and Pizer, Groom et al., etc.) but that does not relate to hyperbolic discounting. This discussion should be left to chapter 3 and its discussion of behavioral economics or the authors should establish a clear link between this topic and the subject matter of the chapter.	Noted and in part accepted - see answer to Comment 36 for first question. Section has been shortened and revised in response to second part of comment.
35805	2	25	31	25	33	This is actually not the case in terms of long-term policies such as those addressing climate change. Uncertainty will result in a certainty equivalent declining discount rate schedule. This strengthens the argument here and should be corrected.	Reject. As a starting point we are defining normative theories of exponential discounting to contrast it with hyberbolic discounting without focusing on the context.
22991	2	25	32	25	36	Something missing here in discussion of hyperbolic discounting	Accepted - text revised.
27100	2	25	33	25	33	What about health and welfare that are difficult to value monetarily?	Noted - discussion of this issue is beyond the scope of Chapter 2, more of a topic for Ch. 3.
30785	2	25	36	25	39	This sentence is not clear - suggest reviewing.	Accepted - text revised.
35806	2	25	46	25	47	There is not a consensus view in the literature that "excessive discounting" is the reason that investments in energy efficiency improvements that appear cost effective from a naive NPV sense are not undertaken. This sentence should be deleted or revised to reflect a balanced view of the literature.	Accepted - section has been deleted.
35807	2	25	47	25	47	The phrase "excessive discounting" is a value judgment and, in our view incorrect. The authors should review theliterature on energy efficiency investments under uncertainty.	Accepted - text revised.
22989	2	25	9	25	10	Loss aversion is a very strong point that should be emphasized up front	Noted - and implemented; section has been expanded.
35808	2	25				Hyperbolic discounting is important but has nothing to do with risk and uncertainty. The authors should establish a link with risk and uncertainty or move discussion of hyperbolic discounting to the appropriate sections of the text	Accepted - text revised; section moved to a different spot.
35804	2	25	30			Why is this in a chapter on risk? Constant discount rates are not so clearly normative. ``Excessive'' discounting explaining low efficiency uptake is hardly a clear fact.	Noted and in part accepted - see answer to Comment 36 for first question. Section has been shortened and revised in response to second part of comment.
35809	2	26	1	26	7	The second point within this subsection has already been made earlier in the chapter and the first is made later. Since space is a concern we would recommend deleting this subsection/repetition.	Accepted - section has been deleted.
30786	2	26	29	27	6	While the paragraph refers to "extensive empirical literature", the rest of the text seems to strictly draw from a unique example (i.e. National Flood Insurance Program) which is actually not tied to any country. The reader assumes it is a US example, but the text is not clear and should probably draw from various sources given mention of the extensive empirical literature.	Taken into Account We have modified the Section 2.2 (Now Section 2.4) to reflect the points raised by the Reviewer
35812	2	26	30	26	41	The best return on an insurance policy is to pay one premium and then collect a large claim. In any event, lines 30-41 would seem to apply to any insurance, especially for example life insurance, where the odds of early death are very low. The explanation is not behavioral, as the authors seem to believe, but instead is due to differences in moral hazard. This discussion needs to be revised.	Rejected The point made here is that people do not understand that insurance is a form of protection rather than an investment. Moral hazard is not relevant in this regard.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
24565	2	26	33	26	35	The country of origin of the National Flood Insurance Program (USA) is not specified. Suggest rewording "Thus few people living in flood prone areas in the USA voluntarily purchase subsidized flood insurance…"	Noted Thanks
35813	2	26	33	26	36	Not buying flood insurance is perfectly sensible when one considers that government relief efforts create a moral hazard problem. This section should discuss other (possibly government induced) market imperfections that can lead to this type of behavior.	Rejected The point made here is that people do not understand that insurance is a form of protection rather than an investment. Moral hazard is not relevant in this regard.
27101	2	26	34	6	34	This is one of many instances in this chapter where the country under discussion is not identified. It is very important for the chapter to be clear about the country of study and the relevance to other countries.	Noted, thanks
22992	2	26	37	26	38	A very important point about best return on insurance	Thanks
35814	2	26	40	26	41	The sentence "It is difficult to convince a person that the best return on an insurance position is no return at all[.]" is characteristic of an advocacy document and should be rephrased.	Rejected The point made here is that people do not understand that insurance is a form of protection rather than an investment.
27102	2	26	42	26	47	This ignores the transient nature of many living situations where there up-front costs will not be recovered.	Accepted Good point. We have modified the text to highlight decision makers' present bias as a rationale for not incurring upfront costs
35815	2	26	42	26	47	This paragraph has once again vastly oversimplified the literature on why consumers may choose not to invest in energy efficiency. The products being described here are in fact not perfect substitutes and minor differences may interact with consumer preferences to influence demand. There are other explanations as well, such as renters who may be unlikely to invest in such technologies as their expected stay in the unit is too short to recoup the benefits from the invest in such energy efficient lighting technologies. And so forth. This chapter needs to do a better job of providing a robust and complete discussion of the reasons consumers may choose not to invest in energy efficiency improvements, especially since uncertainty plays a role in some of the explanations ignored. At the very least the chapter needs to make sure that it changes the tone on such statements and examples to ensure that it does not give the impression that the rationales being discussed are the only legitimate explanations for such behavior. Right now the chapter appears to give a very skewed view of the literature.	Accepted - section has been deleted.
35816	2	26	42	26	47	Concerns about flickering, low brightness, and use of chemicals such as mercury explain low adoption rates for CFLs. The entire discussions needs to be expanded and provide a complete, unbiased assessment of the literature on the topic. We believe a better option would be for the authors to leave behavioral economics discussions not related to uncertainty to chapter 3.	Accepted - section has been deleted.
35817	2	26	46	26	46	Characterization of something as "environmentally responsible" is a value judgment. The statement should be rephrased.	Accepted - text revised.
35810	2	26	8	26	18	It is not clear to us how Ambiguity aversion relates to climate change. This discussion should be expanded to make the relationship clear.	Accepted - text revised.
35811	2	26	29	26	29	The section "2.2.4.1 Cognitive myopia and selective attention" (and following sections) never mention another possibility, which is that people are willing to assume a certain level of risk and live with that. This possibility should be reflected in the text.	Accepted - section has been deleted.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
27103	2	27	1	27	6	But shouldn't governments taken a longer term view?	Noted - indeed they should, but in democratic bottom-up driven political systems, this can be difficult, as people with present bias elect officials that pay attention to present issues, not future ones.
35818	2	27	1	27	6	The statements in this paragraph need to be toned down or substantiated with citations to empirical studies that have shown this to be true. The tone of the text is inappropriate for an assessment (switch to "could loom large" and "might make it difficult").	Accepted - text revised.
24566	2	27	11	27	13	Reference to 'earlier times' is an ambiguous timescale. Suggest specifying: "A strong focus on short-term goals (e.g. immediate survival) may have been appropriate as humans evolved, but has less…"	Accepted - text revised.
35820	2	27	11	27	13	The sentence starting with "A strong focus" should be rephrased to provide a more neutral tone.	Accepted - text revised.
27105	2	27	19	27	19	What IPCC scenarios? The RCPs/SSPs are not being developed by the IPCC, but rather by the "scientific community."	Accepted - text revised.
35822	2	27	23	27	25	Is this the best outcome or should we want decision makers particularly at larger social resolutions to fully switch to system 2 methods to best optimize social welfare?	Noted - the introduction to Section 2.4 now discusses this point in greater detail.
22993	2	27	4	27	15	These points have been made over and over earlier in the chapter, could be deleted or drastically shortened	Accepted - section has been deleted.
27106	2	27	45	28	6	What about the role of governments? This section is overly focused on individual choices; it should provide a more nuanced understanding of all levels of decision-making.	Noted - unfortunately there is not a lot of evidence for the operation of the behavioral phenomena described in this section outside of individual choice; we now point to this as a knowledge gap at the end of our chapter.
35823	2	27	46	27	47	The discussion is confusing. Even in the choice not to invest agents are making a choice regarding trade offs. The text needs to be revised for clarity.	Accepted - text revised.
27104	2	27	7	27	19	But shouldn't governments taken a longer term view? This is not just about individuals.	Accepted - this is discussed at greater length in the introduction to this section.
22762	2	27	7	27	44	The audience is not interested in these textbook-like theories and guidelines, and these paragraphs didn't reflect the updated research findings after IPCC AR4, thus, should be deleted.	Noted and in part accepted - see answer to Comment 36 for first question. Section has been shortened and revised in response to second part of comment.
35819	2	27	7	27	19	This topic is not necessarily related to uncertainty. We believe that the authors should delete it.	Noted and in part rejected - see answer to Comment 36.
35821	2	27	20			There's a lot of economics literature on defaults and on behavioral responses to utility pricing etc. The section should be revised to relfect more of the literature.	Accepted - text revised.
35824	2	28	1	28	3	Quasi-hyperbolic discounting and threshold models are different. These sentences are oddly juxtaposed and need to be revised.	Accepted - text revised.
35825	2	28	11	28	13	The sentence starting "Individualist cultures favour…" is an inapproriate cultural criticism. We recommend that this term be deleted.	Rejected - the statement is am empirical observation and no value judgment or criticism is made.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
35826	2	28	20	28	21	This sentence is problematic in that once we have an outcome the event has occurred and there is no longer uncertainty. The uncertainty is over the potential outcomes. To correct this sentence we suggest replacing "resulting" with "possible" and deleting "either probabilistic or."	Accepted - text revised.
35827	2	28	21	28	24	The statement "Most theoretical and empirical work in game theory has been restricted to deterministic outcomes" is simply incorrect. An undergraduate textbook (e.g. Osbourne and Rubenstein) on game theory is filled with games with random (mixed) strategies and decisions in which the state of nature is the outcome of a random variable. Also the term "deterministic outcomes" is redundant. All outcomes are deterministic. The section needs to be revised to reflect the literature.	Taken into Account Good point We have eliminated the phrase “Most theoretical and empirical work….”
27107	2	28	26	28	29	This sentence appears self-contradictory.	Reject. In a stochastic prisoner’s dilemma problem it is possible for the actual losses to be lower when both parties do not cooperate even though the expected losses can be higher.
30788	2	28	41	28	41	Insert "which" between "literature" and "looks" ?	Accepted - text revised.
30789	2	28	44	28	44	"risky" should be "risk of".	Rejected - it is the magnittude of the losses, not the risk of them, that is the relevant variable.
22994	2	28	5			should be "…purchasing insurance …"	Accepted - text revised.
30787	2	28	5	28	6	Is the "orders of magnitude of 100" a typo? (an "order of magnitude" is 10). The example then suggests a difference in probability of two orders of magnitude.	Accepted - text revised.
22763	2	28	7	28	29	The audience is not interested in these textbook-like theories and guidelines, and these paragraphs didn't reflect the updated research findings after IPCC AR4, thus, should be deleted.	Noted and in part rejected - see answer to Comment 36.
26213	2	29		41		The chapter could be shortened if 2.3.1 Expected utility theory 2.3.1.1 Elements of the theory 2.3.2 Decision Analysis 2.3.2.1 Elements of the Theory 2.3.3 Cost-benefit analysis and uncertainty 2.3.3.1 Elements of the theory 2.3.3.3 Advantages and limitations of CBA 2.3.4 Cost-effectiveness analysis and uncertainty 2.3.4.1 Elements of the theory Are deleted	Thanks for the suggestion to delete all these sections. Their inclusion was the result of a deliberative process and has - so far - been endorsed.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
26214	2	29		41		Models and Decision Aids for improving choices related to climate change should be include the topics of Computational Intelligence for Risk Analysis that contains many themes such as Artificial intelligence, expert systems, Fuzzy risk analysis; Artificial neural networks; and Soft computing techniques etc. [numerous literatures are available]. See as an example http://www2.ing.unipi.it/~r000099/isda09/	Thanks for the comment and reference. There are fundamental issues surrounding various 'alternative representations of uncertainty' and their non-inclusion in this chapter reflects a desire not to burden this chapter with these discussions. The alternatives are not limited to fuzzy sets but include certainty factors, belief functions, imprecise probabilities, non monotonic logic, possibiity theory, random sets, to name a few. The premier conference in this field is Uncertainty in Artificaial Intelligence, which has published their proceedings in digital form since 1986. A word count of alternatives over the years is very revealing. In 1986 "belief function" accounted for 29% of the total count, "fuzzy" and "certanty factor jointly for 40% and Bayes" for 26%. In 2012 "Bayes" was 97%,
22996	2	29	16			"… enable one to have more effective…"	Accepted - text has been changed
22997	2	29	18			"…welfare are more likely to be implemented."	Accepted - text has been changed

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
35830	2	29	18	29	18	The authors need to clarify what a "fat tailed" distribution is and how it is connected to worst-case scenarios. This term implies a specific mathematical notion of the shape of the distribution for the outcome. However it seems likely that the same issues would arise for tail events in distributions that are not technically "fat". We would recommend either providing additional evidence as to why the distribution must have fat tails for these arguments to hold or rewording throughout the chapter to simply refer to tail events.	Thanks very much for this comment. There is a glossary entry on this. Actually the term "fat tailed" has several mathematical representations, the most common being: a distribution (a) is leptokurtic, (b) has regular variation, or (c) is subexpponential. It has become something of a buzz word in the climate discussion. The issue is that if a distribution has index of variation < 1, then the mean is infinite. If this applies to social welfare, then maximizing expected welfare is meaningless. Equally disturbing, but not discussed is the case where the index is is < 2, since then the standard central limit theorem does not apply and the (independent) sums of such variables do not converge to normal whose stdev becomes small relative to the mean. The limiting distributon of sums has the same tail index as the summands, the sample mean has infinite variance. An observed relative frequency of arbitrary finite length does not predict the true probability. This sort of thing arises quite often in natural and social phenomena. A colorful history of fat tailed distributions is found in (Mandelbrot and Hudson [2008]). Mandelbrot himself introduced fat tails into finance by showing that the change in cotton prices was heavy-tailed (Mandelbrot [1963]). Since then many other examples of heavy-tailed distributions are found, among these are data file traffic on the internet (Crovella and Bestavros [1997]), returns on financial markets (Rachev [2003], Embrechts et al. [1997]) and
30790	2	29	19	29	20	Some words missing here. Suggest: "Considering the range of behavioral responses to information will enable one to communicate more effectively with stakeholders about climate change risks, and to design decision aids and climate change policies that improve individual and social welfare and are more likely to be implemented."	Taken into Account We have revised the last sentence in FAQ 2.1 to clarify these points
35831	2	29	19	29	19	Should add "corporations" or "firms" into this list of organizations as they are a major player in this "individuals, groups, or countries"	Rejected The comment is not relevant
35828	2	29	2			Investment risks and expected returns are linked even in standard models (CAPM...). ``Outperform" by what measure?	Taken into Account. FAQ 2.1 has been modified and this sentence has been deleted

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
23096	2	29	28	29	33	Making expected utility theory the "standard" for decision-making is rather silly, since it is limited to cases of quantifiable uncertainty (which, outside of artificially constructed lotteries, is rather rare).	Thanks for this comment. The chapter makes very clear that the probabiity distribution used in EUT is, in general, subjective.
22764	2	29	39	32	10	The audience is not interested in these textbook-like theories and guidelines, and these paragraphs didn't reflect the updated research findings after IPCC AR4, thus, should be deleted.	Thanks for this comment. Since many vocalists have not read or understood those text books, a brief recap is necessary.
20699	2	29	4	29	15	Low/high cost discussion needs to take into account location - in relation to wind, Sun, proximity to end-use markets.	Noted FAQ 2.1 reflects this point
21075	2	29	4	29	8	There is a small but growing body of research on perception research. This body makes clear that local actors such as indigenous communities have different perceptions about climate change. This may lead to conflict when action needs to be taken in terms of mitigation. Byg, A. & Salick, J. (2009). Local Perspectives on a global phenomenon-climate change in Eastern Tibetan villages. Global Environmental Change, 19(156-166). Turner, N., & Clifton, H. (2009). " It's so different today": Climate change and indigenous lifeways in Britisch Columbia, Canada. Global Environmental Change, 19, 180-190.	Noted FAQ 2.1 reflects this point
35829	2	29	5	29	6	The terms "misperceive" and "undue" are value judgments. We recommend that they be deleted.	Accepted - text revised.
22995	2	29	8			"quite" needs definition or deletion	Accepted - text revised.
19668	2	29	22	41	28	This is a comment for the whole 2.3 section: as per observations made above, I would recommend also including the multi-criteria analysis or multi-criteria decsion analysis (MCA or MCDA) approach to the list of models and decision aids for improving choices related to climate change. The MCDA tool is being increasingly used in the literature on climate change and in climate-policy making and is attracting a growing interest mostly (see references above). In addition, there are a couple of interesting recent studies that have used MCDA to capture and model uncertainty in relation to climate change responses; see for instance: Durbach IN, Stewart TJ (2012) Modelling uncertainty in multi-criteria decision analysis. European Journal of Operational Research 223, 1-14 AND Stewart TJ, French S, Rios J (2013) Integrating multicriteria decision analysis and scenario planning-review and extension. Omega 31: 679-688. This is a promising avenue of research (of course partially overlapping with other approaches such as scenario analysis and structured expert judgment) and deserves to be acknowledged.	Thanks for this comment. MCDA is a "poor man's multiattribute utility theory". MAU makes very strong assumtions, eg that the utility of one attribute does not depend on the values of other attributes. Thus, the relative value of a polluting factory in your city would not depend on the level of unemloyment, your attitude toward fracking would not depend on the price of oil. In the best case, effort is made to validate these assumtions. MCDA usually skirts the issue of validity of these assumptions and proceeds to simple techniques for assigning values to attributes. In some cases, eg AHP, the values are assigned assuming a ratio scale for utilities, which conflicts with the basic theory. These considerations, together with their absence in the climate change discussion thus far, together with the aggressive page constraints led to their exclusion.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
35832	2	29	22			Expected utility theory is really about representing behavior, not about following four steps to make decisions. However, following these steps is consistent with expected utility. Should be more precise.	Thanks for the comment. EUT has a normative component in so far as the representation of partial belief and values applies to a "rational decision maker". The comment is correct, but the text makes the normastive issue quite clear.
19607	2	29	27	29	37	This part can be deleted, since there is no key information.	The section has been revised.
35833	2	29	22			``subjective vs objective'': This paragraph is not Bayesian, whereas standard EU is. We need not always prefer observed frequencies (we can update a prior...), nor ``must'' we have expert judgment when those are unavailable. One doesn't consult experts when seeing a new coin. Should be corrected.	Thanks for this comment. Of course this is correct. If we have sufficient observed relative frequencies and if all priors consider the events as exchangeable and if the relative frequencies converge to a value in the support of the priors, then the various holders of these priors will tend to converge. If we have a new coin, then we can analyse its center of gravity, curvature etc and infer its probability of heads under some distribution over initial conditions, or we can ask experts, or we can flip it a few times. Any sensible person would do the latter. IMO this comment leads into a discussion that is too academic for this chapter.
19576	2	3	4	3	4	"2.3.2.2 How Can Decision Analysis can Improve Decision-Making under Uncertainty?" might be "2.3.2.2 How can decision analysis improve decision-making under uncertainty?"	Noted.
22998	2	30	11	30	12	sentence doesn't make sense	Accepted - text revised.
22999	2	30	17			"Condorcet's voting paradox" needs reference or explanation	Thanks, but this would be like citing Newton for gravity. See the wiki page http://en.wikipedia.org/wiki/Voting_paradox.
35834	2	30	17	30	18	It is not clear what the phrase "must have recourse" means here. The authors should clarify this.	Accepted - text revised.
35836	2	30	20	30	20	Please insert a reference.	Please insert a reference.
35837	2	30	20	30	22	Under Condorcet's paradox, voters are in fact all acting rational, it is just that some of the axioms of utility theory are violated. This should be corrected in the text.	Correct, the axioms are violated when we try to define group preference by majority
35835	2	30	20	30	29	We do not believe this is related to uncertainty. We feel its link with uncertainty should be establised or the text deleted.	This comment is too unclear for response. Is the claim that expected utility is unrelated to uncertainty? The expectation is taken wrt an uncertainty distribution.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
26786	2	30	23			I am not convinced that this is what the Condorcet's voting paradox says, it would be good to check his essay "Essai sur l'application de l'analyse à la probabilité des décisions rendues à la pluralité des voix" to be sure. This is not my field of expertise, but perhaps the authors should also consult "The Myth of the Rational Voter" by Bryan Caplan.	Rejected This is a statement reflecting current thinking regarding normative models
35838	2	30	23	30	23	Stakeholders cannot ``adopt a common utility function." The utility function reflects the given preferences of an individual. A facilitator could induce compromises, where each side may accept a proposal that does not maximize their utility, but preferences cannot be changed. Further, individual preferences can be measured by observing choices, therefore the only issue is what weights to assign to different individuals in the social welfare function. Even if the weights are unknown, frequently (including for climate change), the problem may be solved with a set of transfers. Choose the optimal climate policy from an equal weighting of individuals. Now, make transfers from those who gain to those who lose. The resulting policy is therefore weakly preferred by all, and so can be implemented unanimously, without any voting paradox issues (indeed, carbon markets make such transfers through the initial allocation of permits). The text needs to be corrected.	Thanks for this perceptive comment. The theory of rational decision does not say how utilities are formed, and hence does not say how they can be changed. For the rest I completely agree with this comment. The 'transsfer' argument is an issue for chapter 3.
23000	2	30	28	30	30	These three lines are confusing - need to explain better.	Text has been revised
30791	2	30	39	30	41	"Whether decision makers should evaluate emission scenarios with 'decision weight probabilities' is a case that remains to be made." This statement does not belong here. The previous discussion seems to be a general summary of how normative results might be converted to "decision weight probabilities" to simplify decision making. However, it says nothing about applying this approach to emissions scenarios (i.e., how or why) and while that may be important, it deserves explanation.	Thanks for this comment. It could be asrgued (successfully in my opinion) that the violations of EUT that lead to these decision weights, belong to "System 1", however the team 2 hasn't yet broached this issue didrectly. There are many problems with using decision weights, includidng their non invariance under various operations, and failure to describe some choice behavior. Rather than opening a discussion of all this, in view of page constraints, it was simply to say that the case has not been made.
30174	2	30	27	31	41	Very good description of EUT. Retain.	Thanks.
30792	2	31	24	31	24	Having a question for a sub-title is unusual for an IPCC report. There are also some wording errors here (i.e., too many "can")	Thank you for you comment. Typo corrected
19577	2	31	24	31	24	2.3.2.2 How Can Decision Analysis can Improve Decision-Making under Uncertainty? might be "2.3.2.2 How can decision analysis improve decision-making under uncertainty?"	Thank you for you comment. Typo corrected

