Expert Review Comments on the IPCC WGIII AR5 First Order Draft – Chapter 3

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
17311	3					Gender issues:	No action; these are addressed briefly in section 3.11
17355	3					Comments on Chapter 03 Finn Arler, Aalborg University, Denmark First of all, it is worth underlining from the start that the chapter is full of good points and well-considered arguments. There are several points and arguments I would like to deal with in more detail, though, but due to lack of time I will only make a few quick points. The first two comments are related to the concept 'community', which, in general, plays a very downplayed role in the chapter. The third one is just a hint about the absence of discussions of the concept 'complex equality'. 1. The way the distinction between Polluter Pays, Beneficiary Pays and Community Pays Principles is presented (p. 14), appears somewhat confusing. It seems as if the three principles are alternatives, whereas in fact they are rather supplementary principles, at least in relation to the climate change problem. It begins with the polluter/emitter, who is expected to pay. There are various reasons for exemptions, e.g., if the emitter had no knowledge, and could not be expected to have knowledge about possible consequences, but let us put these exemptions aside for now. If the emitter is also a beneficiary, this strengthens the responsibility. Beneficiaries, who are not polluters (or belong to the polluting community), are not asked to pay. For instance, foreign producers may benefit from the technological progress made by the polluters, foreign tradesmen may benefit from the wealth of the polluting society, etc., but these beneficiaries are seldom if ever asked to compensate victims. This means that the Beneficiary Pays Principle is not truly an alternative to the Polluter Pays Principle. If it is difficult to identify the individuals, who are responsible for the pollution, or if a specific community (a nation) has accepted pollution/emissions within their jurisdiction (typically because the whole community is expected to benefit from the activities leading to emissions), it makes sense to make the community as a whole responsible - but then it is as the polluter (who is often also a beneficiary) rather than instead of the polluter. There is one difficult case, though, namely the descendants of the original polluters. They are not necessarily polluters themselves, but are beneficiaries from previous generations' emissions. Notice again that we are not talking about people, who benefit from the wealth created by the previous polluters, but who do not belong to the polluters' community. Nobody expects these people to pay (although one could expect them to be timid about blaming the direct descendants of polluters). The question is only, whether the people, who belong to the same community (nation) as the previous polluters, should pay, i.e. by compensating for damages caused by the pollution. Seen from an extremely individualist point of view, they shouldn't. They haven't done anything themselves, and cannot be blamed. If current people separate themselves as radically as this from their ancestors, however, it is difficult to see why they should be entitled t	No action; these are good points but this part of the chapter is minor and probably shouldn't be expanded.
10230	3					Figure 3.6 is v2.0 McKinsey cost curve, but we would advise using the latest published version which is v2.1. We would also advise using the 2030 curve rather than the 2015 one shown in Figure 3.6 as this is the year on which our analysis focuses. Please find the v2.1 2030 chart on page 8 in the publication "Impact of the financial crisis on carbon economics: Version 2.1 of the global greenhouse gas abatement cost curve" found at the following link: http://www.mckinsey.com/client_service/sustainability/latest_thinking/greenhouse_gas_abatement_cost_curves. The labels on Figure 3.6 would then of course need to be changed to 2030 from 2015	Noted; will be addressed in SOD

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
3330	3					The chapter is lacking a discussion of the main normative obstacles to responding to climate change on the model of Gardiner (2011) and section IV of Thompson, A. and Bendik-Keymer, J. (2012) Ethical Adaptation to Climate Change (MIT Press). Such obstacles -such as the pure intergenerational problem or institutional fragmentation of agent responsibilities may be some of the best and most important places for any ethical consideration of climate change to begin. In general, chapter 3 does not critically examine the structures of authorty or legitimacy that we have inherited in a pre-climate forcing (or aware of CF) world. This makes the discussion lopsided: focused on going-forward tools that may not effect the underlying forms of power that have given rise to systems of law and legitimacy that hinder or promote climate forncing.	Noted; will be addressed in SOD. We intend to include more on the literature on cooperation, which includes the classic prisoners dillema.
4121	3					Please review chapter 4 sections 4.2.2, 4.2.3, 4.7.2, and 4.7.3. If you feel that these sections contain redundant and/or inconsistent duplications of chapter 3 discussions, please advice chapter 4 authors on how to revise their sections.	No action; presumably issues in chapter 4 will be highlighted by reviewers.
4129	3					It would be useful to highlight the relation of your chapter to the AR4. What has happened since? How were key concepts and methods framed in the AR4 and how do you extend on this assessment?	No action; this is tough for a framing chapter, particularly considering that AR2 was the last AR that considered economics in depth (although economists were involved in AR3 and AR4)
4130	3					Your chapter covers many important issues but it is not always clear how they relate to each other. Individual sections seem very disjunct. It would be helpful for the reader of you developed a storyline that links all issues (which is challenging given the excessively broad scope of your outline) and explains why they are assessed in this order. Moreover, each section should state how it relates to subsequent chapters because your primary role as a framing chapter is to establish transparency over concepts and methods that are used in different parts of the report.	Noted; will be addressed in SOD
4131	3					It would be useful if you could state at the beginning of your chapter how its contents relate to chapter 2. Chapter 2 also discusses CBA, CEA, etc. to some extent. Why and how does your assessment of these concepts and methods differ from chapter 2?	No action; we are not focusing on uncertainty.
4132	3					Please respect the page limit (65 pages) for the Second Order Draft of your chapter.	Noted; we will make the best effort to shorten the length of the chapter as we can.
4144	3					Please review chapter 5 section 5.10 and make sure that the concept of co-benefits is consistent with yours.	Noted; we are revising our co-benefit discussion. Suggest Chapter 5 refer to the SOD and make sure things are consistent.
4486	3					See comment #20.	No action; comment unclear - no page or section reference numbers
4491	3					A general comment on the chapter: The text tends to posit a narrow range of possibilities for the issue being discussed, lists without much analysis the arguments on various sides of the (narrow) framing, and then proceeds to continue the discussion as though the extremely serious problems even in the narrow discussion do not exist or somehow have been settled. Such a format works better for discussions of scientific issues than for discussions of ethics and morality. The chapter does say in several places that it is not intended to be prescriptive, but it might be emphasized that "the literature" by no means constitutes the last word on the various issues being discussed.	No action; comment unclear
2208	3					<no comment here as cells could not be enlarged to fit the text>	No action; comment unclear - no page or section reference numbers

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
15290	3					Table 3.4 may be seen as a summary of the present knowledge. However, the Table contains results from rather old studies and it is later described in the chapter that there are possibilities of significant underestimations. I therefore suggest that the table is deleted or replaced by a true summary of the present knowledge.	Noted; will be addressed in SOD
9289	3					The relationship between the discussion of prioritarianism in section 3.3.3 and that in section 3.4 (p.21) is not clear. One can distinguish between telic and deontic forms of prioritarianism. It is clear that in section 3.4 it is the telic form that is under discussion, since prioritarianism is there stated by way of a value function. But I am not sure which is intended in section 3.3.3. I guess that it may be a deontic form, since it appears in a section titled "justice/equity/responsibility" and a subsection titled "intragenerational justice: distributive justice", and since the author does not anywhere explicitly say that the reason we e.g. "have a reason to give some priority to benefitting people who are not well off" is because doing so leads to a better distribution. If so, it would be helpful to make this clear, and in particular to make clear that the doctrines called "prioritarianism" in these two sections are not the same. If not, it would be helpful to make clear the intended connection between the talk of priority/reasons/ought-statements in section 3.3.3 and the value function given in section 3.4 (or revise the chapter structure - there is some danger of duplication here).	Will be addressed in SOD
16928	3					Fankhauser S, R.Tol, and D.Pearce, 'The Aggregation of climate change damages: a welfare-theoretic approach,' Environmental and Resource Economics, Vol.10. 1997 pp.249-66	No action; comment unclear - no page or section reference numbers
11992	3					General comment: Please address not only the right to live of people but all species. Many cultures respect that already today and do not talk of animals as "resources" but as relatives. You mention for example Bhutan and Brazil's constitution but also American Indigenous people and Aborigenes have a more balanced view. Alternatively, you should define on what basis you consider humans superior to Elephants, Dolphins, flies etc..	No action; we cannot make such prescriptive statements
4258	3					This table seems to exclude more recent examples which attempt to assess the social costs of catastrophic climate change e.g. Http://www.economics-ejournal.org/economics/discussionpapers/2011-40 by Ackerman and Stanton	Noted; will be addressed in SOD

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
13413	3					GENERAL COMMENTS The treatment of historical responsibility could be strengthened by stating the share of cumulative emissions of developed countries (eg since 1850 or 1950), giving some estimates. (The range is usually 70-75 per cent). This could be included in the first paragraph of page 12 of a new paragraph after that. There is need for better balance or clearer conclusions on whether developed countries have responsibility/obligations to take measures to assist poorer countries with their climate actions and their development efforts, because of the developed countries' overwhelming contribution to cumulative emissions. In some places (especially on page 13-14), the treatment of this issue appears to be weighted towards arguments against responsibility because of ignorance etc. More space should be given to the counter-arguments by writers such as Shue and Gardiner. The recent work on climate equity and climate justice in the literature on greenhouse development rights, and on the equitable access to atmospheric space in the context of the carbon budget, has not been reflected in this chapter, which is a significant omission. The section on sub-section on technology transfer (3.12.6.1) is poorly treated. There is too little space dedicated to it, although as a framing chapter, this chapter 3 is supposed to deal with the basics of this topic which is so important for the solution to the climate change crisis, and also specifically to enabling developing countries to contribute to the global solution. It is also critical not only to the economic issue but to the "ethical" issue, as developing countries consider technology transfer to be central to any global agreement on climate actions. The very small space given to this central issue in this framing chapter was due to a misconception that this chapter would not deal with this issue, whereas the Wellington Accord clearly designates this chapter to deal with the framing of this issue. The zero draft had a much longer treatment of the issue, including on technologies in the public domain and patented technologies, the issue of IPRs in the context of access to affordable technology and the principles and mechanisms of international cooperation for technology development and transfer. Unfortunately most of the zero order text has been eliminated. Worse, what remains is often a distortion of the meaning and balance of what was in the original draft and in the zero order draft. In general, issues of interest to developing countries' researchers and policy makers have not been sufficiently addressed in the chapter. A much more lively and relevant review of the discussions and literature on social, economic and ethical concepts, including on the recent significant expansion of work on equity, climate ethics and climate justice, should have been done in the chapter.	No action; this would be normative and policy-prescriptive, which is not the intention of the report

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
8571	3					Considering the centrality of debates about economics and ethics I understand why the IPCC has chosen to include this in its 5th Assessment. These are crucial issues, and are likely to remain central in domestic and international policy discussions. In addition, as someone whose research is focused primarily on the relationships between economics and ethics in climate policy, I recognize that this is an extremely difficult area to integrate in a single chapter. I fully recognise the challenge the authors have accepted in agreeing to lead this chapter. However, I am deeply concerned about this chapter and am unconvinced that it represents a constructive addition to these ongoing conversations, and it may even run the risk of reigniting long-standing frustrations about the way neo-classical economics has been used in the climate change context. I think that the core problems in the chapter revolve around the lack of recognition for the boundaries of economics - it is afterall, one one among many ways of seeing the world - and the lack of integration between the first part of the chapter, which is focused on ethics, and the bulk of teh chapter, which ignores ethics almost completely in its focus on econonmics. While I realize this may have been unintentional, the overarching tone of the chapter is something along the lines of, "we have to talk about ethics so we will in broad terms, and then lets get that over and get into the meat of the problem and really focus on economics". This is totally understandable, but is not an integration of ethics and economics and is not particularly helpful for readers who may be coming into these debates looking for a useful synthesis of current discussions in the broad literature on ethics and economics in climate policy. Finally, I was startled that no-where in this entire chapter did the question of rights, or a rights-based approach to ethics, emerge while this has been included in literature in this area and has been used as a point of reflection about some of the limitations of neo-classical economics in this context. I realize you can't cover anything, but ignoring an entire branch of ethical thought about this while some comparatively less central areas of economics are covered in detail seems odd, especially as a rights-based framework presents a radically different alternative to CBA or other economic approaches to valuation. Overlooking this area detracts from the authority and legitimacy of the chapter. I really hate to say this, but in its current form I remain unconvinced that this chapter should even be included in the IPCC, although I realize this is probably not an option at this stage. It requires an enormous amount of non-facile work in order to make a legitimate claim that it has represented a reasonable discussion of the ethics of climate change, much less an integration or thoughtful dialogue between ethics and neo-classical economics. Some of the latter sections are better than the earlier ones, and in several situations (such as the discussion of WTP) the latter section is clearer, more balanced and generall more coherent. In my detailed comments I have suggested removing teh earlier sections to avoid duplication, or at the very least, bracketing the earlier less balanced sections with clear references pointing readers to these stronger sections. Overall sections 3.4 through 3.7 are the weakest. I would strongly recommend serious reconsideration of these sections, as included in my more detailed comments, one constructive strategy for better framing these sections would be to include clearer and strong paragraphs at the start of each section that clearly indicate the limitations of the assumptions used in the section (ie. all of these are non-transparent in their sole use of neoclassical eocnomics as the default appropriate strategy for climate policy decision making, an assumption that does not resonate with the stated goals of the chapter and which is cognitively ill at ease with several other sections - such as 3.11.2)	Noted; will be addressed in SOD. This is a very thoughtful point. And we certainly do need to make sure what we have makes a contribution. However, our goal is not to integrate economics and ethics. These are separate topics with some overlap.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
17804	3					While I like very much this chapter - however in the context of this book it would then have an added value if the various indicators or metrics would be applied across the sectorial sectors and the others - this would then substantially contribute also in the formulation of sustainable development goals. The chapter has to my opinion still an impoprtant bias - it has the major hand of economy - in it and a major philosophy on how using wellbeing - and possibley link to an economic metrix - nevertheless in some instances, places countries areas not even the minimum has been existed in estimating simply the number of death attributable or the number of injuries attributable etc etc - thus a careful revision and shortening of this chapter is required and a transposal accross the other chapters in the metrix used - or a summary table from the sectorial chapters in this chapters - providing the linkage of this general more philosophy to the various mitigation sectors. There are many more issues to be mentioned here from health sciences, and social equity studies - which seem to have been omitted and rather been fragmented - if thought of- accross the chapter.	No action; comment unclear
10686	3					The table 3.3 and accompanying discussion misses at least one new set of metrics in the literature: the Peak Commitment Temperature (PCT) and Sustained Emission Temperature (SET). See Smith S. M. et al. (2012) Equivalance of greenhouse-gas emissions for peak temperature limits. Nature Climate Change.	Noted; will be addressed in SOD
5129	3					To shorten the chapter, I suggest curtailing efforts to provide a CBA primer; sections on policy intruments and criteria for comparing them could be combined into one streamlined chapter. A good deal of cross-referencing with the chapter could be cut if the overall schema of the chapter was clearer. The discussion about common and civil law could be presented very briefly.	Noted; will be addressed in SOD
15375	3					This section starts to lose the tight organization and terse exposition. It is repetitive of much of the earlier material, the author notes this. The discussion of IAM is lengthy but not well-informed. It states broad generalizations based on a couple of biased surveys, and could have simply looked at the actual publications describing the models and results to see how wrong Terry Barker and others were. A list of IAM's that are being discussed and a table comparing their content and basic methodology needs to be included. Right now this seems too much like a set of off the cuff generalizations with random examples – the danger of the approach I applauded in the first part of the chapter. DICE, RICE, PAGE and FUND are good models, but the IAMC includes many more. Leave it to chapter 6.	Noted; will be addressed in SOD
10848	3					In this section, it would have been good to mention and discuss that most economic models of mitigation will somehow implicitly assume an "exchange rate". Discussing how that is done, reporting on the values obtained, etc, would be extremely beneficial to the metric community.	Noted; will be addressed in SOD

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
15378	3					This section absolutely must include a discussion of Mark Jaccard's work on consumer behavior in order to deal with the issue of "consumer misperception" in a way that is compatible with earlier discussions of prescriptive and market based policies. There are a number of problems with the position stated here. 1. Unless policies actually remove the specific market failure at a cost less than the foregone gains from moving to a perfect market, they will not necessarily improve welfare. [For a citation, see just about any paper by Stavins or Jaffe and Stavins on energy efficiency]. Specifically, has there been any analysis of the full implications of using corporate average fuel economy or appliance efficiency standards to remedy an information problem? 2. The observation that consumers suffer "buyer's remorse" in the particular form of wishing their newly purchased vehicle had better fuel economy does not imply that a. a government imposed standard will make them any better off, given the lack of information regulators have about individual preferences and circumstances and the frequency of "voters' remorse". b. Buyer's remorse is not confined to new car purchases. Therefore either the rationale for regulating vehicle choices applies to every other instance of buyer's remorse (I am particularly subject to it when I eat out, so shouldn't there be minimum standards for restaurant food? Oh, that's right, New York City does regulate restaurant food) c. Since buyer's remorse violates the basic axioms that characterize preferences that lead to a consistent ordering (or utility function) it is far from clear how to define any welfare criterion based on consumer preferences – is there not an argument that decisions under uncertainty (which includes all purchase decisions in some degree) should always be represented in terms of ex ante preferences rather than hindsight re-evaluations?	AGREE action will be taken
3372	3					3.10.1 mentions 5 metrics for evaluating climate change effects, citing Schneider (2000). But then only one metric, economic cost, is further explored in 3.10.2. Why are the other metrics not specified? These other metrics seem to be particularly relevant for exploring the co-benefits of mitigation action, and are utilized in the sectoral chapters.This issue is, in my opinion, at the core of the AR5.	Noted.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
16933	3					IPCC is so loaded with costing models and gurus that I will refrain from commenting on the specific model results, but I am a bit puzzled about the purpose of this section. One point that I think could usefully be made is that however “costs” are defined and models run, the costs of mitigation are set within both vastly larger determinants of economic growth – they are a difference in percentage growth rates of some small and highly uncertain fraction of a percent. Morever the determinant sof long-run growht remain something of an economic puzzle, but we know that innovation is important. Another way to make the point is that a scatter plot of EMF-22 results of 2050 GDP vs CO2 across all models and scenarios shows almost no discernible relationship (Grubb, Hourcade and Neuhoff, Chapter 11). However, the discussion on the McKinsey curve unfortunately seems to illustrate the extent to which disciplinary bias risks denigrating this chapter. Apparently the McKinsey curve is “highly controversial” (a statement repeated) whereas models that assume the baseline is perfectly optimal, that all actors are rational optimising agents with perfect foresight, that there is no endogenous technical change, etc etc, are not controversial. This is really not the intellectual standard one would hope for, even in a First Order Draft. The same applies even more to the discussion on “negative cost” measures, where the comments also contradict both the theory ("System 1") implicit in the FOD Chapter 2, and the evidence in much of the rest of the AR5 draft chapters (most obviously, buildings). The “negative cost” issue is well over twenty years matured, with a huge literature, and this text reads like first reactions from an economist who has read nothing about it. The evidence incidentally, spans not only technological assessment but applied policy evaluation (there is plentiful material in the other AR5 chapters, to which I could add our own analysis in Grubb, Hourcade and Neuhoff, Chapters 4 and 5, which review respectively the theory and the empirical evidence from policy evaluation). Again moreover this is duplicating old debates and discussions in the IPCC; the chapter should at least acknowledge that the McKinsey estimate of “negative cost” potential was substantially smaller than the IPCC AR4’s own estimate (c. 3.5 vs 5 GtCO2 from the buildings sector respectively). Finally, I am not convinced it is fair to criticise the McKinsey curve for its proprietary nature. The 200-page report they published was far more detailed than many academic papers, and a scan of their website seems to me to show a considerable degree of transparency and debate. The core point however is just that McKinsey curve is the only consistent study to aggregate bottom-up assessments globally into a cost curve, the main alternate being the IPCC's own AR4 assessment which was presented in a different way, and suggested a bigger First Domain (and smaller Second Domain) potential. □	Noted; will be addressed in SOD
18347	3					Please link your discussion of different modeling approaches to relevant section in Chapter 4 (4.5.3.1) to avoid redundancies and sharpen specific chapter-relevant focus.	Noted; will be addressed in SOD
10685	3					It is good to see some discussion of alternative emissions metrics here, which are the subject of a fair amount of academic research and political discussion (see Plattner, G-K. et al. "IPCC Expert Meeting on the Science of Alternative Metrics", IPCC 2009) but have been underplayed in previous WG3 reports. But the discussion here contains much high-level theory and little relevant application. For instance, how do the metrics relate to the 2 degree limit (and 1.5 degree limit) specifically? Plus it would be very useful for readers to see how the use of different metrics would affect estimates of aggregate CO2e emissions, both for historical trends and future pledges. Even if this is just done using the GTP100, which is perhaps the most commonly cited alternative to the GWP100, it would be a big step forward.	Noted; will be addressed in SOD

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
11357	3					I think that this section provides a good overview of metrics from the economic perspective -- I like the way that the discussion starts from the general economic frameworks and then the individual metrics are drawn.	Thank you for your comment.
16934	3					Damages: Surely in a chapter on social, economic & ethical dimensions, the most important points to make are that the quantified estimates cited are rendered controversial by all the issues discussed previously in the chapter around aggregation, plus the discounting / intergernational debate, the missing values, etc. I also find it bizarre to discuss these issues without referring for example to the more qualitative risk studies, for example Downing's risk matrix (Watkiss and Downing, 2007). AR5 is the first IPCC assessment that could take full account of the post-Stern debates on climate impacts and valuation. This chapter does not do these justice. One overview is given in the first chapter of Grubb, Hourcade and Neuhoff, 'Planetary Economics: the three domains of sustainable energy development.', Taylor and Francis (Chapter 1)	Noted; will be addressed in SOD
16641	3					What are the practical draw-backs from applying weights this way?	No action; comment is too vague; no line number or page number.
12790	3					You may also like to cite experimental studies, with regard to leadership e.g. see Arbak, Emrah; Villeval, Marie-Claire (2007): Endogenous Leadership Selection and Influence. Hg. v. Centre National de la Recherche Scientique. Centre National de la Recherche Scientique. Écully (Working Papers, 07-07), or Potters, Jan; Sefton, Martin; Vesterlund, Lise (2007): Leading-by-example and signaling in voluntary contribution games: an experimental study. In: Economic Theory 33 (1), S. 169–182)	AGREE action will be taken
5128	3					The section on behavioural economics and culture (apart from offering a curious blend of topics) was the strongest for me, as it uses concrete examples, eschews high theory, and helps broaden discussion.	NOTED Thank you for your comment.
3373	3					In contrast to the general approach of chapter 3, this section is written in a bottom-up manner, detailing examples. It does not give concepts and categorizations of behavioral issues. This section could learn from chapter 2, and offer a categorizing, thus enabling also the sorting of examples, which are not mentioned in the text.	NOTED general action will be taken
12789	3					The relevance of subjective justice perceptions is important, here: a fair burden-sharing rule is more likely to be accepted and followed (Third Assesment Report, WGIII). So the stability of an agreement could be improved if the agreement is in line with the individual perception of fairness.	NOTED general action will be taken
5323	3					As mentioned already in the remarks to chapter 1 and in the comment on Chapter 2, section 2.4.3: The authors seem to ignore possible switching cost and other hidden cost incurred by the consumers through adopting new technology.	AGREE action will be taken
4113	3					Please discuss this section with chapter 2 authors.	AGREE action will be taken
4507	3					It seems biased to give such prominent treatment to cultural constructs such as buen vivir and Gross National Happiness without giving equally explicit to the "stewardship" model of human/environment interactions as developed by Evangelical Christians (as in, for example, Katherine Hayhoe and Andrew Farley, A Climate for Change). Other major religious traditions also stress obligations to future generations and other species.	DISAGREE Buen Vivir and GNH don't have anything to do with a religious point of view, they enhance an alternative (non western) cultural attitude! So I don't agree with this comment, and inclusion of Evangelical Christians.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
15457	3					The chapter contains a section on social and cultural issues (3.11.2), as part of an effort to seek alternative efforts to traditional mitigation strategies. Similar alterantive ways of understanding issues of vulnerability and adaptation should also be discussed briefly, so that problems of universaalism and specificity are acknowledged and addressed. A good source for "Asian' perspectives, containing a critique of some of the dominant universalizing tendencies, is in "Human Security and Climate Change in Southeast Asia", eds., Lorraine Elliott and Mely Caballero-Anthony. Routledge Security in Asia Pacific Series, 2012	NOTED but adaptation and vulnerability are treated in WGII
5325	3					I also do not know why this section is important for the IPCC report. The section also ignores all the critical literature on social capital. To name two important critical contributions: Robert Solow (2000) “Notes on Social Capital and Economic Performance,” in Dasgupta, P. und I. Serageldin (ed.: Social Capital, a Multifaced Perspective, The World Bank, Washington D.C.., pp 6-10. J. Sobel (2002): “Can we trust Social Capital?” Journal of Economic Literature 40, 139-154.	NOTED general action will be taken.
3374	3					It is not well motivated why technological change is such an important concept that it deserves its own subsection.	No action; this section is given and agreed by the WGIII Plenary
9010	3					This section on learning by doing does not mention that learning by doing in many developing countries is unduly constricted by the international property rights regime. If the issue about technogical transformation for climate change is one of acceleration, then the IPR regime could be an obstacle to this objective. See United Nations (2011a). World Economic and Social Survey 2011: The Great Green Technological Transformation. Sales No. E.11.II.C.1.	Will be addressed in SOD
9009	3					The section confines itself to literature on technological change of specific products and sectors. It cites studies that say that "innovation responds quickly to price changes" (p. 70 , lines 30-31). The kind of technological change required to respond to climate change is system-wide, both on the production and consumption side. It is important to cite problems that must be faced when system wide technological change, not just individual sectoral change, is required. For example: Wilson, Charlie, and Arnulf Grübler (2010). Lessons from the history of technology and global change for the emerging clean technology cluster. Background paper prepared for World Economic and Social Survey 2011. Wilson, Charlie (forthcoming). Historical scaling dynamics of energy technologies: a comparative analysis. This publication studies the problems of system-wide technological changes in response to climate change: United Nations (2011a). World Economic and Social Survey 2011: The Great Green Technological Transformation. Sales No. E.11.II.C.1. A survey of the more development-oriented literature would have identified the system-wide challenge required in technological development.	Will be addressed in SOD

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
12531	3					There are recent noteworthy developments in “experience curve” assessment. I am providing separately a recent summary paper, “Experience Curves and Solar PV” (2012-09-03-nwec-experience-curves-and-solar-pv.pdf) with additional references. Suggested additional language in this section: “A new paper sponsored by the Santa Fe Institute (Nagy et al. 2012) summarizes a meta-evaluation of estimation methods including cost per cumulative production (“Wright’s Law”), cost per annum (“Moore’s Law”), cost per rate of annual production (“Goddard’s Law”); time-lagged variants of the single factor approaches; and hybrid or multifactor estimators combining the single factor approaches (based on work by Nordhaus and Sinclair, Klepper, and Cohen). Forecast skill for each of the methods was assessed with a hindcasting approach across 62 technologies in four categories (chemical, hardware, energy and other), with time series ranging from 11 to 39 years. The analysis concludes that the traditional experience curve approach (Wright) performs quite well across technologies and different time scales, and is significantly better overall than the other approaches, although Moore is very close over shorter time ranges. The robustness of the results for the experience curve approach is striking.” Bela Nagy, J. Doyne Farmer, Quan M. Bui and Jessika E. Trancik, 2012. Statistical Basis for Predicting Technological Progress, arXiv:1207.1463v1 [physics.soc-ph], http://arxiv.org/abs/1207.1463 .	Will be addressed in SOD
18359	3					Please link this discussion to the relevant sections in Chapter 13 (13.9.3) and 16 (16.5) to sharpen chapter specific focus and avoid redundancies.	Will be addressed in SOD
12532	3					This discussion should be expanded. There is considerable literature and research on open source technology and intellectual property, and this is an important development pathway for mitigation and adaptation measures for climate response.	Noted for reorganizing section in SOD
9011	3					This section on international cooperation for technology transfer and development could be strengthened by referring to a vast literature (there are only two citations right now). For example, there are suggestions and citations for needed actions at the international level in Chapter VI entitled "Building a Global Technology Development and Sharing Regime in United Nations (2011a). World Economic and Social Survey 2011: The Great Green Technological Transformation. Sales No. E.11.II.C.1.	Good point, but this issue is addressed in more detail in chapter 13
6983	3					Some suggestions: (1) moral responsibility for CC - individual, collective, or both?; (2) criminal justice and CC; (3) ethics of geoengineering; (4) the role and nature of feasibility constraints in moral arguments about CC; (5) triage; (6) methods in ethics for assessing different post carbon futures.	No action; too general for research need
16642	3					Shorten this discussion. Many of the technical details can be left out.	No action; comment must be referring to another section, as this section is only two sentences.
11007	3					While ethics permeates the discussion of climate policy, its role appears to be largely one as rationalizing interest-based positions. Further the research tracing the roots of ethical behavior to evolutionary biology suggests that, insofar as ethics influences behavior, it often favors behavior that is more ‘tribal’ and less universal and more emotive and less rationalistic than is suggested by the discussion.	No action; this comment appears to misunderstand the discipline of ethics.
16630	3					Delete the sentence that starts with "[t]his is to assume…"	No action. Disagree with comment
5125	3					This appears to be the result of a numbering problem; the section is almost completely redundant. Following the intro and overview in the current 3.1, this section should be omitted and 3.3 on adjusted up.	Cross-referencing has been corrected. The section is essential for describing the chapter's structure.
9343	3					Section on procedural justice should conclude with some discussion on how and in what context it can be applied to issues of climate change 9as thesection on distributive justice)	Will be addressed in SOD; will add an example, if possible