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
25927	2	31	25	31	26	Stochastic analysis, as well as the concept of super-hedging strategies, may deserve to be mentioned here. Super-hedging refer to technologies which penetrate more in the hedging strategy than in any of the perfect forecast strategies. Such a situation shows that the stochastic analysis of future climate strategies gives insights that are beyond any interpolation of the deterministic strategies. Useful references are: • Labriet M., Loulou R. and A. Kanudia, 2009. Modeling Uncertainty in a Large scale integrated Energy-Climate Model. In: Environmental Decision Making under Uncertainty, J.A. Filar and A.B. Haurie (eds), pp.51-77. 10.1007/978-1-4419-1129-2_2 • Labriet, M., A. Kanudia and R. Loulou. 2012. Climate mitigation under an uncertain technology future: a TIAM-WORLD analysis. Energy Economics, Vol.34, Supplement 3, pp.S366-377. Available online 10 March 2012. http://dx.doi.org/10.1016/j.eneco.2012.02.016 • Loulou, R., M. Labriet and A. Kanudia. 2009. Deterministic and Stochastic Analysis of alternative climate targets under differentiated cooperation regimes. Energy Economics, Volume 31, Supplement 2, International, US and EU Climate Change Control Scenarios: Results from EMF22, p.S131-143. http://dx.doi.org/10.1016/j.eneco.2009.06.012	Thank you for your comment. We do indeed discuss one of these papers but in the later section where specific results from IAMs are discussed.
35839	2	31	25	31	29	We do not understand the wording here. Expected utility theory would allow the decision maker to directly incorporate the uncertainty if probability distributions can be defined. Is this referring to sensitivity analysis over these distributions? What sensitivity analysis is being conducted over should be clarified for the reader.	Noted The final version does not have this statement
30793	2	31	39	31	42	CBA is not restricted to government decision-making. It is widely used by private corporations too, though not necessarily to evaluate social costs and benefits.	Thank you for your comment. We rephrased this paragraph using the term collective rather than government
35842	2	31	39	31	43	It would probably be good for the uninitiated reader to mention here that BCA seeks to maximize social efficiency and refer to chapter 3 for a more complete explanation.	Thank you for your comment. Text amended
30173	2	31	8	31	11	This is an excellent expression of the limitation of expected Utility. It might be a good idea to consider a statement about "contrained choices" and that there are other non-expected utilitytheories Starmer, C. (2000). Developments in non-expected utility theory: The hunt for a descriptive theory of choice under risk. Journal of economic literature, 38(2), 332-382.	Thanks for this comment. The very strong page constraints prohibit a tour d'horizon which would include these interesting references
19610	2	31	38	32	17	The part is talking about some very basic information of CBA and can be deleted.	Thank you for you comment. However we decided to leave some very general notion of CBA as many reviewers found it useful.
35840	2	31	37			The last sentence about environmental economics in the first paragraph seems tacked on relative to the ones before it. Please revise the text.	Accepted The sentence has been deleted.
35841	2	31	37			Why is {nordhaus_economics_2011} lumped in with arguments against CBA rather than with {pindyck_fat_2011}? A more careful reading of this literature would really help this discussion.	Thank you for your comment. Although Nordhaus is generally in favour of CBA he has shown some concerns exactly related to the presence of uncertainty. We have however omitted this particular reference.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
19608	2	31	37	34	37	The authors are talking about the advantages and limitations of CBA and CEA. However, the findings such as "the CEA's failure to deal with low probablity events", "CEA assists in overcoming biases related to assessing multiple and contrasting sources of uncertainty" are very subjective. Actually, the author should emphasized that the abilities of CEA and CBA to deal with uncertainties both rely on the IAM they selected. More literatures can see: (1)Kok et al. 2011. Cost-effectiveness of greenhouse gas mitigation in transport: A review of methodological approaches and their impact. Energy Policy. 39(12):7776-7793. (2) Brown D, Ryan L.2011. Comparative analysis of evaluation techniques for transport policies. Environmental Impact Assessment Review. 31(3):226-233.	Taken into account. We had written 'CBA's failure' and stand by it. We do not regard the Weitzman debate about infinite expected (marginal) damages as 'subjective', it rather points to a crucial debate presently going on in climate economics. However we follow the reviewers in that the sentence 'CEA assisstes..' is problematic in the sense that it opens space for misinterpretation. We eliminated it. Finally, we disagree with the claim that the validity of our statement depended on the choice of IAM, as our statement addresses an effect before numerical implementation. Furthermore, to our impression, the literature the reviewers mention points to another issue: how to balance long-term vs. short term policy measures and create consistency when evaluating options across sectors. While we claim that our statements are universal, we see the latter discussion as allocated in Chapter 6 rather than in our Chapter.
30794	2	32	11	32	12	This sentence does not make sense and needs to be reworded.	Thank you for your comment. Text amended
23097	2	32	13	32	13	Instead of saying that CBA "faces major challenges" when applied at a global level, it should be stated that it is not appropriate for use outside of very limited, small-scale problems.	Thank you for your comment. We do only discuss here challanges deriving from the presence of uncertainty. A thoroughly discussion of major limitations of CBA is given in Ch3 and we refer to it.
21076	2	32	23	32	28	Options for decision-making at the community level also need not only to take into account the cost benefit analysis but also the life script of the communities. For example, the Trio indigenous community in Suriname is believing in the apocalypse and will rather chose for adaptation than mitigation, even if it will provide some monetary benefits. Such life scripts are specifically important for indigenous peoples and other strong collective settings. Smith, G. (2013). Participation of the Trio indigenous community in climate change mitigation projects: A worldview conflict analysis. Doctoral dissertation. Department of Conflict Analysis and Resolution, Nova Southeastern University.	Thank you for your comment. We do only discuss here challanges deriving from the presence of uncertainty. A thoroughly discussion of major limitations of CBA (including those related to cultural differences) is given in Ch3 and we refer to it.
35843	2	32	3	32	3	The use of the term "relative importance" could be misinterpreted. We understand that the paragraph is referring to relative importance with respect to the objective function, but we would suggest considering alternative wording such as baseline wealth or utility.	Thank you for your comment. Text amended