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
2577	3					Section too theoretical. Would be good to have cases of litigation against national governments in favor of climate law, compensations etc. If possible, with tipologies of settlements	Will be addressed in SOD
9014	3					Section 3.3 and the executive summary highlights the legal principle of wrongdoing for determining responsibility. It ignores literature among philosophers and ethicists, such as Gardiner (2010) and Shue (1996, 2010), which argues that wrongdoing is not necessary to assign social responsibility. See: Shue H. (2010). Deadly delays, saving opportunities: creating a more dangerous world? In: Climate Ethics Essential Readings. S.M. Gardiner, S. Caney, D. Jamieson, H. Shue, (eds.), Oxford University Press, Oxford; New York pp.146–162. Available at: http://site.ebrary.com/id/10399387	Thank you. We added a sentence and a cross-reference
13009	3					The more general philosophical issues about the traction of normal concepts of responsibility should probably be mentioned (see, for example, Jamieson, 'Ethics, Global Warming and Public Policy' 1992; Sinnott-Armstrong, 'It's Not My Fault'; Gardiner, 'Is No One Responsible for Global Environmental Tragedy' 2011).	Thank you, we added a discussion of the responsibility of individual persons.
4482	3					This section leaves all the issues hanging. The entire IPCC exercise is pointless if the obligation of present to future generations is not recognized. The discussion of the various definitions of "harm" is unduly abstract.	No action; disagree. This section is simply meant to outline the rest of the chapter
2114	3					On line 37, it is claimed that both options of applying prioritarianism to emission rights are problematic. So is the conclusion of this section that prioratarianism about emissions is implausible? If so, is there a recommended alternative?	Agreed. We changed the wording.
4487	3					As above, legal systems pertain to existing nation-states. The international law of torts is, to put it mildly, undeveloped. These arguments having to do with different concepts of torts seem like scholasticism (in the bad sense), given that there is no encompassing international legal authority, and there is not likely to be one in the forseeable future. (And would such a single world-wide authority really constitute movement in the direction of greater justice? It is not at all clear that it would.)	No action; international law beyond scope of chapter
2121	3					The discussion is 3.3.7.1 & 3.3..7.2 could be better structured. As it stands, there is considerable repetition and overlap between the different "components".	Will be addressed in SOD
9015	3					This section involves a sophomoric discussion of welfare functions, and issues of aggregation across individuals and across time. Nevertheless, it devotes enormous space and word count to additively separable forms, without evaluating the relevance of these approaches to ethical and social decision-making on climate change. This section is thus a chief example of the irrelevant and wasted literature review in this Chapter. The discussion on page 19 with the figures on distribution of invididual well-being across time does not refer to any existing peer-reviewed article. This section ignores the literature on historical responsibility and agreed international principles such as the right to development and equitable access to development.	No action; disagree with comment
3608	3					Connection to climate change mitigation issues too loose and abstract because lacking concrete examples in the text. Please add more application examples!	Some examples have been added. But the applications of general theory are not always immediate.
16632	3					The paragraph that starts in this line needs a connection to the previous paragraph or a transition/subtitle.	No action; comment unclear; no line reference numbers
13011	3					Clare Palmer's interesting (2011; in the Arnold volume) argument about the problems facing some ecological analyses may be worth a citation.	Added
2207	3					A recent and relevant source for this entire section is John Nolt, “Nonanthropocentric Climate Ethics,” WIRES Climate Change 2, 2011, pp. 701-711. (http://wires.wiley.com/WileyCDA/WiresArticle/wisId-WCC131.html).	Reference added
3329	3					I find this expression, "non-human values" equivocal and potentially confusing. "Values concerning non-humans" or something of the sort would be better.	It's now defined.
4489	3					Recommend dropping this entire section.	No action; sections are set by IPCC WGIII

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
6975	3					D.o.	No action; no comment
8489	3					As Hochschild (1981) notes in "What's Fair?", there are multiple "domains" of equity and equality, including social, political, economic, health, environmental, etc. Citizens may not hold equal or consistent orientations to equality (of opportunity, or condition) across those domains.	It's not clear how this point is relevant.
6976	3					D.o.	No action; no comment
16634	3					A version of this paragraph should be close to the beginning of the section and deleted from its current position.	No action; comment does not provide paragraph reference
16930	3					Aggregation of costs and benefits This section might usefully start with an important caveat along the lines in my general comments: aggregation approaches reside within and are constrained by a moral framework of norms and rights. To take a blunt and highly personal example: my father is very ill with Alzheimer's disease. He needs constant care, adds nothing to the economy, consumes a lot of resources of the UK National Health Service, and is clearly no longer enjoying life. Any conceivable cost-benefit analysis would suggest that his life should be terminated. The State, fortunately in my view, has absolutely no right to do so; nor do I, or anyone else. The cost-benefit aggregation of welfare is only an acceptable basis of decisionmaking within carefully described boundaries. The problem of climate change most fundamentally is that it does involve the logical equivalent of transgressing the Westphalian principle of Sovereignty, but with no agreed basis on the acceptable implications of this. The idea that the welfare of Tuvalu, or those living in the Bangladeshi delta, can be aggregated into irrelevance is not accepted by those who live there (the issues of WTA vs WTP metrics is core here: see section 3.10). Unless this section starts by acknowledging this limitation, it will alienate those who feel vulnerable, and make them believe that cost-benefit is a codeword for trampling on and ignoring their rights and interests. I am not sure if the brief dive into maths helps, or will alienate some readers. Finally, in a different vein, fundamental issues in Aggregation also surfaced in the Stern review and subsequent debates, most notably involving Dasgupta's critique around consistency in equity weighting (eg. Dasgupta 2007). Note that Dasgupta concluded that with high levels of inequality aversion and uncertainty 'no optimum policy exists .. consumption discount rates cannot be defined and social cost-benefit analysis of projects becomes meaningless.'	The chapter has been reorganized in response to this comment and others like it, to make the limitations more explicit.
16932	3					I don't understand the purpose of the section on "The Paretian Approach" in this section. In some circumstances (e.g. many of those pertaining to 1st Domain processes) Pareto improvements are possible. The dilemmas of aggregation are then avoided because one set is Pareto superior to another. This is essentially the economic terminology for the broader principles of First Domain effects. Since this chapter is about clarifying ecnomic principles, it might be useful to clarify the economic processes that correspond to First, Second and Third Domain (eg. see Figure 2.3 in Grubb, Hourcade and Neuhoff, Chapter 2). However, the whole point is that the three domains are not substitutes, but complementary. Domain 1 / Pareto improvements are not alternates to cost-benefit, but simply reflect different dimensions of the element; consequently, I am not sure how they fit logically in this section. (Grubb, Hourcade and Neuhoff, Planetary Economics: the Three Domains of Sustainable Energy Develpoment, Chapter 2 (submitted, and sent to IPCC Secretriat), Figure 2.3 Three Economic Processes)	Noted.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
9016	3					This section discusses issues of aggregation among individuals and across time, a discussion that is neither new nor made relevant to the question of climate change in the section. It talks about the issue of proper discount rates but does not reflect that discount rates could differ among individuals and countries not only due to tastes but also due to differences in incomes, wealth, and level of development. It devotes some space to th relationshio between market rates of interest to the discount rates but must recognize the fact that ethical judgements and considerations of equity must play a decisive role in any setting any weighting between current and future generations. It would also be useful and more accurate if the discussion in this section could recognize Ramsey's original own deep doubts about the mechanics of aggregating across generations and relatively weighting their marginal utiliites.	No action; we have considered the point but feel is not valid. Discounting aspects are explicitly treateds in section 3.6
3609	3					Connection to climate change mitigation issues too loose and abstract because lacking concrete examples in the text. Please add more application examples!	A few more examples have been added. But the theoretical underpinnings of practice are inevitably abstract.
7362	3					This discussion adds little to the analysis and is unncessary.	No action; others attach importance to the Paretian approach.
4635	3					Section 3.6 makes the case forcefully that “there is no consensus on the pure discount rate”. Economists who work in the area of benefit-cost analysis hardly need to be told this fact. However, they and non-economist policy-makers could use help. Can the section be summarized beyond “use a rate between 1.4% and 7%” or “many analysts suggest a rate of around 2%”? While it would be easy to repeat the benefit-cost analysis at different discount rates, and many of us have done this, someone at some point has to come up with a specific rate. This is also true if one tries backing in to the analysis by calculating the discount rate at which two projects would return the same net benefit.	No action; the report should recognize disagreement. Please go to specific authors for specific numbers (our table 3.1). Cannot create a consensus that does not exist.
13000	3					Discounting is one of the most important issues in climate ethics and economics. Unfortunately, the treatment here is much too brief (e.g., see the second assessment report), and appears to take almost no account of the ethical questions and objections surrounding discounting (see, e.g., chapter 8 of Gardiner, A Perfect Moral Storm). I would recommend an expansion and a particular focus on the ethical concerns.	No action; space limited.
18596	3					3.6 discusses discounting and discount rates – but to what extent is this really relevant? Isn’t the problem that some alternatives (or sorts of behaviour) are unacceptable from an “ethical” perspective to at least some individuals? What are we trying to discount? The balance between consumption or investments or how to distribute something that is ultimately restricted over time? Is discounting a relevant way to handle fundamental choices in society?	No action; NPV is the standard tool. This section tried to elicit the ethical element behind this concept, with applications to the distant future.
3610	3					Connection to climate change mitigation issues too loose and abstract because lacking concrete examples in the text. Please add more application examples!	Need to discuss use of concrete examples throughout chapter
13007	3					I'm surprised that there is no mention here (or elsewhere in the chapter) of the claim in the literature that there is a strong overlapping consensus at least on the claim that the richer, more developed countries should take the lead and accept heavier initial burdens (e.g., Shue 1999, Singer 2002, Gardiner 2004, 2011). Even if one disagrees, it seems relevant to discuss this alleged consensus.	No action; no change implied, adequately addressed (see lines 31-32 on page 32)
8490	3					It may be helpful to place this section earlier in AR5	Will refer to TSU, not sure we agree

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
18736	3					This section heavily focuses on economic approaches to the assessment/evaluation of policies and institutions. While the overview of criteria appears balanced as far as the contribution of mainstream economics is concerned (e.g. in terms of challenges faced and approaches used), it is extremely narrow in disciplinary focus and fails to incorporate the valuable (and, in the real world, highly relevant) contributions of other disciplines. One example is law, which is the means by which policies become operational in most cases and, as a discipline, by definition deals with interactions between sets of rules, principles and rights and duties. Accordingly, interactions between policies can only be fully understood when their potential legal conflicts with existing or future procedural and substantive rules are also factored in, as these can either result in the inapplicability or only partial applicability of the policy, or significantly hamper its implementation (or result in other consequences, such as litigation or liability for damages/compensation). By the same token, the success or failure of policies is often strongly affected by how well these harmonize with the existing legal framework, and how conducive that framework is to their effective implementation. For instance, procedural or institutional rules (which body has what power to play which role in the operationalization of a policy) can be decisive for the real-life application of a theoretically superior policy. Unfortunately, there has been very little jurisprudential scholarship specifically on evaluation of climate change policies, and hence it is difficult to pinpoint seminal research (see, e.g., Hollo, Erkki et al. (eds), Climate Change and the Law, Dordrecht: Springer, 2012); rather, it is necessary to understand the legal system in its entirety (and conversely grasp related scholarship very broadly) to fully capture the role of this discipline in evaluating climate policies. The same would apply to other disciplines that can contribute to the assessment of policies, such as e.g. behavioral psychology and its study of the behavioural factors that motivate or hamper change in human behavior e.g. to reduce emissions. Also, A brief acknowledgment of the epistemological challenges of the main criterion (environmental effectiveness: how to establish causality in complex physical and socioeconomic systems? How to define the environmental outcome that serves as the benchmark of effectiveness when mitigation policies typically pursue so many different and not always compatible environmental and other (social, economic, innovation etc.) objectives? Etc.) and the inevitable contingency, i.e. proneness to value judgments of all other criteria would seem helpful here, as it is barely discussed in ch. 3. Social science and humanities literature has begun looking at the limitations of the criteria developed in neo-classical economics, but is still scarce. See Mehling, Michael (2002): “Betwixt Scylla and Charybdis? Effectiveness in International Environmental Law.” 13 Finnish Yearbook of International Law 129-182; Erkki J. Hollo, Kari Kuusiniemi, Eriika Melkas and Michael Mehling (2002), “Legal Aspects of Climate Change: Instrument Choice and the Kyoto Mechanisms,” in Understanding the Global System: The Finnish Perspective, edited by Jukka Kayhkö and Linda Talve, pp. 177-182. Turku: FIGARE, 2002	Noted to be considered in revising

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
9005	3					This section constitutes the nub of the fundamental weakness of the Chapter 3. The main line of reasoning of the section is correct that the "major differences between developing and developed countries' conditions and circumstances lead to differences in suitability and performance of policy instruments" (p. 38, lines 24-25). This should have been the touchstone for the policy discussions in the chapter since by nature climate change is a inter-state, and more accurately a global North-South, policy issue. There is only one reference in the whole section and this presents a stark contrast with the other sections which have numerous, overlapping citations. There exist many references that could have been referred to, just to cite two examples consider the following: (2009b). United Nations World Economic and Social Survey 2009: Promoting Development, Saving the Planet. Sales No. E.09.II.C.1.; and United Nations (2010a). World Economic and Social Survey 2010: Retooling Global Development. Sales No. E.10.II.C.1. The bibliography of these publications point to a vast policy evaluation literature pointedly ignored in this chapter. In many of these alternative uncited analyses, price mechanisms are seen to be either less effective or unacceptably inequitable. The text in this section gives an example of this in: "the use of certain market mechanisms, such as carbon trading schemes, may not be suitable or effective, or require significant efforts for creating the institutional prerequisites" (page 38, lines 36-38).	Will be addressed in SOD
11010	3					key point is that there are tradeoffs among the criteria by which policies may be evaluated. Shaping policies to make them politically acceptable within a given institutional setting makes them less efficient. Also, policy makers' knowledge is imperfect. Note 23 accurately observes that political factors have often been more important than economic ones. But the draft has almost nothing to say about what those factors are. In fact institutions and the uneven distribution of power within societies results in very uneven weights in the welfare of groups within a society. Whether the selectorate is broad or narrow with respect to the ruling coalition on the one hand and the population as a whole on the other is likely to profoundly affect policy choice. Further, policy instruments differ in the "political visibility" of costs and benefits. Compared to Pigouvian taxes, command and control regulations offer less easily perceived costs and more easily perceived benefits. At least in countries with broad rationally ignorant selectorates there is a bias toward the choice of less economically efficient command and control.	Good point; we took this into account in revising section. See new sentences in 3.9.1.4.
4500	3					It would seem appropriate in this section to cite the critique(s) of conventional integrated assessment models, such as Ackerman et al. (2009) which already is listed in the bibliography. There is by no means a consensus that existing integrated assessment models accomplish the objectives listed in this section.	We now refer to this paper in this paragraph.
17913	3					The explanation of co-benefits are inconsistent with agreements made in Wellington implying that LAs also use the term denoting climate benefits (and costs) from policies targeted at other policy objectives. The explanation additonally omits the possibility that climate policies often have an impact on pollution abatement costs and move the intersection points of marginal abatement costs and marginal social damages of pollution - thereby potentially yielding net gains for society. According to Pitcher (2000, p. 131), this is due to the fact that "policies to control greenhouse gas emissions have joint products; they also end up reducing emissions of other gases, or have impacts that are germane to other areas of concern…it is no longer possible to assign unique costs to the various outputs". Please take into account the definition and conceptual issues discussed with the Co-Chairs and the TSU prior to LAM3. Hugh Pitcher (2000) Extending Integrated Climate Assessment Models to Include Ancillary Benefits: Problems and Prospects. In OECD, "Ancillary Benefits and Costs of Greenhouse Gas Mitigation". Proceedings of an IPCC Co-sponsored Workshop, Washington D.C., USA.	We revise explanation of co-benefits, in a whole new section.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
17914	3					From the last short paragraph of the sub-section, it does not become clear whether the term co-benefit extends to these "other national objectives" (line 14). For chapters 4 through 12 and 15, these other objectives play an important part in the co-benefit/co-cost discussions. Please liaise with the relevant chapters in the cross-cutting meeting to determine a viable labor division and synthesis of results with respect to the co-benefits/co-cost assessment across chapters.	We now refer to the new longer section on co-benefits
15361	3					This section agrees with me on the prior comment, but sweeps all the prior issues about the Pareto principle under the rug.	No action; no change implied
15363	3					This section is nice, points out how choice of an ethical system can be self-serving. Once it is possible to show that a particular ethical system leads to a specific distribution of wealth among parties, then those who gain from such an outcome have every reason to advocate that particular system. Therefore, a systematic comparison of ethical arguments to outcomes for parties making those arguments would be very enlightening, especially if combined with an analysis of whether those parties reveal their adherence to the same ethical arguments in their other dealings and decisions. For example, suppose some parties advocate an ethic that implies that a class, of which they are a member, should pay compensation to another class. Do those parties now provide a higher percentage of their GDP as aid to the class deserving compensation as part of climate policy?	No action; no change implied, confirming
15364	3					The discussion on prescriptive policies versus market-based policies in this section needs to be applied in each of the policy chapters (e.g. chapters 13-16).	No action; needs addressing in chapters 13-16
15365	3					This is weak; many examples of modeling of cap and trade with regulatory measures show that the prescriptive measures move more costly actions down the supply curve and push out less costly, so that the same emissions are achieved at higher cost. This clearly applies to CES, RPS, CAFÉ, and LCFS. See: Jan Imhof. “Subsidies, Standards and Energy Efficiency”. The Energy Journal. Vol. 32 (Special Issue 1). October 2011.	Will be addressed in SOD
15366	3					This is weak; many examples of modeling of cap and trade with regulatory measures show that the prescriptive measures move more costly actions down the supply curve and push out less costly, so that the same emissions are achieved at higher cost. This clearly applies to CES, RPS, CAFÉ, and LCFS. See: Jan Imhof. “Subsidies, Standards and Energy Efficiency”. The Energy Journal. Vol. 32 (Special Issue 1). October 2011.	No action; duplicate
15368	3					This overlaps with international and regional chapters – though much clearer, it needs to bring in perspective on on-the-ground adaptation, how institutions shape economic outcomes of policies, and realism in assessment of aid and possibility of delivering on the ground improvements without harm.	No action; Chapter 3 deals with concepts, and Ch 13, 15 (for instance) deal with evaluative aspects as such.
15372	3					This needs to start with Acemoglu, Shirk, etc to discuss how Limited Access Order policies are designed to maintain the rulers in power in a limited selectorate by distributing patronage – climate becomes another example. And even in more advanced economies the same holds – see Lane and Montgomery, Weingast on nuclear power, Cohen and Noll, etc. See: Daron Acemoglu, “Why not a political Coase theorem?” Journal of Comparative Economics. Shirk, Susan L. China: Fragile Superpower. New York: Oxford University Press, 2007. Lane, Lee L. and Montgomery, David, Political Institutions and Greenhouse Gas Controls (November 5, 2008). Reg-Markets Center Related Publication No. 08-09. "Congressional Influence over Policymaking: The Case of the FTC" (Barry Weingast, Randall L. Calvert, and Mark J. Moran), in Mathew D. McCubbins and Terry Sullivan (eds.), Congress: Structure and Policy (Cambridge University Press, 1987), Ch. 19. Linda R. Cohen, and Roger G. Noll (With Jeffrey S. Banks, Susan A. Edelman, and William M. Pegram). The Technology Pork Barrel. Washington, D.C.: The Brookings Institution, 1991.	No action. We feel that this political discourse would take us too far afield from climate policy, especially in a short section of a chapter that cannot cover all such considerations.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
15373	3					This section provides a clear statement of the efficiency criteria normally applied in economic studies. I do not think it does as good a job of stating distributional criteria criteria. The ethics section makes it clear that distributional criteria embody ethical judgments, that they are not self-evident, and that different ethical systems would support different criteria. Thus any simple summary of distributional criteria is likely to be oversimplify.	Good point. We now clarify that the point of measuring distributional effects is then to insert them into a SWF. We added a parag that refers back to SWF in section 3.4.5
15374	3					The treatment of co-benefits is generally good. However, it leaves out the critical qualification that a comprehensive C-B is required to estimate co-benefits properly, and that if optimal controls are put on each of the sources of co-benefits, by the envelope theorem the co-benefit terms disappear from the first-order conditions. Thus the degree of co-benefits depends on the sign and magnitude of the deviation from optimality in controlling other externalities and the assumption that optimality cannot be achieved. If optimality can be achieved for all externalities, then the only significance of co-benefits is that the objective function in cost-benefit analysis is not separable, and the optimal value for all externalities must be solved for simultaneously.	We now refer to the new longer section on co-benefits in SOD.
9336	3					the chapter attempts to cover several aspects of the literature on ethics and economics but then ends abruptly; it does not provide the linkages which are important to policy makers: for example, a mix of policy instruments is indicated but when is it preferable to use legal instruments as compared to economic instruments? also, the quantitative CB approach is privileged, sometimes at the cost of repitition (pointed out later in a specific content. In particular, a discussion on deliberative approaches could be added. a last section to bring the pieces in the discussion to a logical end with choices for decision makers under different situations could be added.	Noted; will be addressed in SOD. More examples to be included in SOD.
17292	3					This is an innovative, timely and important contribution to the Fifth Assessment Report and IPCC assessment as a whole. The executive summary is well written and internally consistent. The chapter as a whole is in better shape than several other First Order Drafts.	Thank you for your comments.
16623	3					Try shortening to about half its current length.	Noted; we will make the best effort to shorten the length of the chapter as we can.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
8787	3	0				The apparent ignorance of the authors of some of the earliest and still most salient literature on ethics and climate change (Jamieson D (1992) 'Ethics, public policy, and global warming', Science, Technology and Human Values, 17(2), 139-53 - Also in Light A and Rolston III H (2003) Environmental Ethics: An Anthology, London: Blackwell and reprinted in Jamieson D (2003) Morality's Progress. Oxford: Oxford University Press) and more recent literature (e.g. Garvey J (2008) The Ethics of Climate Change: Right and Wrong in a Warming World, London: Continuum, Gardiner's work referred to in Chapter 4 of the WGIII AR5 FOD) is shall we say surprising. Jamieson (1992) is all the more salient since Charlesworth M & Okereke C (2010, Policy responses to rapid climate change: An epistemological critique of dominant approaches, Global Environ. Change, 20:121-129, doi:10.1016/j.gloenvcha.2009.09.001) demonstrates the epistemological assumptions of economistic approaches to climate change are false - we cannot robustly predict costs to be used in CBA. That the ethics of utilitarianism is given prominence is not surprising, though disappointing given Jamieson (1992). That only deontological forms of ethics are the only others given any prominence (with the partial exception of Buen Vivir and GNH) is again unsurprising; however, it is unforgiveable given Jamieson (1992). It is all the more unfortunate as evidence is available that the utilitarian ethics that underpins conventional economics is the principle ethical starting point of only a minority of the global population - albeit the most influential proportion. In summary economic approaches to climate changes are irrational and undemocratic. I have completed a currently unpublished book manuscript that directly addresses making climate and sustainable development policy in the light of inability to predict the Earth System with a virtue epistemology and ethics approach being a central response. Evidence of the democratic distribution of ethical assumptions and discussion of the application of virtue to sustainable development issues include, http://www.earthcharterinaction.org/invent/images/uploads/echarter_english.pdf, Palmer M and Finlay V (2003, n.b. page xi, Faith in conservation: New approaches to religions and the environment, Washington DC: The World Bank, http://go.worldbank.org/3L9IDQNFO0 or http://www.arcworld.org/books_resources.asp. Accessed 9 May 2011); Connelly J (2006) 'The virtue of environmental citizenship' in Dobson A and Bell D (Eds.) Environmental Citizenship, Cambridge, Mass.: MIT press; Sandler R and Cafaro P (Eds.) (2005) Environmental virtue ethics, Lanham, Md.: Rowman and Littlefield ; Inglehart R, Basanez M, Deiz-Medrano J, Halman L & Luijkx R (2004) (eds.) Human Beliefs and Values: A Cross-Cultural Sourcebook based on the 1999-2002 values Surveys, Mexico City: Siglo XXI; and to an extent BBC World Service polls http://www.bbc.co.uk/pressoffice/pressreleases/stories/2007/11_november/05/climate.shtml, http://www.bbc.co.uk/pressoffice/pressreleases/stories/2009/12_december/07/poll.shtml and http://www.bbc.co.uk/pressoffice/pressreleases/stories/2010/01_january/17/poll.shtml.	Will consider these references
8790	3	0				It is surprising that this chapter does not mention work such as that by Okereke (an author of Chapter 4) on justice and climate change.	Will consider this reference
8793	3	0				The coverage of the literature that the authors choose to discuss is adequate, though limited by being framed by their assumptions being largely restricted to consequential and deontological ethics and predictive epistemology.	No action. We feel that the text adequately addresses this issue.
12239	3	0				General comment: There seems to be some inconsistancy on the level of detailes between the different sections. Making the text more consistent in respect to these aspects will make the text easier to read and the information easier to grasp.	Noted; smoothing out the choppiness among the various section is a goal for SOD
12240	3	0				General comment: Some of the information might be redundant, and can be removed, e.g.line 1 - 2 on page 14, and line 18-19 on page 41.	No action - Line references do not appear correct

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
12241	3	0				General comment: The complecity is varying substantially between sections. It seems like the different authors in this chapter had completely different readers in mind. F.ex. The reader who needs the specification: "A policy is more cost-effective if it achieves a given pollution abatement at lower cost." (page 41 line 18-19) will find it hard to understand section 3.10.3 or 3.10.5.	Noted; smoothing out the choppiness among the various section is a goal for SOD
12242	3	0				General comment: This chapter is a bit too detailed. If the text were restricted to explain the main conclusions and dilemmas under each headline it will be easier to read and the main points under each headline will come across a lot clearer.	No action. Our goal is to assess the literature; detail is inevitable.
12243	3	0				General comment: Some of the sub-subsections have introductions of the kind: "This subsection summarizeses..." (e.g. 3.10.4 and 3.11.1), while others don't. We'd recommend that this type of introduction is restricted to sections(3.X) and not used on sub-subsections.	Good point; will try to address use of introductions to sections in revision.
4919	3	0				One general conceptual problem related to the analysis of the ethical aspects is that the impacts of the expected worse future climate conditions (for next generations or for some regions) are considered as a possible basis e.g. for compensatory duties etc. It is admitted that it is not easy to define what is the wrong (worse) climate and what is the basis to which the future well being (worse off) could be compared, however, another critical problem associated with climate change is identified (according also to the former IPCC ARs and the UNFCCC as well) with the rate/speed of the change because of the limited ability to adapt to it (i.e. the problem of the "time frame").	No action; good point but not clear what action is being requested.
10689	3	0				Some parts of the chapters are written more like a review and not as an assessment. I suggest that the authors put more emphasis on the assessment aspects.	Noted; good point which we will keep in mind in our revision. This is a framing chapter however, which makes the distinction more muddled.
10714	3	0				I'm not sure if chapter 3 is the best place, but somewhere in WGIII the various alternatives for design of multi-gas policies (as embedded in the UNFCCC) should be discussed; i.e. whether a gas-by-gas approach, a basket approach (like in the Kyoto Protocol) or a multi-basket approach is chosen. There are some papers in the literature on this. (see brief disussion of this - and references - in section 8.7.1.5 of WGI).	No action - Chapter 3 is not the best place for this issue to be addressed
10715	3	0				Section 3.10.3 on metrics could be better integrated in the chapter with stronger links to applications in the chapter (and probably also in other parts of the report).	The section is already too long; but will try to link it better
12998	3	0				The second half of the chapter (from 3.6 onwards) seems disconnected from the first half, especially in that the ethical aspects seem to be displaced by the narrowly economic. Also, more could be done so that the first two chapters anticipate the first half of this chapter. Indeed, there is some question about why chapter 3 does not come earlier, given that value claims are already being made in chapter 2.	Will work to smooth things out in SOD. We agree that our chapter might appropriately go before the current Ch 2 but that is a decision for the IPCC. However, ethics and economics are two somewhat separate issues addressed in the chapter. There is no intention to fully integrate them. Such a goal would be too ambitious.
13008	3	0				I'm surprised by the relative lack of discussion of some normative perspectives, such as human rights and the capabilities approach.	We cover the rights of nature. This chapter is not intented to be prescriptive.
8820	3	0				This is a clearly written chapter that provides an overview of social, economic, and ethical concepts relevant for assessing climate change impacts and policies. Most of the comments provided below reflect my own experience in the decision sciences and what I perceive to be a general tendency in the chapter to overly rely on the insights and prescriptions of economics, to the extent that important insights from other social sciences are at times neglected.	Thank you for your comment.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
16927	3	0				This chapter has an almost impossible task. Unlike most others, which are focused on topics specifically related to climate and energy, or the literature mostly of recent years (eg. Chapter 2), the chapter 3 outline appears in effect to be asking to interpret Millennia of thought on social, economic and ethical concepts, as they might pertain to climate change. This is an awesome task. The authors have my sympathies. Unfortunately the chapter in its current form does not even get close. The present draft seems to suffer from a partisan emphasis, a lack of awareness of numerous key debates and perspectives, and a fatal lack of intellectual integration. Because of the central importance of the issues, this is sad because it represents a huge missed opportunity. Shedding objective clarity on these issues could be tremendously helpful, and help the governmental audience to understand some of the most fundamental obstacles to global cooperation, and thereby help to overcome them. Unfortunately, in its current form the chapter risks doing the opposite, and may risk undermining the entire AR5 (WG3) report in the process. The last time the IPCC formally attempted to address such broad, cross-cutting and sensitive issues of ethics, valuation etc was in the Second Assessment Report. The resulting controversy almost destroyed the institution. Some governments, led by India, threatened to walk out, and ended up rewriting the PSM and demanding changes in the underlying chapter on 'cost-benefit' in ways to which the Authors of that chapter formally objected. In end, it should be noted, it was the authors that subsequently seemed to shift their position (without overtly admitting it), when they later clarified what they had stumbled over and concluded that economics could not be expected to come up with a global 'cost of damages' answer (Fankhauser, Tol and Pearce, 1997). The Third Assessment report did discuss a number of the principles to try and clarify at least what went so wrong, and I would strongly suggest that this chapter starts from the points reached out in the TAR (the Technical Summary seems to contain a useful road into this).. The present draft shows no awareness of this history and little better understanding of the issues. This, combined with the partisan coverage, lack of awareness of key debates, and a lack of intellectual integration, at present could place the AR5 in similar difficulties. It must be addressed. Though I am aware of this historical knowledge, my own research expertise is not really aligned with the scope of the chapter. Having spent ten years at the UK's leading economics faculty, to some extent I must share the bias towards western economic thought that this chapter displays. A colleague of mine (Sonia Klinsky) who did her PhD at UBC on the topic of climate and justice has submitted detailed comments on the content of this chapter, which seem to me compelling. Consequently I confine my specific comments to two main areas: section 3.5 on aggregation of costs and benefits (the topic on which the Second Assessment blew up); and 3.10 on metrics of costs and benefits. However I offer the following broad cross-cutting thoughts for the authors to consider. (1) There can be genuinely incommensurate ways of assessing a problem, when moral frameworks clash. A classic example in philosophy (I may have details wrong) is if three children are playing and one finds a musical instrument. They may have completing claims to ownership: one found it first; one may be able to play it, and thus gain most value from it; the third may recognise it as something his father lost the previous year, and hence claims family rights. There is no "objective" right answer. A decision may be reached through negotiation (which could include, for example, sharing). The outcome of such negotiation may indeed reveal preferences includin	Noted; we are sensitive to the value of a statistical life issue, which was a problem for some in the SAR. Integration with Chapters 2 and 4 is nice but logistically difficult.
4257	3	0				This chapter doesn't seem to consider health co-benefits explicitly-- in fact health as a topic sems to be absent	No action; health is not the focus of this chapter.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
8143	3	0				This is an extensive chapter that is well-written and covers a lot of material on topics related to procedural and distributive justice, social welfare functions, cost benefit analysis (CBA), time and discounting as well as technological change. The challenge is to integrate these concepts so the reader sees how they are connected. One way to do this is construct some illustrative examples related to mitigation and/or adaptation (e.g. carbon policy, investment in energy efficiency measures) that will enable you to: • Link concepts of distributive justice and the construction of a social welfare function more closely • Tie CBA more closely with discounting over time • Show how technological change relates to the above conceptual and methodological issues • Highlight concepts of behavioral economics that should be considered in designing and evaluating different policy instruments In our FOD Chap. 2 we provide a set of examples in the Introduction (Sect. 2.1) that we weave into our discussion at various points of the chapter. Feel free to use any of these examples or variations on them if that would be helpful in this regard. We then introduce System 1 and System 2 behavior that forms the basis for Kahneman's book Thinking, Fast and Slow and illustrate how it impact on Perceptions and Behavioral Responses to Risk and Uncertainty (Sect. 2.2) and Tools for improving decisions related to uncertainty and risk in climate change (Sect. 2.3). Some of this material may be relevant to linking concepts of behavioral economics and descriptive models of choice in your chapter. I elaborate on these points in the Specific Comments.	Good suggestion. In fact, such examples (as are in Ch 2) are intended for the SOD.
11530	3	0				This is an extensive chapter that is well-written and covers a lot of material on topics related to procedural and distributive justice, social welfare functions, cost benefit analysis (CBA), time and discounting as well as technological change. In our FOD Chap. 2 (attached) we introduce System 1 and System 2 behavior that forms the basis for Kahneman's book Thinking, Fast and Slow and illustrate how it impact on Perceptions and Behavioral Responses to Risk and Uncertainty (Sect. 2.2) and Tools for improving decisions related to uncertainty and risk in climate change (Sect. 2.3). Some of this material may be relevant to linking concepts of behavioral economics and descriptive models of choice in your chapter. □	No action; duplicate