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
35844	2	32	30	32	32	We recommend that the sentence starting with "If they use" should be deleted. It does not seem to be correct and relies on the confusing System 1/2 specification.	Taken into Account. We have revised the example to address the points raised by the reviewers.
20700	2	32	31	32	36	What an absurd passage! No reference to varying power densities, or EROIs. These are absolutely fundamental concepts which throw grave doubt on this whole passge.	Taken into Account. We have revised the example to address the points raised by the reviewers.
30795	2	32	32	32	35	This sentence confuses the reasons for having a short time horizon. The cost of an effective flood prevention scheme is not determined by (or should not be determined by) the time horizon of the decision-makers. Rather, a decision not to invest would be driven by lack of belief that such a scheme will be needed "in the short term", and that it will be someone else's problem if and when it is needed. Suggest something like: "The mayor and his advisors may choose to focus on short-time horizons to defer the high upfront costs of building an effective flood protection scheme; this is because they are unconvinced that such an investment will bring any significant benefits over the first few years when they are likely to be held accountable for the decision."	Taken into Account. We have revised the example to address the points raised by the reviewers.
23002	2	32	34			Change discounting to discount?	Thank you for your comment.
22765	2	32	42	33	2	The audience is not interested in these textbook-like theories and guidelines, and these paragraphs didn't reflect the updated research findings after IPCC AR4, thus, should be deleted.	Thank you for you comment. However we decided to leave some very general notion of CBA as many reviewers found it useful.
23098	2	32	43	32	44	Saying that CBA is "in principle" the best measure of people's preferences is foolish: CBA is an axiomatically simple formulation that does not, alas, have much relation to real people, real markets, or the real world. By what "principle," then, is it best?	Thank you for your comment. Text amended
23001	2	32	8	32	9	sentence doesn't make sense	Rejected. Sentence seems clear.
32612	2	33		35		Somewhere in this section on decisionmaking methods, the point about the difficultes of CBA and alternate approaches could be underscored by the developments in UK debate around Impact Assessment. The government has acknowledged fundamental difficulties of CBA approaches (the Price review on the Economics of Sustainability, HMG 2009). The Joint Regulators Group has issued a paper acknowlegdng that fundamentally different approaches are required in large part because of discounting imponderables (JRG 2012: "for very long-term impacts such as global warming it would seem best to set discounting aside for now. Policymakers need information on very long-term options to be presented in ways that they and others can absorb and understand. Where discount rates are appropriate they are an invaluable tool. Where they are not appropriate other ways need to be found to present the time dimension." .. iscounting of all money-valued costs and benefits is not an appropriate technique to use for policies or projects where the very long term dominates the appraisal. For such rare cases, such as the very long term impacts of global warming, different techniques should be used in presenting policy advice on the importance of very long term costs and benefits." Drawing on this the UK ENerty REgulator Ofgem is adopting revisions to its entire Impact Assessment framework based on recognition that there are categories of Strategies and Sustainability issues that require a different approach framed around options, pathways, security and legally established long-term goals (Office of Gas and Electricity Markets, 'Strengthening strategic and sustainability considerations in Ofgem decision making' July 2012 www.ofgem.gov.uk; also written up as a paper in submision to J. Regulation and Governance).	Thank you
20701	2	33	1	33	8	No reference to thorium here. Extraordinarily, the only reference I have noticed in the whole SOD to thorium is in Chapter 7, p. 27, line 32. Does this suggest ignorance, or bias?	Rejected. Thorium is too special a topic for a framing chapter.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
19828	2	33	16		17	I agree that this is a way to adress the problem. But is this way actually used in the later chapters of this report? If not then the authors of the different chapters should coordinate which approaches are being included and give reasons for not including the others.	Thank you for your comment. Some of the papers cited later when actually looking at integrated assessment modelling actually do this. It is however true that still research needs to be carried out and we state this clearly in the executive summary
23003	2	33	20	33	23	sentence doesn't make sense	Taken into Account: The sentences have been clarified.
30797	2	33	24	33	25	Something is missing in here. The meaning is not clear.	Taken into Account: Added missing words.
22766	2	33	32	34	10	The audience is not interested in these textbook-like theories and guidelines, and these paragraphs didn't reflect the updated research findings after IPCC AR4, thus, should be deleted.	Thank you for you comment. However we decided to leave some very general notion of CBA as many reviewers found it useful.
30796	2	33	4	33	8	This sentence is long and confusing and should be reworded. Also, it does not offer any explanation for CBA being critiqued. Perhaps it means "one size of CBA does not fit all". Suggest the following: "For example, the uncertainty surrounding the potential impacts of climate change, including some possibly irreversible and catastrophic effects on ecosystems, and an asymmetric distribution of such effects around the planet, suggests CBA may be inappropriate for assessing optimal responses to climate change in all circumstances."	Thank you for your comment. Text amended
35848	2	33	42	33	44	CBA is also used by integrated assessment models. And re line 2 pg 34, these have also done stochastic programming. This should be reflected in the text.	Accepted. We fully comply with this statement and highlight this issue now in the text.
35845	2	33	9	33	15	These six lines constitute the entire treatment of the fat tails literature in this chapter (and presumably in the entire IPCC). It is remarkable that one of the few new concepts, which has profound policy implications (potentially anyway) is not treated more thoroughly in the chapter on uncertainty. This discussion should be expanded to appropriately characterize the issue and reflect its importance in the literature.	Thank you for your comment. A special appendix on fat tails has been included.
35846	2	33	9	33	15	The issue of fat tails is not with cost benefit analysis, but instead the use of unbounded utility functions. The problem with cost effective analysis and chance constrained programming is that they do in fact require a damage function contrary to the statement on line 13, page 34. To determine the target or target probability, one at least has to have implicitly a damage function in mind (or use cost benefit analysis and a damage function directly). Therefore, a disadvantage of these methods is that they do not make clear their assumptions regarding the benefits of climate policy. This discussion needs to be revised.	Taken into account. We agree that CEA does need implicit knowledge about damages, or at least about our knowledge structure. We will formulate more carefully. However we disagree that the issue is primarily about the unboundedness of the utility function. It is about how to act in view of large uncertainty in combination with potentially *large* damages. Some authors feel that the drastic action suggested by CBA under that boundary conditions as well as the sensitivity of those numbers to assumptions is worrisome.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
35847	2	33	16			``this problem'': what problem, exactly? And why the emphasis on value-at-risk without any discussion of its downside? It's not an ideal risk metric, as is well known. Given the framing emphasis on the downsides of expected utility, we need consistency in presentation when it comes to other approaches.	Taken into Account. We have clarified this problem but feel that the discussion on how to deal with low probability events is justified.
30175	2	33	41	34	29	This section is also very good, expecially the section that notes the inability of CBA to deal with low probablility high consequences events. However, it leaves out the trump for CBA (See John Adams, 1999. Risk) - In a situation where a landowner, say a small atoll would be compensated for inundation due to flooding induced by climate change, CBA can't cope when the landowner who says his/her land is "priceless" and therefore willingness to accept falls down. Although there is a market value for land, the owner of the land does not ascribe a monetary value to the land. There is mention of contingent valuation and hedonic pinciples, but it get's sticky when a price can be set by the market, but the stakeholder in question fundamentaly disagrees with the evaluation tool.	Thank you
19609	2	33	31	34	3	The part is talking about some very basic information of CEA and can be deleted.	Rejected. We fully acknowledge that the piece of information the referee is pointing to is rather elementary, indeed. However as a framing chapter, Ch2 has to be self-contained to a certain degree, in particular as we are addressing a rather interdisciplinary audience. In fact, a considerable fraction of reviewers asked for even more elaborate information on that elementary level throughout the Chapter.
35849	2	34	11	34	25	CEA requires goals, not just energy technology parameters. This discussion needs to clarify (that at least implicitly) an analysis of climate change damages has to be made.	Taken into account. We fully comply with this statement and modify the text in order to make that point clearer.
30798	2	34	12	34	15	This is not clear. Where in the previous discussion is there any mention that CEA "focuses on energy technology parameters"? It could be shortened, and possibly clarified, by using words like: "... the focus of CEA is not on climate damage effects which are scientifically uncertain, but rather on more tangible factors, such as energy alternatives, where scientific understanding is more established".	Taken into account. The text is made more coherent.
35850	2	34	12	34	15	Refers to the text: ``does not require knowledge about climate damage functions." The text needs to be clarified to indicate that we do need to choose a target.	Taken into account – will be clarified.
35851	2	34	20	34	21	We recommend that the sentence starting with "CEA thus assists…" should be deleted. It is not correct since the uncertainty still exists in determining the target.	Taken into account - this part will be re-written.
30799	2	34	25	34	37	This meaning of this text is not clear.	Taken into account - this § will be expanded in order to make the message clearer.
23004	2	34	28			Could reference all of WG I here; that's what it's all about	Accepted & implemented.
30800	2	34	30	34	34	This sentence is very hard to follow. The meaning is not clear.	Taken into account - this § will be expanded in order to make the message clearer.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
23005	2	34	33			What does "self-conflicting prescriptions" mean? Need an explanation here	Taken into account - this sentence will be expanded in order to make the message clearer.
35853	2	34	45	34	46	We recommend that ``need to be incorporated'' should be revised to ``might be incorporated'', or else it's not a generally conceded judgment.	Accepted.
35852	2	34	39			The stochastic IAMs cited above have adaptive policymakers who learn over time and are aware of that. The text should be revised to reflect that.	Noted, but rejected. The rebound effect, or Jevons Paradox, is a crucial insight for energy system planning, and as far as we know it is dealt with both in the sectoral chapters (where the issue of energy efficiency is addressed) and the national and sub-national policy chapter (given that different policy instruments lead to different degrees of rebound, contingent on how they affect relative prices). For our chapter, however, the rebound effect is of only tangental concern..
20702	2	34	8	35	6	Here and elsewhere there is grave weakness in discussion of the Jevons paradox. For road transport, to take just one example, the conclusions drawn by Michael Sivak's "Effects of Vehicle Fuel Economy, Distance Travelled, and Vehicle Load on the Amount of Fuel Used for Personal Transportation in the US: 1970-2010" highlight the difficulties. Also in Chapter 7, and briefly here, there coul be refence to the attractions of Battery Switch Stations. There should at least be forward reference to page 52, although there the discussion of the Jevons paradox (or 'rebound effects') is weak.	Not sure if this concerns this chapter.
35854	2	35	1	35	38	The selection of topics and their relative coverage is odd in that we get lots of detail about things like tolerable windows (which is good) but very little (or no) detail on things like stochastic integrated assessment models. A discussion of stochastic dynamic integrated assessment models is highly relevant for this chapter and should be included.	Taken into account. The TWA is now covered in response to the request a of reviewer and we should not remove it. We expand on dynamic effects in both the tools and the IAM section. Otherwise stochastic IAMs is what 2.4.2-SOD was all about.
35856	2	35	12	35	16	It seems like the term "cost effective" in the statement provides enough ambiguity such that one could argue it is not suggesting the application of the precautionary principle.	Taken into account - we give a more careful interpretation.
35857	2	35	18	35	18	The concept of "deep uncertainty" should be defined for the reader. It may be more appropriate however to focus on more commonly understood expressions of uncertainty.	Taken into account. We now use connsistently 'Knightian uncertainty' that we had introduced before.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
23006	2	35	3	35	15	This is a rather confusing summary of the precautionary principle. Try to rewrite to make more comprehensible.	Taken into account. Due to space limitations we cannot give a comprehensive overview on the discussion regarding the PP. What we wanted to highlight is that there exists an imprtant strand of alternative decision criteria beyond expected utility optimization much of which is to be found under the umbrella 'PP'. Will will make clear the minimax is not a comprehensive mapping of PP but just one realization.
35855	2	35	3	35	3	Contrary to the claim, expected utility does also ``examine outcomes over all possible states of the world.'' Indeed, a particularly salient critique with respect to climate change is just this ``small world'' assumption that we can define and analyze all possible states. This should be corrected in the discussion.	Taken in to account. Our statement was not to say what EU would not do; it rathers attempted to describe how to operate minimax. Our revised text simply eliminated that sentence, as it describes a matter of course and seems to confuse more than to add insight.
22767	2	35	39	35	48	The audience is not interested in these textbook-like theories and guidelines, and these paragraphs didn't reflect the updated research findings after IPCC AR4, thus, should be deleted.	Taken into account. To our understanding, a framing chapter should summarize the relevant methodologies, that are then applied, indeed, in the literature since AR5. In fact, many reviewers even asked for more elaborate descriptions of concepts. However we condensed that §.
35858	2	35	39			Is it fair to equate the precautionary principle and minimax? There is a literature on this that is not reflected in the chapter but should be. Please revise to reflect a broader perspective.	Taken into account. Due to space limitations we cannot give a comprehensive overview on the discussion regarding the PP. What we wanted to highlight is that there exists an imprtant strand of alternative decision criteria beyond expected utility optimization much of which is to be found under the umbrella 'PP'. Will will make clear the minimax is not a comprehensive mapping of PP but just one realization.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
20703	2	35	22	37	31	Nothing on the implications and effects of the Jevons paradox.	Rejected. Our Chapter is on concepts of decision-making, not about individual underdetermined processes, which are Chapters following Chapter 6 are devoted to.
22769	2	36	1	36	15	There has quite a few recent literatures on this topic, and some more information could be added "Adaptive management can be defined as a structured process for improving management policies and practices by systemic learning ...Adaptive management is often associated with "adaptive" organizations."(IPCC-SREX,2012) "Adaptive management is described as a two-phase process of deliberative and iterative phases, which are implemented sequentially over the timeframe of an application. Key elements, processes, and issues in adaptive decision making are highlighted in terms of this framework." (Williams B K. Adaptive management of natural resources: framework and issues. Journal of Environmental Management, 2011, 92: 1346-1353); "participatory adaptive management" and "adaptive governance" in "Allen et al. Adaptive management for a turbulent future, Journal of Environmental Management, 2011, 92: 1339-1345. "challenges that can lead to failure in adaptive management programs...Adaptive management can be a powerful and beneficial tool when applied correctly to appropriate management problems." in "Allen C R, Gunderson L H. Pathology and failure in the design and implementation of adaptive management. Journal of Environmental Management, 2011, (92): 1379-1384."“Adaptive management is becoming an increasingly popular management-decision tool within the scientific community and has developed into two primary schools of thought: the Resilience-Experimentalist School (with high emphasis on stakeholder involvement, resilience, and highly complex models) and the Decision-Theoretic School (which results in relatively simple models through emphasizing stakeholder involvement for identifying management objectives”--McFadden et al, (2011) Evaluating the efficacy of adaptive management approaches: Is there a formula for success? Journal of Environmental Management, 92(5) : 1354–1359.	Noted. Much of this goes into detail beyond what this chapter has room to cover. What we have done is to note the IPCC-SREX definition, whioch is one that includes both active and passive forms: "The IPCC Special Report on Extreme Events (IPCC-SREX, 2012) defined adaptive management as structured processes for improving decision-making and policy over time, by incorporating lessons learned. "
35859	2	36	1	36	46	These paragraphs give a relatively negative portrayal of adaptive management, putting more emphasis on its drawbacks than on the useful to beneficial utility of a well-designed program. It may be useful to eliminate the PAM and AAM distinction and simply describe adaptive management as an effective tool for uncertain climate actions - in which you learn as you go and make changes accordingly.	Noted. In response to this and other comments we have been clearer about noting positive examples from the literature of PAM. ("There are examples from the literature of PAM in the context of climate policy; Nilsson (2006), for example, reports on a case study of Sweden, and finds the institutionalization of lessons learned over time from the ex post analysis of national policy."). We maintain the distinction between PAM and AAM to highlight the fact that AM in its most progressive form has so far proved elusive, for good reasons.We believe this to be a useful and accurate appraisal.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
35861	2	36	16	36	33	We recommend that these two paragraphs should be deleted. They are not relevant and not necessarily correct given the first sentence of the second paragraph which reads: "In practice, adaptive management can easily fall victim to the System 1 dynamics characterized above, and other institutional constraints and dynamics, such as the accountability elected officials in a state parliament feel towards the residents in their home district, rather than the citizens of the state as a whole."	Accepted. We agree that the link to systems 1 and 2 are on the speculative side, and were not necessarily grounded, and so have removed them.
22768	2	36	2	36	33	The audience is not interested in these textbook-like theories and guidelines, and these paragraphs didn't reflect the updated research findings after IPCC AR4, thus, should be deleted.	Noted. We have tried to pull the description of adaptive management closer to actual experience with climate policy. Our understanding, however, is that to some extent the framing chapters are a bit textbooky, by design, as the cover some basic principles that come up later.
35862	2	36	26	36	29	This point requires additional clarification. If the only "bias" was a politician who responded solely to the net impacts on his own constituents, then wouldn't a system 2 approach where the only individuals who had standing in the objective function were the decision maker's constituents produce the same outcome? Who should have standing in a decision maker's objective function is a deep unanswered philosophical question and not necessarily a limitation of system 1 decision making.	Noted. We have actually dropped this text.
35863	2	36	30	36	32	It may be useful to note that this is a result of the knowledge being a public good.	Accepted. We have changed a sentence to read: "Reflecting the public goods character of institutional knowledge, all jurisdictions could then use this knowledge in a later round of policy-making."
35864	2	36	37	36	37	The meaning of "pursued" is unclear here. Please clarify this in the discussion.	Accepted. We have changed the sented to read: " ... with the expectation that some technologies will not prove practical, while others will be successful ..."
30801	2	36	44	36	46	Attribution and establishment of an acceptable counterfactual in ex post analysis are two challenging methodological issues when assessing the relative effectiveness of different instruments. In that context, is it possible to qualify what is meant here by "robust analysis"?	Rejected. There is nothing here about counterfactual. It is the fact that different jurisdictions adopted different instruments, and it is hence possible, using commonly accepted social science qualitative research methods, to come up with some generalizable knowledge about cause and effect relationships. We defer to those disciplinary standards that label such methods as robust.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
22770	2	36	48	37	9	The audience is not interested in these textbook-like theories and guidelines, and these paragraphs didn't reflect the updated research findings after IPCC AR4, thus, should be deleted.	Rejected Since this is a chapter on risk and uncertainty we feel it is important to discuss uncertainty analysis techniques to guide deliberative thinking
35860	2	36	1			There is a literature on learning---and even active experimentation---in a climate context which should be included in the chapter. Please revise the text to reflect a broader perspective.	Accepted. We have included an example of this: "There are examples from the literature of PAM in the context of climate policy; Nilsson (2006), for example, reports on a case study of Sweden, and finds the institutionalization of lessons learned over time from the ex post analysis of national policy."
32395	2	36	47	37	40	Please refer to the IPCC AR5 Uncertainty Guidance Note and make sure that all statements as well as the box content are in line with it.	Yes they are
35865	2	37	1	37	3	The sentence starting with "QUA" should be deleted. Either support this statement with appropriate citations or delete it.	Thanks, that is a misprint, QUA should be QLUA. With that correction, its obvious.
22942	2	37	11			while getting dug into the Science, Technology and Society (STS) contributions to these efforts to define and quantify uncertainty with greater texture, a short sentence noting that this work has been underway for two decades now would help. This could be quickly referenced by the seminal contribution of Brian Wynne (1992): “Uncertainty and environmental learning,” Global Environmental Change June: 111-127.	Quantifying uncertainty analysis has been around since at least 1975. The historical backgsround was removed for space, but the box Uncertainty Quantification cites an early technical guidance document.
30802	2	37	11	37	40	Box 2.2 on Quantifying uncertainty is very useful and puts forward some critical points, but the third paragraph is essentially a long citation. Consider re-writing it.	Thanks very much for this comment
22771	2	37	11	37	40	The audience is not interested in these textbook-like theories and guidelines, and the Box2.2 didn't reflect the updated research findings after IPCC AR4, thus, should be deleted.	Many people in the climate community are unfamiliar wth quantitative uncertainty analysis and don’t realize that many of the questions being debated have been around a long time, and considerable experience exists in the wider community. The quotes serve a very useful purpose in that regard. Unfortunately, reviewer does not reference any post AR4 research which would obviate box 2.2.
29907	2	37	11			I don’t find Box 2.2 useful. Particularly the last paragraph consists solely of two long quotes from the literature.	Many commentators found it very useful, see response to comment 598. and 600.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
25309	2	37	11	37	40	Box 2.2 is important bridging the communication gap between science and policy. The present description in the box is too technical and esoteric. It fails to communicate clearly how the uncertainty is quantified such as by the 'confidence levels' used throughout the AR5 SOD; i.e. how the qualitative confidence scale in Figure 2.5 (page 64, SOD Ch. 2) relates to qualtitative scales in Table 2.3 (page 64, SOD Ch. 2). It is unclear how the confidence level of a statement is quantified in practice. This should be explained through illustrative examples taken from real-life situations, as avaiable in the scientific and policy literature.	I agree that reasoning under uncertainty is difficult, it is much easier propagate uncertainty with simple rules such as: if X is likely and Y is likely, then X AND Y is likely. In the natural language who notices the difference between X and Y is likely snd X and Y are likely? Its not really a problem of technical vesus non technical people, the National Reseach Council experts count as 'technical people' and yet they make elementary errors in probabilistic reasoning. Correct reasoning under uncertainty is not "esoteric" it is just hard. Smart people make dumb mistakes all the time. Such errors are mostly harmless, but n climate change they are not. The purpose of Box 2.2 is to make people aware of these difficulties, it is not the place to explain how the verbal modifiers are derived.
35866	2	37	11	37	40	The text of the box should be updated so that the reader understands how this information is relevant to the discussion within the chapter.	Box 2.2 takes an example of invalid probabilistic reasoning not from IPCC itself but from a high value user. This choice was deliberate. IPCC's decision to continue their calibrated language cannot be revisited in this round. IPCC does not caution users regarding the problems of propagating their calibrated language, with the result that even the NRC makes mistakes in this regard. Box 2.2 is an attempt to flag this issue and repair this deficiency. I would agree that it deserves MUCH higher visibility.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
23007	2	37	12			What does "natural language" mean in this context?	A discourse in the natural language is one in which words bring their meaning "off the street", and are not formally (re) defined for a specific context. The IPCC's calibrated language gives words "very likely" etc a specific quantitative meaning, and then turns them loose into the natural language where they will be propagated in ways that contradict their formal meaning. In their quantitative formal meaning, X and Y is likely is NOT the same as X and Y are likely. Yet once the words are turned loose in the natural language, intelligent technical people like NRC experts will confuse them.
23008	2	37	30			"early" should be quantified. What year?	This referes to "early handbook"? The references says US NRC 1983.
35867	2	37	41	39		Expert agreement is a highly problematic area; moreso than presented in the text. The discussion should be more robust.	The references contain ample information on expert (dis)agreement. I wouild certainly support more information and background on structured expert judgmenmt, but at this point the page constraints are binding. Expert disagreement is not the most importahnt omission, in mty opinion. More important IMO is the quality of expert judgments and the results of validation. In many studies, quality control and validation are absent.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
35868	2	37	41	39	6	It may be a lot better than nothing - but it can lead to "overconfidence" in the results. With the best will in the world experts simply may not know the range of uncertainties/drivers of some things related to climate change (unless in some sense they keep widening distribution to reflect "ignorance" - but how much?, and what does it mean). What the distribution means in terms of a density distribution representing the future is unclear to me. We recommend adding a bit more about why information can be limited (e.g.- if the information that expert will use to make a judgment on is simply "not there" to form an "accurate" distribution). This whole theme of uncertainty becuase of lack of knowledge or ignorance (related to the idea of waiting for more information) should generally be emphasized more in the Chapter.	Thanks for this comment, of course the discussion is strongly space constrained, adding here means substracting somewhere else. There is really a lot of data and experience on quantitative expert judgment. As explained in section 2.2 the experts' uncertainties are subjective probabilities. They are not estimating a distribution based on observed frequencies but quantifying their partial belief. Hence the question of accuracy in the commenter's sense does not arise. Whether uncertanty comes from lack of knwledge or inherent randomness is an old discussion. Is your uncertainty about the outcome of a coin toss due to inherent randomness or to lack of knowledge of initial conditions at the time of the toss. On the horizon of classical physics, if you know the initial conditions you can predict the result with certainty. But then there are chaotic systems whose sample paths are Brownian motion and have no derivative...but they're only approximately Brownian motion... This discussion then slides into quantum mechanics and the viability of hidden variable reconstructions. Been there got the tee shirt. Not gping back, at least in AR5.
22772	2	37	42	38	15	The audience is not interested in these textbook-like theories and guidelines, and these paragraphs didn't reflect the updated research findings after IPCC AR4, thus, should be deleted.	roger: Many people in the climate community are unfamiliar wth quantitative uncertainty analysis and don’t realize that many of the questions being debated have been around a long time, and considerable experience exists in the wider community. The quotes serve a very useful purpose in that regard. Unfortunately, reviewer does not reference any post AR4 research which would obviate box 2.2.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
23009	2	38	1	38	2	Should this be "expert opinions" rather than just "experts"	YES, excellent catch. Thanks, its fixed.
20780	2	38	1	38	2	sentence unclear	Word added for clarification, instead of inferring "elaboration" from the previous sentence, the second sentence now reads "the most recent elaboration" …. Thanks
30803	2	38	1	38	3	This is an important sentence because it addresses the topic of how "expert performance" can be validated, but it could be made more clear. Consider adding more detail. I.e., is there a nugget about how validation is done that can be summarized from the Goossens et al. reference? Specifically, how might experts be selected and would a validation protocol reject those who evidently underperform?	This is a good suggestion. I included a bit more background, but space constraints are binding. If given (even) more space I would add more.
35870	2	38	1	38	1	What does "benchmark" mean here?	rom Merriam-Webster "Definition of BENCHMARK a : a point of reference from which measurements may be made b : something that serves as a standard by which others may be measured or judged c : a standardized problem or test that serves as a basis for evaluation or comparison (as of computer system performance)
35869	2	38	1	38	3	The sentence that starts with "The most recent benchmark..." should be revised to make its relevance to the discussion more clear.	This is a good suggestion,space willing I will include something.
23010	2	38	13	38	15	Sentence is too long and confusing	Agreed, changed to "Structured expert judgment can provide insights into the nature of the uncertainties associated with a specific risk in the spirit of System 2 behavior."
22773	2	38	21	38	26	The audience is not interested in these textbook-like theories and guidelines, and these paragraphs didn't reflect the updated research findings after IPCC AR4, thus, should be deleted.	Rejected Since this is a chapter on risk and uncertainty we feel it is important to discuss uncertainty analysis techniques to guide deliberative thinking
30804	2	38	31	38	32	"Structured expert judgments of climate scientists were [N.B.] recently used to quantify uncertainty in the ice sheet contribution to sea level rise." Can you provide a reference for this statement?	The reference Bamber, J.L., and Aspinall, W.P., (2013) An expert judgement assessment of future sea 1evel rise from the ice sheets, Nature Climate Change, PUBLISHED ONLINE: Janurary 6, 2013 | DOI: 10.1038/NCLIMATE1778. added

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
23011	2	38	33	38	35	Sentence seems to be missing something	Agreed, changed to "Damages or benefits to ecosystems from invasions of non-indigenous species are impossible to quantify and monetize on the basis historical data and illustrate the use of structured expert judgment in the climate change arena"
22774	2	38	46	39	12	The audience is not interested in these textbook-like theories and guidelines, and these paragraphs didn't reflect the updated research findings after IPCC AR4, thus, should be deleted.	Rejected Since this is a chapter on risk and uncertainty we feel it is important to discuss uncertainty analysis techniques to guide deliberative thinking
35871	2	38	46	39	6	Expert judgments also suffer from a number of biases. Ottaviani and Sorenson, Journal of Financial Economics, 81(2):441-466 (2006) and others show that experts have strong incentives to conform to the mean opinion. Powell and Aberson, Bulletin of the American Meteorological Society, 82:2749-67 (2001) and Kelly et. al., Journa of Economic Behavior and Organization, 81(2):644-683, (2012) show that experts at the National Hurricane Center over-predict hurricanes will land near population centers, because they face a high penalty for incorrectly predicting a hurricane will not land near a population center. A more robust discussion is warranted here.	thanks for the references, I will follow up. Its not clear that these are STRUCTURED expert judgments in the sense of this paragraph. Was there a formal recruitment, training, elicitation protocol, were calibration variables used, etc. The problems with unstructured expert judgment are well known. THese are good examples of "improper scoring rules" where experts are rewarding for slanting their views. Stgructured elicitations with proper scoring rules ect are exactly introduced to counter this, but the strongest prophylactic is the use of calibrastion variables to measure expert performance. But all of this seems toff-message given the vey aggressive space constraints.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
30805	2	38	47	38	47	"Expert judgment studies do not reduce uncertainty; they merely quantify it." This seems like a broad statement, because there must be countless examples where groups of experts express opinions, based on established knowledge in their fields, to non-experts and thereby "reduce uncertainty" in the minds of the latter. Could this be clarified further?	Thanks, this is a fundamental point. A ballistics expert testifying in a murder trial is reducing uncertainty in the minds of the jurors about the bullet's trajectory. This expert says what all ballistics experts would say, that's why one is sufficient. this sort of expert advisor siply reports a scientific consensus, which is presumed to exist. We don't use expert judgment to assess the speed of light in a vacuum, but we might ask an expert to tell us what that is. The expert does not quantify his subjective uncertainty. If necessary to add this distinction it would belong in the sentence "A wide variety of activities falls under the heading expert judgment that include blue ribbon panels, Delphi surveys and decision conferencing.". However, it seems a bit off message, given the aggressive space constraints.
21595	2	38	31	38	32	Include reference to Bamber and Aspinall, Nature Climate Change if this is the paper being referred to. Another relevant paper is on the expert judgement of climate tipping points by Lenton et al. (2008), PNAS.	Bamber and Aspinall, Nature Climate Change is added to the references.
32396	2	38	31	38	32	If this statement is to be kept there needs to be at least one citation and reference to WGI Ch04.	See comment 607, I had added the reference, but it didn't get into the text
22775	2	39	19	39	24	The audience is not interested in these textbook-like theories and guidelines, and these paragraphs didn't reflect the updated research findings after IPCC AR4, thus, should be deleted.	The audience is not interested in these textbook-like theories and guidelines, and these paragraphs didn't reflect the updated research findings after IPCC AR4, thus, should be deleted.
23012	2	39	26			Spell out RCP	They are spelled out in 2.3.7.2:"In the climate change arena, scenarios are currently presented as different emission pathways or Representative Concentration Pathways (RCPs).
22776	2	39	26	39	32	The description of RCP as well as the main findings from the RCP analysis is not the target of Chapter 2, and these should be in SPM and Chapter 6, thus needs to be deleted here.	The concern is with scenarios as used by IPCC.
22777	2	39	38	40	30	The description of RCP as well as the main findings from the RCP analysis is not the target of Chapter 2, and these should be in SPM and Chapter 6, thus needs to be deleted here.	The concern is with scenarios as used by IPCC.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
24567	2	39				This section deals with risk including revisions to emissions scenarios between AR4 and AR5. While there are clearly good reasons for the change to Representative Concentration Pathways (RCPs) e.g. the inclusion of radiative forcing, and important caveats about not using these 'illustrative examples of possible futures' in a deterministic way, the new scenarios may further confuse readers and our stakeholders about the likely future under a changing climate. It would therefore be useful to provide some commentary on how the scenarios might best be communicated. The importance of this, from the perspective of coral reef management, is illustrated in a recent paper in Nature Climate Change by Van Hooidonk & Maynard. In the paper the researchers use the latest RCP based CO2 scenarios to assess the risk of coral bleaching on reefs around the world over the rest of this century. Because of the way the scenarios are constructed, there is a perverse outcome whereby the lower emissions scenarios e.g. RCP 2.6 appear to result in a worse coral bleaching outcomes than the higher emission scenarios (figure 1 of the paper). According to the authors, this is because of the assumptions about radiative forcing and emissions intensity in the next decade or so being different in each RCP model). However even though this can be 'explained' it is likely that the important insights provided by these scenarios will be lost in the explanation of such counter intuitive outputs to the broader community. Citation: van Hooidonk, R., J. A. Maynard, and S. Planes. "Temporary refugia for coral reefs in a warming world." Nature Climate Change (2013).	Text has been revised
27451	2	40	13	40	30	Delete Line 13-30 (incl. Figure 2.3) - there is no benefit showing AR 4-scenarios; results of RCP-scenarios have been discussed above.	They are a good illustration of possible misinterpretations of scenario information. I believe they should stay.
23013	2	40	8	40	12	But as AR4 and later work continues to show, the models themselves are still not adequate for determining long-term natural variability, e.g., long-term forecasts of ENSO, or NAO, etc., so much caution should be used for decision-making. The reliance on model results here is not consistent with what is known, as recent results continue to show the inadequacies of the models. On problems with reproducing ENSO, see: Tierney, J. E., J. E. Smerdon, K. Anchukaitis, and R. Seager (2013). Multidecadal variability in East African hydroclimate controlled by the Indian Ocean. Nature 493, 389-392. On problems with reproducing drought, see: Coats, S., J.E. Smerdon, R. Seager, B.I. Cook and J.F. Gonzáez-Rouco (2013). Megadroughts in Southwestern North America in ECHO-G Millennial Simulations and their Comparison to Proxy Drought Reconstructions. J. Climate: submitted. Also see: Schiermeier, Q. (2013). Climate models fail to 'predict' US droughts. Nature 496, 284.	rc: Very good comment, but it belongs in the scenario chapter, not here.
23014	2	41	1			Hansen's point is very important	Very important indeed. This is one reason why scenario analysis is not uncertainty analysis.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
35230	2	41	13	41	13	The public and the policy-makers should be informed how to deal with the results from scenario analyses and what should be put into action under such uncertainties. Many studies have provided such views. It is suggested that the following sentence should be inserted in the end of this paragraph: “The results from scenario analyses should be viewed as only suggestive and illustrative (Nordhaus, 2010). When uncertainty is always associated with projections, policy-makers should consider expanding research into climate change, improving monitoring systems, and taking actions designed to enhance the adaptability and resilience of ecosystems and economies. (Alley et al., 2003)” (see: Nordhaus W D. 2010 Economic aspects of global warming in a post-Copenhagen environment. PNAS, 107(26): 11721-11726. and Alley R B, Marotzke J, Nordhaus W D, Overpeck J T, Peteet D M, Pielke Jr. R A, Pierrehumbert R T, Rhines P B, Stocker T F, Talley L D, Wallace J M. 2003. Abrupt Climate Change. Science, 299: 2005-2010.)	Rejected. This is all very true, but doesn't add enough to warrant inclusion
22778	2	41	13			The public and the policy-makers should know how to deal with the results from scenario analyses and what should be taken into action under such uncertainties. There are several studies providing these views, among others, the bellowing should be inserted to the end of this paragraph: “The results from scenario analyses should be viewed as only suggestive and illustrative (Nordhaus, 2010). When uncertainty is always associated with projections, the policy-makers should consider expanding research into climate change, improving monitoring systems, and taking actions designed to enhance the adaptability and resilience of ecosystems and economies. (Alley et al., 2003; Xie and Duan, 2010)” (see: Nordhaus W D. 2010 Economic aspects of global warming in a post-Copenhagen environment. PNAS, 107(26): 11721-11726. Alley R B, Marotzke J, Nordhaus W D, Overpeck J T, Peteet D M, Pielke Jr. R A, Pierrehumbert R T, Rhines P B, Stocker T F, Talley L D, Wallace J M. 2003. Abrupt Climate Change. Science, 299: 2005-2010. Xie P and Duan B. 2010. A Study on Climate Change Risk Premium. Journal of Financial Research, (8): 16-32.)	Rejected. This is all very true, but doesn't add enough to warrant inclusion
23015	2	41	15	41	28	This is a simplified and misleading in the sense of being much too positive about the high resolution methodologies. Downscaling is a very complex subject, over which there is much controversy in the scientific literature. A good reference on inadequacies of the models is found at: Smith, L. A and N. Stern (2011). Uncertainty in science and its role in climate policy. Phil. Trans. R. Soc. A 369, 4818-4841. (DOI: 10.1098/rsta.2011.0149).	Accepted. We added a note of caution and that reference.
29908	2	41	15			Box 2.3 I don't find this box relevant to the topic of the section 2.3.7.2. Downscaling techniques do not necessarily "reduce uncertainties". Even if it is relevant, the text in the box should be fully reviewed by WGII Ch21 authors who specialize in downscaling discussions. The box should at least provide a balanced view of pros and cons of downscalinte techniques in the context of uncertainty discussions.	From the perspective of developed countries, enough information is given for introduction of mitigation and adaptation policies. Downscaling techniques provide information for regions where no or poor resolution generates uncertainty. Although we are not experts, regional downscaled information is wide in use by small islands to assess mitigation technologies (future wind speed) and several data for adaptation (temperature, precipitation). Without that, no accurate climate policy in this sense is possible.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
30806	2	41	17	41	19	"Such scenarios currently exist at the global level through Global Change Models (GCM) providing resolution of a few hundred kilometers". This use of GCM as an abbreviation is incorrect (or at least unusual). It is generally used for "General Circulation Model" or "Global Climate Model" and it would be surprising to see it used for anything different in an IPCC report. Moreover, the sentence refers to spatial resolutions which are consistent with those used in global climate models: models of global change (i.e., of the impacts of changes in climate and other global pressures) would have spatial resolution expressed in different terms. Also, it is probably worth saying that most GCMs now produce outputs at grid resolutions of 200 km or less. It is not likely that there are many datasets in the CMIP5 archive at resolutions coarser than 3 deg lat/lon.	Accepted - rephrased.
30807	2	41	22	41	25	Many downscaling techniques take account of elevation effects; this is not something restricted to RCMs. Also suggest saying "project climate change" rather than "predict climate change".	Taken into account - text modified.
30808	2	41	24	41	25	Characterizing "the risk of extreme events such as hurricanes" is something that GCMs can address to some extent because hurricanes are weather systems large enough to be captured in GCM grid cells. A better example would be convection storms that can cause extreme rainfall events, but which occur at spatial scales much smaller than a typical GCM grid cell.	Accepted - text modified accordingly.
21596	2	41	25	41	27	Box 2.3: SRES should be defined in this chapter.	Taken into account - we point to the Glossary for a definition.
20781	2	41	31	41	36	paragraph can be cut	Accepted. We have only retained the last sentence.
22779	2	41	31	41	35	There is duplication of paragraphs and findings before, thus need to be deleted.	Accepted. We have only retained the last sentence.
23016	2	41	40			It would have been much better if nations had worked toward an emissions target in terms of tons of CO2; to have a target of degrees C implies a much better understanding of climate than we have today. But that's a larger issue than this chapter can deal with.	Accepted. It is a much larger issue.
35872	2	42	14	42	16	The sentence starting with "These again show…" is awkward and should be rewritten.	Accepted. The new sentence is "These show sensitivity to technological uncertainties, insofar as individual countries may find it difficult to estimate their future abatement costs, in turn influencing their level of commitment."
23017	2	42	6	42	33	This could easily be shortened to one sentence per bullet point	Rejected. After careful consideration, we decided that the additional text provided a useful roadmap for reading this very dense section of the chapter. In particular, the text highlights how there is a difference in the types of uncertainties that play a role across policy contexts.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
20782	2	42	6	42	33	section can be shortened or cut. There is no need to summarize subsections at the beginning of each section.	Rejected. After careful consideration, we decided that the additional text provided a useful roadmap for reading this very dense section of the chapter. In particular, the text highlights how there is a difference in the types of uncertainties that play a role across policy contexts.
22780	2	42	6	42	34	There is duplication of paragraphs and findings later, thus need to be deleted.	Rejected. After careful consideration, we decided that the additional text provided a useful roadmap for reading this very dense section of the chapter. In particular, the text highlights how there is a difference in the types of uncertainties that play a role across policy contexts.
23018	2	43	24			The need for a truly integrated analysis could be made earlier, and emphasized more strongly	Rejected. This would venture into the area of prescriptive language in the area of research policy.
40556	2	43	24	43	27	It is not clear how they reached their conclusion that we had better prepare for the worst case without probabilistic analysis. Please explain it logically.	Rejected We did not say this. Rather in FAQ 2.2 the last paragraph indicates that one cannot undertake such an analysis
30810	2	43	26	43	27	Is there any prospect that necessary probabilistic information will be available one day? If not, does that mean that "truly integrated analysis" will never be possible?	Noted. It may never be possible. We feel like it would be possibly controversial, and speculative, to suggest this in the text.
35874	2	43	32	43	33	The phrase "who is modelled as a System 2 decision maker undertaking complex computations" should be deleted.	Taken into Account We are using the terms deliberative thinking rather than System 2 decision maker
25574	2	43	37	43	37	What do you mean the sentence of "We also examine the effects of (…) through Monte-Carlo analyses," in this context? More explanations are needed.	Thank you. Text amended
35873	2	43	4	43	27	This section discusses how "waiting and learning is likely to be desirable" but you should mention the corollary option here as well, which is adaptive management“ i.e., proceeding under uncertainty and learning as you go.	Thank you. Text amended
30809	2	43	7	43	10	Is it also worth stating that action is generally justified when there is reasonable certainty that delay will only make negative impacts worse, even if the extent of that additional damage is uncertain?	To our impression this statement is true, yet encapsulated in the existing descriptions of stock-and-flow problems with damage uncertainty. We would like to abstain from highlighting special effects if they are not highlighted in the literature.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
40557	2	43	28			Decision making under uncertainty is one of the most important issues for climate change intervention, where a various kind of uncertainty is entangled. Therefore, Section 2.4.2, which deals decision making under uncertainty, is a very important section. This section relies on Table 2.2 as the evidence. However, as will be commented to Table 2.2., this table itself have fundamental failure that appears to be a limited selection of literature from limited areas is adopted. Furthermore, the conclusion is basically drawn by the majority rule based on the collected paper in Table 2.2.Thus, the result can reflect the preference of the authors or just the current trend/atmosphere of some academic societies of this point of time, and may not imply the best solution. As described above, this section is obviously one of the most important sections and will exert a great influence. Therefore, we expect IPCC to make a careful and thorough assessment with multi-facetted and pantoscopic point of view, not limiting with climate mitigation with limited number of reports. If it is not possible to implement such assessment, they should not show any definite conclusion but show only current academic accomplishments and challenges to be addressed for the future research.	Thank you for your comment. We aknowledge that the Table reflects our best possible effort (but still incomplete) to reflect existing literature. However this is what the report is about. We cannot make research, rather we are reviewing research.
25929	2	44				An additional column on the nature of the mitigation action would be welcome. Indeed, the overall mitigation might be not only delayed or advanced due to uncertainties, but the nature of the mitigation policies may change. This is what is observed with stochastic analysis implemented in TIAM-WORLD, as illustrated in the following articles: • Labriet M., Loulou R. and A. Kanudia, 2009. Modeling Uncertainty in a Large scale integrated Energy-Climate Model. In: Environmental Decision Making under Uncertainty, J.A. Filar and A.B. Haurie (eds), pp.51-77. 10.1007/978-1-4419-1129-2_2 • Labriet, M., A. Kanudia and R. Loulou. 2012. Climate mitigation under an uncertain technology future: a TIAM-WORLD analysis. Energy Economics, Vol.34, Supplement 3, pp.S366-377. Available online 10 March 2012. http://dx.doi.org/10.1016/j.eneco.2012.02.016 • Loulou, R., M. Labriet and A. Kanudia. 2009. Deterministic and Stochastic Analysis of alternative climate targets under differentiated cooperation regimes. Energy Economics, Volume 31, Supplement 2, International, US and EU Climate Change Control Scenarios: Results from EMF22, p.S131-143. http://dx.doi.org/10.1016/j.eneco.2009.06.012	While we understand the wish articulated by the referee, due to space limitations we have to abstain from this extension.
23019	2	44	11	44	17	The need for more research on how decision makers actually operate is a strong point to be made	Thank you, this is very important and we have incorporated your comment in the executive summary.
35876	2	44	13	44	17	This paragraph (starting with "Although IAMs") should be deleted or rewritten in a way that it does not refer to System 1 and System 2.	Taken Into Account. We have modified this paragraph to reflect the appropriate roles of Intuitive and Deliberative planning.
35877	2	44	13	44	17	Regarding IAMs modeling system 2 policymakers: IAMs are not meant to be predictive, it's not clear that we want a system 1 policymaker, and there have indeed been studies incorporating behavior like ambiguity aversion. This text should be corrected.	Taken Into Account. We have modified this paragraph to reflect the appropriate roles of Intuitive and Deliberative planning.
22781	2	44	18	45		Insert an article in intersection of "Accelerates/increases mitigation action" and "Up stream": Ting Wei and Dong er al (2012). (see: Ting Wei, Shili Yang, and Wenjie Dong. Developed and developing world responsibilities for historical climate change and CO2 mitigation, www.pnas.org/cgi/doi/10.1073/pnas.1203282109)	Thank you
35878	2	44	18			Table 2.2 some of the papers cited in the table are not in the references.	Taken care off: This time we have foressen an extra iteration to tackle this point.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
40558	2	44	18			As described in Chapter 2.4.2.1, the result would largely depends upon whether the model was Cost Benefit Analysis (CBA) or Cost effectiveness analysis (CEA). CEA analysis usually tends to provide more stringent results, because it tries to satisfy the most stringent pathway of the assumed. On the other hand, in the case of CBA, the result would be different as reported by E Baker for Carbon tax analysis. Therefore, at least, Table 2.2 should indicate if each of the results was obtained by CBA or CEA.	Accepted - text modified accordingly.
40559	2	44	18			The paper by Webster et.al.(2002) does not seem to indicate the Accelerates/Increases Mitigation Action, but they just analyzed future GHG emission pathways taking into account uncertainty, and found the median of the expectation is lower than the SRES pathway. Therefore, this paper seems to be inappropriate to be categorized as "Accelerates/ Increases Mitigation Action". This paper should be discarded from here. 2) Furthermore, a paper "An analysis of CCS investment under uncertainty," Energy Procardia, 4, 1997-2004, (2011), which analyzes relationships between carbon price and CCS investment (and concluded that existence of carbon price volatility requires higher carbon price for CCS implementation than that without volatility), is should be cited as an example for Delays/ Decreases Mitigation Action of Policy Response, but is not found there. 3) Apart from CCS investments, another paper, "Solving optimal timing problems in environmental economics" by Balikcioglu, Fackler, and Pindyck, in Resource and Energy Economics 33, 2011, 761-768, for example, shows quantitatively that global warming response measures would be introduced with difficulty due to possible sunk costs that may be caused under uncertainties related to warming damages and mitigation costs. Many other papers that indicate smaller investments are better when uncertainties exist seem to have been published. 4) Furthermore, some papers in the Table are not listed in the reference, although this is the last timing for us to review the IPCC report (main body). 5) In summary, Table 2.2 is based on a limited information of insufficient width of diversity of papers. And therefore, I have to say that the discussions and conclusion based on such a "balance of 'part of' reports" might evoke in confidence that IPCC is biased. From this view point, this section is better to be removed not only from the view point of scientific insufficiency, but also to avoid any skepticism of readers for IPCC.	We are very grateful for these hints. The table has been edited appriopriately.
35875	2	44	4	44	4	The expression "appears to be" is ambiguous. The chapter should state clearly whether or not consensus exists.	Accepted - text modified accordingly.
25928	2	45				Replace Labriet et al., 2010 by Labriet et al., 2009. To add, at the same place, Labriet et al., 2012. Corresponding reference is: Labriet, M., A. Kanudia and R. Loulou. 2012. Climate mitigation under an uncertain technology future: a TIAM-WORLD analysis. Energy Economics, Vol.34, Supplement 3, pp.S366-377. Available online 10 March 2012. http://dx.doi.org/10.1016/j.eneco.2012.02.016	Thank you. Table and references amended