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
11014	3	0				The current draft of Chapter 3 fails to take advantage of the new institutional economics (NIE) and positive political theory (PPT) literatures. These fields of study discuss many central issues of economic development and the links between political institutions, economic institutions, and technological change. The relationships studied are important potential influences that require consideration in the new IPCC scenario building process. Further, the NIE and PPT literatures throw much light on the question raised in Chapter 3 about how national institutional matrices will influence the institutional and political feasibility of using various mitigation policies and policy tools. A revision of Chapter 3 appears to be the most logical place in AR 5 to remedy this neglect. The NIE literature suggests that societies' institutions differ greatly in the degree to which they permit entry into political and economic activity. These differences are stable over long periods of time. They appear to affect per capita GDP growth rates as well as the rate of technological change. There are multiple implications for future patterns of economic development as well as for the feasibility of both mitigation and adaptation. Institutions constrain policy choice and policy performance. These constraints are likely to be important to both mitigation and adaptation. A few of the well-established links between national institutional matrices and political behavior include the following. 1) The timing of major contests for political power has a major effect on policy makers' discount rates. 2) The range of organizations for which government provides third-party contract enforcement affects the prevalence of collective action problems. 3) Large N selectorates reinforce rational ignorance, while small N selectorates bias the political process in favor of providing private rather than public goods. 4) Institutional matrices often create "veto gates" at which actors are empowered to block implementation of proposed policies; societies differ greatly in the number and distribution of such veto gates. 5) Institutional change, like technological change but through different mechanisms, tends to be path dependent. Accounting for these and other institutional constraints suggests a new criterion for policy choice which is quite relevant to climate policy analysis. "…[A]n extant mode of organization for which no superior feasible alternative can be described and implemented with expected net gains is presumed to be efficient. (Williamson, Oliver E. "The New Institutional Economics: Taking Stock, Looking Ahead." Journal of Economic Literature Vol. XXXVIII, September 2000: 595–613) Consideration of institutional factors also largely explains the lack of progress toward mitigation noted in Chapter 15 of the AR 4 Working Group 3 report.	No action. These are good points, however, the chapter cannot cover all of economics.
17150	3	0				In general, good, sound and balanced chapter - with plausible justification for treatment of ethical issues in AR5 in general.	Thank you for your comments.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
17151	3	0				Fact-Value dichotomy (e.g., the possibility of value-free economics) assumed throughout ch 3, even though much literature heavily criticizes this view (Putnam, H.: The Collapse of the Fact/Value Dichotomy and Other Essays. Cambridge Mass.: Harvard University Press, 2002. Or: Douglas, H.: Science, policy, and the value-free ideal. Pittsburgh: Univ. of Pittsburgh Press, 2009. Or: Caldwell, Bruce J.: Beyond Positivism. Economic Methodology in the Twentieth Century. Revised Edition. London: Routledge, 1994). Example: p. 8, l. 12: "Positive questions are essentially value-neutral". ------ As a result of this misconception, ch 3 fails in addressing (at least mentioning) implicit (opaque) value judgments in economic, technological and other studies related to mitigation options - as another highly important task of ethics in climate policy. Already on the level of data selection for empirical analysis, even more on the level of parameter choice in Integrated Assessment Models, and concerning the scope of studies in general (what do they not take into account? Why?). Literature (for example): Beckerman, Wilfred: Economics as applied ethics. Value judgements in welfare economics. Houndmills, Basingstoke: Palgrave Macmillan, 2011. Or: Ackerman, Frank/DeCanio, Stephen J./Howarth Richard B./Sheeran Kristen: Limitations of integrated assessment models of climate change. Climatic Change, 95 2009, 297-315.	No action; this is a mistaken comment. There is no suggestion that economics is value-free.
17152	3	0				Unclear throughout ch. 3: Relationship between ethics and economics. It should be made clearer that the normative presuppositions and objectives of (welfare) economics (such as "efficiency") are obviously "values" (in your terminology). These values should be (explicitly) framed and reflected in ETHICAL terms therefore. They cannot be derived from mere economic concepts. In other words: the role of economic arguments (e.g., compared with the role of social, ecological, and other arguments) in the evaluation of climate policy options can only be determined by ETHICAL considerations. Moreover, ethical considerations (should) already integrate all relevant knowledge from economics, etc. Thus, one cannot play off ethical arguments against economic ones, as sometimes suggested by the authors and by many economists (e.g., when assuming a trade-off between ethics and efficiency, even though efficiency is one normative target among others - and not even a very important one). These issues remain unclear/ unresolved in the Executive Summary (no explanation of relationship between welfare economic approach and ethical considerations of justice and values), in the Introduction (for instance, p. 8, l. 14f: "using economics and ethics to answer questions of what should be done"), etc. Chapter 3.7 discusses parts of the ethics-economics relationship, but with a much too narrow focus: ethics is reduced to equity (and assumed as being independent from efficiency, which is disputed among economists).	Noted. We think we are fairly clear on the normative aspects of economics. We will try to integrate the sections better in the SOD
17153	3	0				Missing in ch 3: mentioning that climate political (or WG III AR5) PROBLEM FRAMING is always value-laden (what counts as "problem", etc) and therefore implying lots of ethical questions.	No action; comment unclear
17154	3	0				Missing in ch 3: ethics of dealing with risks and uncertainties. Even though risks and uncertainties are discussed in other chapters of WG III AR5, it should at least be mentioned in ch 3 (which is about ETHICS!) that these aspects are among the biggest ethical challenges related to climate policy-making.	No action; this issue is more appropriate for chapter 2
6952	3	0				The title of the chapter is 'Social, Economic, and Ethical Concepts and Methods'. However, only 10 or so pages of the 76 pages of content address ethical and moral issues, whereas economics gets around 46 pages. This imbalance does not reflect the many developments in the philosophical literature on CC of the last 10 years. Key debates that are not surveyed (or mentioned) relate to: the attribution of moral responsibility for CC to individual or collective agents (or both, or none); moral justifications for the precautionary principle; the ethics of geoengineering; the role and nature of political representation.	No action; we feel this issue is adequately addressed

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
18586	3	0				Many questions confronting society with regard to climate change are issues of economics and ethics, rather than natural science. This chapter (intends to) frame the ethical and economics dimesions of climate change. True but what is the conclusion. To draw science-like conclusions on ethics?	No action. Comment unclear; no page or section reference numbers
18587	3	0				What ought to be done is the subject matter of ethics.	No action. Comment unclear; no page or section reference numbers
18588	3	0				True, but what are the implications? To try to sort outsome sort of science-like conclusions on ethics? The intention is unclear and the delivery is vague.	No action. Comment unclear; no page or section reference numbers
18589	3	0				CBA is mentioned and discounting is discussed but as a reader it is hard to read out conclusions/learnings. It would be interesting to add case studies and clarify the consequences of different levels of discounting.	No action. Comment unclear; no page or section reference numbers
18590	3	0				A long discussion on different principles for responsibility ends in nothing (more than it is hard) and than turns into a discussion on legality/legal principles. Will this really be helpful?	No action. Comment unclear; no page or section reference numbers
18591	3	0				Legal rights? For whom? In what sort of context? Now the discussion turns into civil or common law principles.	No action. Comment unclear; no page or section reference numbers
18592	3	0				“Cosmopolitan democracy”	No action. Comment unclear; no page or section reference numbers
18593	3	0				What is the long reasoning aiming at? Reaching “divine justice” or action on mitigation?	No action. Comment unclear; no page or section reference numbers
18594	3	0				Coming up next is a division of values into non-human and human.	No action. Comment unclear; no page or section reference numbers
18595	3	0				And so “wellbeing” is analyzed/discussed	No action. Comment unclear; no page or section reference numbers
18597	3	0				Policy instruments are understood as the key means or operational forms for achieving policy objectives and policy targets. Policy instruments are often understood to have the effect of guiding social considerations targeted by public policy, providing incentives or disincentives and information.	No action. Comment unclear; no page or section reference numbers
18598	3	0				A long discussion end without any sort of firm conclusions.	No action. Comment unclear; no page or section reference numbers
18599	3	0				The subject is now turned into an overview of policy instruments (no direct link). Should it be coupled to later chapters? (13 – 15?)	No action. Comment unclear; no page or section reference numbers
18602	3	0				The problem is not the analysis/the overview (restrictions and flaws was clearly declared from the very beginning) but how the material has been used sometimes.	No action. Comment unclear; no page or section reference numbers
18603	3	0				MACCs and wedges are also discussed in other chapters (at least in chapter 6 and 7) but neither the basic descriptions nor the conclusions seem to be aligned.	No action. This chapter set up the framework; other chapters will be consistent in the SOD
18607	3	0				The chapter goes through a lot of interesting material but where does that lead us?	No action; comment unclear
18608	3	0				Is an ethical response to climate change an issue that can be answered by science. If so, when? The intention goes, in my eyes, far beyond what can be delivered. Ethical conclusions will be drawn by societies/communities in the form a “value systems/paradigms”. They can be informed by science but hardly formed.	No action. Comment unclear; no page or section reference numbers

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
8998	3	0				The Chapter takes the tone of an undergraduate textbook to review what its authors consider to the relevant literature on social, economic, and ethical concepts and methods. Large word counts are taken up by mostly wel known approaches that are irrelevant to policy making at the international level on issues related to climate change. The self-stated claim of the chapter is "not to attempt to answer normative questions" (line 17 page 8). The authors intend the chapter to be a "resource for policymakers and researchers who are trying to solve normative questions. In that sense, the chapter is policy-relevant but not policy-prescriptive". The chapter as written privileges market-based policies that are effective mainly in developed countries. Because of this bias, much of the literature it surveys is irrelevant to its self-stated intention. The incomplete treatment of literatures creates an imbalance in favor of normative approaches that work best in to developed country contexts which have operating - though perhaps poorly regulated - private markets. There is a need to recognize more of the development-oriented literature.	Noted. We recognize the importance of developing country perspectives. We are also trying to move away from textbook treatments.
9013	3	0				There is no coverage of the recent and growing literature on carbon budgets in the the chapter. If there is anything that is new since AR4, it is this literature and should be incorporated in the chapter	No action. We don't think this is necessary in framing chapter. Perhaps more appropriate for one of the policy chapters.
9017	3	0				Drawing on the literature, it is important for the survey of the intellectual property literature to balance the coverage between the conditions under which monopoly property assignment of intellectual property has a positive and the conditions under which this approach has a negative impact on innovation and dissemination of technologies. When the current developed countries were poor, the enforceable intellectual property protection regime was mainly at the national level. The survey should reflect the variety of aspects under which developing countries are at a disadvantage in undertaking climate change technological transformation.	Noted; will be addressed in SOD. CA provided paragraph addressing this comment. However, there is little evidence that IPR has been a barrier to diffusion of climate-friendly technologies.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
12777	3	0				Within this chapter justice issues are looked at from different points of view as well as as an interdisciplinary perspective. Therefor it is often not easy to follow which perspective is taken. To support the reader you may like to consider restructuring the chapter (e.g. according to the dimensions of justice; see Executive Summary, line 26, or bundling of ideas acording the differentiation: Intragenerational justice: egalitatrian principle, CBDR, Need ..., Intergenerational justice and historical responsibility...or: present the main idea, then introduce the single building blocks, ways of measuring the blocks...). You may also like to check who the readers are (Are readers able to follow, can the reader make links between the statement. You may also like to consider which statements can be grouped because they depend on the same main presuppositions (e.g. with regard to uncertainty or dicount rate). You may find some ideas for structuring the arguments in Chap. 4 and in Chap. 3 on page 46. Actually, at this stage, it does not make much sense to give comments on the chapter as there is far too much confusion. Especially this concerns 3.1, 3.2, 3.3 (3.3.6 and 3.3.7.1 are much better organised, in section 3.3.7.2 and 3.3.7.3 the main point is the missing references), 3.4.3, 3.4.4. (3.4.5 is easier to follow, however, at some places it might also be worthwile to think about the placement of the arguments, to be more focused on the climate problem), 3.4.6 (provide better links to climate problem and referecnces, consider shortening), 3.5.1 (reconsider the structure of arguments and for whom it is written, ll 20-28 are fine, however the link to justice considerations is missing, (3.5.2 is easy to follow, 3.5.3. also easy to follow, however, focus should be on the main point), 3.6, 3.7. (link to welfare theory is missing), 3.8 (high potential for shortening, e.g. 3.8.2.1 to 3.8.2.3, statements could be better linked with the other sections of chapter 3), 3.9.1.2, (3.10 and 3.11 easier to follow, still, some arguments should be reconsidered and more focused, the sections can also be shortened, (3.12. is fine). You may also like to consider whether it might make sense to strictly differentiate between the normative concepts of justice and the individual perceptions of what is fair and may like to use the term fairness for the subjective perspective (with regard to the climate context see e.g. Ittner, H., Ohl, C. (2012), International negotiations on climate change: Integrating justice psychology and economics – a way out of the normative blind alley? In: Kals, E., Maes, J. (Hrsg.), Justice and Conflicts: Theoretical and Empirical Contributions. Springer, Berlin, Heidelberg, ISBN 978-3-642-19034-6, 269-282).	No action; section titles were given
7898	3	0				Although in chapter 3 many aspects are discussed that are also dealt within chapter one, links and cross references are missing and should be included.	No action; Ch 1 is an overview so it is inevitable that there will be overlap.
7899	3	0				Some sub-chapters are rather isolated. For instance, the key claims of section 3.3. are largely ignored by the other sub-sections. Also, several points that are made in sections 3.11 and 3.12 challenge assumptions the analysis in sections 3.5, 3.7, and 3.10 are based on. Cross references should be included and/or discussions moved to other sections. To provide just one example: in section 3.12 it is argued that technological inovation should be modelled endogenously; studies projecting costs of mitigation that are cited earlier assume innovation to occur exogenously. This difference should be noted and discussed.	No action; we note these particular differences in the text.
7900	3	0				With the exception of section 3.3 the chapter omitts almost all contributions from the field of climate ethics. This is surprising given the titel of the chapter. Another surprise is that although there have been hardly any contributions to climate ethics from a utilitarian or welfarist perspective so far (notable exceptions are Broome 1992, 2012 and Lumer 2002), most of chapter 3 deals with these approaches while duty and/or justice based perspectives are ignored (see references mentioned in the following, in particular in comments 60 and 82). Two salient concepts, C&C (Meyer 2000) and GDR (Baer et al. 2009), are mentioned only once and are discussed nowhere.	Will be addressed in SOD

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
7901	3	0				Important issues that are discussed in the literature (sometimes at great length) are not dealt with, such as: wich stabilization levels can be justified on ethical grounds, mitigation duties of high emitting countries, responsibilities to finance adaptation / provide compensation to those (most) vulnerable to climate change, and duties of individual persons.	No action; these are policy-prescriptive issues, inappropriate for IPCC
16622	3	0				Chapter 3 does a great job in gathering the main social, economic, and ethical concepts and methods surrounding climate change. However, many sections the chapter fail to provide insight on how the concepts and methods included in the chapter or a particular section can be used in practical policy-making. Addressing this issue would make the chapter more engaging and will provide a common thread to the ideas included in the chapter. I would like to point out that by and large most of the relevant information is already included in the the chapter. That said, the organization of the chapter would greatly benefit from a short introduction to each section that highlights the relevance of the material in the section for the reader—how this material can be useful in policy making—and examples of how the concepts and methods in the chapter have been implemented in the literature (and maybe in policy if proved successful). For the section introductions, in many cases there is a paragraph in the section does serves this purpose but it is located at the end of the section (or subsection). I recommend that the authors move these paragraphs much earlier in the section. Also, in some sections, many applied examples are already mentioned in the references but need to be highlighted. I recommend that the authors do so. In other sections, the theory is presented with some practical objection that make it difficult implement. In these cases, I recommend that the authors point out the kind of advances in the theory that would make the policy implementable or workarounds/simplifications that have already been applied but may have some shortcomings.	A very good point which we will try to address in the SOD.
3139	3	0				There is some overlap between this chapter and chapter 2 (e.g. on CBA and other approaches to aggregating costs and benefits) that could help both chapter streamline if resolved. This chapter has a very different feel from WG1 and WG2 chapters and much of WG3. there is little/no discussion of "what's happened since AR4." I don't have a problem with that, but perhaps it is useful to have some text at the outset indicating that the kinds of issues addressed here haven't in past had much attention in IPCC. Thus most of this is "new."	No action. There hasn't been an economics and ethics chapter since at least AR2. Furthermore this is a framing chapter. Thus it seems inappropriate to just focus on what has happened since AR4.
5120	3	0				The chapter title includes "social', but the exec summary truncates to economics and ethics; suggest including some high-level framing in terms of social interactions (decisions and behaviours) and obligations (living together despite differing values). This framing would help to draw a tighter bead on the "legal" aspects of the chapter (justice and rights)	No action. Although social is in the title, the outline is focused on economics and ethics, which is reflected in the text. We do address social issues, particularly in section 3.11.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
5126	3	0				I regret that I have now run out of time for more detailed commentary on the chapter; however, I have read it through carefully and while I conpletely understand the material and respect the selection of sources, I remain unclear about just what the chapter is meant to achieve. No doubt this is my failing and not the authors'. Nevertheless, the chapter appears quite fragmentary; there are certainly good overviews of relevant matters in economics and justice, but the connecting tissues are missing. Much of the content is quite abstract, and I cannot see it as aiding a decision maker any more than consulting a good text would. Given what is in place in the chapter, it seems to me that it needs to be reframed as an overview of the way economics think about policies to address climate change (including the implications from technology change) accompanied by a normative critique. The critique would draw on what tends to be missing or underemphasised in economic thinking, as well as what different policies imply under different considerations of ethics and justice.	Will be addressed in SOD. But we will not be able to refocus entire chapter to talk about the use of economics.
5127	3	0				I do not follow the order of the chapter. Why, for example, is aggregation of costs and benefits at section 3.5 and the metrics of costs and benefits at 3.10? The secion on technology change seems almost an afterthought.	Noted. The sections are not easy to organize logically. We have tried reordering them a number of times and there seems to be no easy solution. The IPCC gave us the section titles.
3612	3	0	0			Problem of Chapter 3 is that it partly lacks the connection to the concrete climate issues important in this report. Chapter 4 is indicated as too long as it now already surpassed the allocated number of pages. The description of different issues, such as equity and burden sharing (4.7.3.2) or the indicators or equity (4.7.4.1) are presented more suitable. It may be considered to integtrate these sections into Chapter 3 rather than deleting them in Chapter 4.	No action; Chapter 3 is already too long -- cant move sections from Chapter 4.
14310	3	1				In addition to cost benefit analysis, other approaches deserve a much broader discussion. Cost effectiveness and the rich literature on the "tolerable windows approach" (guard rail approach) or the safe landing approach should be discussed as well. For the guard-rail approach please refer to "T. Bruckner, K. Zickfeld: Emissions Corridors for Reducing the Risk of a Collapse of the Atlantic Thermohaline Circulation, in: Mitigation and Adaptation Strategies for Global Change 14, 61-83, 2008" and the references therein.	No action. This might be more appropriate in the policy chapters.
3371	3	1				It is a little unclear what the "social" in the city refers to, and where it appears in the text.	No action; we address social issues in section 3.11.
4918	3	1				Ch.3 Social, Economic, and Ethical Concepts and Methods	No action; comment unclear
4932	3	1				MISPRINTS etc.	No action; comment unclear
16667	3	1				This is supposed to be a chapter about ethical concepts. A great deal of ethics concerns individual behavior and motivation. None of that literature is reviewed in this chapter. It should at least be acknowledged that this is a very partial review of the terrain and a great deal of the usual concerns of ethics are being left out. For two papes that bring questions of individual responsiblity to bear on climate change see Dale Jamieson, “When Utilitarians Should be Virtue Theorists,”Utilitas 19,2 (June, 2007):160-183; and “It’s Not My Fault: Global Warming and Individual Moral Obligation” in Perspectives on Climate Change: Science, Economics, Politics, Ethics, ed. Walter Sinnott-Armstrong and Richard Howarth (Elsevier, 2005)	Will be addressed in SOD
16676	3	1				The 10 pages that should be dropped should NOT be the ethics since that is what is new and addressed only chs 3 and 4. Some of the economics is discussed elsewhere in the report and that is the natural place to look for cuts. If I had to cut I guess I would look to 3.8, 3.92, and 3.10	Thank you for your comment.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
9381	3	1		111		The whole chapter is very close to welfare-ethics and to utilitarianism. Yet, it lacks a more comprehensive portray of the ethics of climate change. This would include: ethics of risk, human rights approaches, cosmopolitan interpretations of justice, interpersonal and international obligations which result from that normative framework, Aristotelian approaches which include theories of human flourishing, basic-needs-accounts, theories of ecological justice and approaches to environmental ethics which address the value of natural goods to non-human entities, finally theories which discuss climate as a public good. Moerover, the general scope of ethics is not so much the issue of how exactly burdens and profits shall be outweighed against each other (even though this is of course an important question) and how human well-being can be quantified, but rather: Which claims can be justified both regarding the chance to a decent life for all persons (Aristotelian, Kantian approaches) and regarding a vulnerable nature which suffers from climate-change (environmental ethics).	Will be addressed in SOD
15216	3	1				There are some repeated topics and descriptions. It needs to be restructure the chapter.	Noted; will be addressed in SOD
13013	3	1		111		In my view this chapter is poorly structured and very uneven, not only in the clarity of the writing, but also in the degree to which the material is general or specialized, and accessible to lay readers or rather technical. I suspect that this is because it is an amalgam of work by different authors. One way of improving the structure of the chapter might be to bring section 3.7.3, which now begins on p.31, up to the front, to serve as an introduction to the major ethical issues. It is much clearer, less technical, and more relevant than much of the material that now comes before it. Although this would help, I'm not sure that the problem of the chapter's structure and uneven writing and uneven level of detail in the different sections is remediable unless someone does a total rewrite.	Will be addressed in SOD
9190	3	1				it should be noted the costs presented here is assuming that the governmental intervention is cost effective - often it is not the case. As such these are minimum cost estimate.	No action; comment unclear
11566	3	1		77		General comment: the chapter is called "Social, economic, and ethical concepts and methods". The chapter focuses nonetheless primarily on economic concepts. Little is said about the social and socio-economic concepts and about the difference between economic and other methods. Furthermore, the chapter does not take into account new movements within the academic literature on rational choice, social dilemma theory, public goods and institutional theory. Especially, it is extremely problematic that the chapter does not discuss the work of Elinor Ostrom. Furthermore, it would be more beneficial if the chapter is presented more in the style with chapter 4 that is dilemma and problem driven. The Ostrom approach would be consistent with the conclusions of chapter 4 and 13.	No action. Ostrom is discussed (see p40) and section 3.11.3
6471	3	1	1	77	30	The entire chapger is ethically problematic from the standpoint of acknowledging that according to some ethical theoriies, conflcts between values are resolved not through efficiency arguments but by acknowledging duties, responsibillities, and obligations entailed by deontological arguments including but not limited to human rights based theories. The chapter may remain as wrritten but to solve this problem but it must strongly and expressly acknowledge that rights based theories and other ontological aruments hold that welfare maximation goals may not ignore or jsutify failure to abide by ethcial obligatio This could be remedied by a stement in the preamble thatsays Some ethicists hold that deonotologiasl theoires on which rights to be protected from climate change harms are based may not be modified by utilitarian or welfarte maximizzation techniiues that undermine clear obligations to prevent harm to human life and ecological systems on which life depends. Ethicsists hold that conflicts beteen utilitarian or cosequentiist climate change policy guidence should be reolved on the basis of the strength of ethical aruments not on consequentalist grounds.	Will be addressed in SOD

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
9385	3	10		14		The debate on justice is very much focused on the future-generation-perspective and the past-generation-perspective (inter-generational justice). Even though this is important, cosmopolitan frameworks also argue for obligations to help persons in need independently of causation of harm; this means that the temporal dimension is not the most important perspective.	No action; we disagree. We believe this issue is adequately covered in the sections 3.3.3 and 3.3.5 discuss issues of intra-generational justice and the section on promoting good
10701	3	10	1	10	7	The Ad hoc group for the modelling and assessment of contributions of climate change (MATCH) produced several papers that are relevant for the issues discussed here; see http://www.match-info.net/	Will consider these references; may include grey literature
11551	3	10	1			"Developing countries will suffer disproportionally more from climate change". Yes but it depends on the response capacity of the country, cf. Chapter 4.	Will be addressed in SOD
3920	3	10	1	10	1	This 'suffer proportionately more' sentence seems to be conflict with the discussion latter in the chapter on the non-identity problem.	Agreed. We change 'people in developing countries' to 'developing countries' and delete the parenthesis. However, it should be noted that we have this "conflict" only if we do not solve the NIP e.g. by introducing a non-comparative notion of harm that reflects a threshold of well-being.
9338	3	10	11	10	14	wWho is morally responsible for achieving justice? important question?Who is morally responsible for achieving justice? important question? Any positions in the literature on this? Could be highlighted	No action; we disagree as we ask the question in the next lines and discuss it in 3.3.1 and 3.3.2
4481	3	10	18	10	24	This paragraph is confused. In what sense can past generations "owe" something to the present generation? The past is history, and persons who lived in the past have no capacity to act in the world any longer. Also, it is unduly narrow to cite only Rawls in the context. The nature of our obligations to future generations runs through all the major religious traditions, including the natural law tradition. Rawls represents only a tiny sliver of the literature on this vast subject.	No action; we disagree. In the text we say: "justice considerations apply to intergenerational relations if". Justice considerations to not apply to the relations between past and currently living people. But it makes sense to say that currently living people stand under imperfect duties towards past people. Also, it makes sense to claim that past people violated their duties of justice vis-a-vis currently living people. And see response to comment 7907
2111	3	10	18	10	19	Awkward sentence.	Agreed. Deleted sentence
7907	3	10	19			Intergenretional justice is not central in rawls Theroy of Justice. Early contributers to the debate about obligatrions to future generations are Parfit (1984), the contributions in Sikora/Barry (1996, reissued), Partridge (1990), and Howarth (1992).	Noted. In our assessment Rawls's discussion of the Savings Principle is an important contribution. At the same time we agree and added references.
2110	3	10	2	10	3	Ungrammatical sentence.	Agreed. Change to 'There is'.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
3923	3	10	25	11	13	Some of these intergenerational propositions seem to be proposing not only that abortion is ethically unacceptable but that a failure by each and every woman to conceive to the biological maximum is violating a fundamental human right. Where in this chapter do the authors guide policy makers as to how to use their own values to make decisions about such ethical matters? Another problem is that the reference in line 32 to 'minima duties of justice to future generations' in a global emissions cap context ignores all the non-emissions benefits each generation passes on to future generations in material and non-material forms. Again, on current projections future generations will be more wealthy than today's generation, so what is being proposed appear to be a transfer from the poor to the rich. Again it would be helpful if the executive summary included its guidance as to ethical answers to these questions.	No action; disagree with comment. The duties are "minimal" as fulfilling them is required for protecting future people against violations
4921	3	10	26			I understand that the focus (based on cited literature sources) is on future temperature as a key factor determining the quality of life, however, in context of (anthropogenic) climate change not only the present emissions affect the life conditions of future generations, but also the changes concerning the sources of these emissions, primarily the rate of utilization of the (finite) fossil fuels (rate of depletion of these resources), the longer-term "benefits" from these activities (e.g. modern or less modern energy or transport related technologies infrastructures; there is a hint to the latter, i.e. better technologies in line 40). As concerns the fossil fuel resources, some also raise the idea of setting caps on the (rate of) use of these resources.	No action; comment unclear
13002	3	10	27	10	32	One might mention that the classic source for these kinds of arguments is Henry Shue's papers from the 1990s.	Agreed, added references
7908	3	10	28	10	34	Here, the perspectives seems to shift from a rights-based approach to an approach resting on the good life. Please clarify if our observation is correct and if so, provide reasons for this shift.	Agreed, changed accordingly.
17159	3	10	3	10	8	Putting so much emphasis on the asymmetry obviously implies a highly disputed value judgment, namely that historical emissions are a huge moral problem. This view is rejected by many authors (and by some governments). Therefore, for being non-policy-prescriptive, the authors should put less emphasis on this asymmetry. By the way: this is again a perfect example for how value-laden problem framing always is...	No action. Disagree that the asymmetry as stated commits us to the view that "historical emissions are a huge moral problem". In 3.3.4 the assessment of the normative relevance of historical emissions is highly qualified.
3921	3	10	3	10	3	Is there an ethical basis for the idea that those who are descendants of those who inflicted, unknowingly, a latent harm on future generations in one particular respect, while creating a middle class out of the poor more generally, now have particularly responsibility to those who might have no realistic hope of escaping poverty except by piggy-backing on the know-how and access to resources and trading opportunities of the 'West'? Remember that the chapter aims to help policy makers determine such ethical matters, using their own values. It would be useful if the executive summary contained its guidance in such respects.	No action; the issue is covered in 3.3.4
6958	3	10	34	10	34	The reference to Rawls here is, I think, misleading: it gives the impression that he explicitly addresses the question of a global cap on emissions.	Agreed! Reference was moved
9339	3	10	38	10	40	why is this sentence within parentnesis?	Agreed, parenthesis deleted
4480	3	10	4	10	4	There is no basis for asserting that the developed countries face "potentially modest damages from future climate change." The statement might be true if the effects of climate change were known to be only minor, but the developed countries are also vulnerable to potential global catastrophes brought on by climate change.	Agreed. Will change 'potentially' to 'relatively'
6957	3	10	4	10	34	insert 'relatively' before 'modest'	Agreed.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
11009	3	10	41		43	The draft at this point intimates the larger question. What valid basis exists for setting ethical principles by which to judge the behavior of nations and generations in a radically diverse world?	No action; we disagree: The comment poses a good question, but it is unrelated to this paragraph and cannot be addressed here
3922	3	10	8	10	14	Again it would be useful if the executive summary provided the chapter's answers to the question of what ethics has to offer in answering these questions.	No action; we disagree as this would be too difficult to do. However in 3.7 we indicate the relevance of the discussions
14839	3	10	17			This section is confusingly presented, with an underemphasis and under-elaboratino of the main point and overemphasis on counter-points that maybe academically interesting but teribly pertinent or widely held. The first one and a half paras could be elaborated, and the remainder addressed more concisely or eliminated.	Will be addressed in SOD
15637	3	10	6			"historical and causal responsibility" - not clear how these two terms are being distinguished. If causal refers to current (as opposed to historical) emissions, then the statement is no longer correct.	Agreed. Deleted "historical and"
11196	3	10	17			suggest add s people (the last word of the heading), ie rights of future peoples	No action; we disagree as we do mean individual people
15638	3	10	38		40	The view that future generations may well be better off should contain some proviso about the possibility of catastrophic climate change.	We disagree: No need to do this. When we mention one possibility, we don't have to mention every possibility
7311	3	104	1	104	2	"Plourde CG (1972) A model of waste accumulation and disposal " reference. This reference is VERY old. Please consult ref's in Chap 10.AR4.WGIII. and subsequent literature on drivers for waste generation and disposal practices, including the "de-coupling" of waste generation from the primary drivers of population and prosperity, esp. in highly developed countries with high levels of financial support for recycling and waste minimization activities.	No action. Section 3.12.4 p. 72 - text just refers to this as an example of early work on environmental externalities that have since been addressed more recently (2012 example given)
8145	3	11				You might want to illustrate the different views of distributive justice by extending the emissions permit example to show how they would be allocated depending on what system one uses.	No action; difficult to address given our length constraints
6959	3	11	1	11	4	A further response to a rights-based conception of intergenerational justice is to push a (Kantian) obligation based view: present people have duties to future people, but it need not follow that future people have rights against present people. In my view, Onora O'Neill offers the best defence of this approach in 'Towards Justice and Virtue: A Constructive Account of Pratical Reasoning' (Cambridge: Cambridge University Press, 1996).	Agreed. We added a sentence to the first paragrah of this sub-section.
12132	3	11	1	11	13	This does a good job of summarizing some key issues quickly. One that it leaves out, however, is the claim of 'will theorists' that future people cannot have rights because they cannot exercise them. See, for example, Hillel Steiner (1983) 'The Rights of Future Generations', in Energy and the Future, ed. Douglas MacLean and Peter G. Brown. Totowa, NJ: Rowman and Littlefield, pp. 151-65.	Agreed. We added the reference.
16668	3	11	14			The usual cites for equal allocation of emissions permissions plus trading are Dale Jamieson, "Climate Change and Global Environmental Justice, " P. Edwards and C. Miller (eds.), Changing the Atmosphere: Expert Knowledge and Global Environmental Governance (Cambridge: The MIT Press, 2001): 287-307; and Peter Singer, One World, Yale University Press, 2002; both following Agrawala & Narain, Global Warming in an Unequal World	Agreed. We added references

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
4483	3	11	15	11	35	As noted above (in comment #10), this approach to "distributive justice" seems to suggest that "justice" is like dividing up a fixed pie. The real-world economy is not like that. It would be unjust in the extreme to coercively redistribte the goods and services produced in all the world's countries according to some abstract scheme. Production and distribution are inextricably linked, and the effort and talent (and capital) involved in production give the producers a prima facie claim to the fruits of that production. Furthermore, promoting the notion that "justice" is like dividing a pie will make it much more difficult to make progress on climate, because there can be no criteria for agreement if the negotiations take the form of purely redistributive conflicts. In short, ignoring production in discussions of distributive justice is an unwarranted abstraction from the actual functioning of the global and national economies, and violates the basic right of people to own what they produce.	Thank you for the comment. The subject matter here is not all goods that are relevant for well-being but the remaining permissible emission permits.
13003	3	11	15	11	19	The distributive concerns are not limited to the particular mode of implementation (i.e., a cap and trade permit scheme), but arise from any intervention (e.g., via taxation, standards, etc.).	Agreed. We changed the text accordingly
7911	3	11	15	11	35	There are many egalitarians that do not presuppose equality for the sake of equality but ascribe instrumental value to equality . Rather, there is a presumption in favor of equality. The presumption is not prone to the levelling down objection. Also, is prioritarism really the most common perspective? The defense of prioritarinism should be substantiated.	No action; disagree with comment. We don't understand the 'presumption in favour of equality'. We do not mean to defend a particular view.
13015	3	11	15	11	35	The quick survey of principles of intergenerational justice should at least mention classical utilitarianism, which seeks to maximize value irrespective of distribution but takes account of diminishing marginal utility, and therefore ends up being significantly more egalitarian than present distributions, or likely future distributions.	Agreed. We discuss utilitarianism later in the chapter and we put a reference in the text
11552	3	11	15	11	35	The discussion of equality should take into account the difference between absolute and relative equality. Richard Wilkinson & Kate Pickett “The Spirit Level: Why More Equal Societies Almost Always Do Better” (2009) shows that relative inequality within countries matter (in terms of health, etc.) more that absolute global inequality.	Disagree with comment. We don't see the relevance of the literature for the topics discussed.
4936	3	11	18			[Del] By distributing [tradable] emission permits .. ~ The possibility of trading is a different (additional) issue, at least irrelevant here.	Noted; we deleted "tradable"
9001	3	11	18			The use of the word "tradable" is specious and is not needed in the phrase "distributing tradable emission permits". It is the distribution of permits, whether these are tradable or not that are necessary to achieve a "globally just" distribution of emissions. Markets might not work; "we" might be smart enough to distribute the permits correctly without requiring the subsequent trading of permits. As a philosophical-ethical chapter, this an example of this chapter's heavy reliance on the a framework where markets - working via property rights (a category always created by social arrangement based justified on philosophical grounds) - to achieve social ends.	Agreed. We deleted "tradable". And see what we said on p. 11, line 43-44
3924	3	11	18	11	18	Who is 'we' - a policy elite? And if we are a policy elite what weight should we put on dissenting views?	Agreed. We changed the text accordingly
2113	3	11	20	11	20	Comma missing (after parantheses).	Agreed.
6961	3	11	21	11		Surely add a reference here to Rawls, as a prioritarian?	No action; disagree. This is controversial. However, we added a reference to Sen.
3925	3	11	22	11	22	Does a strictly egalitarian position require 'a fair go' (meaning some sort of equal opportunity to move from log cabin to president), or does it mean equality of outcome, (in the Gini coefficient sense that effort, skill and merit should go unrewarded)? The phrase 'equality is of intrinsic value' could be read in the second way.	No action; disagree. 'Equality of intrinsic value' is neutral between equalities of different things

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
3926	3	11	26	11	27	The proposition that we should promote wellbeing of X over Y does not explain why 'we' should not ignore X and instead promote the wellbeing of Z over X and Y, where Z is the least well-off in the world.	No action; disagree if the comment is meant as a criticism. 'We' always consider all possibly affected people
17702	3	11	31	11	35	The sufficitarian views should be mentioned on this chapter it is only briefly mentioned in this part. The suficitarian view combined with the Prioritarianism view can be of great importance.	No action; the combination of sufficientarianism and priroritarianism (below the threshold) is an interesting view, certainly worth exploring, but, would require far more detail (and space) than we have
12133	3	11	33	11	34	Prioritarianism is 'the most common perspective on distributional justice' among contemporary analytic academic philosophers. That seems to me an adequate justification for focusing on it—but it is only fair to note that worldwide, egalitarianism is surely more widespread among the general public	No action; it might be true that "egalitarianism is surely more widespread among the general public", but this text is meant to review and assess the state of art
9287	3	11	34	11	35	I am far from sure that the claim that prioritarianism is “the most common perspective on distributional justice” is correct. For example, the vast majority of economics literature using any social welfare function uses a straightforward utilitarian one. It is surprising that this section does not mention utilitarianism at all.	Agreed. We changed the text accordingly. Utilitarianism is being discussed in a another section of the chapter. We refer to the section in the same paragraph
13004	3	11	35			I'm surprised to hear that prioritarianism is the most common perspective.	Agreed. We changed the text accordingly.
13016	3	11	35	11	35	On what basis is it claimed that prioritarianism is the most common perspective for distributional justice? I know of no evidence for this claim, which strikes me as dubious.	Already addressed.
15641	3	11	36	12	2	It is not clear why prioritarianism is singled out as raising concerns about the background distribution of resources - in principle these could apply to any of the egalitarian positions outlined above. This paragraph could be enhanced by referring to some of Simon Caney's more recent work on the distinction between holistic and atomistic accounts of climate justice (eg Caney, S. 2009. Justice and the Distribution of Greenhouse Gas Emissions. Journal of Global Ethics 5 (2):125-46.)	No action; already addressed. For Caney see p. 12, lines 1-2, we replaced to the one suggested: 2009.
3927	3	11	36	12	2	This section ignores the problem that 'we' are not a benevolent government. In reality, the contemplated distributions will take place through political processes, meaning most likely that they will favour those with the greatest political clout. If the chapter aims to help policy makers with ethical issues, it needs to put them in the context of what is likely to happen when politicians actually move to put in place the proposed redistributional mechanisms. This further illustrates why a positive theory of state action is necessary.	No action; disagree. The literature reviewed in this section does not predict likely outcomes of the ongoing negotiations
4937	3	11	37			emission rights ~ as above, better to call it: emission permits (throughout this section)	Agreed. We replaced emission rights by emission permits
12134	3	11	41	11	42	The logic of why the worse off would benefit more from being able to sell an equal share of emissions (declining marginal utility?) needs to be specified, and an explanation needs to follow of why the first option is problematic.	Comment unclear.
9800	3	11	42	11	43	The currently highly unequal distribution of rights is crucial in the justice discussion. Whenever emission targets are set, two drawbacks have to be considered: 1. concerning intragenerational justice the status quo of living has to be considered, moreover a huge part of the emissions of developing countries is caused by products sold in the industrialized countries. 2. concerning intergenerational justice the legacy value has to be considered, i.e. the possibilities we leave for future generations. REFERENCE for legacy value	No action; in the text we consider these issues in the other subsections (issue 1 in 3.3.4, issue 2 in 3.3.2)

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
4922	3	11	43		46	To some extent, this is actually the case for an "inter-national" system, namely, the EU's ETS.	No action; this sub-section reviews the philosophical literature.
14840	3	11	48			Caney could just as well be interpretted to be arguing that it is questionable to insist that the prioritarian ideal is the preferred distribution when the distribution of only one good is being adjusted, it may well be the case that an even *greater* reallocation to the worse off is justified. Again, this section seems to provide undue emphasis to counter arguments that are not evidently of relevance to the climate context.	Agreed. We changed the text accordingly
2115	3	11	48	12	2	A brief explanation of why this claim is true might be helpful.	Will be addressed in SOD
7909	3	11	6	11	13	At this point, the future individual paradox (FIP) occurs for the first time and a way to circumvent it is suggested. However, later on the FIP is mentioned several times as a problem. More convincing would be to discuss the FIP in greater detail here and refer to this section later on. You should also note that Parfit himself has recently argued that the FIP does not nullify our duties towards future generations (2011).	Agreed. We improved the discussion and added the reference.
2112	3	11	7	11	13	I wonder if this discussion of the Non-Identity Problem is not too condensed to make sense to those unfamiliar with the Problem. I realize that space is very limited, but perhaps something can be done to explain the Problem more clearly. Alternatively, if there is no space for that, then perhaps the attempt to explain it should be given up. (However, given that the Problem crops up several times later in the chapter, perhaps the latter is actually not the way to go.)	Agreed. We improved the discussion
13014	3	11	7	11	13	This account of the non-identity problem would be incomprehensible or misleading for anyone not familiar with it. A better and clearer account is needed.	Agreed. We improved the discussion
6960	3	11	9	11	13	A different tack is to argue that we owe justice to future people not because of the particualr identities they will come to have (which generates the NI problem), but just in virtue of the fact that they will be people. Jeffery Reiman argues that this is a Rawlsian approach to the NI problem ('Being Fair to Future People', Philosophy and Public Affairs, Vol. 35, 2007, 69-92). I think he interprets Rawls correctly, and that this approach is also generated by the Kantian vision of intergenerational justice mentioned in the previous comment. In general, I think Kantian approaches are seriously under-represented in the chapters as a whole.	Agreed. We improved the discussion. The fourth response to the NIP (new text) reflects the idea the commentator refers to; we added the reference.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
7910	3	11				You write: "If an intergenerationally just global quota has been determined, and if there are going to be emission permits allocated under that quota, then the question of how emission permits ought to be distributed among the states (and, ultimately, the individuals) on this planet arises." This is certainly correct. However, the very important question what a just global quota could be is neither addressed in section 3.3 nor at any other point in chapter three. Given that many ethical contributions on how far current generations should lower GHG emissions (and hence, what "our" quota should be) exist (e.g. Gardiner 2004, 2011a, Ott et al. 2004, Page 2006, Caney 2010a, Ott/Baatz 2012) and that this is one of the most important questions concerning climate change, it should be explicitly addressed at greater lenght in chapter 3. In addition, questions about how to allocate emissions permits eventually depend on how much permits are available in the first place.	No change needed. In my understanding the text does address the question "what a just global quota could be" by discussing in 3.3.2 how considerations of justice can help to specify the "just global quota". Of course, I am happy to add references. I do not think that this section should assess normative theorists' specific suggestions of what the "just global quota" is since these suggestions have to rely on empirical claims, the assessment of the normative relevance of the imposition of risks of rights violations on future generations, and have to presuppose an understanding of how to weigh claims of currently living and future people ...
17158	3	11	14			You could add that there are also more complex ethical theories discussing distributive issues. There might be more than only one criterion for how to distribute wealth, etc. See for instance Kowarsch, M./Gösele, A.: Chapter 7: Triangle of Justice, in Edenhofer, O./Wallacher, J./Lotze-Campen, H./Reder, M./Knopf, B./Müller, J. (eds.): Climate Change, Justice and Sustainability: Linking Climate and Development Policy, Dordrecht: Springer 2012, pp. 73-90. They argue that three dimensions of justice are to be taken into account at the same time: basic needfulfilment, basic opportunities, fair procedures. Distributive questions can only be solved when applying all these criteria at the same time.	No action; disagree with comment
15639	3	11	18			Re "tradable" - in principle, a just distribution could be achieved without requiring that permits (or 'entitlements') be tradable. Being tradable seems to be more strictly a condition for efficiency rather than justice.	Agreed. We deleted tradable. And see what we said on p. 11, line 43-44
15640	3	11	20			It could be worth explaining that what all egalitarian views (whether direct or indirect) share is the idea of the equal worth or dignity of all human beings (see eg Sen (1980). Equality of what?). Otherwise it isn't clear in what sense indirectly egalitarian views are indeed egalitarian.	Comment unclear. The view referred to is controversial.
13265	3	11	36	12	2	there is the factual case, not explicit, that current emissions rights (considered as the per CO2 per capita emissions) are not fairly distributed and that any, even hypotetical, allocation of emission's rights should have to deal with this assimetry. It is considered to analyse this case in the report?	No action; already addressed
3320	3	112	29	112	31	I find the usage of "distributive justice" here odd. Distributive justice standardly concerns the partition of benefits or burdens, not whether justice is determined with respect to outcomes. Take human rights, for instance, which figure prominantly in climate ethics debates. They are neither procedural nor distributive in the traditional sense. They are deontological: concerned with specific results, namely, that rights are upheld, but are not concerned with distributing rights in any ordinary or traditional sense of partition being up to the judgment. Rights involve judgment in terms of applicability and balancing, but neither is distribution per se. So, I would strongly recommend revisiting this paragraph by making a different between procedural and *substantive* justice, including both distributive justice and human rights justice as species of substantive justice.	Will be considered further.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
3322	3	112		114		I find the absence of qualitative normative approaches such as capabilities theory or human rights troubling. The executive summary will provide the at-a-glance overview of normative frames for many policy makers and observers. That human capabilities or rights are not even mentioned is a serious oversight from the standpoint of considering climate ethics in a balanced way.	Will be addressed in SOD
3321	3	113	27	113	32	I find this paragraph vague to the point that I cannot evaluate what it is saying. Are the "instruments" *means* or *normative* guides? If the latter, then I find the assertion lacking credibility without much more said.	This will probably be de-emphasized in SOD, since it is the subject of later chapters in WGIII.
3323	3	115	1	115	10	Again, there is much more to climate justice and ethics than well-being and fairness. Questions of right are not primarily procedural and are not primarily concerned with maximizing or distributing well-being. Rather, rights are commonly thought of as the conditions of dignity, or the consequences of freedom (autonomy). When related to well-being, rights are concerned with the basic needs or conditions of agency of individuals. The absence of a discussion of rights or capabilities (which are not directly framed in terms of well-being, which is a matter of functioning not capability) makes this paragraph seriously misleading and concerns me that the entire chapter will have majorly misleading discussions of justice and ethics.	We can't say everything in one paragraph, and we can't deal with a prediction about what will happen later in the chapter.
3324	3	115	27	115	28	First, well-being and cultural values hardly exhaust the relevant human values at stake in climate justice or ethics. Autonomy or freedom, agency or capability (dignity) ought to figure centrally. None of these is reducible to well-being or considers itsself anything short of universal, i.e., not culturally limited. Second, "non-human values" is equivocal and perhaps non-sense. Perhaps you mean, "values concerning non-human life" or something of the sort? You aren't implying, I assume, that you will consider the values of -made by or held by- non-humans, if there be such values?	Noted; will be addressed in SOD
3326	3	116	14	116	14	"Non-human values" is confusing again. Also I would include mentioning "biotic integrity" alongisde "biodiversity." A wave of criticism of the term "biodiversity" is beginning to form and the result may be to blindside appeals to the term for a time until sufficient conceptual clarification is done. Biotic integrity does not share the exact same domain as biodiversity but handles many of the objects or situations I believe you have in mind, siuch as species extinction, wilderness, and so on.	The mention of biodiversity has been removed.
3325	3	116	4	116	12	Again, the absence of considerations of right or of capability seems a major oversight here. Both are neither compensatory nor always or ever distributive (capability is distributive, but in a way that is embeds quantiy within qualitative structures that are highly determinative of the shape of any possible distribution) -but could at best be used to justify appeals to either and to shape the way in which such appeals could possibly be discharged to the satisfaction of justice.	Capabilities are dealt with under wellbeing. The entire section on justice is about rights. This has been made more explicit.
3327	3	117	38	117	40	This is speculation and plays into techno-optimism. Moreover, it is normatively problematic. Unless we have strong, definite grounds which allow us to predict a rise in technological capacity which will offset climate burdens sufficiently to allow humans to improve well-being, then claiming it "might" be so is distraction or worse. Consider, it might be the case that if my daughter goes and climbs a cliff-face well above her current climbing ability that she will emerge victorious with improved skills. But I would be rash to speculate so in the absence of determinate and strong grounds that she will emerge victorious.	The author of this comment forgets that growth results from investment as well as technical progress. However, we will delete 'human', and try to make this clearer.
3328	3	117	ftnote 1	117	ftnote 1	Gardiner (2011) has the most sophisticated analysis of a *morally non-arbitrary* concept of a generation. I would cite it.	Agreed, I added a reference to Gardiner 2011
6962	3	12	1	12		Perhaps add a reference to Jonathan Wolff and Avner de-Shalit, 'Disadvantage' (Oxford: Oxford University Press, 2007) re. their pluralist account of disadvantage.	Thank you, reference added

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
9801	3	12	19	12	22	I would be very cautious using the argument that "people living today would not exist at today's level of prosperity had previously living people not engaged in the emission-generating activities as they did, and thus nobody is better or worse off owing to the emissions of previously living people." Politicians and business practionners might use this argument also for future generation to excuse their decisions today.	No action; we cannot omit an argument for fear of it being misused.
2202	3	12	19	12	22	Confusingly stated; not only would these people living today not exist at their present level of prosperity; they would not exist at all.	Agreed. Text was changed accordingly
7912	3	12	2	12	2	At the end of section 3.3.3 in remains unclear which distribution of permits is to be regarded as just. If you are not willing to make such assertions, you could at least clarify which distributions would definitely be unjust. For instance, on page 32 different principles are mentioned though some (most?) of them should not be considered accroding to the analysis in section 3.3.3 (e.g. the "sovereignty principle"). Please be more explicit at this point.	Is discussed in ch. 4 and further below in sec. 3.6
9290	3	12	20			As far as I can see the clause "at today's level of prosperity" is unnecessary (and therefore confusing). Isn't the point that owing to the non-identity problem, the people who in fact live today would not have lived at all in the case in question?	See above response to comment 2202
9291	3	12	21	12	22	"and thus" - this follows only if the auxiliary premise that nobody can be better or worse off existing than not existing is used. That premise is controversial (IIRC e.g. Arrhenius, Holtug, Rabinowicz, Bykvist all deny it).	No action; we are only describing an argument, not endorsing it. In addition, we disagree with the characterization of the various sources.
12528	3	12	22			Add after "people" -- "Shue (2009) provides a bounded view of these issues to develop a balanced framing for policy development." Henry Shue, 2009. SBSTA Technical Briefing: Historical Responsibility. http://unfccc.int/files/meetings/ad_hoc_working_groups/lca/application/pdf/1_shue_rev.pdf	Will consider this reference; there is a peer-reviewed article that would be better to refer to
4484	3	12	23	12	37	The claim is made that the arguments in this paragraph refute the arguments in the previous paragraph. This is only an assertion, however; there are arguments to be made on both sides of the "historical responsibility" question, and this paragraph by no means settles them.	This is not the claim. The first sentence says 'speak against', not 'refute'. We changed the wording. The claim is that there are two ways of taking into account historical emissions from the perspective of distributive justice that are not open to these objections.
13659	3	12	23	12	37	There is emphasis n the problems of assigning 'historical responsibility' in this section on account of 'lack of knowledge'. However, it can be seen that even if the year from which accounting is done is changed to 1970 (around which time, CO2 emissions were globally acknowledged to cause environmental damage), Annex-I countries bear responsibility for a majority of the emissions (in spite of knowledge of the problem). So historical responsibility can be argued to be current responsibility (Kanitkar et.al)	No action; we seem to agree or I do not understand the comment.
13425	3	12	23			Not clear what "do not speak against" means. May be clearer if it is changed to "From the perspective of distributive justice, however, these objections should not stand in the way of taking into account….." or something to that effect.	Agreed.
9340	3	12	27	12	29	Historical responsibility can still remain ;it is important to remember this and highlight that the three conditions mentioned earlier do not take away historical responsibility.	No action; we believe the text adequately reflects this

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
2116	3	12	27	12	28	I wasn't sure why taking emissions into account in this way is not (at least partly) open to the objections of the previous paragraph. Regarding the first objection, it might still be argued that at least until they reach adulthood, present people still cannot reasonably be expected to influence past people's action. And regarding the second objection, if past people are to be excused for ignorance of the consequences of their actions, then this seems to apply also to the *by-products* of their actions.	No change needed. Presently living people cannot influence past people's actions. From the perspective of distributive justice what counts are the benefits that people have realized and will realize from their own and past people's activities that have emissions as their side-effect. This is not a question of culpability.
13005	3	12	38			Tim Hayward and Steve Vanderheiden's papers on ecological space might deserve citation.	Agreed. We added references.
13414	3	12	38	12	42	Missing from this paragraph and from the chapter as a whole are references to significant recent work on concepts of equity in the context of climate change and climate justice, including the carbon budget approach linked to equitable sharing of atmospheric space (which has been dealt with by several writers, including in the BASIC experts report) and the greenhouse development rights framework (Baer et al, 2008).	Agreed. We added references
9524	3	12	4			Please, add words, 'idea of', in front of historical responsibility as it is under discusson in UNFCCC.	No action; disagree with comment
7359	3	12	4	12	4	"This is usually interpreted to imply that current and historic differences among countries should play a role in determining emission reduction obligations" - this does not state clearly enough that the "historic differences" are the historic differentiated contributions. It also could be useful to quote the entire Article 3(1) or at least its concluding sentence that: "Accordingly, the developed country Parties should take the lead in combating climate change and the adverse effects thereof." So it is not just emission reductions but also in the approach to "adverse effectts" so adaptation that developed countries have agreed to do more. A link to the Rio Declaration Pricinple of CBDR may also give readers a better understanding of the relevance and application of the principle.	Agreed, we made changes
9118	3	12	40	12	42	Heinonen & Junnila have deontrated with a case study of two Finnish cities that the impact of increased driving may be rather small due to multiple factors, but primarily to GHG emissions per VMT in a city structure being substantially higher than of those in less dense areas.	Thank you. Reviewing the literature on this issue does not belong in this.
4923	3	12	6		8	Actually the UNFCCC itself makes clear that interpretation in the preamb.: "Noting that the largest share of historical and current global emissions of greenhouse gases has originated in developed countries .. " and in para 3.1. "in accordance with their common but differentiated responsibilities and respective capabilities. Accordingly, the developed country Parties should take the lead .." Concerning the footnote, those commitments/obligations only for: developed countries (included in Annex II of the UNFCCC) ..	We made some changes in response to 7359 which address this comment, too.
9525	3	12	7	12	8	Please, replace here with the following, as this principle of 'common but differentiated commitments and responsibilities' remains the subject of interpretation and negotiation (Honkonen, 2009); some states insist developed countries should have mitigation obligation in proportion of their historical emissions but there is no common recognition how parties deal with their historical emissions under UNFCCC.	We made some changes in response to 7359 which address this comment, too.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
8248	3	12		14		The main focus of the authors remains to provide insights on potential complexities associated with allocations of emissions rights across regions (or agents) based on their differential historical emissions-activities. Comment: At this point, it might also be worthy to discuss about distributive and social and ethical aspects of emission allocation in a situation in which emissions in one country has gone down dramatically due to external circumstances (such as that in Russia) relative to the historical level (e.g. 1990). While the three principles of responsibility sharing are well discussed, are there some studies that estimate how different country responsibilities (e.g., developing and developed country) might alter if alternative measures are used. In other words are there estimates that can practically be applied to different countries as emission rights for the future?	Thank you. Reviewing the literature on this issue does not belong in this.
6963	3	12				I think this section could be cut without loss.	No action; sections are set by IPCC WGIII
15642	3	12				The emphasis in this and the subsequent section on "historical" responsibility over other kinds of responsibility is somewhat problematic. Some parties to negotiations would see references to historical responsibility as being synonymous with "full" historical responsibility (i.e. strict responsibility of developed countries for all past emissions). While this may be an overly restrictive view of what historical responsibility entails, it is nevertheless the case that there is an important distinction between (a) historical responsibility and (b) _causal_ responsibility for emissions (which may relate to past, present or future). 3.3.4 implies as much by saying that CBDR applies to both current and historic differences (line 7). However, later sections - in particular section 3.3.5 - sometimes blur this distinction. For example, the Polluter Pays Principle is not purely an instrument for assigning historical responsibility (indeed some theorists argue it is purely prospective), but it is certainly associated with causal responsibility.	Thank you. Agreed. We put emphasis on the distinction in 3.3.5
10951	3	12	1	12	42	Note the sensitivity of outcomes of a responsibility approach to choices made.Note also that a "forwardlooking" responsibility approach can get a very different outcome for fast-growing DCs. Confer: Rive, Torvanger, Fuglestvedt (2006), Climate agreements based on responsibility for global warming: Periodic updating, policy choices, and regional costs, Global Environmental Change, 16, 182-194.	Thank you. The article investigates the likely distributional implications of alternative ways of taking into account historical responsibility for DCs and over time. This is not the topic of the subsection.
13266	3	12	19	12	22	this third argument is complex. Not all people have been benefited from the emissions of previous generations. For the poorest in least developed countries, this argument do not apply. Maybe a threshold of living standard could be set to recognize who have been benefited and who have not.	No action; we are only describing an argument, not endorsing it. For the discussion of the argument, see below.
15644	3	12	19	12	22	Suggest removing further discussion of the non-identity problem here and below as it has been amply discussed above; some would argue that the prominence of this issue in academic debate is disproportionate to its relevance to policy. Removing this would contribute to shortening the chapter overall.	No action; no change needed. It is true that some have that view
16960	3	12	19	12	22	To further support my comment about not labouring the non-identity problem, here is a sample from a new book on climate change and intergenerational justice: 'Although it [the non-identity problem] presents a real philosophical puzzle about how some approaches to justice can conceptualise harm-avoidance principles with intergenerational scope, its dominant place in debates about intergenerational justice does no favours to philosophical contributions to such debates, and - in my opinion - has become a serious hindrance to progress in the face of real and pressing political problems.' (McKinnon, C. 2012. Climate Change and Future Justice: Precaution, Compensation, and Triage. Abingdon, UK: Routledge., pp.41-42)	No action; see response to the previous comment 15644 and see comment 7909

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
15643	3	12	8			CBDR applies not only to "emission reduction obligations" but also to adaptation obligations as well. Alternatively change line 4 to "Historical responsibility with respect to mitigation"	We made some changes in response to 7359 which address this comment, too.
8822	3	13				this section on intra-generational justice reads too much like a tutorial; I'd make major cuts here in the text and rely on cited references if the reader wants additional details.	Disagree with comment. We believe the text provides a survey as is required.
16669	3	13	1			A book-length treatment of the compensation issue is Catriona Mackinnon, Climate Change and Future Justice: Precaution, Compensation and Triage (London: Routledge), 2011.	Will consider this reference; may be grey literature
4485	3	13	13	13	18	All three "principles" implicitly assume that the individuals involved are members of a community with well-defined rights and obligations to each other. This is not the reality; we live in nation-states, and it is unrealistic and counterproductive to pretend that all individuals can be viewed as members of a single global collective. We may have some responsibility for the actions of our own governments, and we may feel a sense of empathy or solidarity with citizens of other nations, but no national government is going to treat all people in the world as if they were their own citizens. This can be illustrated by considering what would constitute "justice" if some government or governments) behave in an aggressively genocidal manner (e.g., Nazi Germany). Would it be "just" to allocate emissions rights to such a government or governments? The point is that the justice argument cannot be separated from existing political realities. This comment applies to the philosophical underpinning of the entire chapter.	No action; disagree with comment; do not see why this is an objection to the principles. They are about what rights and responsibilities there should be.
10423	3	13	13	13	20	Expand this section	No action; we believe the text adequately reflects this
3607	3	13	13	13	18	Please add "Disregarding transaction costs, according to the Coase-Theorem (Coase, 1960), compensatory payments lead to the same optimal emission reduction, regardless the polluter or the injured party pays". Cite: R. H. Coase (1960). The Problem of Social Cost. Journal of Law and Economics 3, 1–44.	Disagree with comment. None of the three schemes asks the injured party to pay.
3928	3	13	13	13	20	Ronald Coase has made the point that, in the absence of well-defined property rights, the attribution of cause from proximity effects is arbitrary. From the victim's point of view the polluter is the cause. From the polluter's point of view it is instead the victim's proximity (or even their existence) that is the cause. (Coase's actual famous example, was the free range farmer's cattle feeding on the cropper's crops and the question of who should pay for the fence.) However, once the property right is established, the conflict can be sorted. (Perhaps the free range farmer buys the croppers land, or perhaps the free range farmer becomes a cropper?) Who knows what the outcome will be? Coase won the Nobel for this insight and it is surely important enough for the chapter to acknowledge.	Disagree with comment. See previous response.
17703	3	13	19	13	28	Why suddenly from a neutral level of analysis, the text jumps to an individual lever with he or she. I does not seem right; probably just referring to "agents" will fit better.	Thanks. We replaced "he or she" by agent. On the victim-side we kept he or she.
2203	3	13	2	13	2	They not only suffer disproportionately; many of them die. See first comment.	Thank you. In parantheses we added "or will die prematurely owing to these consequences".
9119	3	13	21	13	21	To my knowledge the intake fractions are much higher in cities (e.g. Apte, J.; Bombrun, E.; Marshall, J.; Nazaroff, W. (2012): Global Intraurban Intake Fractions for Primary Air Pollutants from Vehicles and Other Distributed Sources, Environmental Science and Technology, 46, 3415-3423.).	No action; comment unclear
9341	3	13	24	13	24	;	No action; no comment