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
25930	2	45				This section would deserve a more detailed analysis of the impacts of uncertainty on the mitigation strategies, more particularly on the nature of mitigation. Such results are provided by multi-scenario analysis done by EMF27 and reported in Chapter 6 (authors of Chapter 6 could provide more details). Stochastic analysis implemented in TIAM-WORLD also provides interesting results. Here is an extract of Labriet et al. (2012) on this topic: Some of the hedging mitigation options appear to be “super-hedging” actions, which means that they penetrate more in the hedging strategy than in any of the perfect forecast strategies. Such a situation shows that the stochastic analysis of future climate strategies gives insights that are beyond any interpolation of the deterministic strategies. The penetration of gas, either for electricity generation or final energy use, especially in industry, is one of the most significant super-hedging options in several regions and in the three climate cases (...) Gas appears to be a particularly robust choice given long-term technology uncertainties. Gas combines two characteristics that make it a good “install-now” strategy, which in turn, allows "wait-and-see" for other options. First, gas produces mild GHG emissions per unit of energy, compared to other fossil fuels. Secondly, gas technologies have low capital costs relative to other low-emission technologies, both when used for direct combustion and for electricity generation (...) By implementing gas, the policy maker keeps a middle-of-the-road position that does not emit too much GHG and that can be modified without too much “regret” in terms of economic losses, when uncertainty is resolved on the more effective options. On the other hand, under perfect knowledge of the future, more effective options exist and may be implemented without risk.	While we understand the wish articulated by the referee, due to space limitations we have to abstain from this extension.
30811	2	45	11	45	11	Footnote: what are "convex damages" ?	Accepted - text modified accordingly.
30812	2	46	1	46	2	"In this climate or damage response uncertainty suggests decade-scale earlier investments in mitigation technologies ten years earlier than if these responses were certain." The meaning is not clear, suggest rewording.	Accepted - an editing error had occured.
24568	2	46	1	46	3	The meaning of the sentence starting "In this climate or damage response…." is unclear to reviewers. Consider re-phrasing.	Accepted - an editing error had occured.
35879	2	46	1	46	1	The sentence starting with "In this climate" is unclear. Maybe what is meant is "In this, climate", but the antecedent of "this" is still unclear.	Accepted - rephrased.
35880	2	46	3	46	3	What are "properties" here?	Accepted - rephrased.
40560	2	46	31	46	35	2.4.2. Decisions with the number of papers are dangerous, since such number only demonstrates majority among academia, and not directly linked with policy making procedures.	Accepted - text modified accordingly.
22782	2	46	34	46	35	To avoid misleading, after "no policy case imply losses of carbon free capital", we should add "as well as the preclusion of risks from uncertain investments."	OK, thank you
35884	2	46	34	46	37	Everything after the colon is unclear and should be rewritten for clarity.	Thank you, rephrased
35881	2	46	4	46	4	It is important to note that most estimates are that learning is likely to be slow (see for example, Roe and Baker, Science, 318:629-632; Kelly and Kolstad, Journal of Economic Dynamics and Control, 23(4):491-518, 1999; Leach, Journal of Economic Dynamics and Control, 31:1728-52, 2007). This favors acting now, since improvements in the state of knowledge is unlikely in the short term.	Accepted - text modified accordingly.
23020	2	46	46	46	47	This is a very good point that could be emphasized more	Thank you, due to limited space we cannot however emphasize more this point.
35882	2	46	6	46	8	These sentences seem to be mutually contradictory and should be revised.	Accepted - some editing problem had occured.
24569	2	46	7	46	7	Remove the word 'precisely' at the end of this sentence, as this is a repetition.	Accepted - some editing problem had occured.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
25057	2	46	8			After "2011b)", please add, "Those are what literatures tell us especially when models use CEA. However, this is yet to be proved by evidences. In reality, there will be cases where investors hesitate to invest because of future uncertainties."	Taken notice of - it is said clearer that a Maximin strategy is used.
35883	2	46	9	46	37	Many US government agencies are conducting scenario analyses, aimed at bracketing the potential effects of various climate outcomes on agency missions and resources. This is done with an eye on potential policy options, which could take the form of goal setting, refinement technology performance standards, and even regulations. For one example, look into the Corporate Average Fuel Economy standards in the US for personal vehicles.	Thank you
20704	2	46	10	46	37	How is it possible to write this section without reference to intermittency, need for back-up, and/or loss of energy security?	Accepted. We will add some lines accordingly.
30813	2	47	1	47	3	Something is missing here. Consider inserting "for" in front of "international negotiations" ?	Accepted. We have added the missing word ("for").
30814	2	47	1	47	3	A word seems to be missing in this sentence - please review and correct.	Accepted. We have added the missing word ("for").
30815	2	47	12	47	15	This sentence is difficult to read, suggest editing. Possibly, reword as: "Kolstad and Ulph (2008) show that partial or complete learning has a negative impact on the formation of an MEA because as outcomes become more certain, some countries also learn the MEA will reduce their own welfare benefits--which deters them from joining the coalition."	Accepted. We have used your wording. Thank you!
23021	2	47	21	47	24	The Montreal Protocol was negotiated by and for developed countries only; this makes it an imperfect analogy for climate	Noted. It is clearly imperfect, and yet may be the closest analogy to the climate problem that exists. We have noted that it is an analogy, and hence by definition imperfect.
35885	2	47	22	47	22	Does "They" here refer to "Heal and Kunreuther"? It isn't clear.	Accepted. We have replaced with "The authors."
35886	2	47	29	47	31	It is not the case that LDC's have not adopted agreements. Most LDC's signed and ratified Kyoto, for example. Instead, agreements have not required LDC's to conduct any mitigation. This is an indication of more negotiating power, not less. In general, all countries have negotiating power since they are sovereign. The text should be corrected.	Accepted. We have revised the text to note that LDCs agree, but are nevertheless less likely to agree to binding targets for the reasons described.
35887	2	47	31	47	31	The sentence starting with "They will have to" is prescriptive and should be deleted.	Accepted. We have reframed the sentence to avoid the prescriptive language: "For the situation to change, they would have to enhance their negotiating power in international climate change discussions by highlighting their concerns (Rayner and Malone, 2001). "

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
22783	2	48	1	48	4	The view from Thompson(2010) is conflict with Victor(2011). Thus we need to delete "Consistent with this reasoning".	Noted. What was actually missing was the word "greater" before uncertainty, which then makes the two consistent. The revised text is: "Consistent with this reasoning, Thompson (2010) examined negotiations within the UNFCCC at two points in time, and found that greater uncertainty with respect to national emissions was not associated with increased support for a national commitment to a global treaty. "
22784	2	48	14			This subsection only discusses the MRV in AFOLU sectors and doesn't discuss the "treaty compliance" issue, thus we suggest to change the title of 2.4.3.3 to "Design of monitoring, verification regimes in the AFOLU sectors".	Accepted. We have changed it.
23022	2	48	16			It is more common to use the word "measurement" when referring to MRV	Accepted. We did a web search for MRV, and found both, but in official UNFCCC documents we saw predomoninantly "measurement" as opposed to "monitoring."
30816	2	48	3	48	6	This sentence is not clear. One can easily have difficulty with the words "conservative estimate of emissions" -- it likely means emissions are likely to be higher in reality, but it could mean they are expected to be lower. If the emissions could actually be higher than estimated, why would excluding the pool from MRV be allowable? The parenthetical statement does not help much because "unknown actual values" is confusing.	We struggled, until we found that the comment referred to the line numbers one page later. Accepted. It was unclear. We have revised. Conservative means higher, in that it doesn't advantage the country excluding the pool.Revised text: "The exclusion of a pool (e.g. soil) in an MRV regime should be allowed only if adequate documentation is provided that the exclusion provides a more conservative estimate of emissions, in so far as it does not work to the advantage of the party seeking the exclusion (Grassi et al., 2008). "

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
35888	2	49	20	49	21	This discussion is not worded clearly. For example, a cap and trade system is fully flexible with respect to how emissions are reduced, but still mandates a certain total emissions. Perhaps instead state that market based instruments either increase the cost of emitting, mandate total emissions, or both, but allow flexibility as to how emissions are reduced.	Accepted. We have reworded the sentence to note that the felxible instruments do not mandate particular behavioral changes, but give flexibility as to which ones. New text: "More flexible policy instruments, by contrast, have the effect of promoting cost effective strategies to achieve a mandated target, rather than mandating particular one behavioral change among alternatives."
23023	2	49	38	49	39	The lack of studies here should be emphasized	Actually, we are removing the system 1 and 2 language here.
35889	2	49	39	49	40	The sentence starting with "At the outset…" should be deleted. This notion of trying to encourage system 2 behavior, if it is to be included, would need to be characterized in a more neutral and informative manner. We recommend that the authors better describe or not include it.	Accepted.
22785	2	49	42	50	2	The audience is not interested in these textbook-like theories and guidelines, and these paragraphs didn't reflect the updated research findings after IPCC AR4, thus, should be deleted.	We are puzzled by this comment. The entire point of this paragraph was to introduce that aspect of the literature that is new, i.e. since the AR4. That has to do with issues of regulatory risk. Without the text here, the reader would be left wondering why we don't cover issues associated with choices between price and quantity instruments. We have slightly shortened the text, however, removing the most textbooky of the sentences, the first one.
29957	2	49				Basically, it would be the case that flexible environmental regulations are more effective at inducing technological change, compared with direct regulations which specify a particular technology to achieve regulatory goals. Under the existance of uncertainty, however, There is a caveat that flexible regulations tend to encourage relatively simple, straightforward technological change, such as end-of-pipe technologies, which will discourage radical, clean innovations, which could be better from a long-term perspective (Yarime, 2007). Yarime, Masaru, "Promoting Green Innovation or Prolonging the Existing Technology: Regulation and Technological Change in the Chlor-Alkali Industry in Japan and Europe," Journal of Industrial Ecology, 11 (4), 117-139 (2007).	Accepted. We have included another phrase " ... there is some evidence that the behavioural change will be of an incremental character, whereas other instruments can lead to investments in more radical innovations (Yarime, 2007)."

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
25676	2	49				This section should explain that market-based mechanism such as emission trading has several problems. Volatility of emission permit prices affects volatility of product prices as evidenced by fluctuating price developments in the EU-ETS. Therefore, the market-based policy tools of cap-and-trade cannot provide credible incentives for the technological change, as described in (Montgomery, 2005, abstract) and (Baldursson, 2009, page29). In addition, CO2 leakage caused by the implementation of the ETS happened actually through transfer of industry from one country to others. Market mechanisms at least under Kyoto-like international scheme, where the condition of all countries' meaningful participation is not met, do not work well, as shown in (Rosendahl, 2011 abstract), (Aichele, 2012, page336), and (Peters, 2011, page1). These literatures are listed in the No9 line of this table.	Noted. We deal with those aspects of the reviewer's comments that have to do with uncertainty, such as the issue of volatility of carbon prices and the associated uncertainty concerning their future values. This text is already in the section, later on. Other issues, such as leakage, go well beyond our scope.
22946	2	5	10			May want a definition of "normative" here at the beginning	Accepted.
22947	2	5	15			Not just international negotiations, but multi-agents also include internal national government debates	Accepted
31203	2	5	19	5	21	the author introduces `this chapter' in comparison with the full AR4 - WG III; this is misleading; I would rephrase as follows: ", this chapter reviews … and uncertainty that will be be used in this report."	We could reword the sentence. Revisit this comment after reviewing the revised ES.
33630	2	5	26	5	30	Your stating that there are two developments, but we believe you mean that these two are the most important ones, leaving: 'Two important developments make…'. Also because in line 29-30 there is a development number 3: 'the number of different policy instruments'. perhaps it is best to formulate it: 'severall developments make decision... '	Accepted
33631	2	5	26	5	32	Unknowing if the literature supports this argument, we believe that an important development is missing in this paragraph, namely the shifting power of the USA and the EU in world politics. New, fast-growing industries like China and India are becoming more important, taking away the strength of the EU and the USA.	Rejected. Outside the scope of this chapter.
35674	2	5	26	5	32	This is a really broad statement which really is not true. All of the policy instruments have been around for years (feed-in tariffs were initiated in the late 1970s in the US in the Public Utility Regulatory Policy Act (PURPA), for instance. RECs are somewhat recent, perhaps dating from the 1990s. The discussion should better reflect this fact and possibly provide examples.	Accepted
22948	2	5	31			Should carbon offset payments be mentioned here?	Accepted
23547	2	5	33			This distinction between locus and type of choice is excellent. Please don't remove it.	Noted. The only change we made was from Locus of Decision Making to Scale of Action.
35675	2	5	33	5	43	This paragraph seems to be mixing up risk with broader issues. A common problem with the chapter. The definition of risk in the chapter should be more concrete and consistent.	Taken into Account We have modified the Executive Summary to reflect this point
35676	2	5	33	5	43	The paragraph starting with "Climate change policies" confusing as written leaving author's point unclear. The paragraph needs to be rewritten with a clear purpose.	Taken into Account We have modified the Executive Summary to reflect this point
35677	2	5	37	5	37	Data are never imprecise: data are what they are, immutable and incontrovertible evidence. What may be imprecise is the relation between the data and those unknown qualities or quantities that the data are supposed to be informative about. Please clarify this so as not to confuse the reader.	Accepted
22949	2	5	39			Another kind of decision is the use of geoengineering - a technology decision	Well actually it could be a mitigation policy such as CCS (it's a different matter that we don't like it) so I think it's a fair comment. I would accept it.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
33632	2	5	39	5	40	your stating that a decision requires international cooperation, this is not completely true. A decision can be made individually, but succesfull implementation of this decision requires cooperation.	Rejected. The statement under question has been qualified and should stand. It reads "A decision, such as setting a climate change target, requires international cooperartion." This seems internally conistent.
30745	2	5	42	5	43	Suggest giving an example of livelihood and lifestyle choices.	Accepted. We have given an example in Sect 2.3 on renting an apartment or buying a house and show how it impacts on climate change.
20766	2	5	44	6	4	I think this paragraph can be cut as it does not add more information to the executive summary	Accepted.
35678	2	5	44	6	4	This entire paragraph (starting with "The presence of risk…") should be deleted. It does not provide useful information to the discusion.	Accepted. The Executive Summary presents key findings and messages from the chapter that are revised from the ones in the SOD.
20765	2	5	6	5	6	remove THE before HOW	Editorial – copyedit to be completed prior to publication.
33629	2	5	6			We suggest to leave out 'the', creating: '… we explore how the decision processes of different…'	Editorial – copyedit to be completed prior to publication.
27441	2	5				This ES would benefit very much if the key findings were presented in bold and not the section reference and the uncertainty language. Regarding the style, it reads different from other ES since it uses "we". A consistent style in all ES is desirable. Furthermore, the structure of this ES seems a bit odd; it has 2 pages explaining what it does and why and only then 1 page of results. Or do the first 2 pages present results as well? If so, present them accordingly. From a reader's perspective, the ES should rather put emphasis on the main results/key messages.	Accepted. The Executive Summary presents key findings and messages from the chapter that are revised from the ones in the SOD.
35671	2	5	1			In the executive summary - we liked having 6 main bullet points of main observations - but it wasn't always clear why they came from. It would be very helpful - maybe in footnotes (or any Appendix) to cite the sections in the Chapter that support making these observation meaning. Very hard to track back to the text otherwise.	Accepted. The Executive Summary presents key findings and messages from the chapter that are revised from the ones in the SOD.
21588	2	5	2	6	45	The first two pages of the Executive Summary reads like the introduction of a text book and could be shortened to half a page. The important information needs to be incorporated in the key findings, which lack explanations of the factors considered to reach each conclusions.	75 Accepted. The Executive Summary presents key findings and messages from the chapter that are revised from the ones in the SOD.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
35672	2	5	2			The authors and the corresponding text should acknowledge that uncertainty has increased in some dimensions. For example, page 11, line 15 discusses an increase in uncertainty over sea level rise.	Thank you for this comment. At the beginning of this process I proposed tracking the growth / shrinkage of uncertainty. Ice sheets is an excellent example of negative learning which you can find documented in the expert judgment study of Bamber and Aspinall 2013. uncertainty on ice sheet collapse has increased over 2010 - 2012. I added the last sentence below in section 2.3.7 Uncertainty analysis:"Structured expert judgments of climate scientists was recently used to quantify uncertainty in the ice sheet contribution to sea level rise (Bamber and Aspinall 3013). One result of this study is a clear demonstration that experts' uncertainty in the contribution to sea level rise from ice sheets in 2100 increased between 2010 and 2012." I would like to see much more of this type of work.
27440	2	5	33	5	35	These two dimensions (locus and type) certainly make sense. However, it does not become clear in the AR5 that theses are really used by other chapters. If this observation is correct, the concepts should better not be presented as overall link between all chapters.	Accepted - further efforts were made in Addis Ababa to get greater use of these dimensions by other chapters, but language in Chapter 2 has also been softened.
35673	2	5	4			The uncertainties described are also due to the effects of those policies.	Very true, I believe secton 2.4 deals with that extensively.
30742	2	5	1	7	36	The first person use of "we" is misleading. Who is "we", the authors or the IPCC? Consideration should be given to whether first person narrative is appropriate.	Accepted - language has been changed throughout
30743	2	5	17			Which previous IPCC reports are extended in this chapter? It would be useful to have this reference point.	Noted We have indicated in Sect. 2.3.3 that this chapter builds on Chap. 2 in AR4
30744	2	5	33	5	35	There is reference to Part I, Part II and Part III. Are these references to the broader report? It is not clear. Are these three parts communicated elsewhere in the document?	Noted We have deleted any references to Part I, II and III in the final ES.
20769	2	5	1			The description of the various sections could be excluded from the summary as it seems more appropriate to an introductory chapter	Accepted. The Executive Summary presents key findings and messages from the chapter that are revised from the ones in the SOD.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
35891	2	50	11	50	11	What does it mean for a decision to be "long-term"? The authors should clarify what is meant here.	Accepted. We have revised the text to read: "Vasa and Michaelowa (2011) assessed the impact of policy uncertainty on carbon markets and found that the possibility of easily creating and destroying carbon markets leads to extreme short-term rent seeking behaviour and high volatility in market prices. In their view, these negative effects would be reduced if there were greater confidence that markets would endure over one or more investment cycles, and if there were clearer consequences of non-compliance. "
35892	2	50	31	50	31	Similar to what? Please clarify.	Accepted. It was not clear. We have revised the sentence to read: "Reinelt and Keith (2007), likewise, studied investments into carbon capture and storage (CCS), and found that regulatory uncertainty increases social abatement costs by as much as 50%. "
35893	2	50	38	50	46	Providing the reader with the intuition behind this result would be useful.	Accepted. It's an interesting and non-obvious intuition. We have inserted: "The intuition behind this finding is that the grandfathered scheme would create a situation of windfall profits, and risk averse investors would be more influenced by the other, less desirable state of the world, the absence of carbon markets."
20237	2	50	7	50	14	KEEP this para as it is important finding for policy makers regarding ETS. Move this para to SPM.	We don't understand this comment in the context of the text corresponding to the line numbers suggested.
40561	2	50	7	50	14	Important description. Please maintain this paragraph.	We don't understand this comment in the context of the text corresponding to the line numbers suggested. Since you like the paragraph, we are not complaining.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
35890	2	50	9	50	9	"With a stroke of a pen", should be deleted to improve the sentence. The authors should avoid using colloquialisms.	Accepted. The new sentence reads: "Vasa and Michaelowa (2011) assessed the impact of policy uncertainty on carbon markets and found that the possibility of easily creating and destroying carbon markets leads to extreme short-term rent seeking behaviour and high volatility in market prices. "
20238	2	51	25	51	35	KEEP this para as it is important finding for policy makers regarding ETS. Move this para to SPM.	Accepted. We are happy to keep it. We have drawn out this lesson into the key findings of this chapter, and are working on getting them into the SPM, which is somewhat beyond our own range of authority as Ch2 LAs.
40562	2	51	25	51	35	Important description. Problem and cause of recent carbon market should be delivered to policy makers, in SPM.	Accepted. We are happy to keep it. We have drawn out this lesson into the key findings of this chapter, and are working on getting them into the SPM, which is somewhat beyond our own range of authority as Ch2 LAs.
35894	2	51	32	51	33	The phrase "if an ETA were in place" should be deleted or provide a supporting reference.	Noted. The sentence was unclear and has been revised. It all relates to the Barbose reference. It now reads: "Barbose et al. (2008) examined a region—the western United States—where no ETS was functioning but many believed that it would, and found that most utilities did consider the possibility of carbon prices in the range of $4 to $22 a ton. At the same time, the researchers could not determine whether this projection of carbon prices would have an actual effect on their decisions, were an actual ETS in place, because they were unable to document the analysis underlying the utilities' investment decisions. "

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
35895	2	51	33	51	35	We believe that this sentence is redundant with the pervious sentence and can be deleted.	Accepted. Mostly. We have removed most of it, revising the text to: "Barbose et al. (2008) examined a region—the western United States—where no ETS was functioning but many believed that it would, and found that most utilities did consider the possibility of carbon prices in the range of $4 to $22 a ton. At the same time, the researchers could not determine whether this projection of carbon prices would have an actual effect on their decisions, were an actual ETS in place, because they were unable to document the analysis underlying the utilities' investment decisions. "
19149	2	51	51	2		Point 2.4.4 Instruments promoting RDD&D. One important instrument in promoting biomass is to ensure that governemt ministries are fully behind this. The general consensus at present is to move out of (traditional) biomass quickly. In reality, this will not occur.	Noted. However, we believe that this comment to go way beyond the scope of this section, as it does not deal specifically with uncertaint, but rather a specific policy for a specific technology.
35897	2	52	12	52	14	It's not at all clear that ``System 1 behavior'' is the simplest explanation for ``venture capital investors'' looking for ``short- to medium-term returns.'' The argument should be dropped.	Accepted. Dropped.
35898	2	52	14	52	15	The sentence starting with "There is no literature" should be deleted. Litterautre doesn't exist because the idea doesn't make sense.	Accepted. Dropped.
21401	2	52	16	52	32	in addition to the good influence for TIF in Germany, add the bad influence (Economic impacts from the promotion of renewable energies: The German experience/page 6 lines 3-6)(attached on email)	This comment is hard to respond to because we don't have access to the email. As far as we understand, the bad influence of the FIT does not have to do with the issue of uncertainties, and hence we are not covering it here. We do believe that these receive treatment in Chapter 15.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
25677	2	52	16	52	32	This part should explain that FIT in Germany had several problems. For example, FIT policy did not lead technological innovation and caused increase of electricity price, as described in (Manuel, 2010, page6 and 13), (Marc, 2006, page 9 and 11), and (Batlle, 2011, page15). The first literature is listed in the No22 line of this table. <Reference> [1] Marc Ringel (2006). Fostering the use of renewable energies in the European Union: the race between feed-in tariffs and green certificates. Renewable Energy Volume 31, Issue 1, January 2006, Pages 1-17 [2] C. Batlle, I.J. Perez-Arriaga, P. Zambrano-Barragan (2011). Regulatory Design for RES-E Support Mechanisms: Learning Curves, Market Structure, and Burden-Sharing, MIT CEEPR WP 2011-011. Available at: http://www.iit.upcomillas.es/batlle/Publications/MIT%20CEEPR%202011-011%20Regulatory%20design%20of%20RES-E%20support%20mechanisms%20v3%20_%20Batlle%20et%20al.pdf	Noted. We understand that these issues receive treatment in Chapter 15. We see them as going beyond the scope of Chapter 2.
35896	2	52	4	52	6	Clearly subsidies to R\&D are preferred to an emissions tax by firms, irrespective of behavioral assumptions. The main disadvantage of subsidies is that they ignore simple low cost methods of reducing emissions, such as conservation. This should be clarified.	We agree with this argument, and believe that it receives treatment in Chapter 15. It goes beyond the scope of this paragraph, where we deal with issues of risks and uncertainties. We have clarified this by revising the first sentence of this paragraph: "Several empirical studies have compared the effectiveness of market instruments with other instruments that provide direct stimulus to low carbon investments, at various stages in the RDD&D chain, with a focus on risks and uncertainty."
20705	2	52	44	52	56	Papers such as Sivak, referenced above, help shed light on the effects.	This comment appears to be aimed at the Technical Summary, rather than Chapter 2. We do not address it here.
23359	2	53	23	53	32	Specific (explanation to households' reluctance to incur upfront costs); it may not be economically rational to incur upfront costs because of heterogeneity. For example (light bulbs were used earlier), Frondel and Lehmann (2011) or Mills and Schleich (2010) pointed out that it may not be economically rational to replace all incandescent bulbs with compact fluorescent light bulbs (CFLs). As illustrated by Frondel and Lehmann (2011), for the main bulb in the German living/dining area, which is typically used for more than 3 hours a day, the higher purchasing costs of a CFL pay off in less than one year. However, for a bulb in the attic, storage room or bedroom where the daily usage time is less than 15 minutes, higher purchasing costs of CFL may only pay-off after more than a decade (if at all). Literature cited here: a) Frondel, M. and Lohmann, S. (2011): The European Commission's light bulb decree: Another costly regulation? Energy Policy 39, 3177-3181; b) Mills, B. and Schleich, J. (2010): Why Don't Households See the Light? Explaining the Diffusion of Compact Fluorescent Lamps. Resource and Energy Economics 32 (3), 363-378.	Taken into Account. This section has been modified to reflect issues that may reflect deliberative thinking such as obsolescence, heterogeneity and differential usage.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
35900	2	53	24	53	24	The phrase "As the above studies indicate" should be deleted with the citations from the deleted paragraphs added here. The previous analysis is insufficient to characterize the literature or support the statement. Furthermore the statement is not a consensous in the litterature. And finally is a point for Chapter 3.	Accepted
35901	2	53	28	53	28	The sentence "or choices that are triggered by System 1" should be deleted.	Accepted
35902	2	53	33	53	35	The sentence starting with "To encourage households" could be read as prescriptive and needs to be reworded.	Accepted
23360	2	53	42	53	49	Specific: this paragraph praises a particular design feature of a smart metering feedback system, implemented by Opower; while I like the idea and the paper, naming and praising ("take some lessons from OPower") the company seems a bit awkward for an IPCC report;	Taken into Account. The discussion on O-Power has been modified to reflect this concern.
23361	2	53	42	54	5	Specific: This paragraph talks about feedback effects via smart metering technology and highlights one particular result (i.e. 2% reduction due to social norms); while I like this particular finding, it may be useful to also report empirical findings in a more general sense, i.e. how much electricity may be saved using feedback on energy use. For example, the meta analysis by Ehrhardt-Martinez et al. (2010) suggests that such feedback is more effective if proficed more frequently and at a less aggretate level. In particular, meta-analysis by Ehrhardt-Martinez et al. (2010) of 57 initiatives generally supports these findings. The report median household electricity savings of 3.6% for enhanced billing (e.g. household specific information and advice), 6.8% for estimated feedback (e.g. web-based energy audits and billing analysis), and 8.4% for daily/weekly feedback (e.g. based on con-sumption measurements by mail, email, or meter self-reading), savings of 9.2% for real-time in-formation on electricity use at the overall household level, and 12% if such feedback is provided at the level of individual appliances or even plugs (e.g. via home area networks). A recent study for Germany by Schleich et al (under review) find that providing feedback on electricity use reduces consumption by 4.5% (for a city in Austria). Literature: a) Ehrhardt-Martinez, K., Donnelly, K.A., Laitner, J.P., 2010. Advanced Metering Initiatives and Residential Feedback Programs: A Meta-Review for Household Electricity-Saving Opportunities. Report No. E105. American Council for an Energy-Efficient Economy, Washington, D.C. ; b) Schleich, J. , Klobasa, M., Gölz, S. and Brunnder, M. (under second review Energy Policy): Effects of feedback on residential electricity demand – Findings from a field trial in Austria.	Accepted. Additional discussion on smart meter has been added here.
35903	2	53	42	53	47	This reads like an advertisement for Opower. It should be substantially rewritten or deleted.	Taken into Account. The discussion on O-Power has been modified to reflect this concern.
30817	2	53	8	54	14	There may be a need to include the notion of "obsolescence" in the discussion about factors affecting behavioural change. For example, in the decision to invest in a specific renewable energy technology, maybe long term benefits outweigh upfront cost if the situation is static, but if technology evolved rapidly then the decision can result in significant costs if the equipment becomes obsolete.	Taken into Account. This section has been modified to reflect issues that may reflect deliberative thinking such as obsolescence, heterogeneity and differential usage.
35899	2	53	8			Reluctance to invest in energy efficient appliances can also be explained by factors other than ``System 1 behavior.'' It may even be a rational outcome of System 2 behavior. There is an extensive economics literature on the energy efficiency paradox, and it seems strange in a review document to single out one explanation, especially when it may not even be the most common one.	Taken into Account. This section has been modified to reflect issues that may reflect deliberative thinking such as obsolescence, heterogeneity and differential usage.
35906	2	55	10	55	11	Changing perceptions should not be discussed in this manner. Instead, we feel that the authors should focus on transfering and/or improving information. This framing should be corrected throughout the chapter.	Rejected. Transferring or improving information doesn't preclude the possibility that people's perceptions are changing.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
20783	2	55	14	55	19	last three sentences of paragraph can be shortened or cut	Accepted. We have rewritten and shortened this entire paragraph to now read: "In this sub-section, we review what is known about public support or opposition to climate policy, climate-related infrastructure, and climate science. In all three cases, a critical issue, and indeed the rationale for their treatment at the end of this section, is the role that perceptions of risks and uncertainties play in shaping support or opposition."
22786	2	55	21	55	45	These paragraphs are not related to risk nor uncertainty, thus needs to be deleted.	Rejected. We appreciate the concern, but in this case there is a clear link between these issues of public support and acceptence, and the psychological factors associated with perception. It is our understanding that this chapter is the place in this report where these perceptions issues are meant to be covered, and indeed an earlier section of this chapters described the state of the science with regard to perceptions. These paragraph, in turn, illustrate a number of policy-relevant implications.
35904	2	55	6	57		Public Acceptance. Broader coverage of the literature is needed (See section 2.4.5).	Noted. We are not sure in what way to broaden the coverage of the literature, as you suggest, as we have done our best to provide a broad survey of the empirical literature on public acceptance of climate policies and specific infrastructure projects. To deal with this comment, we will carefully respond to and react to the other more specific comments on this section.
29976	2	55	8	55	9	I suggest to rephrase the sentence, adding that climate policy implies interventions into society that may carry not only negative effects, but also positive effect, adding example of positive effects. It is known that there could be problems of negative impacts as diminished competitiveness for job creation, but, on the contrary, climate change policies could be a source of competitiveness and new job creation, in particular where fossil energy is imported at an elevated price.	Noted. In response to the review comments, we have deleted that material highlighting negative effects. That cures the imbalance that you noted.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
35905	2	55	8	55	8	The wording and tone of this sentence is inappropriate for the IPCC. The authors should provide strong support for this statement or delete it.	Accepted. We have deleted the statement.
29975	2	55		58		Although it is true that the science-policy interface is indeed complex, many works have highlighted the importance, for the science–policy interface, of the influence of vested interest, and their practice of manufacturing controversy to avoid pro-climate regulations. It is useful that the AR5 and in particular this Chapter 2.5 describe and underline these tactics, because still today they are important to understand how uncertainty is considered by policymakers, how they shape the debate and how they are effective in slowing new climate legislation.. As an example, some of the deniers' tactics used are: • manufacturing uncertainty by raising doubts about even the most indisputable scientific evidence. • promoting scientific spokespeople who misrepresent peer-reviewed scientific findings or cherry-pick facts in their attempts to persuade the media and the public that there is still serious debate among scientists that burning fossil fuels contribute to global warming and that human-caused warming will have serious consequences. • attempting to shift the focus away from meaningful action on global warming with misleading charges about the need for "sound science."	Noted Thanks We have moved the discussion of the Science-policy interface to the first part of Sect 2.4 (now Sect 2.6) to highlight its importance in Managing Uncertainty, Risk and Learning
35907	2	55				We believe that section 2.4.5 is unrelated to uncertainty and should be deleted.	Noted. We are sensitive to this comment, and the fact that the issue is somewhat tangential. However, the Plenary Approved Outline for our chapter specifically included issues of perceptions of risk and uncertainty, and it appears that our chapter is the only one where this issue arises in the WGIII report. We do feel an obligation to cover the relevant issues related to perceptions, and the topic of public support for policies, and for infrastructure projects, is a key case in point. What we have done, in light of this comment, is to draw this point in the introductory paragraph for section 2.5. It now reads: "In this sub-section, we review what is known about public support or opposition to climate policy, climate-related infrastructure, and climate science. In all three cases, a critical issue, and indeed the rationale for their treatment at the end of this section, is the role that perceptions of risks and uncertainties play in shaping support or opposition."

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
20706	2	55	16	55	21	The perverse effects of subsidies and partial risk guarantees on much wind, solar PV, and biofuel investments are clear to see. Also the simple burning of palm oil in proposed new power stations, referred to earlier.	This comment appears to be directed at the Technical Summary, rather than Chapter 2, and hence we do not deal with it here.
20707	2	55	29	56	18	Surely the failure of the international system to date to incorporate 'embedded' or consumption-based emissions is a glaring omission here which must be rectified.	This comment appears to be directed at the Technical Summary, rather than Chapter 2, and hence we do not deal with it here.
22787	2	56	27			Insert: People's awareness of risk may not be necessarily correlated to their support to policy measures. Taking disasters that highly linked to climate change as an example, a national survey in China found that people's acceptance to the disaster policies are significantly influenced by their judgment on government responsibility and expectation on government assistant (Wang et al., 2012). (see: Ming Wang, Chuan Liao, Saini Yang, Weiting Zhao, Min Liu, Peijun Shi. Are people willing to buy natural disaster insurance in China? Risk awareness, insurance acceptance, and willingness to pay. Risk Analysis, Vol. 32 Issue 10. (2012).)	Accepted. We have added the following sentence: "Other factors can influence support for policy, of course: studies in China (Wang et al. 2012) and Austria (Damm et al. 2013) found that people's acceptance of climate-related policies was related not just to their underlying perceptions of risk, but also on their beliefs about government responsibility."
29977	2	56	37	56	38	The comparison between natural involuntary risks (negative impact associated with an occurrence that happens to us without our prior consent or knowledge) and risk due to activities that we decide to undertake (or we can contribute to the decision…) is misleading. I suggest avoiding this comparison and to refer to level of risk usually accepted by policymakers (i.e. to regulate carcinogenic compounds)	Noted. We have not removed the citation, but rather have noted the point you raised. We now add another sentence: "Using natural analogues, Roberts et al. (2011) concluded that the health risks of natural CO2 seepage in Italy was significantly lower than many socially accepted risks. For example, it was three orders of magnitude lower than the probability of being struck by lightning. This could reflect the general findings of risk acceptance being contingent on other factors, such as voluntary character or assumed causation."
35908	2	56	6	57	17	It is important to be clear about whether or not carbon storage and nuclear power are low cost options for reducing CO2 emissions, not just whether or not they have public support.	Rejected. We are focusing here on public perceptions of carbon storage and nuclear power not on the costs of these measures which may be important in final decisions made with respect to these technologies.
29982	2	57	18	58	35	It seems quite strange to me that the only correction between the FOD version of this chapter and the SOD is that the name Sheila has been added to the citation Jasanoff. This is wrong or at least non coherent with all the other citations.	Noted!

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
22788	2	57	19			To add to the beginning: "Science-policy interfaces are defined as social processes which encompass relations between scientists and other actors in the policy process, and which allow for exchanges, co-evolution, and joint construction of knowledge with the aim of enriching decision-making." (see: Van Den Hove. 2007. A Rationale for Science-Policy Interfaces. Futures, 39(7): 807-826.	Thank you for this invaluable reference. We have added this definition. See it at the beginning of Section 2.6.2
35909	2	57	19	57	19	What makes this model "linear"?	The section has been modified.
33646	2	57	21	57	25	"this model implies … truth" I don't think the conclusion follows from the argument. The ideologically-based opposition to mainstream science is not a logical consequence of the linear model of science and policy. This opposition is largely ideological in nature (Oreskes and Conway). Thus insert "... attributed to ideological bias ..." (line 24). Since this opposition has nothing to do with the linear model, they should not be linked the way they now are in this paragraph. By linking these two, the following paragraph implies that with the linear model, also Oreskes and Conway's thesis (of ideological oppostion to mainstream science) is rejected by new research. This is however not the case.	The comment is well noted, and we have reflected it in the changes to the section.
25678	2	57	23	57	25	This part should be deleted completely because the expression of "biased, industry-sponsored scientists with little regard for the truth" is too subjective and there is no evidence for the fact.	Comment noted, and the section has been edited.
22943	2	57	33	58	4	See comment #2 above; this is a place where this work can be linked together in the text and to STS contributions.	Noted!
23024	2	57				This discussion of uncertainty and the science policy interface makes one wonder why this was not treated earlier in section 2.4 This section as a whole deals with ways to improve how we address what are, essentially, reflections of paradigmic, epistemic, or translational uncertainty on the development and implementation of policy at one level or another. Earlier presentation and description of these new uncertainty categories could help structure section 2.4 in a more digestible manner. It could also clarify the differences among these uncertainties and those in Table 2.2.	We have moved this subsection to the earlier part of Section 2.6 (formerly Section 2.4). In addition, we have incorporated some of the reviewer prescriptions in the new subsection.
29978	2	57	28	58	3	“This model … the truth”. This seems to be simplistic: there is not only one reason behind the public refusal to accept a firm scientific consensus. But it is hard to believe that the industry-sponsored mass disinformation campaigns have no effect at all. The text seems to make a caricature of the problem in order to dismiss the importance of the industrial pressure on politics.	Comment well noted. The intention was not to make a caricature of the problem or downplay the importance of industrial pressure on politics. Instead, the notion was to present an array of reasons. We have expunged the confusing sentence.
33647	2	58	23	58	25	"… is regarded as necessary, though in itself insufficient, for …" Reasoning: The argument used in this paragraph assumes that lack of transparency is a limiting factor in public acceptance and thus in socially robust knowledge. This may be the case for a sub-class of people, but perhaps more importantly, ideological resistance impedes this acceptance. "Extended peer review" would do very little if anything to take away this resistance. Reframing the issues in ways that cause less dissonance with the audience's ideology may be another useful strategy to gain social legitimacy amongst skeptical groups in society.	Accepted and incorporated
20784	2	58	41	58	41	remove question mark	Noted
20785	2	58	43	58	43	remove question mark	Noted
35912	2	58	43	58	45	Delete the sentence starting with "If so". It is not the role of IPCC to suggest that policy makers try to adjust the preferences of their consituents.	Accepted

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
35911	2	58	36			Why is reviewing ``what is known about public support or opposition to climate policy in general'' important in a review of the implications of risk and uncertainty for mitigation policy? We recommend that this discussion be deleted.	Reviewing what is known about public support or opposition to climate policy is a key component of the factors influencing climate change response policies. Nonetheless, we have removed this discussion from the related section.
29981	2	58	30	58	35	The conclusion of the section 2.4.5.3 is based on the works of only one author (Jasannoff, 2010) and for this reason the conclusion seems again too simplistic; although it could be true that the “linear model” is not adequate, the importance of industry lobbies in confusing policymakers and blocking climate legislation could not be dismissed so easily.	Noted! We have edited the entire section, and this includes removing the simplistic notions and the linear model inadequacy.
29979	2	58	4	58	5	I ask to add another important form of uncertainty affecting the science-policy relationship, the “manufactured uncertainty”, the influence of disinformation campaign organized by industrial lobbies on how uncertainty is considered by policymakers, used as a tool to block or to delay climate mitigation policies. I strongly suggest considering this issue in this section otherwise an important aspect of the connection between science and policy is missing. Like Big Tobacco before them, many Big Oil lobbies have been enormously successful at influencing governments and Parliaments, thus blocking regulation on climate. Documents highlighted in many reports provide evidence of oil industry corporations’ cozy relationship with government officials, which enable them to work behind the scenes to gain access to key decision makers. In some cases, industrial proxies have directly shaped the global warming message put forth by federal agencies.	Thank you for this inclusion. The section has been revised accordingly. Specifically, we have added a fourth dimension to the uncertainty space using your suggestion
23025	2	58				This section needs some kind of introduction so that it is clear what the bullet points refer to	Some of the parts of the section have been moved to the early parts of section 2.4. A definition has been inserted to clarify what science policy interfaces are.
30818	2	58	36	58	26	The point-wise presentation of these "Gaps in Knowledge" is appreciated, but this section needs an introduction. It reads more like a summary of where to go next--and perhaps it should be stated as such? Suggest writing a short paragraph, possibly referring back to the previous sections to identify where gaps exist, to make this more readable.	Some of the parts of the section have been moved to the early parts of section 2.4. An introductory definition of the science policy interface has been included.
35910	2	58	36			The most important knowledge gaps seem to be missing: reducing uncertainty regarding the feedback effects of radiative forcing on temperature, reducing uncertainty over climate damages, reducing uncertainty in the degree of sea level rise, etc. The behavioral uncertainties listed are second order.	Noted
20708	2	58	3	58	22	Myopic behaviour, lack of proportion, sub-optimal responses, and poor predictive capacity are not merely the province of households and firms but of political systems, and the bureaucrats abd others who support them. Households whose property values and health are adversely affected (without compensation), and who see wind turbines placed where there is little wind and solar panels where there is little Sun, and power stations burning palm oil thousand of miles from source are surely not myopic! As is pointed out in Chapter 3, page 55, lines 1-3, excessive entry of firms may arise.	Taken into Account. We highlight that myopia and other sub-optimal responses are part of the domain of decision makers at all levels. There are certainly situations such as referred to in Chap. 3 p. 55 where decision makers are not myopic.
30819	2	59	1	59	4	This is almost impossible to understand without some explanation of terminology.	Accepted: will redraft this.
30822	2	59	12	59	12	Delete "lead"	Editorial – copyedit to be completed prior to publication