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
4924	3	13	24		28	The PPP is universally accepted (as a principle "in principle") according to the 1992 Rio Principle 16, but indeed it is not universally applied. As a matter of fact, the PPP is part of the UNFCCC: in form of financial and technological assistance by the Annex-II developed countries to the developing countries. Indirectly the BPP is also there when the (better) "respected capabilities" of the developed countries are also considered as an argument for their duties for compensatory measures (i.e. assisting developing countries)..	Thanks you. See above, response to comment 15645.
13415	3	13	29	13	46	This treatment of arguments on why the polluter pays principle cannot be applied (or can be applied in only a very limited way) in relation to compensation is much too one sided. At least equal space should be given to the opposite argument. This counter-argument has been made by others such as Gardiner 2010 and Shue (1992 and other articles) -- for example their point that if people in poorer countries are deprived of their share of an important resource needed for their very survival, then ignorance is not an acceptable reason for not assisting or compensating especially since the rich nations' overuse of the resource denies the poor of extricating themselves from the problems the rich created.	Thank you. This is a misunderstanding. The review in this section agrees with the point made in the comment, see end of sec. 3.3.5 (and compare 3.3.4): "Principles of distributive justice can also be applied (at least to some degree) to the distribution of duties to pay for adaptation measures to those who suffer from climate damages. It has been suggested that these duties should be allocated mainly to the highly industrialized and rich countries according to their ability-to-pay that reflects their causal role in bringing about the problem in question (Shue, 1999; Caney, 2010; Gardiner, 2011). Secondly, currently living people stand under intergenerational duties of justice with respect to climate justice if they can be said to know not only about the seriously harmful consequences of their emission-generating activities for future people, but also about effective measures that they can implement at reasonable costs to themselves to protect future people's basic rights (see, e.g.,Birnbacher, 2009; Gardiner, 2011). Failing to fulfil their duties vis-à-vis future people would then constitute harmful wrongdoing."
2117	3	13	31	13	31	Aren't the rights to receive compensation also potentially relevant to *future* people?	Agreed. We changed to "for currently living and future people"
2118	3	13	33	13	35	A reference to sec. 3.3.6., where this question is discussed in the legal context, might be useful.	Agreed. We added cross-reference
11553	3	13	33			The discussion of duties bearers might have should take into account the difference between the duty to avoid (local) environmental pollution and (global) climate change. In the former case people cannot claim ignorance.	No action; we're only dealing with climate change, so this is irrelevant.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
9120	3	13	38	13	44	Potentially with fine particulate matter also. And the direction of GHG's is not clear due to the wealth and proximity effects.	No action; comment unclear
2204	3	13	38	13	38	Even under the usual conditions for the nonidentity problem, there are ways in which a person might be said to be harmed without appeal to a threshold conception of harm. Consider this notion of harm: Person P is harmed by an action A if P is made worse off by some consequence of A than if P had been unaffected by that consequence. This idea explicitly allows that one may be harmed by some consequences of an action and not harmed (perhaps even benefited) by others. In climate change case, one consequence of our prolonged GHG emissions is the existence of certain future people; another is, let's say, their suffering and/or dying in a drought. The suggested concept of harm implies that our emissions harm these people by afflicting them with drought, thereby making them worse off than they would have been had they not been so afflicted—which could have been the case, for example, if they had migrated before the drought began. The fact that they would not have existed were it not for our emissions does not nullify the harm. (Example is from John Nolt, "Response to Critics of 'How Harmful Are the Average American's Greenhouse Gas Emissions?'" Ethics, Policy and Environment, accepted, revised and forthcoming.)	No action; in the text the point is made on p. 12, lines 30-33.
14841	3	13	1			This section relies heavily on an distinction between wrongful actions that call for compensatory measures and other actions that may lead to undeserved benefits or cause harms. It is not clear how important (if at all) this distinction is in the climate context. That PPP is "...far from universally accepted..." is a strong and unsubstantiated statement. The our basic problems are obviously each subject to counter-arguments that should not be omitted. Is the identity problem relevant? Are the inheritors of the benefits of emissions of those who are now dead responsible (see Shue). Is the difficulty of defining a threshold harm sufficient to absolve the polluter?	Thank you. - The distinction is considered important by many authors and in many contexts. At the same time ist importance is contested as sections 3.3.5 together with 3.3.6 show. - Agreed. We deleted "far from universally accepted".
15645	3	13	1			The conceptual distinction between sections 3.3.4 and 3.3.5 is unclear, and suggests that using distributive and compensatory justice as a point of distinction between the two sections may not be ideal, particularly as considerations of historical responsibility are split across the two sections. Moreover, it is at best incomplete to say that the three principles identified in 3.3.5 (lines 17-18) are principles of compensatory justice when in fact they are at least as plausibly principles of distributive justice (see eg Caney, S. 2010. Climate Change and the Duties of the Advantaged. Critical Review of International Social and Political Philosophy 13 (1):203 - 28.). It may be more straightforward, for example, to combine 3.3.4 and 3.3.5 into a single section on principles for assigning responsibilities for emissions.	No change needed. We do not think that PPP is "at least as plausibly" understood as a principle of distributive justice. This claim is more plausible with respect to BPP and CPP but as I say in the text these principles are heavily disputed. -- Also, we do think that the issue of historical responsibility should be discussed (as in the draft) from both perspectives, distributive and compensatory justice.
3929	3	13	1	14	47	Surely a chapter on ethics in relation to the use of government action should acknowledge John Stuart Mill's famous harm principle and advice policy makers how to think about it from an ethical perspective taking their own values into account? It seems to be a natural fit with the non-identity principle. Mill's harm principle says its OK to remonstrate with people that they should behave morally and ethically, but it is impermissible to take away their freedom to make a moral choice, unless their action would impose a harm on others. The non-identity principle seems to be making a case that actions today can't be said to be imposing a harm on unborn generations. Surely the chapter should be providing policy makers with guidance on how to evaluate these two points from an ethical perspective?	Thank you. We added references on harming as wronging.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
12779	3	13	25	13	25	Because of PPP being part of the CBDR the statement that PPP is "...far from universally accepted" should be reconsidered.	Agreed. We changed 'far from' to 'not'
13267	3	13	45	13	46	this a double edge argument. Some people is not worse but rather not exist at all, that is true. But there are potential people who should have existed, but factually does not, if the past emissions were not emitted. Technology improvements plays for both sides, on one, better medical equipment and infrastructure allow some people that in past conditions did not exist, to exists now; on the other, better technologies for natality control create the figure that some people could have exist, but do not.	No action; comment unclear
6311	3	13	45	13	46	I would encourage the authors to limit the discussion of Parfit's non-identity problem. While it has been reviewed amongst philosophers extensively in the literature, it is deemed by many to be relatively nonsensical. For the purposes of the credibility and integrity of this report, I would limit discussion on what comes across to the reasonable, non-philosophical public as rather silly.	Disagree with comment. The non-identity problem is genuine. Reviewing the philosophical and normative literature on climate change requires reviewing the various interpretations of the relevance of the non-identity problem
8146	3	14				It would be helpful to provide examples of how the BPP and CPP principles relate to climate change (CC).	Noted; space constraints prevent us from providing much in the way of examples.
13416	3	14	1	14	8	This treatment of arguments on why the polluter pays principle cannot be applied (or can be applied in only a very limited way) in relation to compensation is much too one sided. At least equal space should be given to the opposite argument. This counter-argument has been made by others such as Gardiner 2010 and Shue (1992 and other articles) -- for example their point that if people in poorer countries are deprived of their share of an important resource needed for their very survival, then ignorance is not an acceptable reason for not assisting or compensating especially since the rich nations' overuse of the resource denies the poor of extricating themselves from the problems the rich created.	No action; this comment is the same as comment 13415, see our response to comment 13415
6964	3	14	1	14	2	I outline an approach to intergenerational corrective justice that overcomes the problem of dead duty bearers: Catriona McKinnon, 'Climate Change and Future Justice: Precaution, Compensation, and Triage' (London: Routledge, 2011), esp. chapter 4.	Agreed. We added a reference and refer to McKinnons partial solution of the problem.
11554	3	14	1	14	2	The discussion of the identity problem should consider that there may also be an identity problem at the victim side. Who should have compensation?	Agreed. We added this dimension of the discussion
9292	3	14	16	14	18	"Owing... section 3.2.4)". I found this sentence confusing. Is the point that past emissions that e.g. raised the standard of living for predecessors but happened to have no knock-on effects (e.g. via technological progress) for present people are excluded? If so, I don't understand how the non-identity problem is relevant here.	Agreed. We clarified this.
2120	3	14	16	14	20	Passage is cumbersome.	Agreed. We clarified this.
12135	3	14	18	14	19	BPP's implication that existing people should be responsible only for emissions from which they have benefited seems to me exactly right. While some disagree, it may be worth noting that this is not necessarily an objection to the principle.	No action; we do not claim that it is an objection to the principle as such.
12136	3	14	20	14	22	Need benefiting from injustice be voluntary in order to create an obligation to disgorge the gains? (Note Butt's argument that it need not [2007, p. 134].)	Noted.
6965	3	14	21	14	21	The word 'feasibly' does a lot of work here. It would be good to indicate that somehow.	Noted. We deleted "feasibly" and added to the sentence.
11555	3	14	23	14	33	The presentation of the community pays principles is too short. In general, thorough discussions of collective responsibility and remedial responsibility are lacking.	Cannot be addressed given the space constraints
6966	3	14	26	14	26	Janna Thompson's communitarian approach to intergenerational justice should be referenced in connection with 'transgenerational community' (see Janna Thompson, 'Intergenerational Justice: Rights and Responsibilities in an Intergenerational Polity', London: Routledge, 2009).	Agreed. We added a reference to Thompsons 2001 article in Ethics.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
2119	3	14	3	14	4	There is something confusing about this conclusion, with its focus on PPP. For example, the third problem identified in the previous paragraph does not seem to arise for PPP, as the question of whether or not the polluter *benefited* from the emissions is not obviously relevant to her compensatory duty under PPP.	Agreed. We clarified this.
12137	3	14	31	14	33	Shouldn't the criterion be whether the past emitters could reasonably have anticipated whether their emissions would be harmful?	No action; this is how the "ignorance" problem is explained on p. 13, lines 33-37
9293	3	14	32	14	33	In light of the last sentence, I take it that “can [now?] be shown” should read “were known at the time of emission”.	Thank you. In the sentence we now refer back to the first and second problem as introduced.
9342	3	14	34	14	47	a great deal of space to illustrating the limited applicability of the principle of compensatory justice. any other approaches?	No action; we review distributive justice in 3.3.4
14844	3	14	34			That the applicability is "limited" has not been compellingly established.	Thank you. 'Compellingly' is too much to expect in this survey. We changed the wording.
16670	3	14	39			distinction between causal responsibility vs. ability to pay was discussed in following prior to other references: Dale Jamieson, “Global Responsibilities: Ethics, Public Health, and Global Environmental Change,” Indiana Journal of Global Legal Studies 5,1 (Fall 1997): 99-119	Thank you. We added a reference.
12138	3	14	39	14	42	There does not seem to be a plausible rationale based on *distributive justice* for including the causal responsibility of past people as a factor in allocating the burdens of adaptation, as opposed to ability to pay.	Thank you. We changed the wording. We mean to refer to the correlation between level of (past) emissions and level of wealth
6967	3	14	45	14	46	A third and distinct reason for thinking that present people have IG duties of justice is that they have an obligation to (at least) put future people at risk of life in conditions in which the pursuit of justice is not possible.	Thank you. We changed the wording and added a cross-reference.
14842	3	14	8			"…a small part of the problem…": is not substantiated.	Agreed. Was changed to "some part". How big the part is depends on the percentage of emissions (causally relevant for climate change today and in the future) that have been caused during the lifetimes of today's adult population.
14843	3	14	9			BPP: again, discussion of the counter-arguments to the objections, which do not seem strong. (What about partial responsibility for past emissions that led to benefits being enjoyed? How strong is the condition of voluntary acceptance?)	No action; cannot be addressed given the space constraints
12780	3	14	1	14	2	I am not sure if this assumption is replicabel to climate policy, since countries do not die.	No action; point is made: See below, p. 14, line 30-31.
6465	3	14	3	14	8	The analysis of the polluter pays principle is based excusively on obligagtions of individuals. Yet nations have responsiblility under the UNFCCC under the "no harm" priciple in the Preamble, and various express provisiions dealing with obligations ofd developed and developing countries. If this is true the limitations of the 'plluter pays principle" identified in this section are not applicable. A sentence should be added distinguishing obligagions of individuals from nations.	Agreed. See sec. 3.3.6
8147	3	15				Can you provide an example of a causal link with respect to legal issues and its relationship to CC (e.g. liability of a firm for polluting)?	Will be addressed in SOD
4619	3	15	18	15	18	bon père de famille	Will be addressed in SOD
9121	3	15	18	15	21	Again the implications of accumulation of wealth (agglomeration economies) and the GHG's from the construction of infrastructure systems (including buildings) should not be forgotten.	No action; comment unclear

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
9122	3	15	22	15	24	Higher density may potentially lead to more consumption of goods, especially if rebound effect exists due to savings on transport costs (see the first comment concerning the whole AR5).	No action; comment unclear
14846	3	15	30			The causal link is trivially shown in the case of depleting a finite common resource, the depletion of which prevents subsequent legitimate use.	No action; consulted with legal expert - this is incorrect, at least in the context of tort law. It is necessary to show that the defendant's act caused actual harm to the plaintiff.
6968	3	15	30	15	39	Reference should be made here to Sinnott-Armstrong's rejection of the Harm Principle as generating liability for individuals for CC in virtue of their emissions: his arguments draw on (he claims) the absence of a causal link between individual emissions and CC. See Walter Sinnott-Armstrong, 'It's Not My Fault: Global Warming and Individual Moral Obligations' in Gardiner, Stephen M., Caney, S., Jamieson, D., and Shue, H. (eds), Climate Ethics: Essential Readings (Oxford: Oxford University Press 2010). An excellent response is Hiller, Avram, 'Climate Change and Individual Responsibility', The Monist, Vol. 94, No. 3 (2011), pp. 349-68. And John Nolt's controversial paper should also be mentioned: Nolt, John, (2011), 'How Harmful are the Average American's GHG Emissions?', Ethics, Policy and Environment, 14:1, 3-10.	No action; comment is mistaken and this is not an appropriate place to mention this literature
9526	3	15	35			Please, delete also.	No action; disagree with comment
6969	3	15	40	15	46	This paragraph could be cut without loss.	No action; this paragraph was included because some of the arguments for climate responsibility rely on theories of unjust enrichment.
9003	3	15	47			Legal systems do not recognize legal liability from externalities. Existing legal systems appear to provide inadequate and incomplete help to making progress on normative questions.	No action; consulted with legal expert - the chapter makes it clear that the legal system is a source of possible insight on climate responsibiity but in no way determinative.
16631	3	15	47	16	2	Change the sentence that starts with "[t]his approach…" to this approach could lead to serious errors because weighting monetary values helps capture wealth differences among different countries.	Noted.
4925	3	15	6			Just recently a court (ECJ) decided against aviation companies as emitters of GHGs ..	Will be addressed in SOD
4926	3	15	9		14	Just recently a court (US AC) decided that the GHGs are pollutants .. (i.e. with harmful effects and certain duties for the emitters within the USA) ..	Will be addressed in SOD
14845	3	15				This section seems fails to distinguish between states and individuals (or firms), which may well have different responsibilities. This may especially be the case after having signed an international declaration (Rio, 1992) stating: " "In view of the different contributions to global environmental degradation, States have common but differentiated responsibilities. The developed countries acknowledge the responsibility that they bear in the international pursuit of sustainable development in view of the pressures their societies place on the global environment and of the technologies and financial resources they command." As CO2 remains in the atmosphere, the mentioned degradation continues even as a result of historically emitted GHG pollution.	No action; we are avoiding discussion and interpretation of UNFCCC and related international agreements (beyond the scope of our chapter).
12781	3	15		16		All topics regarding historical responsibility or intergenerational justice should be summarized in one section.	No action; disagree with comment; it seems reasonable to separate legal issues

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
7360	3	15				This section discusses legal concepts of historical responsibility from a compensatory perspective but misses discussion of legal concepts in the allocation of emission rights considering historical responsibility. This is not addresed in 3.3.4 and so should be inculded here. Some discussion of such issues is availble in: Carlsson, Jonathan. (2009) 'Reflections on Problems of Climate Justice: Climate Change and the Rights of States in a Minimalist International Legal Order.' Transnational Law & Contemporary Problems Vol,18, 45. and Parikh Jyoti, et. al. (1997) 'Climate Change, North-South Co-operation and Collective Decision-Making Post-Rio.' Journal of International Development, Vol. 9, No. 3. 403	No action; international law beyond scope of chapter
3930	3	15	1	16	2	This section arguably needs to make the point that a common law determination does not generally dictate the outcome. Polluters who are determined to be outside the law can make themselves legal by achieving the plaintiff's consent.	No action; comment unclear
4569	3	15	17	15	18	Add: Grossman, David A., Tort-Based Climate Litigation. 2009. In: William C.G. Burns and Hari M. Osofsky (eds.), Adjudicating Climate Change: State, National, and International Approaches. Cambridge University Press Cambridge UK, 193-229.	Will consider these references
3141	3	15	2			section 3.3.6 might benefit from some discussion of legal cases (e.g., in Alaska) where countries have actually tried to address climate with nuisance and other frameworks. The attribution problems, within the legal system, are a severe barrier. And a little case study or two (just a few sentences) would help underscore that.	Will be addressed in SOD
15646	3	15	27			Re "1990" - explain that this determination was on the basis of the publication of the IPCC's first assessment report.	No action; consulted with legal expert - it does not seem to me that the motivations for the UNFCC are relevant.
4568	3	15	7	15	8	Add: Burns, William C.G. and Hari M. Osofsky. 2009. Overview: The Exigencies That Drive Potential Causes of Action for Climate Change. In: Adjudicating Climate Change: State, National, and International Approaches. William C.G. Burns and Hari M. Osofsky (eds.). Cambridge University Press, Cambridge UK, 1-27.	Will consider these references
6466	3	15	15	15	29	In the United States, legal liability under statue as well as tort law makes someone reponsible for inherently dangerous activities once they should have been on notice that the activitiy was dangerous. Actual knowledge is not a requirement.In climate change the anlsysis would follow that when governments or indviduals are put on notice through scientific organizations that greenhouse gas emissions were potentially dangerous. Under litigation about the meaning of the "no harm principle" international courts have said that lack of certainty about harm is not an excuse for behavior that is dangerous.	No action; already addressed.
8823	3	16				same comment with respect to procedural justice: too much general information is included; I suggest letting texts fulfill this function and omitting much of this tutorial.	No action; disagree with comment
11197	3	16	15			The UN has a system of accredited non government parties, and it may be worth mentioning this here, as to how the UN effectively recognises and addresses this issue.	Will be addressed in SOD
16671	3	16	16			Classic cite for procedural justice, especially the question of who among the affected count is Nozick, Anarchy, State, and Utopia	Will be addressed in SOD.
6971	3	16	16	16	20	The 'all affected' principle delivers a fully intergenerational vision of justice, such as that embodied in Rawls' Just Savings principle.	Will be addressed in SOD
7913	3	16	25	16	31	What would the ideal of deliberative democracy mean for climate policy and decision making? In our opinion, it would be more important to elaborate on that. And: procedural justice clearly is more than just providing information.	Will be addressed in SOD

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
11198	3	16	31			The UN General Assembly has recognised the right of Indigenous Peoples to not only be consulted or to participate in activities that will affect them but accords them the right to give or withhold their free, prior and informed consent to developments that may impact them. This right to FPIC includes the right to reject development proposals from any third party, government or industry, that affects their customary territories. (United Nations Declaration on the Rights of Indigenous Peoples).	Will be addressed in SOD
6970	3	16	6	16	8	This makes it look like procedural and distributive justice are alternatives, whereas (for many) distributive justice is the outcome of procedural justice.	No action; disagree with comment
14848	3	16				Sec. 3.3.7 on procedural justice could greatly benefit from some of the empirical research carried out on the conduct of the UNFCCC negotiations, and the disparate capacity to engage between developed countries and developing countries.	No action; this issue is too large to be addressed here
3931	3	16	4	16	8	This section seems to be saying that if a political majority determine to kill all non-believers that is fine from a procedural justice viewpoint as long as the public decision was taken in a fair way, independent of outcome and the oppressed minority had a fair say in the decision. But that notion of untrammelled majoritarian democracy is starkly inconsistent with the idea of individual human rights. This might be the ideal 'deliberative democracy' it is not the ideal of checks and balances and protections for human rights that are central to the US constitution. The idea of individual basic rights is supported elsewhere in the chapter in the intergenerational context, its application to the procedural justice section would seem to be relevant and appropriate.	Will be addressed in SOD. It may be enough to remove 'independent of outcome' from the first sentence.
11556	3	16				In relation to the discussion of levels and scope of procedural justice two contributions should be taken into account. Steve Rayner “How to eat an elephant: a bottom-up approach to climate policy” (Climate Policy 10 (2010) 615–621) and Elinor Ostrom “Green from the Grassroots” (Project Syndicate, June 12, 2012). Both papers discuss the relevance of polycentric and overlapping local and national policies - combined with a thin global agreement.	Will be addressed in SOD; this issue is more appropriate in 3.11.2
8824	3	17				this section, on “non-human values,” would become more meaningful if it were to begin with examples of the types of impacts and areas of risk that are relevant because they are directly related to climate change.	Done that to some extent
17164	3	17	11			Chapters 3.4 and 3.5 do not make sufficiently clear that the aggregated view is highly problematic from many ethical perspectives. It seems like a bias toward utilitarianism here.	This was not the intention of the section and chapter. We have changed the emphasis.
12139	3	17	11	17	14	It seems to me that more of a transition is needed in shifting to 3.4, indicating that the account is moving from largely deontological accounts of distributive justice to consequentialism.	We have put more stress on the transition.
7915	3	17	12	17	24	Please explain the concept of a value that your remarks are based on. What is a value: a whish, preference, good, benefit, etc.?	Not every common concept can be defined. Our use of a concept reveals our meaning.
7916	3	17	15	17	18	This reads as if an unpolluted environment is a luxury good. That thi is not the case is demonstarted, for instance, by Martinez-Alier (2002).	This remark has been removed
9386	3	17	19		27	In discussing values, much emphasis is laid on the "incommensurability thesis"; yet this is a very general observation which does not say much about the particular values involved.	Noted; another example added.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
17161	3	17	19	17	27	In my opinion, the authors make it too easy for themselves when arguing that different kinds of values (environmental, cultural, social, economic, etc) cannot and should not be compared with each other. If a decision is to be taken, then such a comparative valuation is absolutely necessary and indispensable: Weighing different kinds of goods is at the heart of most decisions. But the point is that not everything can be reasonably valued with one single (quantitative or pseudo-quantitative) metric, such as in monetary terms (values require a common nummeraire to be commensurable). Rational choice does not necessarily require commensurability, but only comparability. See, e.g., Beckerman, W.: Economics as applied ethics. Value judgements in welfare economics. Houndmills, Basingstoke: Palgrave Macmillan, 2011, p. 97.	The authors do not argue that different kinds of value cannot and should not be compared.
2205	3	17	26	17	27	Procedure is not the only other possible determinant of rightness in such cases. One may count all choices that are worse than no other as right. Or one may used localized and expanded conceptions of betterness.	Have changed 'will' to 'may'
16675	3	17	29			The section on non-human values should make reference to respect for nature. The Taylor book of that title (published in a new edition in 2011) is only cited for its arguments concerning the moral status of individual organism. For a broader conception of respect for nature see Dale Jamieson, “Climate Change, Responsibility, and Justice,” Science and Engineering Ethics 16 (2010): 431-445	Included
9387	3	17	34		36	The comments on Kant are rather cursory - actually, a whole strand of thought in the human rights-traditions refers to the diginity of persons.	We don't have the space to treat Kant properly
6973	3	17	40	17	40	Why 'vehicles'? Why not 'who experience pleasure, pain, suffering …'?	Corrected
9388	3	17	42		44	It is not very fair to cite Routley and his ideas about "chauvinism" in order to introduce non-human values. In recent years, authors in the field of environmental ethics have given detailed and very elaborated accounts of non-human values.	We've expanded a bit
9389	3	17	42	18	12	The overview over environmental ethics - or positions which defend a value in nature - is very cursory. It does not represent the current situation in research.	We've expanded a bit
11557	3	17	8	17	10	Another justification of just procedures is an epistemic argument. If people and societies are challenged by a knowledge deficit (as for example Hayek argues), then polycentric deliberation through democratic and just procedures may be necessary due to epistemic reasons.	Will be addressed in SOD
17160	3	17	1			You should add justifications for procedural justice beyond mere instrumental reasons (such as your first reason, which is however very unspecific), for instance that human rights etc imply a certain right to "self-determination" and to co-decide about the way certain goods are provided in society. See, for instance, again: Kowarsch, M./Gösele, A.: Chapter 7: Triangle of Justice, in Edenhofer, O./Wallacher, J./Lotze-Campen, H./Reder, M./Knopf, B./Müller, J. (eds.): Climate Change, Justice and Sustainability: Linking Climate and Development Policy, Dordrecht: Springer 2012, pp. 73-90. There are many other publications arguing this way.	Will be addressed in SOD
6972	3	17	1	17	10	This section could be cut without loss - it adds very little.	Will be addressed in SOD
13932	3	17	8	17	10	The reference to "imprefect procedural justice" is not that clear. You may consider deletion.	No action; disagree with comment
8595	3	17		17		A section on values is a good idea, but it would be very helpful to have a more balanced introduction. A clear paragraph identifying the limitations of what this section is and is NOT covering (including rights) would be helpfu	Done that.
8148	3	17		22		How is value and well-being linked to CC? What do different strategies imply about well-being? Can you illustrate how different social welfare functions impact the rankings of different strategies regarding CC in a more concrete manner with an example (e.g. carbon tax policy)?	Have added examples.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
8249	3	17		22		The authors talked about the concept of individual and aggregated social wellbeing in the form of a society's social welfare function over time. Comment: The authors' explanation of estimating a temporal social welfare function (SWF) is clear. However, since the focus is on estimation of a temporal SWF, it might be more elaborating if they explain little more on the procedural issues relating to the measure of temporal SWF. For example, some key temporal issues such as uncertainty in population growth due to exhaustible resource constraints over time are not covered in their discussions in this subsection.	At this point we are dealing with values. There are empirical constraints on the promotion of values, such as resource constraints. We cannot deal with constraints at this point. They come up later in the chapter and the volume.
14309	3	17	11			The current version of the chapter shows a strong bias in favor of using social welfare functions to support climate change decision making. Many pages are devoted to the derivation of social welfare functions, whereas their fundamental shortcomings are not discussed in detail. Only 3 lines refer to the problems of aggregation (page 20, lines 33 - 35). The discussion of the "Paretian approach" (Section 3.5.3.) is not a suitable substitute for such a discussion as it refers to a method that was suggested to work even under the condition that no such a thing like a social welfare function exists. It does not, however, discuss the reason why "Some economists have claimed ..." that there are severe problems in deriving social welfare functions (page 20, line 33). As these reasons (e.g. the Impossibility Theorem of Arrow) have led the 2nd Assessment Report to make a strong recommendation against the usage of social welfare functions (and especially against the usage of optimization approaches to climate change decision making in general) the AR5 must refer to this statement and explain the progress (if there had been some) that led to a reconsideration of this recommendation. The mere observation that many researchers have used CBA is not sufficient to abstain from a detailed discussion of the weakness of CBA applied to a global problem.	The remarks in the SAR do not seem to constitute a strong rejection of social welfare functions or optimization. We believe we have stated the required assumptions correctly.
8581	3	17	11	17	28	This section on values would benefit from a first few lines more clearly linking it to the previous discussion of ethics so that the reader can more easily make the jump from one section to the next (as they stand there is almost no connection made). It is also intriguing that the examples used to discuss value in the second paragraph are both largely monetary. Its also not clear that these examples have anything to do with VALUES (more freedom to devote to environmental resources? This may be a result of certain kind of wealth, but is hardly a value if framed in this way). Line 19 is particularly problemtic - it fundamentally assumes that the ONLY way to assess an outcome is through a utilitarian aggregation. This is a serious problem. How for instance, does this section propose to deal with extinctions? Is the loss of life truly captured through aggregation? Does value lie only in the aggregate? This entire chapter assumes that utilitarianism (and then narrowed even more stringently into neo-classical economics) is the only way to represent value even though the literature on ethics and climate change, and on the utility of utilitarianism for complex policy contexts, would point out the limitations of this.	More linking has been created between sections. The word 'aggregation' was evidently misleading and has been removed.
7914	3	17	11			From 3.4 onwards the whole debate is on value and welfare. Debates on justice and deontological reasoning are skipped, although most literature in climate ethics is on justice and, so far, there only very vew utilitarian/welfarist contributions exist (see comment 50). Section 3.3, which takes this (partially) into account, is unrelated to discussions in other sub-chapters. Demands for redistribution and compensation are mostly ignored in chapters 3.4 to 3.10.	We try to deal with one topic at a time. Section 3.3 is about justice and section 3.4 about value.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
6467	3	17	17	17	28	This section must acknowledge that some ethical principles would not resolve conflicts of values throug weighing or balancing but would restrict certain behaviors absolutely if they interfere with basic rights or deontological duties, This sectio as written is very misleading in that it does not recognize that disputes about ethical duties according to many ethical theories should be settled based upon the strenth of ethical arguments. For this reason it is important to add a sentence ot this section something like: Some ethical theoires hold conflicts between values must be resolved by the strenght of ethical arguments. If for instance, an activitiy creates a human rights violattion, that activity is ethically unacceptable and cannot be justified on consequentialist analyses.	This is not about a conflict of different ethical principles, but a conflict of the values that are recognized in a single ethical theory. The idea that rights constitute a side-constraint on maximizing value is discussed in sections 3.2 and 3.3. It does not conflict with the weighing of values.
12782	3	17	28	17	28	The subdivision of human values, which is used in the following sections should be mentioned here. So that human values include cultural and social values, wellbeing and its aggregation, lifetime wellbeing functions, social welfare functions, valuing population. Maybe it could be helpful to make subsections: 3.4.2 Human values 3.4.2.1 Cultural values 3.4.2.2 Wellbeing etc.	We do not have the space to reiterate the structure of the section.
6312	3	17	28	17	29	Again, it is simply inaccurate to say that "values can be classified into human and non-human values." Use a different language, i.e. anthropocentric and non-anthropocentric, or similar.	Anthropocentric' is now mentioned as a synonym for 'human'.
7917	3	17	29	18	18	The whole section is highly superficial, given standards of environmental ethics. Also, you should discuss the consequences for climate policies if some of the perspectives mentioned are adopted. Eventually, the section should be skipped given it's insufficient depth.	Section expanded a bit
9393	3	18		23		These pages are very much an excursus about social welfare-theory and utilitarianism. This does not represent the range of options to work on competing values in ethics.	More emphasis has now been given to the range of options.
13566	3	18				also related to comment 4, and so relating to consistency, later on, these broader dimensions are touched on including the definition of wellbeing (on page 18) in a broad sense as that (which is) good for a person - in addition to the Gross National Happiness of Bhutan (see also Happiness Planet Index http://www.happyplanetindex.org/), there are also studies which trace a persons wellbeing / happiness and affinity to the environment to time spent in nature (see work of Nisbet et al. 2009 Environment and Behaviour) http://eab.sagepub.com/content/41/5/715.short and 2011 Journal of Happiness Studies http://www.springerlink.com/content/t657024255174pt7/)	Comprehensive references have been included
4938	3	18	11			{Add} The {}increased speed/rate of the loss	No action; disagree with comment
9527	3	18	11			please, delete .) (parenthesis and period).	Done
11558	3	18	16	18	18	If human value cannot be measured. What is the relevance of using the aggregate of people's willingness to pay for it as a measure of its value? More needs to be said about what value theory is assumed.	This comment seems to result from a misunderstanding at this point, since we are not discussing human values.
17139	3	18	19			See also: Petheram, L., Zander, K., Campbell, B., High, C., and Stacey, N. (2010) 'Strange Changes': Indigenous perspectives of climate change adaptation in NE Arnhem Land Australia. In Global Enviornmental Change 20 (4): 681-692; Nakashima et al. (2012) Weathering Uncertainity: Traditional Knowledge for Climate change Assessment and Adaptation. UNESCO and UNU Press.	We checked the first reference; it contains little evidence of damage to culture specifically. The second reference appears to be grey
12140	3	18	20	18	23	It may be worth noting that whether there are any goods that are not measured in terms of good for individuals (human or otherwise) is controversial (that there are not is assumed at the top of p. 20).	Some sentences have been added about this controversy. The top of page 20 does not make this assumption, however