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
30823	2	59	17	59	19	This is unclear. Suggest rewording as something like: "Determine the extent to which robust decision-making can overcome uncertainty in climate change impacts at the tail(s) of the distribution of possible outcomes."	Accepted: will redraft this.
30820	2	59	5	59	5	It is not clear where this comes from. Is it possible to use IAMs in this way? Suggest explaining further.	Accepted: will redraft this.
30821	2	59	6	59	6	Is this really a gap? There is an explanation in the earlier parts of the chapter of how people employ both System 1 and System 2 thinking. The general message appears to be that both are important and useful, but that there are risks attached to using System 1 too much.	Accepted: will redraft this.
35680	2	6	10	6	19	We recommend that this entire paragraph be deleted or substantially edited to provide 1) links back to appropriate underlying sections of the text and 2) supporting literature.	Paragraph can be reworked if still in revised ES
26407	2	6	10	6	11	Institutions and individuals generally do not accurately perceive the economic risk-return tradeoffs associated with climate change. Instead, institutions and individuals generally apply a heuristics approach - or rule of thumb approach - to understanding the risk-return tradeoff associated with not mitigating climate change.	Low mitigation efforts probably depend on economic consequences that are well assessed. On the other hand, based on the (wrong) perception that for many countries, adaptation is more important that mitigation.
19826	2	6	10		37	The summaries of what factors are covered in each section should be removed from the Exec Summary so as to focus on the "Key Findings" from line 46 on. Executives need to know what was found, not how the authors found it.	Accepted We have revised the ES to highlight Key Findings
31204	2	6	15	6	19	I've not read AR4, but this part of AR5 makes me think that in AR4 there was no mention of cognitive biases and that cognitive biases are of importance only in risky and uncertain environments. This is not true; e.g. our limited computational abilities are not a consequence of risk and uncertainty; we can be rationaly bounded in certain environment. I understand your premisse that risk and uncertainty are constraints under which agents make transactions; e.g. the purchase of an energy efficient appliance is constrained by my lack of knowledge about the prices of energy and money (interest rates) in the future. I also understand that once risk and uncetainty are introduced in the report, they become variables which policy makers will try to influence. The author is clever in taking that perspective. But, here too, I'm afraid that the reader will think that without risk and uncertainty there is no room for policy intervention to alleviate climate change.	Accepted - new Section 2.4 now makes it clear that its coverage of behavioral models and cognitive biases does not only cover responses in risky and uncertain environments. See answer to Comment 36 above.
35681	2	6	27	6	27	This statement that climate change policies are an exercise in risk management is nice but it really is an oversimplification of the problem. We suggest deleting or expanding to clarify the complexities.	Accepted. We have clarified why climate change is an exercise in risk management.
35682	2	6	35	6	37	It is not the role of the IPCC to prescribe strategies for ``gaining public support'' (lines 35--36). We suggest that the authors edit the sentence that describes a role within the bounds of the IPCC's remit.	Accepted The ES was extensively revised and this phrase was deleted
35683	2	6	35	6	37	We recommend that the sentence starting with "It also examines…" should be deleted. This sentence is indicative with larger problems with the chapter, particularly section 2.2. It is outside of the scope of the IPCC's report.	Sentence can be reworded, not deleted. The whole report is about mitigation policies. We are NOT advocating public support for these--just reviewing the literature in this regard.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
35684	2	6	38	6	45	This entire paragraph (starting with "The developing countries...") is unclear and unsupported by the text of the chapter and should be deleted. It contains broad statements that requires strong support but none is provided even with references. Just looking at the first sentence one wonders, upon what is this conjecture based? What about increased food prices in the future? Those don't make the list. Increased energy demands that can't be met, human health impacts? We recommend that the authors edit the paragraph providing reference to the appropriate underlying sections of the chapter and appropriate references.	Paragraph can cite WG II on impacts. I think it can be reworded but I don't see anything wrong with its basic points.
35685	2	6	38	6	45	The discussion of uncertainties enhancing mitigation should make clear that we have much less confidence about the degree to which mitigation is enhanced. We are also not sure we actually have a firm basis for saying that policy instruments that acknowledge biases are ``likely to perform quite well'' or that ``minimizing the variance in profit'' stimulates investment so much more rapidly.	Rejected--we have provided level of confidence.
22502	2	6	38		39	The text said the developing countries will suffer the most from climate change impacts,however according to the common sense,the countries suffers a lot or not is related to geographic location ,not only the economic level.For example,the vertical zonality and economic type should be considered.If the pointview is accepected ,arguments should be strengthen.And the suffer in different regions should be added.	: It is both a function of geography and level of economic development. And to a large extent, a high level of the latter can compensate for location. Last part of comment is unclear
20767	2	6	39	6	39	dysfunctional doesn't seem a word that can be applied to weather patterns	'Accepted - will be re-written
30746	2	6	39	6	39	What is a "dysfunctional and unpredictable weather pattern"? Use of the word "dysfunctional" in this context also occurs at P. 15, L 42. Perhaps it should be explained on first use, or changed to something more familiar. E.g., "changeable", "damaging", "severe", "extreme" ?	Accepted - will be re-written
35686	2	6	39	6	39	What is a "dysfunctional weather pattern?" The authors should explain what this means or find other more precise terminology.	Accepted - will be re-written
30747	2	6	40	6	41	"Methodologies to aid decision-making in the face of uncertainties require intensive use of resources and data that are beyond their reach." "beyond their reach" refers to "developing countries" at the start of line 38, but this should perhaps be clarified.	Editorial – copyedit to be completed prior to publication.
35687	2	6	41	6	41	Beyond whose reach? The object of the sentence is unclear. We suggest that the authors clarify the object in the sentence.	Accepted. The Executive Summary presents key findings and messages from the chapter that are revised from the ones in the SOD.
35688	2	6	41	6	42	Why would risk displace responsibilities from the government to the private sector?. It seems strange to state something so unclear without more of an explanation. Please elaborate.	Accepted. The Executive Summary presents key findings and messages from the chapter that are revised from the ones in the SOD.
35689	2	6	46	7	88	These authors should review these findings in order to 1) verify that they are not policy prescriptive and 2) are supported by the literature. The authors, following IPCC policy, should provide reference back to the underlying chapter wherever making confidence/uncertainty statements.	Accepted. The Executive Summary presents key findings and messages from the chapter that are revised from the ones in the SOD.
22950	2	6	47	48		The first statement here has no content whatever - simply says sometimes wait, sometimes take action. How is this helpful?	Accepted. The Executive Summary presents key findings and messages from the chapter that are revised from the ones in the SOD.
21589	2	6	47	7	3	The rationale for acting or waiting is extremely important. This paragraph needs to provide more information on the range of policies for which it is best to act or wait, and/or to provide some examples.	Accepted. The Executive Summary presents key findings and messages from the chapter that are revised from the ones in the SOD.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
35679	2	6	7	6	7	The clause "and how they affect the actions and well being of different stakeholders" should be deleted. Formulation of the problem does not require knowing how people are impacted. This seems to almost be the answer.	Accepted. The Executive Summary presents key findings and messages from the chapter that are revised from the ones in the SOD.
19606	2	6	25	6	26	Scenario analysis should not be categorized as decision making tool or policy analysis tool instead of uncertainty analysis. Uncertainty analysis investigates the uncertainty of variables that are used in decision-making problems in which observations and models represent the knowledge base. In other words, uncertainty analysis aims to make a technical contribution to decision-making through the quantification of uncertainties in the relevant variables. Normaly expert judgement is a uncertainty analysis technique, and other techniques include Monte Carlo sampling, classic statistic tools, but not scenario analysis. Details can see references: (1) Etienne de Rocquigny, Nicolas, Devictor, Stefano, Tarantola (Editors), Uncertainty in Industrial Practice: A Guide to Quantitative Uncertainty Management, Wiley & Sons Publishers, 2008. (2) J.C. Helton, J.D. Johnson, C.J. Salaberry, and C.B. Storlie, 2006, Survey of sampling based methods for uncertainty and sensitivity analysis. Reliability Engineering and System Safety, 91:1175–1209.(3) Santner, T. J.; Williams, B. J.; Notz, W.I. Design and Analysis of Computer Experiments; Springer-Verlag, 2003. (4)Morgan MG, et al.Uncertainty: A guide to dealing with uncertainty in quantitative risk and policy analysis. Cambridge University Press. 1990.	I might agree that scenario analysis should not be a decision making or policy analysis tool, but in fact most people do see it that way, It has certainly played that role in the IPCC. No change to text.
19601	2	6	46	7	36	Key findings in this part are listed with high, medium or low confidence. But for the other chapters, key findings are noted with high, meidum, or low agreements as well as robust, medium, or limited evidence, which accord with the metrics in the appendix in chapter 2. Please use the same indicators, and keep this charpter accordance with all the other chapters.	Comment accepted – will be revised accordingly
34445	2	6	47	7	3	How is this policy-relevant? This finding reads very generic. In what kind of climate policy-related situations is uncertainty a reason to wait and learn, when is it a reason to act and learn later? Your answer to this question ("when external events are likely to generate new information...") needs to be broken down to specific choice problems in the context of climate change to become meaningful for policymakers. Please provide more detail.	Accepted - text has been changed
27442	2	6	47	7	3	This finding reads very generic. Especially the first sentence is redundant since it is obviously true. In what kind of climate policy-related situations is uncertainty a reason to wait and learn, when is it a reason to act and learn later? Your answer to this question ("when external events are likely to generate new information...") needs to be broken down to specific choice problems to become meaningful for policymakers. Please be more specific.	Accepted - text has been changed
20694	2	6	1	6	7	It would be useful to provide a couple of examples of the scale and significance of 'embedded' emissions. Thus the UK (several other examples could be given) claims it has reduced CO2 emissions by over 20% since 1990. In fact, once 'embedded' emissions are taken into accout they have increased by over 20%. This problem has been discussed by UK DECC chief scientific advisor Prof. David MacKay and by Dept. of Environment chief scientific advisor Sir Robert Watson - only for their concerns to be dismissed/sidestepped by the government departments concerned.	Rejected. We think that this example is too specific at this instance.
30824	2	60	1	66	28	Does this appendix really belong here? It is relevant throughout the report, and in the WGI contribution to the AR5, the guidance note is cited as a footnote.	We wanted to be self-contained & also expand on what it relevant for WGIII. However under space-constraints we now decided to reduce the Appendix to 1 §.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
22528	2	60	1	66	28	In order to shorten the chapter, the "Appendix: Metrics of uncertainty and risk" could be moved to Annex II and replaced with a summary of the main concepts with an schematic approach.	We wanted to be self-contained & also expand on what it relevant for WGIII. However under space-constraints we now decided to reduce the Appendix to 1 §.
30825	2	60	25	60	25	What does "(M11)" signify? This also occurs at P60, L 37, 41 and P61, L. 16.	Noticed. However under space-constraints we now decided to reduce the Appendix to 1 §.
23026	2	61	17			The Guidance Note needs some kind of simplified introduction, to make it clearer what the points are	We wanted to be self-contained & also expand on what it relevant for WGIII. However under space-constraints we now decided to reduce the Appendix to 1 §.
35913	2	61	17			Given that there is a separate Guidance Note, there is no good reason to summarize it here. The whole section "General recommendations of the GN" appears to be superfluous, and it fills about 6 pages.	We wanted to be self-contained & also expand on what it relevant for WGIII. However under space-constraints we now decided to reduce the Appendix to 1 §.
20786	2	67	1			references should be double-ckeched and edited	Noted
22752	2	7	1			after "(high confidence).", to add "The perception that the impact of climate change is neither immediate nor local persists leading many to think it rational to advocate a "wait-and-see" approach to emissions reductions. (high confidence, robust evidance)"	Taken into Account. These issues are discussed in Risk Perception and Response to Risk and Uncertainty (Sect 2.5) and not in the revised Executive Summary
33633	2	7	10			we suggest to give an example of 'institutional and governance factors', these terms are vague and an example will make it easier to interpret.	Taken into Account. These issues are discussed in Risk Perception and Response to Risk and Uncertainty (Sect 2.6) and not in the revised Executive Summary
35693	2	7	10	7	15	This entire paragraph (starting with "A number of institutional…") should be deleted. Climate change risk management is going to be about a lot more than renewable energy generation - preparedness and adaptation are arguably the most important risk management priority in most of these countries.	Accepted. The Executive Summary presents key findings and messages from the chapter that are revised from the ones in the SOD.
22754	2	7	11	7	13	The institutional and governance factors are not the only obstacles to climate change risk management, and they are not only happen in developing countries. Thus this sentence needs to be changed to "A number of factors stand in the way of effective climate change risk management, including social, economical, institutional and governance factors. (high confidence). Researches on the investments in renewable energy showed the risk management could be improved if countries..."	Taken into Account. These issues are discussed in Managing Uncertainty, Risk and Learning (Sect 2.6) and not in the revised Executive Summary.
24556	2	7	11	7	13	Effective climate change risk management in developing countries is likely to involve a portfolio of civil service actions, including but not limited to investment in renewable energy generation. This sentence implies that the only option is investment in renewables, whereas the later section where it is discussed in more depth (p.17 lines 5-7) gives investment in renewables as one example. Suggest reframing to: 'This could change if these countries developed a more transparent, predictable and effective civil service to foster mitigation efforts such as foreign investment in renewable energy'	Taken into Account. The Executive Summary presents key findings and messages from the chapter that are revised from the ones in the SOD.
22952	2	7	12			The term "civil service" would be better replaced by "governance"	Noted

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
33634	2	7	13	7	15	It is unclear why it is interesting that there is little research on the effects. Is it because you try to initiate more research or are you covering for the 'weak' conclusion.	Taken into Account. The Executive Summary presents key findings and messages from the chapter that are revised from the ones in the SOD.
26408	2	7	13	7	15	This could also change if capital markets supported investments and associated risk management in developing countries that mitigated climate change, specifically based on rewarding developing countries for mitigating the emissions under their control such as land-use change.	Taken into Account. The Executive Summary presents key findings and messages from the chapter that are revised from the ones in the SOD.
35694	2	7	16	7	22	This entire paragraph (starting with "The selection of climate change…") should be deleted or, at the very least, reduced to low confidence reflecting the ambiguity of the literatue.	Taken into Account. The Executive Summary presents key findings and messages from the chapter that are revised from the ones in the SOD.
22953	2	7	22			"quite" needs definition or deletion	Noted
21591	2	7	23	7	28	The role of perception for investment in low-carbon fuelds is important and needs to be included in the SPM.	Noted
24557	2	7	24	7	28	The meaning of this sentence is difficult to determine due to its length. Suggest splitting into two sentences with a full stop after 'perceived risks'	Noted
35695	2	7	28	7	28	"High confidence" here should be "medium confidence" reflecting the uncertainty in the literature.	Noted
20768	2	7	29	7	29	delete E after HERE	Noted
33635	2	7	29			Typo: 'Here we suggest studies…'	Noted
35696	2	7	29	7	36	This entire paragraph (starting with "The chapter concludes…") does not well represent the research gaps in section 2.5 and should be rewritten.	Taken into Account. The Executive Summary presents key findings and messages from the chapter that are revised from the ones in the SOD.
22954	2	7	32			Could mention hardware like pads and mobile phones	Noted
35697	2	7	33	7	36	The discussion regarding "fat tails" is inadequate. It should include a definition of "fat tails", a discussion of why they matter, and how we might want to react to them. The authors should also provide supporting references to more detailed discussions of why the reader should be concerned about "fat tails."	Taken into Account. Fat tails are defined in Tools and Decision Aids for Managing Risk and Uncertainty (Sect 2.5) and are not mentioned in the revised Executive Summary.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
35229	2	7	4	7	4	The uncertainty of scenario analyses and modeling researches is a crucial issue for the whole IPCC AR5 WGIII, thus it is important to provide detailed elaborations on this matter so that policy makers and the public can have accurate comprehension and interpretation of the key findings of the report. Misunderstanding and misinterpretation can then be avoided. It is suggested to include the conclusions drawn from page 41 line 1-13 in the ES as follows: “Scenario analyses are an essential step in scoping the range of effects of human actions and climate change under uncertainties, but the decision-makers must have a clear understanding that the scenarios are highly simplified by the analysts with their large amount of hypothesis which are sometimes not feasible in the real world. Meanwhile, the high agreement among scenarios analyses may come from their goal-orientation and dependence, thus the statistical distribution of the results from scenario analyses should not be treated as statistical distribution of the events from the real world. Therefore, the results from scenario analyses should be viewed as only suggestive and illustrative (high confidence, robust evidence). It is easy to read more into these analyses than is justified. Analysts often forget that scenarios illustrate possible futures along a continuum. They tend to use one of those scenarios in a deterministic manner without recognizing that they have a low probability of occurrence and are only one of many possible outcomes. The use of probabilistic language in describing the swaths of scenarios may also encourage the misunderstandings that these represent science-based ranges of confidence. The robust evidence and high agreement of scenario analyses after AR4 throughout the world is caused by the goal-orientation research pattern that modelers are requested to focus on the achieving of 2 °C goal, while many of these models have common ancestors which created dependences between different model runs. Objective probability statements on global surface warming require estimating the models’ bias and interdependence.”	Taken into Account We have modified the Executive Summary to reflect the important points raised by the Reviewer
22753	2	7	4			The uncertainty of Scenario analyses and modeling researches is a very crucial issue for the whole IPCC AWGIII work, thus it must be highlighted to the readers. Otherwise the results from IPCC will be most likely mistranslated to the public and the policy-makers, and ruin the reputation of IPCC. The paragraphs on Page 41 provided such insight, and must be stated in the ES as follows. Thus the following paragraph needs to be added here: “Scenario analyses are an essential step in scoping the range of effects of human actions and climate change under uncertainties, but the decision makers must have a clear understanding that the scenarios are highly simplified by the analysts with their large amount of hypothesis which are sometimes not feasible in the real world. Meanwhile, the high agreement among scenarios analyses may come from their goal-orientation and dependence, thus the statistical distribution of the results from scenario analyses should not be treated as statistical distribution of the events from the real world, therefore, the results from scenario analyses should be viewed as only suggestive and illustrative (high confidence, robust evidence). It is easy to read more into these analyses than is justified. Analysts often forget that scenarios are illustrative possible futures along a continuum. They tend to use one of those scenarios in a deterministic fashion without recognizing that they have a low probability of occurrence and are only one of many possible outcomes. The use of probabilistic language in describing the swaths of scenarios may also encourage the misunderstandings that these represent science-based ranges of confidence. The robust evidence and high agreement of scenario analyses after AR4 throughout the world is caused by the goal-orientation research pattern that modelers are requested to focus on the achieving of 2 °C goal, while many of these models have common ancestors which created dependences between different model runs. Objective probability statements on global surface warming require estimating the models’ bias and interdependence.”	Thank you for this comment. P 40-41 already contains the text "... it is easy to read more into these analyses than is justified. Analysts often forget that scenarios are illustrative possible futures along a continuum. They tend to use one of those scenarios in a deterministic fashion without recognizing that they have a low probability of occurrence and are only one of many possible outcomes. The use of probabilistic language in describing the swaths of scenarios may also encourage the misunderstandings that these represent science-based ranges of confidence. ..... many of these models have common ancestors which created dependences between different model runs. Objective probability statements on global surface warming require estimating the models’ bias and interdependence.”