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
3932	3	18	20	18	21	Can a reference be provided for this assertion? It looks like a novel assertion, because as I understand it, the economist's concept of individual utility maximisation would not see any such division. Human wellbeing can't be divorced from the cultural and social context. Individual's act on the basis of the overall effect on their wellbeing, defined in the broadest possible context.	This has been dealt with by means of a reference and some sentences.
11216	3	18	25			add s to people, ie Arctic indigenous peoples	Done
11217	3	18	26			add s to people, ie Cultural values and indigenous peoples. Correct section is 3.11.2.3 (not 3.10.2)	Done
17140	3	18	26			Reference is made that a further discussion of cultural values and indigenous peoples is included in section 3.10.2 - however, section 3.10.2 deals with The Cost of Mitigating GHG's and does not include a discussion of these issues. A discussion of Social and Cultural Issues is included in section 3.11.2	Numbering corrected
3933	3	18	28	18	28	Since this is an ethical chapter, should it not note that the benchmark for the Gini coefficient is equality of materialistic outcome - specifically, actual outcomes are compared with the benchmark that x percent of the population should receive x percent of the income, for all values of x and regardless of effort, luck, skill or merit.	This matter of detail is not needed here.
9390	3	18	33		35	The overall value of human life is not well-being, but dignity (or call it autonomy, self-respect etc.). The focus on well-being is understandable in two frameworks: theories on distributive justice and - in a way - a utilitarian framework. Yet, it is not adequate in a discusison of "values".	Wellbeing is explicitly defined to include all of a person's good. So it includes dignity if dignityis a good.
7918	3	18	33	19	4	The capabilities approach is briefly mentioned. Then, the move from values to aggregation quickly shifts the perspective to utilitarian ethics. This perspective, however, obscures problems of justice and human rights, importants aspects of the capabilities approach and other ethical approaches (see comment 50). The whole section (including 3.5-3.7) is interesting for utilitarians only.	No action; we deal with the aggregation of people's good, whatever it consists in. This is explained
17162	3	18	4	18	5	One could add: Leopold, Aldo: A Sand County Almanac. New York: Oxford University Press, 1949. And: Schweitzer, Albert: Kultur und Ethik, Beck: Munich 1996.	One of these added
2206	3	18	4	18	5	A more up-to-date and better argued source than Taylor is Agar N. Life's Intrinsic Value: Science, Ethics and Nature. Columbia University Press, New York, 2001.	Added
17704	3	18	8	18	10	Poor quality graph, great idea but not properly explained. Some color would be good.	Figures will continue to be improved in future drafts
2335	3	18	33	21	44	For this section, I would like to add some points from my research article to elaborate main argument in the sub sections. "The profile of wellbeing varies among different social structures. Interns of material sense of wellbeing, lack of a telephone does not count as poverty in a developing country, because telephone is not considered a necessity. However, in a developed country, a telephone is considered as a consumer good, the lack of which is deemed as poverty. Furthermore, social stratification leads to ordering sense of wellbeing. Social network, civic conscience and mutual trust as the elements of the social capital of society to strengthen the people participation, caste system appears as obstacle for the social process." Reference:- Withanachchi, S. 2011, "Participatory Development Approach in Local Governance – Its Relevance for Economic Development: a case study of Sri Lanka", Federal Governance, vol. 8 no. 3, pp. 50-68	Noted
13933	3	18	11	18	11	There is a typo. A) in excess. Two parethesis in excess occur on footnote 3 in that same page.	Corrected

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
3142	3	18	19			section 3.4.2: there are some reports (by UNESCO, I think) on impacts of climate change on world heritage sites. throughout, the role of uncertainty and perception (especially in light of chapter 2) seems under-played. Section 3.8 addresses uncertainty, but do the perspectives discussed earlier in the chapter—for example, varied justice perspectives—lead to different assessments under different kinds of uncertainty? The chapter should get a steer from the TSU on policy design and choice (addressed in section 3.8 and 3.9). These are good discussions, but the same issues are rehashed (usually with lower quality writing and analysis) throughout WG3 and this needs to get streamlined. □	Peer-reviewed literature on cultural damage is scarce. It is not really feasible to say much about uncertainty in the space; this has to be left to chapter 2. Overlap with other chapters is being addressed as well as we can.
9344	3	18				Could add the discussion on well-being in the conceptual framework of the Millennium Ecosysttem Assessment (2003) and (2005)	Not peer-reviewed
6974	3	18				The relevance of the material in this section to ethical debates about CC should be better signposted.	Some examples have been added. But it seems obvious that valuation is needed by all decision making
16672	3	19				I'm not sure about this distinction between values that contribute to the good of a community and those that contribute to humans as individuals. It could and has been argued that the former are values precisely in virtue of functioning in the latter way.	Yes. This controversy is now mentioned with a reference.
8582	3	19				The quality of graphics is hard to read and I don't actually understand what this is trying to convey.	Figures will continue to be improved in future drafts
9391	3	19	1		2	In ehtics, the most important question is how well-being is defined, not how it is aggregated. Moreover, the claim which the authors formulate is not coherent with the former claim of the "incommensurability" of values. If well-being is a value, there is nothing more to say than that there are trade-offs which cannot be avoided.	No action; comment unclear
2122	3	19	1	19	3	The reader may benefit from some brief sign-posting explaining the focus on *aggregation* of wellbeing.	Text has been changed.
16633	3	19	1	19	1	Delete.	No action; other comments imply that this sentence needs stressing, not deleting.
4488	3	19	19	3	23	Why include this discussion when its premises (numerically measurable utility that is cardinally comparable across individuals) are so easily rejected? This discussion and the accompanying Figure are potential candidates for excision.	Not everyone thinks they are easily rejected.
7919	3	19	19	19	23	A cardinal scale at every point in time is a heroic and completely unrealistic assumption.	Some basis for it is referred to.
9392	3	19	3			Usually, ethics does not define the well-being of a society in terms of aggregates, but in terms of either community values or political values (equity, justice, common goods such as health-care, public education, good condition of the environment) plus individual well-being.	This is well covered by the existing text.
13934	3	19	9	19	9	This figure is not helpful and uses space. The text is clear enough. Suggest deletion of this figure.	Conflicts with previous comment.
8583	3	20	1	22	28	It is strange that in a chapter on ethics and economics, the strategies for defining a social welfare function are covered in depth (line 1 on pg 20, to the end of page 22), while the ethical problems of these, and some of the ramifications they have on discussions about population are refered to only vaguely and in only 4 lines (lines 28-31 on page 22). It is this type of systemic lack of balance that is going to result in profound criticism of this chapter.	No action; subsection on population on p. 22 adequately addresses this issue

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
11559	3	20	1	30	24	Textbook style explanation of economic concepts. The economic concepts should be related to the ethical, social and political dilemmas (as it is done in chapter 4 where sections are problem driven discussions). The relevance of the concepts for environmental issues and climate change should be stressed. What implication does it have for climate ethics how we measure well-being? The sections may be shortened.	Noted; we already intend to shorten textbooky sections for SOD
3934	3	20	33	20	35	Why is the adjective 'sceptical' used here rather than "mainstream" or "valid"? What economists have accepted is that interpersonal utility comparisons are inherently subjective, making choices between contending weighting systems arbitary. The sentences in lines 33 and 34 are a bit misleading in that they omit the subjectivity-arbitrariness aspect. If there is any claim to the contrary - that these comparisons can be made on a non-arbritary objective basis, it should be documented. Failing that, the rest of this section starting in line 36 with the words 'we set it aside' looks like a cop out.	Sceptical' is a correct adjective. References to means of interpersonal comparison are included.
7935	3	20				In general, models discussed overstate mitigation costs (see section 3.12: inovation is - unplausibly - modeled as exogenous) and underestimate damages (reasons are amongst others: high dicount rates, the models only account for certain types of harms, damages are assumed to be linear, etc.). Again, a critical discussion of the models would be valuable that takes up the many critical points raised throughout chapter 3.	Noted; will be addressed in SOD
9002	3	20				The discussion on social welfare functions is of little practical value to make progress in arriving at normative decisions in the question of climate change which involves agreement and negotiations among human populations (states) and not central planning. Even in a national context, the use of social welfare functions might not be justified. One possible way to provide a perspective on the usefulness of the concepts related to aggregation is to refer to the possibility that if the a global social welfare function were to be used as a framework, the Convention recognizes two kinds of 'individuals' - Annex 1 and non-Annex 1 countries. The application of the principle of common but differentiated responsibility would entail a greater weight to non Annex 1 welfare functions.	Parties to negotiations make judgements of value, which should be soundly based. This chapter aims to help them.
10263	3	21	22			Routa, J., Kellomäki, S., Kilpeläinen, A., Peltola, H. and Strandman, H. 2011. Effects of forest management on the CO2 emissions of wood energy in integrated production of timber and energy biomass. GCB Bioenergy 3: 483–497. Citation from the article: "Over the life cycle, the net CO2 emissions per unit of energy are smaller for wood than those for fossil fuels; i.e. on average 99 kgCO2MWh 1 for Norway spruce (range 65–152 kgCO2MWh 1), 123 kgCO2 MWh 1 (range 78–192 kgCO2MWh 1) for Scots pine and for coal 341 kgCO2MWh 1, if the emissions for production and transportation of coal are excluded (Statistics Finland, 2005). Intensive management for timber and energy biomass clearly decreases net CO2 emissions in energy production." "Intensive management for timber and energy biomass clearly decreases CO2 emissions in energy production. Thus, it seems possible to produce forest biomass for energy purposes with relatively low CO2 emissions by applying intensive management and in this way also substitute for fossil fuels (Sathre, 2007)."	No action; comment is aimed at a different chapter
2123	3	21	33	21	34	I can see that the alternative of *average* utilitarianism is not important here, as we are dealing with a fixed population; but still, this sentence might seem puzzling to those familiar with the alternative. So perhaps it could be noted as a view to be discussed in the next subsection.	Wording has been altered
6977	3	21	40	21	44	This paragraph could be cut without loss.	It has been cut.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
9288	3	21	43	21	44	“Is not consistent with Harsanyi's theorem” - it would be better to state which axiom(s) of Harsanyi's theorem is violated by the SWF under consideration (esp. since anyone who would otherwise advocate the maximin SWF is likely to bite the corresponding bullet(s)).	Has been cut
4490	3	21	7	3	12	There are hidden Malthusian assumptions in the assertion that this form of utilitarianism leads to anti-natalist policies. For example, a larger population may lead to a larger number of geniuses (Mozart, Einstein, Salk), with corresponding increase in the average utility of all.	No action; comment unclear
16673	3	22				This begins a discussion on the failures or weaknesses of the applications of cost-benefit analysis to cliimate change. This point was made early on in the discussion in Dale Jamieson, “Ethics, Public Policy, and Global Warming,” Science, Technology, and Human Values 17, 2 (Spring 1992): 139 153. Moreover, Mark Sagoff's classic attacks on cost-benefit analysis would seem apropos here as well.	Done.
17705	3	22	19	22	27	There can be a average critical level utilitarianism function too	No action; yes, but not everything can be mentioned. We have to balance degrees of importance.
2124	3	22	2	22	3	This is the sort of sign-posting I had in mind in comment 16 above.	Sign-posting has been improved.
16635	3	22	2	22	6	What/who determines value? This would lead nicely into the economic discussion of anthropocentric measures of value.	The epistemology of value is discussed in the sections on economic measurement.
3935	3	22	28	22	29	This sentence should surely be copied into the executive summary.	Noted; will be addressed in SOD.
7921	3	22	39	23	7	You should mention (and dicsuss) general objections against constructing a social welfare function, especially if the function is supposed to represent well-being globally over a century. Criticism to such an approach goes back to the 40s (Neumann/Morgenstern 1943).	No action; comment is unclear
9345	3	22				p.22, line 31:Section 3.4 In examining the value of population, how do the authors view the contribution made by population to production of goods and services which add to well-being.	No action; we distinguish objectives from constraints. This is a matter of constraints.
7920	3	22	31			Here, you move straight from a utilitarian to an economic anaylsis. As is well-know, economics is not just applied utilitarianism. The many differences between both approaches go completely unmentioned, thereby concealing the many problematic assumptions the economic concepts (that are dealt with later on) are based upon. Rather than moving on to aggregating costs and benefits you should discuss what the analysis in 3.4 means for acting on climate change.	Noted; need for more climate examples already intended for SOD.
13935	3	22	2	22	31	Do not think this section adds much. Can be a short footnote of previous section.	No action; disagree with comment. Population is perhaps the most important, and perhaps the most ignored, issue in the valuation of climate change.
7922	3	22				Is the old economic idea to claculate efficient (optimal) climate policy still alive in chapter 3.5? If so, you must try to show why positions that deny this very possibility are not plausible (see comment 36). Also, if you think that it is possible, you must address optimality in a triangular affair as stated in the first chapter, i.e. calculate the optimal mix between mitigation, adaptation and geoengineering.	No action; comment unclear
7923	3	22				The problem of weighing and aggregating peoples utility is highly sophisticated and has not been resolved in utilitarian theory so far. In addition, it faces rather fundamental challenges (as famouslyexpressed by Parfit (1984) and Rawls (1971)). Therefore, the goal to maximize utility over time is problemtaic and discussions on how to do it best should occupy less room.	If it's difficult it needs more space, not less.
10965	3	22	32	27	4	The point that is being made in this section is in the last sentence of four words. The section could be shorter in areas like covering the Pareto criterion.	We do have to cover the Pareto criterion and the potential Pareto criterion.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
6468	3	22	33	22	37	This section fails to acknowledge that aggregation of harms and benefits is ethically problematic according to some ethical theories including deontological and rights based theores. In fact the entire section of Chapter 3 is ethically problematic from a deontological ethical perspective. This can be remedied by acknowledging as the Stern report did, that if human behavior create human rights violations, the welfare aggregation techniques may be unacceptable.	The comment ignores the existence of 3.3. However, the chapter has been reorganized to place more stress on this point.
9346	3	23	1	23	1	page 23 line 1: what does ' times arre separable' mean?	No action; this expression is defined.
16636	3	23	12	23	19	Why not assess the different views? Are they irrelevant to policy-making? Or are the authors being prescriptive by omission? Explain the reasoning behind this to clarify doubts.	No action; comment unclear. The paragraph says that the assumption is false but unavoidable.
12141	3	23	2	23	3	The concept of separability is first introduced in 3.4. Also, doesn't 'weak separability' need to be defined?	No action; the notion 'weakly separable' is not used in the analysis.
4492	3	23	20	23	28	This paragraph (and the preceding text) implicitly assumes that "practical decision-making" has to be case in cost-benefit form. It most definitely does not. There are other criteria, the most basic being "right vs. wrong." (This is not meant to imply that it is easy to determine which is which in some situations.) It is a economistic fallacy to assume that all collective action problems can be framed as cost-benefit problems.	No action; disagree with comment. Judging goodness is always a matter of balancing goods against bads.
16637	3	23	20	23	28	Clarify how social welfare functions can be used as practical tools or what can the theory helps us understand. Shorten this section. Many of the technical details can be excluded. Highlight the examples with practical applications.	Practical dimensions of CBA will be expanded
14244	3	23	6	23	11	It might be worthwhile noting that, in the context of how section 3.4.4. aggregated temporal well-being into life-time wellbeing, the pure discount factor in equation 3.5. assumes that individual temporal well-being is aggregated at the same rate as wellbeing is aggregated over generations. However, there is some argument to be made that individual temporal well-being should be aggregated according to the individual's time preference, while the generational discount rate is usually considered more suceptible to normative reasoning. Section 3.5.1. assumes that temporal individual well-being is aggregated over individuals first and then aggregated discounting at a rate delta. If 3.4.4. should still hold, then delta entangles individual and generational discount rate assuming implicitly that they are the same. Work like that of Calvo & Obstfeld (1988) [Optimal time-consistent fiscal policy with finite lifetimes. Econometrica 56: 411–432.] distinguishes the discount rate at which individual's discount their own temporal well-being and the rate at which a social planner discounts the lifetime well-being of different generations. Also note that in the climate change context, Schneider et al. (2012, forthcoming) [Tradingoffgenerations: Equity, discounting, and climate change. European EconomicReview, http://dx.doi.org/10.1016/j.euroecorev.2012.08.006] show that there is a tension between intra- and intergenerational equity if a normatively chosen generational discount rate differs from an individual's time preference rate.	Noted; partially addressed in revision.
4348	3	23	22	23	48	Indication of negetive side of use of forest biomass is important. However, suggestions from the positive side to overcome the disadvantages are useful for the dicision makers.	No action; comment unclear; page and section reference numbers incorrect
6313	3	23	29	24	37	It should be noted here that many have argued that converting ethical values to monetary values cannot happen without loss in all situations. See the work of Mark Sagoff, for example.	Included reference to Sagoff

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
8584	3	23	30	25	44	It is a problem that an entire section discussing the - very difficult and ethically problematic - use of monetization to represent value, and WTP/WTA does, at no point, refer to any of the literature that addresses the limitations of WTP/WTA as a methodology. I honestly cannot imagine another section of the IPCC leaving out a debate of equal importance and pretending it does not exist. It would require little extra space to acknowledge the limitations of this methodology which are CORE to the purpose of the chapter, which is presumably to present the literature that specializes in the interface between ethics and neoclassical economics when attempting to address cliamte change.	Noted; there is now more about this
11560	3	23				Compensation is only discussed in relation to money distribution. There is need for a thorough methodological and theoretical explanation and justification.	Mentioned problems of money as a numeraire
6469	3	23	29	25	44	This section is ethically problematic if it fails to sacknowledge that applying monetary values to determine ethial duties is according to some ethicall theories unacceptable and deontoligical theories in particular. The section is acceptable if it is clear that the utilitarain assumption of this section are contested by many ethical theories and that these conflicts are resolved by ethics on the strenght of ethical arguments about duties, not by efficiencey calculations.	There needs to be something at the beginning to forestall this sort of thing.
8149	3	24		25		There is a nice discussion of contingent valuation methods and the challenges in using it in Chap. 14 of Boardman et al Cost Benefit Analysis: Concepts and Practice (Prentice Hall, 2006). The chapter also discusses some of the judgment biases (e.g. loss aversion, ordering effects, embedding) that impact on behavior. You might want to include some of these concepts here as a way of introducing descriptive models of choice.	Noted; will be addressed in SOD. These issues are now covered in seciton 3.10.
11532	3	24		25		There is a nice discussion of contingent valuation methods and the challenges in using it in Chap. 14 of Boardman et al Cost Benefit Analysis: Concepts and Practice (Prentice Hall, 2006). The chapter also discusses some of the judgment biases (e.g. loss aversion, ordering effects, embedding) that impact on behavior. You might want to include some of these concepts here as a way of introducing descriptive models of choice.	No action; duplicate
9802	3	24	1	24	2	The contingent valuation approach is subject to controversy for different reasons. Concerning climate change you should address one of these reasons: the monetary value of climate change is very difficult to assess on an individual level, due to time (the effects will happen in the future) and space issues (they will occur somewhere else). Nevertheless it is a good screening approach.	Noted; mentioned problems of money as a numeraire
12244	3	24	29	24	30	Please change "extremes of wealth between rich and poor countries" to "extreme differences in wealth between rich and poor countries".	Done.
13937	3	24	39	24	47	This box does not add. The text is sufficientñy clear regarding qalys.	Since value of life is a difficult topic, a box seems worthwhile

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
16931	3	24	39	25	28	Box 3.1 “Value of Life”. This box (and the associated text) needs to show far more sensitivity to the issues and the history of the IPCC Second Assessment. In the first place, the SAR did clarify that the concept is entirely about the “Value of Statistical Life (VOSL)” – not the general Value of Life. I would strongly urge this chapter to use the precise term. Second, the writing seems to miss entirely the fundamental point that led to the blow-up in the SAR. VOSL varies between countries – absolutely. As long as there are no transboundary effects, this doesn’t matter: it is a simple statement of fact. However, since climate change is a global problem with intimate transboundary effects, it is a fundamental moral issue as to whose VOSL is appropriate. VOSL obviously reflects the resources a country has. To be blunt, extending the example in the chapter, if US emissions kill Indians, it is US resources that would be deployed to reduce these emissions. The Indian VOSL is logically irrelevant except in an “opportunity cost” sense that the US could save more Indian lives in other ways, but this is only hypothetical and hence of no relevance unless it is matched by actual US foreign aid expenditure and substitution thereof. Both the political history of the SAR confrontation and the basic logical points it revealed are summarised in Grubb M., C. Vrolijk and D.Brack, The Kyoto Protocol: A Guide and Assessment (1999, Earthscan, London), Annex 2: Key themes in economic debates: insights from the IPCC Second Assessment Report. I would hope that by now there are full accounts since but I have not seen them.	This report takes a different view about the value of life than the SAR's. This is because it takes a different approach to the foundations of cost-benefit analysis. However, we are careful not to say the SAR was mistaken. We do not have the space to engage in much debate about this.
12142	3	24	42	24	43	Note that consequentialist theories do not have to accord the same weight to benefits and harms.	We can't say everything.
4620	3	24	44	25	28	It should be pointed out that it is the value of qalys which enter benefit-cost analysis and not qalys themselves as these cannot be invested; S.Frederic, Understanding discounting, J. Econ.Psychol., 2006, 27: 667-80	Noted; the box points out that qalys need an exchange rate with money to be included in a cba
13936	3	24	1	24	2	Declared preference valuation are not only contingent valuation ones. This has to be clarified. But, more than that, all methods are "subject to controversy, not only contingent valuation as the text seems to suggest. Think you should rephrase this sentence.	Noted; will be addressed in SOD. Techniques of valuation have been moved to 3.10.
13938	3	25	29	25	38	This paragraph is a digression. Optimal taxation appears as out of the subject this section is dealing with.	No action; disagree with comment
7926	3	25	29	25	38	It is an old and outdated perspective that taxes are always inefficient, as shown by the year of the citation.	Noted.
16638	3	25	39	25	44	This paragraph needs more support. Add more references. Move the sentence that talks about the catastrophic collapse of population to a footnote or develop the full argument. This is an intriguing but potentially contentious idea.	The possibility clearly exists, and there seems to be no reason to ignore it.
18385	3	25	8		40	The problem with these economic calculation is that they fail to take account, to use a simple example, of the fact that paying the high cost and intensity of care required for extended life make the reduce the availability of these doctors, increase their prices both of which make care more difficult & refocus research on long-life vs tropical diseases, for example. These points are only infrequently included in cost-benefit analses.	No action; this comment muddled values with constraints.
12783	3	25	34	25	34	Is the reduction of inequality a target of climate change policy in general?. Rich countries may also focus on the need principle for the distribution of emission rights (In this context also see Carlsson, Fredrik; Kataria, Mitesh; Lampi, Elina; Lofgren, Asa; Sterner, Thomas (2011): Is Fairness Blind?--The Effect of Framing on Preferences for Effort-Sharing Rules. In: Ecological Economics 70 (8), S. 1529–1535. Online verfügbar unter http://www.sciencedirect.com/science/journal/09218009)	No action. This seems to miss the point. It's not that inequality is a target but that it affects valuations.
8150	3	26				Can you relate the Pareto criterion to a CC example?	There is more detail in the box.
15360	3	26				That is not the application of potential Pareto; it is to separate efficiency and allocation according to the second theorem of welfare economics – no decision in isolation. Potential Pareto says unless we are unable to fix distributional effects the action offers an opportunity to get the best outcome.	No action; the potential Pareto criterion is stated and then refuted. There is no fault with the logic.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
3936	3	26	10	26	11	The statement that a greenhouse gas exernality makes the world economy inefficient in a Pareto sense is false as stated. The world economy can only be made more efficient in a Pareto sense if some way can be found of improving the welfare of at least one person without reducing that of anyone else. To prove that proposition one must identify that way and use it to prove the point. And in doing so one must consider all the real world problems with political processes, taxes etc. The sentence gives no evidence that any such measure has been identified. Lines 11-12 suggest that instead what is being proposed is that the externality could be eliminated in a frictionless situation where all potential losers were costlessly identified and fully compensated without incurring any transaction costs or adversely affecting any incentives. No resources would be spent in lobbying for colmpensation for example. If that is what is being argued, it is little wonder that the point does not register strongly in international negotiations. A related point is that the economists' neolclassical models commonly assume that NGOs and others will not self-create to deal with the externality independently of government action.	This has been put into a box with more detail
7361	3	26	11	26	14	It is very unclear what is meant by it being "possible to eliminate the externality in a way that is good for everyone." The incorporation of the externality into prices may over time result in the same (or inreased) level of welfare but in a theoertical sense but in a "real" sense that internalisation imposes significant immediate costs that cannot be construed as anything other than "sacrifice." I am also unsure that the phrasing "eliminate the externality" is appropriately specific.	This has been put into a box with more detail
6978	3	26	30	26	43	This material could be cut without loss: the subsequent para is sufficient.	No action; disagree with comment
12245	3	26	34	26	43	These paragraphs are a bit unclear. Please elaborate the basis for the critique.	It's hard to see how it could be unclear. The argument follows the standard form of reduction by absurdum.
12246	3	26	44	27	4	We think this critique is a bit misplaced, as the potential Pareto criterion is a criterion for efficiancy and not suited for deciding matters of wealth distribution.	No action; the potential Pareto criterion is stated and then refuted. There is no fault with the logic.
10421	3	26	5	26	14	This framing of the externality might be controversial without additional references.	Noted; this has been put into a box with more detail
7927	3	26	5	26	14	We do not understand why nobody would be worse off, if externalities are internalized. What is with those that received benefits from externalizations? Please explain.	This has been put into a box with more detail
16639	3	26	6	27	24	What are the consequences of this assumption in practical evaluation?	No action; something wrong with the numbering of this comment.
9394	3	27		30		The discussion on "discounting future goods" is very informative; yet, it does not include the discussion on whether or not discounting is desirable/is right in a moral sense. Authors in the camp of strong sustainability are very critical of discounting. Authors who defend an eco-centric approach often reject discounting.	We are aware of this. Discounting techniques and sustainability conditions may contradict each other. A discussion about this should be made on the chapter about sustainability.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
11365	3	27	11	27	12	The text says that the discount rate tells us how much one should do for the future. But: the discount rate *alone* does not tell us that. One needs *additional* assumptions for that. In order to know how much one should do for the future one needs in addition to assume, for example, that the objective of policy should be to "maximize the discounted total of utility (...) over time" (page 28, line 25-26). This additional assumption together with the discount rate then tells us how much one should do. However, this additional assumption is highly controversial. Maximizing a SWF -- especially one that consists of a sum of (discounted or undiscounted) utilities -- goes not only against the commonsense of many but also against the views on intergenerational justice discussed in section 3.3.2. Many would consider it much more reasonable to define a level of welfare that is owed to future generations (or other things that are owed to future generation) *independently* of maximizing a certain sum. Maximizing a sum could demand too large sacrifices from the present generation (if a low discount rate is used) or too little from the present generation (if a high discount rate is used). For references, see for example: Simon Caney (2008), “Human Rights, Climate Change, and Discounting,” Environmental Politics, 17 (4), p. 549. John Rawls (1971): A Theory of Justice, Cambridge: Harvard University Press, pp. 297 - 98. Dominic Roser (2009), “The Discount Rate – A Small Number with a Big Impact”, in Center for Applied Ethics and Philosophy (ed.), Applied Ethics: Life, Environment and Society (Sapporo: The Center for Applied Ethics and Philosophy, Hokkaido University), pp. 12 - 15.	No action; see justice sections for different ways of viewing social welfare. As 99% of the literature on discounting, this section is based on the assumption that the collective objective is to maximize a discounted sum of future expected utilities.
4622	3	27	21	27	21	the value of consumption (see comment 36)	No action; comment unclear
10703	3	27	23	27	23	Could it be explained more why different discount rates should be used for different assets ?	Will be addressed in SOD
7928	3	27	4	27	4	Rather than "credible" you should write "morally acceptable" or "unfair" or "immoral".	No action. What is at issue is the truth of a proposition, not the fairness of a proposition.
3937	3	27	4	27	4	The argument that it is not credible to propose that the rich should benefit at the expense of the poor without compensation for the poor seems to be inconsistent with the proposition that the world today should make an uncompensated sacrifice in favour of wealthier future generations. Should the paper advise policy makers about how to think about this implication?	This is a good point. The example is now tightened up. No inconsistency need arise.
4621	3	27	5	27	5	The title should read: Discounting the value of future goods because not all goods can be invested (see comment 36)	Will be addressed in SOD
9803	3	27	5			Please sound this paragraph with the corresponding deliberations in chapter 2.	Noted. Cross chapter consistency will be addressed
9285	3	27	6	27	19	The last line is confusing in light of the previous paragraph. The first paragraph in this extract says 'the discount rate tells us how much one * should * do for the future' (emphasis added). The second paragraph then asserts that there are normative and positive perspectives on the discount rate, and that 'both approaches can be relevant, depending on the application'. This is naturally read as implying that there is a purely positive approach to the question of what one should do. But that is absurd. The point might instead be that one can ask both normative and positive questions about discounting (how much should we discount/how much do various bodies discount in various contexts), rather than that there are both normative and positive approaches to answering a single question. Or it might be that some approaches to answering the normative question take answers to the positive question as part of their input, alongside normative additional premises (e.g. a 'democracy'-based premise to the effect that governments/intergovernmental organisations ought to discount to the same extent that individuals in fact do in such-and-such settings). I suspect the latter is what the author has in mind, but this isn't clear from the current text.	Will be addressed in SOD; will add 'under the normative approach' at the beginning of the sentence

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
8585	3	27	6	27	13	The word should is used repeatedly in this paragraph. The inference is that the result of CBA tell us what we SHOULD do. This blatantly disregards any other ways of making decisions and leads the reader to imply that CBA results are the only form of evidence required for making what are necessarily incredibly complex decisions. I realize this seems like a ridiculously petty comment but I am drawing attention to it because of the much broader assumptions it makes that are rife throughout this chapter which gives profound preference to neoclassical eocnomics over any other way of thinking about climate change decision making.	No action; CBA is justified as the benchmark operational toolbox to evaluate policies from the previous section of this chapter. Limitations to CBA are expressed in other chapters.
10422	3	27	6	30	24	Less theory about the General Ramsey rule and how it can be framed to incorporate climate change vulnerabilities, or intergenerational inequities in the face of climate change	No action; the Ramsey rule is precisely about taking into account of intergenerational inequalities and inequality aversion for evaluating policies
9347	3	27				A concluding para needs to be added to Section 3.5 to provide guidance with respect to climate change: what about cost-benefit and climate chage?	No action; we believe the issue is already dealt with adequately. In addition, note that the entire ipcc work is about being policy relevant BUT not policy prescriptive
8596	3	27		27		I have mentioned several detailed comments for this section - and as I have suggested elsewhere - an entire reorganization of the text would be best solution. However, at the very least a better introductory paragraph that says something along the lines of; "Aggregation is required for a variety of economic analysis techniques and is covered in this section. It should be noted however, that assumotions about aggregation can be problematic from an ethics perspective. For instance, as discussed in Section 3.4, many values are difficult to monetize. In addition, many issues of concern may not be feasible or meaningfully aggregated. Despite these limitations this section is focussing primarily on eocnomic strategies of aggregation due to their widespread use. As discussed in Section 3.9 adn 3.11, there are other ways of valueing wellbeing and of conducting analysis"	Noted; the chapter has been reorganized in response to this comment and others like it, to make the limitations more explicit.
14257	3	27				When discussing delta (the pure time preference discount rate of future utility), I miss discussion of the vast empirical and experimental literature showing evidence of a delta that decreases with the time horizon of the future cost/benefit. Quasi-hyperbolic discounting is one possible example; hyperbolic discounting another. These intuitive preferences are very important when the time horizon is as long as for climate change impacts. CBAs should reflect/respect such preferences.	Will be addressed in SOD
8151	3	27		30		Discounting future goods You might want to introduce descriptive models of discounting that illustrate hyperbolic discounting and other behavioral principles in behavioral economics. (See the discussion on quasi-hyperbolic time discounting in FOD Chap. 2 Sect. 2.2.3) and the examples we use to highlight these points. You could then relate these descriptive models to normative discounting models (i.e. exponential discounting).	Will be addressed in SOD
11533	3	27		30		Discounting future goods You might want to introduce descriptive models of discounting that illustrate hyperbolic discounting and other behavioral principles in behavioral economics. (See the discussion on quasi-hyperbolic time discounting in FOD Chap. 2 Sect. 2.2.3) and the examples we use to highlight these points. You could then relate these descriptive models to normative discounting models (i.e. exponential discounting).	No action; duplicate
7924	3	27				Please account for the philosophical literature on discounting (e.g. Parfit 1984, Broome 1992, the conbtributions in Ott/Hampicke 2003, Ott 2003, Baum 2009, Roser 2009, Caney 2009, Hampicke 2011). Section 3.6 is not an appropriate review of the relevant literature but is highly biased and no progress with repsect to SAR has been made. Given that the preceding sub-sections draw on utilitarian thinking it should be mentioned that utilitarians reject discounting future utilities/well-being.	Noted.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
12784	3	27	20	27	26	When dealing with discounting issues you may also like to have a look at Pigou, A. C. (1920), The Economics of Welfare. London: Macmillan and Company or Ramsey, F. P. (1928), A Mathematical Theory of Saving, in: Economic Journal 38, 543 – 559), Arrow, K. J. (1999), Discounting, Morality and Gaming, in: P. R. Portney und J. R. Weyant (Hrsg.), Discounting and Intergenerational Equity, Resources for the Future, Washington D.C., 13 – 22). Buchholz W., Schumacher, J. (2008), Discounting and Welfare Analysis Over Time: Choosing the η CESifo Working Paper Series.	Will consider these references
12785	3	27	32	27	32	This utility function is not consistent with the notation in the previous section.	No action; this utility function is not introduced in the previous section. See page 28 line 24.
10702	3	27	5			Interesting and useful section. But could it be showed more clearly how discounting of costs (and impacts of emissions) are being done? (Or alternatively, point to parts of the chapter where this is used). This could make it easier for non-economists to understand the application and the role of discounting in the context of climate change.	No action; this is not the right chapter to do that.
10966	3	27	5	30	24	Comparison of different approaches such as those of Stern and Nordhaus has already led to an appreciation that discount rates tend to be overused. Much of this is recognition that both collective values in an increasingly urbanised society, and growing dependence on long term infrastructure, are quite different to the more individualistic consideration of values that applies in the commercial context. In order to be more specific for the context of climate change, this section should consider the growing recognition that some forms of government decision making for the allocation of major assets can be classified as either delays in mitigation or as maladaptation. For example, construction of a major state highway on land less than 2 meters above sea level is an obvious example where use of a discount rate determines a planning horizon of about 30 years, but it then tends to cluster a wide range of public and private investment into assets that will not be sustainable. The future impacts will be experienced by an increasing population which has also been accumulating per capita wealth at a rate higher than inflation. So depreciation is outweighed by the other factors.	No action; all these effects may be relevant to Benefit-Cost Analysis, but this does not affect the way we should determine the rate at which these costs and benefits should be discounted.
14245	3	27	5			This is a very nicely written summary of dicounting. However, I would like to raise awareness on the literature discussing non-constant and, in particular, hyperbolic discount rates. In particular, in the context of the current chapter on Ethical Concepts and Methods, I would consider the case of interest where hyperbolic discounting arises as a consequence of intergenerational altruism. While the papers on this topic emphasizing the point in the climate change context are still under submission [e.g. Karp, Provision of a public good with altruistic overlapping generations and many tribes], Ekeland & Lazrak (2010) [The golden rule when preferences are time inconsistent, Mathematical and Financial Economics, 4(1)] make the point in a slightly different context. Ekeland & Lazrak's reasoning implies hyperbolic discounting formulas very similar to those applied in the climate change economics by Karp (2005) [Global warming and hyperbolic discounting, Journal of Public Economics 89: 261–282]. A different rational for hyperbolic discount rates relates to which some of the authors of the chapter contributed themselves, derives hyperbolic discount rates from the limited substitutability between environmental goods and anthropegenically produced consumption, which connects directly to the ethical concept of weak and strong sustainability, which itself is likely discussed in more detail in a different chapter.	All these new insights from the recent literature and DP are useful and important. However, given the limitation of space, it is extremely difficult to introduce them in the text.
12247	3	27	5			This section 3.6 is very informative, well written and to the point on a very difficult subject.	Thank you for your comment.
4347	3	28				Like 11.2, consump-side options in the table should be enriched. The contents in the table can be devided into several potions.	No action; comment unclear; page and section reference numbers incorrect

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
4493	3	28	16	28	16	As noted above (in comment # 12) the "Ramsey rule" as applied to the climate problem is an analytical mistake. Different kinds of assets have different rates of return.	No action. Yes, the Ramsey rule is about the rate at which safe assets should be discounted. A risk premium must be added for risky projects, as in climate change. This is discussed later in the section.
7925	3	28	16	28	24	The interpretation of equation 3.6 is far too simple. The discount rate depends on expectations regarding growth AND the scarcitiy of many DIFFERENT goods.	No action; this is not related to discounting. CBA should also take into account of the evolution of scarcity, thus of value. See page 27 lines 20-26.
12143	3	28	17	28	17	The reader needs to be introduced to the concept of pure time discounting before ð is introduced and defined.	No action; because of lack of space, we prefer to leave the text as it is now.
2125	3	28	23	28	23	Is there an implicit assumption here that individual well-being is determined by preference-satisfaction? If so, is the assumption necesssary?	No action; we assume that.
11366	3	28	26	28	26	This is a minor remark but genuine utilitarianism would not accept a rate of pure time preference (delta) larger than zero. If one uses a delta > 0, one has foregone utilitarianism.	No action; we allow for delta=0 in the text.
14372	3	28	30			Should refer to previous IPCC related analysis of this issue in: K.J. Arrow, W. R. Cline, K-G. Maler, M. Munasinghe, R. Squitieri, and J.E. Stiglitz, "Intertemporal Equity, Discounting, and Economic Efficiency," in Bruce, Lee, and Haites, Climate Change 1995: Economic and Social Dimensions of Climate Change (Cambridge Univ. Press), chapter 4.	Will consider this reference
6979	3	28	34	28	34	The description of the arguments referred to as 'largely intuitive' is seriously misleading. These argument are moral/ethical. Also, Rawls' rejection of a positive discount rate should be referenced here, as should Gardiner's discussion in Stephen Gardiner, 'A perfect moral storm' (Oxford: OUP, 2011), chapter 8.	Will be addressed in SOD
13939	3	28	37	28	38	Suggest to rephrase last sentence before the box. "One additional? argument is that it? Places an extremely moral burden on the current generation".	Will be addressed in SOD
9804	3	28	40	29	5	Are deliberations like Box 3.2 really intended to be integrated in the IPCC report? They are nice thought exercises, but I do not see the impact on the reader. Either you should further elaborate on climate change or you leave it out.	No action; we consider it to be useful for helping the reader to understand the meaning of the calibration.
4623	3	28	7	28	7	to inequalities. Add "one will have an incentive to spread consumption over time"	Will be addressed in SOD
7929	3	29	11	29	12	The median of 4-5% should not be seen as a reasonable choice for it ignores important arguments against such a rate. See the next comment (80).	Will be addressed in SOD
14373	3	29	9			Cline (1992) was the first to use the Ramsey framework for discounting climate change on a century-scale horizon. It would be appropriate to include this reference in the table. Its entries are: delta = 0 (zero pure time preference); eta = 1.5 (elasticity of marginal utility; reaffirmed in Cline 2007 based on observed income tax structures); g = 1% long-term per capita growth. (Cline 2007: Yale Symposium on Stern Review; www.ycsg.yale.edu/climate/stern.html)	Will be addressed in SOD
9286	3	29	9			The 'delta'-value of 0.1% for Stern 2007 is not strictly speaking correct, given the way the author has defined delta on p.28. (Delta is defined here as the rate of pure time preference. Of course Stern's 0.1% is discounting for risk, not pure time preference.)	No action; we agree. Because of lack of space, we prefer not to enter into this level of details.
4624	3	30	10	30	10	…to the distant future, add "giving rise to a declining discount rate"	No action; comment unclear; line reference appears incorrect
16640	3	30	16	30	24	This paragraph should be closer to the start of the section. It provides a good introduction to the ideas in the section.	Will be addressed in SOD

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
7456	3	30	18	30	25	“The strategic energy fund has three lines of financing ---3) the scaling up renewable energy plan (SREP) launched in 2009 to enable government support for renewable energy market creation”. Already in most if not all developing countries there is a vibrant market in fuelwood and charcoal trading etc. However, in some countries there are bans on charcoal production (but not trading), nighttime transport of fuelwood and charcoal, but not petroleum products, etc. These private-sector initiatives should be encouraged and SREP should be involved in removing such restrictions. Mainly they are in place so that ‘officials’ can collect bribes.	No action; comment unclear; section reference appears incorrect
4494	3	30	2	30	15	This paragraph does not do justice to Weitzman's insight. His result does not depend "heavily" on the marginal utility tending to infinity as consumption approaches zero; rather, the argument is that in the face of irreducible uncertainty the possibility of catastrophic outcomes comes to dominate the analysis. It is misleading to downplay Weitzman's argument just because marginal utility may not actually go to infinity.	Will be addressed in SOD; will remove the word "heavily" and a new sentence that recognizes the importance of catastrophes.
4495	3	30	23	30	24	It is not necessarily the case that the discount rate should be the "risk-free" rate. Insurance policies have negative rates of return. As a side note, there is no observable risk-free rate; U.S. t-bills, for example, are not necessarily risk-free.	We agree. We remind the reader that this section is mostly about the risk free rate, and that a risk premium should be added/substracted if the projet raises/reduces the aggregate risk.
7930	3	30	23	30	24	"The discount rate described here should be used to discount risk-free costs and benefits." Is there any specific discount rate described in this section? If so, which?	No action; same comment as 4495
4496	3	30	31	30	32	It is not the case that equity can be separated from efficiency when there are externalities. It seems odd to make this assertion in a text devoted to the largest global externality of all.	No action; no change implied, adequately addressed (line 32 of page 30)
8587	3	30	31	30	35	"Conceptually, climate change mitigation among countries translates to determining emissions entitlements according to chosen equity principles, and then trading in entitlements in markets". Really? Statements like this that do not recognize valid debate about what climate change mitigation SHOULD include (many would argue that trading should not be included for ethical reasons; many other would argue that trading has serious limitations for mitigation) are profoundly problematic. It is possible that this section was poorly written, and that the authors meant to write that "in a stricly neo-classical theoretical model climate change could be simplified into allocations of entitlements which could then be traded, however the realities of climate change pose difficulties for this theoretical construct, and there are many other ways of understanding the challenge of mitigation". However, as it stands this is another example of the failure of this chapter to reflect much of the ethics literature, and to miss key opportunities for constructive discussions between ethics and neo-classical economics thinking.	No action; no change implied as the views of some against suitability and goodness of trading is noted elsewhere in the chapter and in lines 13 to 18 on page 31 of this section
3938	3	30	32	30	33	The paper needs to be aware that markets and the common law do commonly have mechanisms that respond to potential inefficiencies due to externalities. For example, many negative externalities (eg proximity to noise) get reflected in lower land values. Those who buy those properties are thereby compensated for the adverse location effect. Economists distinguish beween pecuniary and non-pecuniary externalities. So the text needs to have a more nuanced discussion of externalities. Another point is that markets achieve an efficient allocation of resources even if an uncompensated externality exists - they do so as long as no other feasible real world arrangements would provide better (but still imperfect) arrangements. Another way of making the point is that efficiency has to be judged against the next best achievable alternative, it is meaningless in a policy context to assess market efficiency against an unachievable perfect world alternative.	Noted; will be addressed in SOD

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
6980	3	30	6	30	7	How is this statement of what prudence requires 'in line with' sustainable development?	No action; because it reduces the discount rates, thereby inducing agenst to emphasize the distant future in their evaluation of actions.
9348	3	30	24			p30, line 24 section 3.6 Add Simon Levin's paper on ' the difficulty with discounting'	No action; not clear which paper the comment is referring to
8586	3	30	25	33	26	The title of this section is "Economics, rights and duties". At no point does the section discuss rights. None of the ethical frameworks covered discuss rights. Teh discussion of economic theory does not disucss rights. The challenges of rights and compensation (and non-compensatory rights) are ignored. Nor does this section actually tackle the relationship of economics to different frameworks of justice despite the first sentence which states that this is the goal of the chapter. For instance, it is not clearly laid out that the first section, Economic efficiency, equity and transfers, implicitly takes a view in which rights do not exist, that compensation is possible, that aggregation of value is possible. These assumptions are central ethical assumptions behind this economic framework and are not identified.	Noted; will be addressed in SOD.
6470	3	30	26	33	19	This section entitled Economics, rights and duties, is deeply ethically problematic in its current form because it resolves conflicts between efficiency and rights conflicts through effienciency arguments. It is seriously flawed ethically because it fails to acdknowledge that equity and rights concerns are usually not resolved by welfare maximization alnalyses. It must contain an express acknowldegment that conflcits between economics,rights, and duties is resolved according to ethics on the strenght of ethical reasoning, not on consequentialist grounds. This is a particularly important addition because the vary title of the section is"economic, rights, and duties>"	Noted; will be addressed in SOD.
3940	3	31	1	31	2	An authority should be cited for the proposition that the issue of who should bear the costs can be separated from the issue of where mitigation takes place. The general contending proposition is that the battle over distribution affects incentives, and thereby outcomes.	No action; no change implied, addressed elsewhere in the chapter
3939	3	31	11	31	15	Again, a perfect world standard seems to be introduced in the use of the words 'undistorted' and 'all participating' countries.	No action; no change implied
7363	3	31	13	31	13	It would be more accurate to say : a system that reconises the difference between the "allocation" of emission rights and the "use" of emission rights "has been regarded as a core element to achieve equitable and cost effective mitigation." It is not necessary to characterise it as a "trading scheme"; instead trading or direct transfers (as referred to at the end of the paragraph) could be included as two models of reflecting the same general premise/objectives.	Noted; will be addressed in SOD
4928	3	31	19			.. e.g. in context of project-based mechanisms or green investment schemes of mitigation actions	Noted; will be addressed in SOD
4939	3	31	27			{Add} abatement potential is in {}many developing countries (because it is not valid for many other developing countries, esp. for majority of the LDCs)	Noted; will be addressed in SOD
4927	3	31	3		6	Oversimplification? i.e unclear how developing countries' mitigation actions fit in this "translation".	No action; no change implied, invalid argument

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
15362	3	31	3			This part comes very close to confusing the question of whether there can (in a game theoretic sense of an outcome that is acceptable to all participants) be agreement on an allocation so that coordinated mitigation can proceed with the ethical question of the right thing to do. Of course, if all participants are motivated by the same moral imperative, then they would choose the outcome that is consistent with, or ranks highest under, that ethical point of view. It should be apparent from history in general and the progress of negotiations, from observing the level of and reasons for foreign aid, and from the stated positions of the parties that there is no such agreement. The discussion of ethical systems leads to characterization of what an ideal climate policy would be from the point of view of different systems. Political economy and the study of international relations reveal what nation-states are actually likely to do in negotiating international agreements and acting unilaterally. Moral reasoning provides a critique of observed and predicted outcomes, which may over time, if articulated well in the families, churches and communities where values are formed, lead to discomfort with the status quo – or to realization that there are other, higher priorities for action to change political systems in order to align public policy better with ethical norms and moral imperatives. Confusing what ought to be with what is likely to be, or worse yet failing to examine proposed solutions critically because their technical deficiencies are covered with moral rhetoric, almost always leads to change for the worse.	No action; no change implied already addressed in various sections
6981	3	31	34	31	35	These transfers could be intergenerational in scope.	No action; no change implied
13006	3	31	42	31	43	In the interest of balance, such worries also arise for economic arguments.	No action; no change implied
8152	3	31	8			I like the example of using Pigou to determine optimal adaptation and mitigation as it relates to emissions reduction.	Thank you for your comment.
17293	3	31				There is an emerging literature on this and also part of the UNFCCC Cancun Text.	No action; no change implied
14847	3	31				Sec. 3.7.3 may be redundant with material discussed in more detail in Ch 4.	Noted.
8153	3	31		32		An example illustrating how these different principles apply to CC would be helpful here.	Noted to be considered in revising
15647	3	31				There is considerable overlap between this section and section 4.7.3.2 (equity principles). It would seem preferable to discuss the operationalisation of equity principles in greater detail in Chapter 4 rather than Chapter 3. The graph provides a simple illustration of the implications of different principles, and could be maintained wherever it is relocated to.	Noted to be considered in revising
17163	3	31	36			You could possibly take into account: Knopf, B./Kowarsch, M./Lüken, M./Edenhofer, O./Luderer, G.: Chapter 26: A Global Carbon Market and the Allocation of Emission Rights, in Edenhofer, O./Wallacher, J./Lotze-Campen, H./Reder, M./Knopf, B./Müller, J. (eds.): Climate Change, Justice and Sustainability: Linking Climate and Development Policy, Dordrecht: Springer 2012, pp. 269-286. There you can find both a systematic overview of ethical proposals for allocation of emission permits, and an economic estimate (graph!) of what this would mean for different regions in terms of costs.	Noted, will be addressed in SOD; reference cited appears to be grey
15648	3	31	41	31	42	Some of the same authors have nevertheless found that some degree of consensus exists between policymakers from developed and developing countries about longer-term convergence towards equal per capita emissions, the polluter pays principle, and the exemption of poor countries from onerous obligations: see Lange, A., C. Vogt, and A. Ziegler. 2007. On the Importance of Equity in International Climate Policy: An Empirical Analysis. Energy Economics 29:545-62.	Noted; will be addressed in SOD
9395	3	32				The authors give a list of principles following Ringius et al. (2002). Even when this list serves as an example, it is necessary to include some of the principles which are now under discussion: "Grandfathering" (which might be part of "souvereignty"), "Across the Board", "Basic Needs", "Rawlsian Principle", "Proportionality Principle". Each of these principles represents what the authors say is in fact critical: "common, but differentiated contributions and rights", p. 33, line 11.	Noted to be considered in revising
6982	3	32	1	32	2	Reference Keith Hyams, 'A Just Response to Climate Change: Personal Carbon Allowances and the Normal Functioning Approach', Journal of Social Philosophy, 40/2, 2009, 237-56.	Noted to be considered in revising
12144	3	32	22	32	23	Why is grandfathering termed 'the sovereignty principle'?	Noted to be considered in revising

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
13017	3	32	22	32	25	What is here called “the sovereignty principle” seems to be several different possible principles, some of which have nothing in particular to do with sovereignty, as far as I can see.	Noted to be considered in revising
4929	3	32	29		33	At least there are some "hints" how to operationalize the equity for the developed countries: (Art. 4.2.a " taking into account the differences in these Parties' starting points and approaches, economic structures and resource bases .."	No action; no change implied
9004	3	32	29		31	This sentence is an instance of specious reasoning and uncalled for: "These agreements do not however resolve the fundamental issues in operationalizing equity principles." The sentence refers to the UNFCC Common but Differentiated Responsibility. Principles in agreements have to be operationalized; one cannot expect agreements to "resolve" them "fundamentally" since they are fundamental principles by nature. In fact, Box 3.3 to which the paragraph refers says that the Kyoto Protocol is its "first concrete expression" (page 33, line 13). The reason used to criticize the principle is therefore uncalled for.	No change needed, but should be considered in rewrite
12529	3	32	33			After "principles" add -- "Baer et al. (2009) provide a criteria-based effort sharing framework combining the perspectives of responsibility and ability-to-pay based on the UNFCCC principle of 'common but differentiated responsibilities and respective capabilities and their social and economic conditions.'"	Noted to be considered in revising
9349	3	32	5	32	5	p. 32 line5: the previous two lines, give three alternatives. which of these three does the word " this approach refer to" explain to make clear.	Noted to be considered in revising
3611	3	32	5	32	5	Please add "E.g., Oberheitmann (2010) proposes the inclusion of historical emissions since 1750 for the allocation of per-capita emission rights based on cummulated CO2-emissions" . Cite: Oberheitmann, A. (2010). A new post-Kyoto climate regime based on per-capita cumulative CO2-emission rights—rationale, architecture and quantitative assessment of the implication for the CO2-emissions from China, India and the Annex-I countries by 2050. Mitigation and Adaptation Strategies for Global Change 15, 137-168. DOI: 10.1007/s11027-009-9207-4	Noted to be considered in revising
7931	3	32				This section should be moved (or related) to section 3.3. Here, the distribution of emission permits is discussed already. A similar list was presented in SAR and the progress in the literature since then is ignored. In addition, there is abundant literature on different distributive principles that should be accounted for (in addition to those cited below: Meyer/Roser 2010, Müller et al. 2009, Schüssler 2011, Shue 1993, 1999, WBGU 2009, Jagers/Duus-Otterström 2007, Gosseries 2004, Caney 2009, Bell 2008, Vanderheiden 2008, and probably many more). Also, the souvereignity principle is dismissed in the ehtical literature. A choice between the rivaling concepts is not as arbitrary as portrayed (see for example Gardiner 2004). Also, many authors argue that a combination of two or more principles can make up for the shortcomings of each principle considered on its own (Page 2008, Caney 2010b, Bear et al. 2009, Baatz 2013). The remark that "Normative interpretations of justice, equity and responsibility (see section 3.2) can be operationalized in different ways, implying different patterns of mitigation effort sharing and international transfers (Tol, 2001; Ringius et al., 2002; Heyward, 2007; Müller et al., 2009; Baer et al., 2009; Ekholm et al., 2010). There are no universally accepted principles to determine this choice. The use of equity arguments between nations and within societies may be self-serving (Lange et al., 41 2010)." seems to be a bad joke given two decades of profound investigations and discussions. Obviously, much more can and must be said at this point.	No plans to move section, but comment will be considered in SOD
10376	3	32	1	32	7	Egalitarian Principle is not very clear that the equal share is the equal of past emissions, present emissions, future emissions or the accumulated emissions.	Noted to be considered in revising
12786	3	32	18	32	25	It would be helpful to mention the difference between PPP and SOV (consideration of historical emissions under PPP).	Noted to be considered in revising
15649	3	32	30			Note that the same Article of the UNFCCC (3.1) refers even more specifically to equity, in the phrase that all parties should protect the climate system "on the basis of equity" - this should be included.	Noted to be considered in revising

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
9397	3	33		37		The discussion of "policy instruments" in ethics needs to comprise the debate on "good governance" and needs to discuss the role of democracy in terms of: How can people be involved in decision-making-procedures? What is the role of local communities in terms of subsidiarity? and: What are the democratic principles underlying decisions about environmental policies? Otherwhise, this section of the chapter is not coherent with the claim at the beginning of the report (introduction) that civil society and non-governmental associations play a crucial role in achieving the aims of mitigation. (The authors mention this on p. 45, 24-29, but don't give a normative background.,)	No action - this is treated in chapter 15.
3941	3	33	1	33	19	The ethical basis for the UNFCCC's normative prescriptions in this box are unclear in the light of this discussion in this chaper. Its proposals seem to be aimed a redistribution from rich countries to the poor, but if this is its principle, why is it proposing a transfer from today's rich to those who will be even richer in the future? Could the chapter provide policy makers with more guidance concerning how they should assess ethical values in relation to these propositions? Another point is that these rights and duties make no reference to himan rights - including the human right to be free to make moral choices.	Noted to be considered in revising, one suggestion is to remove Box 3.3
4940	3	33	11			This principle of ‘common but differentiated commitments and responsibilities’ remains	No action; no change implied, confirming
4930	3	33	13			The differences in production/consumption/emission volumes and the related responsibilities (but w/o explicitly referring to the CBDR) were used for distinguishing the commitments of the developed and (majority of) developing countries in context of the 1987 Montreal Protocol (its Article 5 on "Special situation of the developing countries"). Similarly the 1991 legal instrument on reduction of VOC emissions (LRTAP/VOC protocol) introduced) specific emission control commitments for less responsible countries (Art.2.2.c: instead of 30% reduction on the duty to stabilize .. .)	Noted to be considered in revising, one suggestion is to remove Box 3.3
13424	3	33	16	33	17	It is misleading to state that the on-going climate negotiations are aiming for an outcome with mitigation obligations on all major emitters. Nowhere in the agreed climate convention decisions has there been any statement to that effect, nor has the term “major emitters” been accepted or used in the decisions. There are many interpretations of the recent Durban Platform decision (Dec 2011) and if it is to be alluded to, it is important to have a balanced treatment of the literature and of the position of various Parties.	Noted to be considered in revising, one suggestion is to remove Box 3.3
4941	3	33	17			all major? emitters ??? ~ actually on all countries (with flexibilities to SIDS and LDCs)	Noted to be considered in revising, one suggestion is to remove Box 3.3
13940	3	33	2	33	19	Suggest deletion of Box 3.3 since it does not contain any new info and you need to shorten the chapter!	Noted to be considered in revising, one suggestion is to remove Box 3.3
9805	3	33	20			What is specific concerning climate change. If climate change is "just" one specific subdimension of environmental protection, the decision maker could read a textbook on policy instruments and regulations.	Noted; will be addressed in SOD. We will make this section more specific to climate policy.
13941	3	33	31	33	32	It seems there is a typo where you state "… ate policy instruments in particular, see reduction,…"	Will fix in SOD
13567	3	33	31		21	I found some of this language a little confusing - suggest some rewording	Noted to be considered in revising
13423	3	33	8	33	9	Developed countries are not “called on” to provide new and additional resources but have committed themselves to do so.	No action; no change implied, adequately addressed