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
21590	2	7	4	7	7	The important role of irreversibilities, thresholds etc. for the timing of actions needs to be included in the SPM.	As your concerns are addressed on p. 40-41, the proposal is to carry the message forward to the introduction. I support that, but would not advocate including the "goal orientation" remarks. While these may (or may not) be true, they risk diverting the discussion towards the modelers' motives rather than their methods and results.
35690	2	7	4	7	5	What does "the uncertainty associated with the link of emissions and climate change impacts" mean? Uncertainty about whether emissions cause impacts in general? Uncertainty about what impacts are influenced by emissions? And the emissions don't directly cause the impacts - they change the earth's climate system, which in turn leads to impacts. This discussion needs to be clarify what is intended by the authors.	Accepted: will redraft this.
35691	2	7	4	7	9	What's an example of how the effect of uncertainty shifts if you use a different decision criterion than the two listed here? These two do not contrast with each other - both imply the need for earlier action.	Accepted: will redraft this.
22951	2	7	6			"fat tails" needs further explanation, perhaps in the text - see also line 33 on this page	Taken into account. We will now explicitly point to the definition of fat tails in Annex A.II.5.
35692	2	7	6	7	6	First, what is non-linear? Second, why should non-linearities be a problem in and of themselves? Is it because the models cannot accommodate them?	Link between emissions and climate impacts. Reword this sentence.
30749	2	7	8	7	9	Wording of the last sentence is not clear, especially from "…leads to decade-scale earlier recommendations…". Consider re-writing.	Accepted: will redraft this.
19602	2	7	10	7	15	This finding is very arbitary. I noticed that the authors copy this sentences from BOX2.1, which focused on renewable energy generation in developing countries. This paragraph should be revised: "A number of institutional and governance factors stands in the way of effective climate change risk mangement both in the developing countries and in the developed countries. This could change if these countries develped a more transparent, predictable and effective civil service to stimulate investment in climate change mitigation and adaptation. To date the literature examining the effects of risk and uncertainty on climate policy development unique to developing countries is thin."	Accepted. The Executive Summary presents key findings and messages from the chapter that are revised from the ones in the SOD.
34443	2	7	16	7	22	This seems policy-relevant. Could you please elaborate? Why do decision-makers place weight on short-run outcomes? What kind of incentives would they need to change their behaviour? Who could provide these incentives in what kind of way? What are the trade-offs?	Taken into Account. These issues are discussed in Risk Perception and Response to Risk and Uncertainty (Sect 2.4) and not in the revised Executive Summary
27444	2	7	16	7	22	Please elaborate i.e. provide an example where policy maker's short-termism has been successfully tackled. Who could provide these incentives in what kind of way? Otherwise the result is very abstract and might not be considered.	Taken into Account. These issues are discussed in Risk Perception and Response to Risk and Uncertainty (Sect 2.4) and not in the revised Executive Summary

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
34444	2	7	23	7	28	This seems policy-relevant. Please elaborate. How exactly do some instrument types minimize the variance in profit? What are the drawbacks of such instruments? On which other factors depends their effectiveness? Please coordinate with chapter 15 and 16 CLAs whose chapters address similar questions.	Taken into Account. These issues are discussed in Risk Perception and Response to Risk and Uncertainty (Sect 2.5) and not in the revised Executive Summary
27445	2	7	23	7	28	Please elaborate, i.e. mention examples for instruments that minimize variance to illustrate your finding. Possibly not all readers would understand about which instruments you are talking here.	Taken into Account. These issues are discussed in Risk Perception and Response to Risk and Uncertainty (Sect 2.5) and not in the revised Executive Summary
34441	2	7	4	7	9	This seems policy-relevant. Could you please elaborate by differentiating more specific choice types and the impact of uncertainty on the timing of choices/actions? Where sensible, please establish links to related key findings from WG I and WG II SPMs.	This seems policy-relevant. Could you please elaborate by differentiating more specific choice types and the impact of uncertainty on the timing of choices/actions? Where sensible, please establish links to related key findings from WG I and WG II SPMs.
27443	2	7	4	7	4	"Fat tails" is no common knowledge and needs to be explained.	Taken into account. We will now explicitly point to the definition of fat tails in Annex A.II.5.
30748	2	7	6			What is meant by "fat tails"? This does not strike me as language easily understood. There are several other references to this term, including in FAQ 2.2.	Taken into Account. These issues are discussed in Risk Perception and Response to Risk and Uncertainty (Sect 2.5) and not in the revised Executive Summary
25931	2	77	32	77	33	To replace the reference Labriet M., R. Loulou, and A. Kanudia (2010). Modeling uncertainty in a large scale integrated energy-climate model. Uncertainty and Environmental Decision Making, 51–77. by Labriet M., Loulou R. and A. Kanudia, 2009. Modeling Uncertainty in a Large scale integrated Energy-Climate Model. In: Environmental Decision Making under Uncertainty, J.A. Filar and A.B. Haurie (eds), pp.51-77. 10.1007/978-1-4419-1129-2_2	Accepted. Note that the book results pubblished in 2010.
19827	2	8		41		The bulk of this chapter seems to be very theoretical without much application to climate change. I can see some application in section 2.4 but pages 8-41 need very realistic, practical climate change examples in order to convince the reader that they are relevant to climate change issues. For instance, on page 11, lines 17-21 there is a very unconvincing example of Type I & II errors. Not only does it contain an error (the word NOT is omitted), but it is unrealistic. Type I & II errors normally apply to the results of statistical hypothesis tests, so applying them to a question of causality which cannot be established by statistical testing is unrealistic. I suggest either providing realistic examples, or drastically reducing pp8-41 and focusing this chapter mainly on section 2.4.	Taken into Account. Sect 2.2 now includes climate change examples. We have removed a discussion of Type I and Type II errors for the reasons indicated.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
35703	2	8	11	8	18	We wonder if "risk refers to the potential for adverse effects..." is strictly true. It is probably true colloquially and what many people mean by it. And we might start out by suggesting this is what people often mean by it. This use seems more in line with the term impact used throughout the report and later in the chapter. Risk as useful to the discussion in this chapter should reflect the presence of uncertainty. This distinctions should be made clear and used consistently in the language throughout the chapter. This also provides an opportunity for the authors to note that the presence of large uncertainties associated with this problem require the use of probabilistic analysis to allow policy makers to understand not just the expectation but the full range of possible outcomes.	Taken into account. For us, the term 'potential' enscapsulates the concept of uncertainty. We will say this clearly in a new section on the definition.
35704	2	8	11	8	18	This is a narrow definition of risk, limiting it to the potential for harm. It often is used more broadly to refer to situations of both gain and harm - i.e. investing and many other activities. See Lupton's book on Risk for a discussion. The chapter should consider revising its definition of risk.	We will add that 'gain' could be seen as included in our definition as negative harm.
26409	2	8	11	8	11	Risk refers to the potential for adverse effects on lives, livelihoods, health status, financial, economic,	Taken into account in section 2.1.
27075	2	8	12	8	12	Risk is not solely about uncertainty. There can be very high certainty and still be risk. It may be more useful to emphasize that risk is potential; it need not occur if appropriate policies and measures reduce the potential or the consequences.	Rejected. Our definition points to a combination of impact and uncertainty. If the impact came with certainty, we would not call it risk, but impact. Our definition does emphasize that risk is potential. Finally, the issue of whether it occurs is then a matter of management. Our definitions of uncertainty and risk are deliberately neutral to the fact whether management has already occurred or not. They are a means to describe the state of knowledge. Management is then opening up another dimension, and reductions of risk fall then into the framework of 'decision under uncertainty'. We will clearly state this in a new section about the definitions.
22955	2	8	19	26		Could eliminate this entire paragraph	Accepted We have eliminated this paragraph except for one or two sentences which were moved elsewhere.
34500	2	8	2	8	3	Sentence ending with a verb	Noted
22956	2	8	23			If this paragraph stays in, then reference should be made to AR5, not AR4, otherwise 5 years out of date	Taken into account in section 2.1 as part of the revised introduction.
27446	2	8	26	8	16	What is the meaning of "technological learning", please add a definition.	Taken into account - reference has been added in section 2.1.
27076	2	8	27	8	29	It would also seem important to assess not just current practice, but whether there may be best practices on how to better manage risk iteratively -- and how different management approaches can reduce concerns about deep uncertainties.	Taken into account - in section 2.1.
33637	2	8	28			typo: we think that suggesting must be 'suggest'	Accepted - text revised in section 2.1

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
20770	2	8	3			closing point missing	Accepted - text revised in section 2.1
33636	2	8	3			typo: there is no point (.) at the end of the sentence.	Accepted - text revised in section 2.1
22957	2	8	38			Also an expansion in the number of people who deny/don't want action on climate change, particularly in USA	Noted. While there is literature pointing to this expansion taking place over the years 2007 - 2011 (after a contraction in the years prior to that), we don't know of any peer reviewed literature identifying the effects of this on policy. Hence we don't really draw attention to this point.
23095	2	8	4	8	10	While this chapter later refers to "deep uncertainty," the definition of uncertainty here—which talks about representation by "probability density functions"—neglects to mention the case in which we know little about either the possible outcomes or any related probabilities. This creates a misleading impression about the reach of standard analytical tools, and fails to emphasize the importance of precaution and of developing structures of robustness. "Deep uncertainty" should be defined here, at the outset of the chapter, and be highlighted throughout.	Rejected - this elaboration is not necessary as the definition is as per the IPCC AR5 Uncertainty Guidance Notes.
35699	2	8	4	8	10	The definition of uncertainty too terse, and even ambiguous. This is an important paragraph. Expand on the ideas in it so the reader with no knowledge is clear about what uncertainty measures - especially with respect to what is known and unknown.	Rejected - The definition is as per IPCC AR5 Uncertainty Guidance Notes.
35700	2	8	4	8	10	Can't one still have "uncertainty," even when there is consensus and a complete understanding of a non-linear system? That even with complete expert agreement about how a non-linear system behaves, there is still an irreducilble amount of uncertainty in outcomes merely because that's the kind of system it is - i.e., non-deterministic. This definition suggests that uncertainty only refers to situations of inadequate knowledge or expert disagreement, but that's too limiting - especially regarding climate change, which is inherently a non-linear system. This should be clarified.	Rejected - The definition is as per IPCC AR5 Uncertainty Guidance Notes.
35701	2	8	4	8	18	What is the source of these definitions? They are somewhat intuitive but different disciplines approach these terms slightly differently. Because of the centrality of these concepts to the entire chapter, one would hope for a broad treatment of different meanings, with references supporting the discussion. Where appropriate, the authors should refer to UNFCCC definitions.	Rejected - The definition is as per IPCC AR5 Uncertainty Guidance Notes.
35705	2	8	43			Footnote 1: This is written incorrectly. It should read "Traditionally, 'uncertainty' refers to the incompleteness of knowledge, and is expressed by a belief described by a probability distribution". The word "measure" is much too technical and specific for the very wide readership that the AR5 aims to have -- is the chapter written for mathematicians or probabilists? But perhaps more importantly, the "Traditionally" is disputable, because the "traditional" interpretation of probability (unfortunately) is not the one that is described.	Accepted - traditionally has been changed to generally and measure has been changed to distribution.
35702	2	8	6	8	6	If the errors are quantifiable, can they not then be corrected for? Please clarify or elaborate as necessary.	Rejected - this elaboration is not necessary as the definition is as per the IPCC AR5 Uncertainty Guidance Notes.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
30750	2	8	8	8	10	Why is the uncertainty guidance document included as an appendix in this Chapter? Presumably it should be in the introductory material.	Noted. The decision to include it in appendix was taken by the writing team as it was not essential in the main text.
35698	2	8	1			2.1 should clarify that ``uncertainty'' and ``risk'' are not being used in the same way as in the econ / decision theory literature	Accepted. We will say this more clearly in a new section in which we combine the definitions and a new summary of the SOD-appendix on the uncertainty guidance notes.
30751	2	8	22	8	24	Is it possible to refer to AR5 WG1 here instead?	Accepted. We will modify the text accordingly
19611	2	8	4	8	10	This paragraph have some mistakes about concepts and definitons. For example, probablity density function and parameter intervals are not tools to represnet uncertainties. There are some books about uncertainty the authors can refer to:(1)Morgan MG, et al.Uncertainty: A guide to dealing with uncertainty in quantitative risk and policy analysis. Cambridge University Press. 1990. (2)Lindley, Dennis V. (2006-09-11). Understanding Uncertainty. Wiley-Interscience. ISBN 978-0-470-04383-7. (3)Halpern, Joseph (2005-09-01). Reasoning about Uncertainty. MIT Press. ISBN 978-0-262-58259-9. (4) Smithson, Michael (1989). Ignorance and Uncertainty. New York: Springer-Verlag. ISBN 0-387-96945-4.	Taken into account. We agree that in the context of our Chapter, 'tools' is used for something different. Rather PDFs and intervals should be called 'metrics'. We are happy to point to one of the books the reviewer suggests.
22960	2	9				The discussion of uncertainties on pp. 11-12, beginning with line 46, uses a slightly different typology than Table 2.1 ("negotiation uncertainty" vs. "uncertainty in international climate negotiations" and does not address risks to health and safety. Why is this? The regulatory blob could be more elongated to encompass transition pathway which will be affected by regulation	Accepted. We have revised the section to bring the two into harmony.
27077	2	9			9	The taxonomy is unclear. Individual farmers are concerned about ecosystem responses to climate change, those interested in promoting a particular technology need to understand health and safety issues if there will be public acceptance, regulatory uncertainty often has a large health and safety component, etc. Further, as noted elsewhere in the chapter, the time fram eof the decision is very important, so some of these uncertainties are hardly relevant at different time scales. Technology uncertainties need to be defined as it is not clear what dimension is included here. What about uncertainties related to the harms and benefits of decisions, many of which only become apparent later?	Noted. We have substnatially revised the taxonomy, and also presented a new set of explanatory text. What we now clarify is that we mean the Figure to be capturing one aspect of what we assess in the final sections of this chapter, namely that the types of uncertainties that have appeared most prominently in the literature are somewhat related to the type of choice, and the geographic scale of that choice, that is under consideration. We are now quite clear that the Figure does not capture all aspects of different choices.
33638	2	9				setting a climate change target is not something that has to be done internationaly. Sovereign nation states can set targets as wel. So perhaps this is a better solution: 'setting an effective climate change target…'	Accepted. We have deliberately noted in the revised section that states and smaller political jurisdictions can set targets as well.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
34501	2	9				This table has to be redrawn as a graph. Now the size of the clouds and the color scheme is confusing	Accepted. We have substantially revised the Table, and turned it into a Figure, capturing the fact that it is a conceptual representation of relationships. We hope that the confusion is in turn reduced.
35710	2	9				"Uncertainty in climate and ecosystem responses" should also be included in the "sovereign state" row.	Accepted. We have revised the figure, and the new version contains this feature
35709	2	9				At "Household and individual level" - maybe it should read "health, safety, and well-being." "Well-being" captures a wide array of choices than simply health and safety (e.g., what about economic decisions?).	Noted. We have substnatially revised the figure, and in doing so have harmonized the uncertainties we consider here with the presentation of the sets of uncertainties in the text. Well-being is not one of those.
30752	2	9	10	9	11	"of" missing after "taxonomy"	Noted. We have completely revised the text and this is no longer there.
35706	2	9	15	9	16	It's not clear why uncertainties about the carbon cycle are crucial for instrument choice while uncertainties about the climate system are crucial for the choice of target. We would have put carbon cycle uncertainties in that last category. This taxomy is not correct as presented and should probably be removed.	Noted. As we describe later in the text, uncertainties in terms of sources and sinks is a critical element to be considered when designing monitoring and verification regimes, an element of instrument choice. As we also note, uncertainties about about climate impacts have played a prominent role in the analysis of long-term temperature targets. Certainly biologica, physical,l and chemical feedbacks (e.,g. permafrost melting releasing methane) could play a role in influencing how emissions have to fall in order to avoid overshooting temperature and GHG concentration targets, but this plays more of a role in considering transition pathways. Hence, for this reason as well, the "sources and sinks" bubbles falls primarily over transtion pathways and instrument choice, rather than long term targets.
30753	2	9	17	9	18	"vary according to what types of choices analysts have focused their attention" does not make sense.	Noted. We have revised the text so that his no longer there.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
30306	2	9	19	9	22	In the locus of decision making we should also add the livelihoods group (for example, farmer, industrial worker, fisher etc) as a category as well before the row of hosueholds and individuals	Noted. Actually, we have reduced the number of rows in the Figure, to make them more general, noting that they do not capture all possible loci of decision-making, but rather general groupings.
35707	2	9	19			Table 2.1 is simply not correct and should be excluded from the Chapter. For example, uncertainty in climate systems will have an effect outside of just international cooperation and decision making at the state level. Such uncertainty will directly effect decision making at the local government level and the firm level when making adaptation investments. On the other end risks to health will effect decisions at the national and international level as well. There are plenty of other examples that could be presented in between as to why this figure does not capture the reality of the situation.	Noted. We have substnatially revised the taxonomy, and also presented a new set of explanatory text. What we now clarify is that we mean the Figure to be capturing one aspect of what we assess in the final sections of this chapter, namely that the types of uncertainties that have appeared most prominently in the literature are somewhat related to the type of choice, and the geographic scale of that choice, that is under consideration. We are now quite clear that the Figure does not capture all aspects of different choices.
27447	2	9	19	9	23	Please clarify the two different categories of "Locus of decision-making": Spatial as well as social / actors.	Noted. We have substanatially revised the taxonomy, and also presented a new set of explanatory text. What we now clarify is that we mean the Figure to be capturing one aspect of what we assess in the final sections of this chapter, namely that the types of uncertainties that have appeared most prominently in the literature are somewhat related to the type of choice, and the geographic scale of that choice, that is under consideration. We are now quite clear that the Figure does not capture all aspects of different choices.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
27448	2	9	19	9	23	Why is the term "locus" used? This indicates a geographical location, but in fact you are referring to the decision making instance/actor/group. It would be better to use an expression that is more obvious.	Noted. We have substantially revised the taxonomy, and also presented a new set of explanatory text. What we now clarify is that we mean the Figure to be capturing one aspect of what we assess in the final sections of this chapter, namely that the types of uncertainties that have appeared most prominently in the literature are somewhat related to the type of choice, and the geographic scale of that choice, that is under consideration. We are now quite clear that the Figure does not capture all aspects of different choices.
35708	2	9	33	9	33	The final sentence in this paragraph is true but does not follow logically in this context. Either delete the sentence or place in the appropriate location.	We have deleted this sentence as part of the substnatial revision to this section.
19603	2	9	12	9	16	"That literature……. policy instruments" should be deleted.	Accepted. We have deletd this in the revised section.
34499	2	ALL				This chapter needs light editing for grammar and spelling	Noted
34502	2	ALL				My comment for Chapter 2 is that there is too much theory. With this much theory, without any mathematical explanations or applications of uncertainity measuring mechanisms, it undermines the purpose of the chapter. How about incorporating some uncertainity estimating literature already existing in climate science?The chapter sounds like a review of literature for an economics/statistics journal,not like an IPCC review	Taken into Account We have developed more detailed treatments of uncertainty in Sect 2.3.1 and 2.6.2 and highlighted the need for understanding intuitive thinking and deliberative thinking with respect to risk and uncertainty in the choice and design of policy instruments.