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
15650	3	33	3	33	19	The box (or accompanying text above) should be more specific in stating that _all_ parties have "common but differentiated responsibilities and respective capabilities" for protecting the climate (as per UNFCCC Art 3.1). The reference to "common but differentiated commitments and responsibilities" is incorrect if it is intended as a quotation from the UNFCCC. At line 13, it is debatable whether Kyoto-style differentiation was its "first concrete expression" of CBDR. Arguably some commitments under the UNFCCC itself, eg on financing (Arts 4.3 and 4.4) qualify as the first concrete expression of CBDR. In any case, it would be preferable to see Kyoto-style differentiation as the "high point" of differentiation, and one that is unprecedented in any other international environmental agreements (see Rajamani, L. 2012. The Changing Fortunes of Differential Treatment in the Evolution of International Environmental Law. International Affairs 88 (3):605-23.).	Noted to be considered in revising, one suggestion is to remove Box 3.3
8411	3	33				I suggest to give more attention in this chapter (or in section 1.4.4) to the effects of energy subsidies. As stated by UNEP (2008, Reforming Energy Subsidies. Opportunities to Contribute to the Climate Change Agenda) it is becoming increasingly apparent that many types of energy subsidies today run counter to the goal of sustainable development: they can undermine private and public investment in the energy sector, which can impede the expansion of distribution networks and the development of more environmentally benign energy technologies such as decentralised renewable energy technologies. Fossil fuel incentives play a heavy burden on government finances, weakening the potential for economies to grow and reducing the potential to invest in social equity.	No action; this is out of the scope of "framing" chapters. As such, assessment aspects of policy instruments are addressed in, e.g., Ch 13 & 15
6084	3	33	20			Subsection of 3.8 need to be restructured. For example, 3.8.2 should be titled as various types of policies followed by 3.8.2.1 economic instruments, 3.8.2.2 prescriptive approaches, 3.8.2.3 information instruments, 3.8.2.4 voluntary actions and agreements.	Good point. This will be restructured.
17294	3	33	21	33	26	“Policy” needs to be defined and the broader issues those are included needs to be identified or indicated.	Good point. We can do that.
11189	3	33	27	35	31	P34 (line 14-20): The discussion on 'hybrid instruments' is very short and supperficial and merely lists some 'old' seminal papers and a theoretical recent one. However, it fails to mention that the most comprehensive 'real world' climate policy to date, i.e. the EU ETS system, actually (and increasingly) is a 'hybrid instrument'. Here the quantity approach (limited number of allowances) is combined with a price approach (indeed, auctioning will be the rule in the power sector from 2013 onwards in the EU). Saveyn et al. (2011) compare the socio-economic effects for the EU for 4 different grandfathering/auctioning/carbon taxation schemes in the context of the Copenhagen Accord. This analys shows that auctioning generates a substantial amount of public revenues. Auctioning (and taxation) complies better with the ‘polluter pays principle’ and avoids handing out ‘windfall profits’ to sectors that can easily pass on the opportunity cost of allowances to their customers. BOX 3.4. is not making any reference to these 'real world hybric instruments' either. Literature: Delbeke, J., Klaassen, G.,Van Ierland, T., Zapfel, P., 2010 The role of environmental economics in recent policy making at the European Commission. Review of Environmental Economics and Policy 4 (1), 24–43 /	Good Point. We can add the point about the EU-ETS … some of the other points ARE addressed in other section of our chapter, like the bit about revenue from selling permits.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
11382	3	33	27	35	31	P34 (line 14-20): The discussion on 'hybrid instruments' is very short and supperficial and merely lists some 'old' seminal papers and a theoretical recent one. However, it fails to mention that the most comprehensive 'real world' climate policy to date, i.e. the EU ETS system, actually (and increasingly) is a 'hybrid instrument'. Here the quantity approach (limited number of allowances) is combined with a price approach (indeed, auctioning will be the rule in the power sector from 2013 onwards in the EU). Saveyn et al. (2011) compare the socio-economic effects for the EU for 4 different grandfathering/auctioning/carbon taxation schemes in the context of the Copenhagen Accord. This analys shows that auctioning generates a substantial amount of public revenues. Auctioning (and taxation) complies better with the 'polluter pays principle' and avoids handing out 'windfall profits' to sectors that can easily pass on the opportunity cost of allowances to their customers. BOX 3.4. is not making any reference to these 'real world hybric instruments' either. Literature: Delbeke, J., Klaassen, G.,Van Ierland, T., Zapfel, P., 2010 The role of environmental economics in recent policy making at the European Commission. Review of Environmental Economics and Policy 4 (1), 24–43 /	No action; duplicate
13568	3	33				only a suggestion but just to point you out to work we've done on a systematic review examining ex post assessments of the effectiveness of climate policiesh as it assesses policies with a finer grain (includes source of authority, regulatory target, etc. and focuses on the policy cycle versus just instrument choice) See page 23+ and Figure 6 http://www.sciencedirect.com/science/article/pii/S0301421500000707	Noted to be considered in revising
9396	3	34				Since this chapter is about ethics, it would be helpful to include approaches which develop a normative background for policies regarding climate change. These are, i.e., authors who work on "ecological citizenship" (Andrew Dobson), and work on "Greening the state" (Wissenburg et al.).	No action - is treated in 3.11
11561	3	34	13			It is relevant to mention here that "the political acecptability of carbon taxes is low"?	No action - we do not want to evaluate what policies are more or less politically acceptable in which countries
11725	3	34	14	34	20	Disagree. At least ['Hybrid' policies combining price and quantity control are likely to be superior.] should be deleted.Refer to No.13.	Will be addressed in SOD
10639	3	34	14	34	20	Doubtful. There is few arguments to support this statements. Please refer No. 7	No action; unclear what no. 7 is
9975	3	34	14	34	14	This part should be deleted completely. Levying "carbon tax" and "cap & trade" simultaneously is not meaningful and would fail to reduce CO2 emission because carbon tax and cap & trade are theoretically same mechanism to reduce CO2 emission, as described in (Clive, 2007, page4-5). <Reference> [1] Clive Hamilton, Frank Muller (2007). Critique of the McKibbin-Wilcoxen Hybrid Emission Trading Scheme, Australia Institute. Available at: http://www.ies.unsw.edu.au/docs/WP98.pdf	Need better explanation of hybrid instrument
11562	3	34	14			"Hybrid policies combining price and quantity control are likely to be superior". Why? More needs to be said.	Need better explanation of hybrid instrument
7932	3	34	21	34	22	Legal instruments should not be termed "command and control" policies. This just expresses an economic bias against the law. We propose using the term "legal regulation".	Consider using prescriptive regulations instead of command and control
13942	3	34	26	34	26	There are two .. in that line!	Will be fixed in SOD
9976	3	34	31	34	33	This part should explain that 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, does not work well, as shown in (Rosendahl, 2011, abstract), (Aichele, 2012, page336), and (Peters, 2011, page1). These literatures are listed in the No50 line of this table.	No action; this is out of the scope of "framing" chapters. As such, assessment aspects of international policy instruments are addressed in Ch 13

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
12248	3	34	35	34	38	Please elaborate further on under which assumpltions prescriptive instruments can perform better then market based instruments.	Good point; we will take this into account in revising section
10976	3	34	31	34	33	Market mechanism is highly recommended here in order to minimize total abatement cost. However, not only merits but also demerits should be stated here.	Good point; we will take this into account in revising section
8250	3	34	31-33	35	2-5	While the authors cover many policy instruments that have been discussed in literatures, however, the existing international flexibility mechanisms such as “clean development mechanism” and “Joint implementation” are not explicitly discussed in this subsection. There is a suggestion that some words about the above mechanism can be incorporated around somewhere between lines 31-33. If these instruments are discussed in a later chapter, then it might be the place to provide a reference about those chapters as well.	Scope of section needs clarifying
9977	3	35	33			Carbon pricing is only one of mitigation measures. In this regard, this section should include "voluntary target scheme" as one of mitigation actions, depending on circumstances. There are successful examples of "voluntary target scheme" in the world. Each industry in Japan has voluntary target and the voluntary target scheme has played a big role, as described in (Yamaguchi, 2012, page35 and 154), (Manuel, 2010, page 6 and 13), and (Yamaguchi, 2010, abstract). In addition, there is also a successful example of "voluntary target scheme" in Netherlands, as shown in (Martijin, 2002, page162). These literatures are listed in the No63 line of this table.	No action; voluntary agreements are already discussed in this section (and in the box).
4497	3	36	1	36	1	Footnote 15 is much more important than the other points made in this paragraph, and should be elevated to being part of the text instead of just a footnote.	No action; it is important, but not covered in our chapter; that's why the footnote refers to chapter 2.
11726	3	36	28	37	3	Expression should be met with section 15.3.6.	Will ensure consistency with chapter 15
9978	3	36	28	37	3	This part should explain the advantages of "voluntary target scheme" and successful examples in the world. Each industry in Japan has voluntary target and the voluntary target scheme has played a big role, as described in (Yamaguchi, 2012, page35 and 154), (Manuel, 2010, page 6 and 13), and (Yamaguchi, 2010, abstract). In addition, there is also a successful example of "voluntary target scheme" in Netherlands, as shown in (Martijin, 2002, page162). These literatures are listed in the No63 line of this table.	No action; the performance of policy instruments is left to other chapters (sectoral, national, international)
6085	3	36	28	36	29	After objective, add "There are voluntary initiative that does not include regulatory authority, ex.Japan".	Noted - action will be taken - discussion of voluntary agreements will be changed
13569	3	36	4			if there is interest in examining the policy cycle more thoroughly (see page 13 inour above report for the Network for Business Sustainability), an interesting examination of Germany's experience in the ETS using the Kingdon garbage can model (different streams, policy windows), please see Brunner Understanding policy change: Multiple streams and emissions trading in Germany Global Environmental Change 18 (2008) 501– 507 http://www.pik-potsdam.de/members/brunner/publications/understanding-policy-change-1	No action; no change implied
13943	3	36	8	36	9	"These legal mandates are called direct regulations or command-and-control approaches". Is already explained before and again in footnote 16. This is redundant.	Will be addressed in SOD
7933	3	36				There are many success stories of environmental regulation in the EU, Germany and Japan (for instance, the so called "top runner approach" in the latter). See, e.g., Martin Jänicke (2012b) as well as his further writings on this topic.	Noted - we will add examples from section chapters
8154	3	36				You might want to consider how individuals process information and the types of decision rules they utilize in determining ways to communicate information for achieving social change (See FOD Chap. 2 Sect. 2.2.2)	No action - this is treated in 3.11

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
11534	3	36				You might want to consider how individuals process information and the types of decision rules they utilize in determining ways to communicate information for achieving social change (See FOD Chap. 2 Sect. 2.2.2)	No action; duplicate
18600	3	37				The double dividend hypothesis (p 37): no clear conclusion.	No action; the double dividend hypothesis does not have a clear conclusion.
11727	3	37	13	37	17	It is reasonable. Hamilton et al. also says that hybrid mecanism would fail the various tests of good policy. 1.Hamilton et al.:[Critique of the McKibbin-Wilcoxen Hybrid Emission Trading Scheme], http://www.ies.unsw.edu.au/docs/WP98.pdf	Noted - need better explanation of hybrid instruments
9496	3	37	13	37	16	good sentence - I can agree	Thank you for your comments.
10640	3	37	13	37	17	Good argument. Hamilton et al. also says that hybrid mecanism would fail the various tests of good policy. 1.Hamilton et al.:[Critique of the McKibbin-Wilcoxen Hybrid Emission Trading Scheme], http://www.ies.unsw.edu.au/docs/WP98.pdf	No action; duplicate
9979	3	37	14	37	16	This part should be kept in SOD because this is a good example of the problem. Levying "carbon tax" and "cap & trade" simultaneously is not meaningful and would fail to reduce CO2 emission because carbon tax and cap & trade are theoretically same mechanism to reduce CO2 emission, as described in (Clive, 2007, page4-5). This literature is listed in the No5 line of this table.	Noted - need to clarify hybrid instruments
8751	3	37	40	41		The achievement of more sustainable consumption patterns depends on how consumers value environmental resources (instead of quality)?	No action; relevant, but not in this section / discussed elsewhere
13570	3	37				the dearth of studies to do with policy interactions is duly noted. That being said, you may wish to have a look (page 69) of the NBS report which also echoes the importance of bundles. In addition, we are currently developing a paper through the climatepolicyinnovation.org network which reflects further on our findings to do with the importance of policy combinations / interactions http://www.climate-policy-innovation.com/	No action; these aspects are further discussed in "assessment" chapters (e.g. 13, 15) or even sectoral chapters.
18386	3	37		38		Why focus only on the interaction between carbon taxes, policies to reduce emission and emission trading ---all of which have serious flaws as policies that might lead to changes in habits and practices with respect to energy use, transport systems, continued search for new oil & gas finds and none moving us towards a transition to a sustainable , clean and green world. It seems an excesively narrow approach.	No action; comment is too vague for action.
17295	3	37				Policy interactions may include “disaster” and “renewable energy” policies as identified in the two respective recent special reports of IPCC.	No action; we believe the issue is already dealt with adequately, e.g. when elaborating on green certificates or insurance (footnote 15). Evlauation aspects as such are addressed in assessment chapters (e.g. 13, 15)
11190	3	37				Carraro et al. (1996) develops the politically important concept of ‘employment double dividend’. Carraro, C., Galeotti, M., Gallo, M., 1996. Environmental taxation and unemployment: some evidence on the ‘double dividend hypothesis’ in Europe. Journal of Public Economics 62, 141–181.	Good point; we will take this into account in revising section
11383	3	37				Carraro et al. (1996) develops the politically important concept of ‘employment double dividend’. Carraro, C., Galeotti, M., Gallo, M., 1996. Environmental taxation and unemployment: some evidence on the ‘double dividend hypothesis’ in Europe. Journal of Public Economics 62, 141–181.	No action; duplicate

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
11563	3	37				The different policy instruments are primarily discussed in terms of economic efficiency. Other considerations should be taken into account as well. What ethical and political consequences may different policy instruments have? Different instruments give priority to different key policy agents. What ethical implication may that have?	No action - ethical aspects are laid in previous sections of Ch3. For actual implicatons of policy instruments, see assessment chapters (e.g. 13, 15)
12846	3	38	12	38	17	My reading based on the preceding lines 7-8 is that the lesson is not simply that raising revenue could reduce inefficiencies. Instead, the lesson seems that revenue would have to be used to reduce other distortions, as stated in lines 7-8: “the superiority of carbon taxes or emissions trading depends on whether generated revenues can be directed to reduce other distortionary taxes.” If the lesson is that revenue should be directed to reducing distortionary taxes, the example of EU permit auctioning is misplaced here (as the revenue from auctioning is not dedicated for reducing distortionary taxes). Rather, the province of British Columbia could be given as an example besides Australia. British Columbia uses carbon tax revenue to reduce business and income taxes (B.C. Ministry of Finance, http://www.fin.gov.bc.ca).	Good point, will be taken into account - DDH discussion will however be moved
13571	3	38	28		28	It may be worthwhile to make a distinction between developing countries (more to do with ensuring basic educational attainment, % educated within their population, etc.) and OECD nations (more to do with marginalized populations having access / affordability to higher education, etc.) (again, bearing in mind these are generalizations). In other words, just to flag that issues like health (take the U.S. for instance) and education and (affordable) housing are also key concerns for industrialized nations also	Will be addressed in SOD
15370	3	38	31		33	Easterly (see William Easterly, The White Man’s Burden: Why the West’s Efforts to Aid the Rest of the World Have Done So Much Ill and So Little Good, 2006.) has argued that plans have not been successful in accomplishing development objectives, whether they have been developed indigenously or encouraged or imposed by multilateral financial institutions. Easterly includes poorer countries in his analysis, which in the terminology of North, Wallis Weingast are fragile Limited Access Orders (North, Douglass C., John Joseph Wallis, and Barry R. Weingast, Violence and Social Orders: A ConceptualFramework for Interpreting Recorded Human History. New York: Cambridge University Press, 2009). Stable limited access orders, including such countries as China and India, have achieved economic growth within a planning framework, but as Acemoglu and Shirk (Daron Acemoglu “Why Not a Political Coase Theorem? Social Conflict, Commitment and Politics”, Journal of Comparative Economics, 31, pp. 620-652, December 2003; Shirk, Susan L. China: Fragile Superpower. New York: Oxford University Press, 2007.) suggest, the plans are successful because they are in the interest of a relatively narrow ruling coalition, and if that coalition does not find adaptation or mitigation to be in its interest they will either fail to be included in the plan or will not be pursued or succeed if they are included.	Will take this into account in SOD
11728	3	38	34			One part of the developing countries don't fit such situation. [Most developing countries] is better expression.	Will be addressed in SOD
9528	3	38	34			Please, add many in front of developing countries due to consideration for China, Korea and transition countries.	Will be addressed in SOD
6086	3	38	34	38	38	The sentences here does not make sense. Therefore either delete or rewriting of this paragraph is necessary. Lack of human and financial resources, advanced technology, and have poorer institutional and administrative capacity may lead to the situation where not only certain market mechanisms such as carbon trading schemes but also direct regulation such as performance standards may not function well. Also the contrast between developing and developed countries with respect to policy choices is misleading. For example, actual climate policy introduced in the united states is direct regulation (CAA) and that in Japan is industry voluntary initiative.	Good point. We can clarify.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
13572	3	38	38			suggest an example of entrenched distortions, which may be politically challenging (e.g. fuel and electricity subsidies) -- see fuel protests in Nigeria for instance http://www.cnn.com/2012/01/06/world/africa/nigeria-fuel-protest-explained/index.html	Will be addressed in SOD
9350	3	38	21			p.38 line 21: Section 3.8.3idoes not show the application of these general principles of taxes etc. to climatte change. This should be added. How, in other words, do these applynin the global context to an all pervading externality, without an international government? Are you defining GHG emissions as a surrogate for climate change?	Good point. Think about how to apply these principles to climate change.
11191	3	38	15	38	16	Saveyn et al. (2011) analyse the potential for a 'double dividend' (incl. employment) in the EU comparing a number of options with an increasing share of auctioning and carbon taxation. Saveyn, B., Van Regemorter, D., and Ciscar, JC. (2011). Economic analysis of the climate pledges of the Copenhagen Accord for the EU and other major countries. Energy Economics 33, S33-S40	Reference will be considered in SOD
11384	3	38	15	38	16	Saveyn et al. (2011) analyse the potential for a 'double dividend' (incl. employment) in the EU comparing a number of options with an increasing share of auctioning and carbon taxation. Saveyn, B., Van Regemorter, D., and Ciscar, JC. (2011). Economic analysis of the climate pledges of the Copenhagen Accord for the EU and other major countries. Energy Economics 33, S33-S40	No action; duplicate
17332	3	38	18	38	21	Consider cross-refering to Chapter 15 when appropriate	Good point. We will look for how to do this.
4931	3	38				3.8.4 In this chapter generally, the equity and responsibility issues in context of the climate change policies (besides their global aspects) appear not only in relation to the developed countries and the developing countries, but also with their specificity for the EiTs (e.g. with their historical responsibility somewhere between the two former groups). In particular and more concretely, in subsection 3.8.4 whilst there are strong differences in these conditions between developed countries and developing countries, it was also clearly recognized that the EiTs were in a "between" situation and it also lead to differences in choice of policy instruments (as compared to those instruments which were generally considered relevant/suitable for the highly industrialized countries). During the early stages of the international negotiations (early 1990s) it was not so evident that these EiTs will undertake any emission control commitments; ultimately it happened with "flexibilities" (as e.g. referred to together with relevant policy choices for various sectors for Hungary in "Climate change and Hungary: mitigating the hazard and preparing for the impacts, 2010, ISBN 978-963-508-605-4 http://www.vahavahalozat.hu/files/vahava-2010-12-korrigalt-2.pdf).	No action; we believe the issue is already dealt with adequately
13422	3	39	1	39	8	The use of investment for climate actions is a crucial economic instrument, for both developing countries (thus it is appropriate to mention it here) and also for developed countries. Thus for example a deliberate choice to opt for renewable energy sources has to be operationalized through promoting investments in those sources, even if they are not at the moment as economical as climate-damaging sources. The investment-led approach, with its accompanying policy instruments such as subsidies and legislation, deserves more emphasis, citing the relevant and growing literature. The use of five-year plans in developing countries to allocate investments in climate-related sectors and activities should also be mentioned in this context. A paragraph or more on the investment-led approach (relevant to all countries) could also be usefully added in section 3.8.2 on economic instruments.	Good point. Investmetns can be mentioned in 3.8.2
13574	3	39	17		20	the examples of economic objectives are rather broad - encompassing aspects as diverse as innovation, lowering economic costs, etc. and so difficult to say that these may (all) be met	No action; no change implied, adressed p39 line 21
2271	3	39	18	39	16	It is strange that the Assessnent of Performance does not include attempts to find out whether greenhouse gases in the atmosphere have changed as a result of these policies Meaureents over land surfaces are almost completely neglected	No action; no change implied. Covered as environmental objectives i.e. reduced emissions

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
8155	3	39	19			How much weight should be given to each of these four objectives and how will this tie into CBA?	No action; we have considered the point but feel it is already addressed (e.g. efficiency says nothing about equity)
13573	3	39	2			just to also note that for many developing countries the focus / thrust of power tends to be on the nation state rather than provincial / local levels of public authorities (again bearing in mind some major exceptions) - e.g. mega cities	Will be addressed in SOD
9351	3	39	8	39	8	p39 line 8 onwards: what about governance deficit in developing countries and its efect on efficacy of instruments? Authors do not mention improving governance as an institutional requirement	Good point. This should be added.
17165	3	39	9			There is a lack of coherence and linkage between this sub-chapter 3.9 and the chapters 3.3 and 3.4. The evaluation of policy options is again basically an ethical (i.e. comprising all relevant aspects, not merely effectiveness, etc) task, conducted along the same principles as those outlined in chapters 3.3 and 3.4, so please link these passages. It remains somewhat unclear where the several objectives are derived from.	We did work on improving links between sections in SOD. See revisions to first parag of 3.9, and other changes throughout 3.9.
8588	3	39				There is a potential here to address some of the challenges of this chapter. I realize that the actual order of sections may not be changeable at this point, however, this type of broader discussion - in which multiple criteria area recognised - would have been valuable before the single-minded dicsussions of CBA etc. By placing this section after the previous it seems as thought the strictly economic criteria should take precedence over all others. If moving entire sections is behind the scope of revisions allowed for this chapter, then one way of addressing this would be to include some of the recognition in this section (ie. that there are many different criteria to deal with in any decision) in the earlier sections on CBA and the use of eocnomics as one tool for helping decision-makers make difficult decisions across non-comensurable dimensions.	Good point; we did consider reorganization, but instead add cross-references to other sub-sections. We added references to sections 3.3 and 3.4, and we add discussion of non-economic objectives. See new parag in 3.9.1.
13268	3	39	17	39	26	How adaptation policies are considered in this four categories description?	No action. Adaptation is out of the scope. This is WGIII, focused on mitigation. WGII is about adaptation.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
16929	3	4				I defer to the comments of my professional colleague Sonia Klinksy, on most dimensions of this topic, but offer one fundamental point. Almost all streams of considered analysis recognise that modern economic systems reside within some higher-level framework of rules based upon moral codes. Dr Klinsky has touched on some dimensions of this. Within institutional economics, it is generally referred to as the "institutional environment" that defines for example property rights along with the basic rights of individuals. These set the boundaries within which markets operate, and within which welfare can acceptably be aggregated for the purposes of policy (see my extreme example in relation to section 3.5). With climate change, there is no global agreement on these fundamentals beyond the relatively loose principles set out in the UNFCCC. That is a core part of the problem. To put it in layered terms, the economic system (and aggregation of welfare) resides within an social environment (which may or may not be formalised institutionally) that defines and enforces the acceptable principles and applications of aggregation and its boundaries. As we discused in the Washington IPCC meeting, trading relates closely to this, since trading implies exchangeability and hence potential to aggregate. The institutional environment for example enforces property rights, and also the bounds (eg. I cannot own and cannot sell my mother, or - in modern societies - slaves). I am allowed to own and trade other species, unless in general they are classified as endangered. These are collective social rules that define the boundaries. A diagram on this nesting might be useful. At the international level, the truce was essentially struck in the Westphalian system that codified the notion of Sovereignty of nation-states. Thus for example, War cannot be justified on arguments that it could improve aggregate global welfare. Climate change strains the system because it involves the actions of each country impacting on others. Climate change by its nature thus transgresses the principle of sovereignty, without any other agreed moral framework with which to replace it. The likely victims have not agreed to any system of how their welfare could acceptably be aggregated, akin to the democratic system that underpins the moral legitimacy of economies within a sovereign state. Hence the recourse to negotiations and emphasis on procedure. For this reason I believe the Exec Sum should follow much more closely the logical structure of the main chapter, which works from the ethical principles, and philosophies of justice, equity, and responsibility, values and wellbeing, before it gets to the economic 'toolkits' of aggregation. In other words the first sections lay out various moral frameworks; these should be developed to define more clearly the boundaries around various evaluation approaches (including aggregation & CBA). The Exec Sum should then I think lay out these boundaries, note that they may lead to incommensurate ways of looking at the problem "objectively", and that these can only peaceable or morally be resolved through negotiation, including some attempts to find proxies that represent the interests of future generations. CBA forms a utilitarian approach that has to be nestled within this, with all the complexities and caveats around the way in which damages (and costs) are aggregated (section 3.5) and measured (3.10).	No action. ES already follows the structure of the chapter very closely.
7902	3	4	1	7	24	In our opinion, this is a rough summary only and should be refined.	Will be addressed in SOD
8825	3	40				this section should include a discussion of the practical impacts of uncertainty. For example, Figure 3.4 as shown suggests a far higher level of precision in comparing costs and benefits than usually is possible; thin lines might be replaced by wider lines or bands to illustrate this important point.	Good point. We now clarify uncertainty. We add: "In particular, the diagram presents costs and benefits as if they were certain. A thorough discussion of uncertainty appears in sections 3.6, 3.8.1, and 3.10.5

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
14374	3	40	1			Discussion reads like textbook; could be a section that could be edited down	No action; no change necessary, though we continue to edit for readability.
8589	3	40	1	41	4	This section starts out promisingly, with a very nice clear recognition that there are multiple criteria to consider when evaluating mitigation options. Line 8 states this section is going to address 4 critiera. All of this is good so far. And then, on line 12, all of this framing is stopped and suddenly the reader is presented with the economic frame for policy analysis (and figure 3.4). This movement is illogical and leaves the reader with the impression that the other THREE criteria are subservient to economics. If the authors wish to include this discussion of an economics approach to decision making, it should be moved to a more appropriate location such as under section 3.9.1.1	Good point, this has been clarified. The paragraphs and diagram do relate to all four criteria, not just economics. See new parag in middle of 3.9.1. The diagram can encompass all objectives, not just the first economic objective.
7934	3	40	12	40	15	An economic framework for policy analysis is adopted. This aproach supposes rational self-interested agents that maximizes personal utility. Given that these are heroic and counterfactual assumptions and given that there are many other ways to analyze policy-making, a reason is needed why this framewok is considered to be appropriate.	This point is addressed in SOD; similar to comment 8589. See new footnote in section 3.9.1.1
6087	3	40	2	40	4	Criterion of promotion effect of technological innovation and diffusion is missing. In line 21-24 of page 6 of Chapter 3, there are sentences such as "Meeting aggressive emission reduction targets will be difficult without major changes in the technology of producing and consuming energy" and "Markets, left to their own devices, will underprovide technological change, even in the presence of a carbon price. Studies suggest that environmental and technology policies work best in tandem". Also in Chapter 1 (page 3, from line 47), there are sentences that "it is likely that deep cuts in emissions will require a diverse portfolio of policies and technologies. It is very likely that here are many different development trajectories, but it is virtually certain that the ability to meet those trajectories will be constrained if particular technologies are removed from consideration or are given excessive emphasis". Also in Chapter 2 (page 38, lines 23-24), there is a description that "Several researchers suggest that future pathways for RDD&D will be the determining factor for emissions reductions (Prins and Rayner, 2007; Lilliestam et al., 2012)". This is pointed out in Chapter 6 (6.4.1) that "autonomous technology might not be sufficient to limit climate change and dedicated resources and policies might be needed to induce it" (p.60, lines 22-23). In any case without rapid technological innovation and diffusion, deep emission cut will be impossible. It is highly appreciated that this Chapter has an independent section (3.12) on technological change. As pointed out in that section, policy can play a key role in shaping both the derection and magnitude of climate-friendly technological change. With this in mind, whether a certain policy has such effect as to promote technology innovation/diffusion is absolutely important criteria for policy evaluation. Please add "promotion effect for technologicalinnovation/diffusion as fifth criteria.	Good point but note that innovation is usually considered in dynamic efficiency. Still, we take this into account in the revised version of the section - by making the above-mentioned issue clearer (comment 8589). We added mention of technology here, but must point mostly to other sections for more substantial discussion; see section 3.12

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
9006	3	40	23	42	36	As in other policy evaluation techniques covered in the chapter (see for example section. 3.9.2.1 for an evaluation of quantitative approaches to evaluating policy), there should be a caveat emptor in the potential uses of a partial equilibrium graph Figure 3.4 for policy evaluation purposes of climate change policies. First of all, partial equilibrium graphs implicitly assume full employment, which is not the case in the developing countries. Again, section 3.8.4 recognizes and example of this in: "strong synergies between development, economic and climate policies are found in the literature" (page 38, lines 29-30). When resources are not fully employed as it is the case in developing countries, Figure 3.4 and microeconomic approaches in general do not provide an exhaustive accounting of the impact. Second, there should be a mention that the important distributional impacts are between types of countries - between developing and developed countries - as listed in Box 3.5 on climate policy applied to coal-fired electricity. Climate policy applied to coal-fired electricity at the global level has the potential of preventing developing countries from installing needed energy supply and constricting the development of domestic capabilities, including those of the domestic private sector, and reducing poverty.	Good point; we clarify assumptions, and how unemployment also matters. We add "full employment" to the list of assumptions, and we discuss the generalization to the case with unemployment.
13575	3	40	1+			a couple of comments here 1) suggest highlighting the challenge with attribution / causality - of course some tools attempt to determine this line of reasoning (e.g. logic models) and more nuanced views acknowledge the difficulty in determining that policy x leads to outcome y	No action; good point but we can't discuss causality.
13576	3	40	1+			just to flag again that economics are only one way to conduct policy evaluation -- these economics models can be helpful but speaking both as a former policy practitioner for the Cdn government and in assessing policies in a an academic sense, there is many a time when what these 'models' indicate rarely reflect what happens on the ground -- policy choices are to do focusing events / crises, political / constituency concerns, ideology, etc. - see Pal (2010) in Beyond Policy Analysis Nelson: Toronto	Will took this into account in SOD - we added caveats and discuss alternative approaches
13577	3	40	1+			an alternative view of policy choice and evaluation comes from systems dynamics and related views - an undergraduate student (Harris Berton) directed me to complexity theory (Morcol 2002) (see Pal 2010 page 357) and that rather than assuming linearity (the world, policy decisions as a clock) one can think of them as a cloud - where boundaries change and shift and is more difficult to assess the individual components of, but nevertheless it remains a cloud)	No action - good point, but not clear how this is helpful.
13944	3	41		41		Footnote 25 is redundant too. Already well explained in the text.	We deleted that footnote
9398	3	41				"Efficiency" needs a more critical discussion - i.e. in debates about collective goods and public goods in particular authors claim that efficiency cannot be achieved, even not in policy practices. Rather, sustainance of the good itself needs to be achieved through information practices, regulatory frameworks which engage civil society etc.	See new discussion in paragraph on efficiency.
18387	3	41		45		section 3.9.1.1 to 3.9.3.2 provide a list of policies as if our countries and policy makers could simply pick and chose among policies without a need to consider might work best in their country or region and in total abstraction from changes in the world economy or in the competitive strategies of the firms who must carry out such policies, if ever they were applied. You need to spend a bit more time to discuss the pros-and cons of enacting such policies and making them work.	No action. Sectoral and assessment chapters deal with these aspects. Consistency among framing chapters (e.g. 2 & 3) and sectoral/geographical assessment chapters is a continuous process.
8156	3	42				I like the example of coal-fired electricity. Can you indicate how general are these six distributional effects to issues of CC?	Now addressed in 3.9.1.2
13945	3	42	4	42	27	Suggest deletion. Keep (5) and (6) as a note, not to confuse readers who calculate aggergate surplus. The rest fits into the text.	No action. Comment unclear

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
9807	3	43	10	43	13	Your statement that the other pollutants might be already optimally regulated, is only valid if the emission level is zero. Otherwise there is always a benefit to society when emissions are lower.	No action. We feel that the text adequately addresses this issue. Lower emissions is NOT always a net benefit; the text says net.
4498	3	43	14	43	16	This paragraph discusses "energy security" as if dependence on imported fossil fuels were the primary problem. However, this is not the case for two reasons. (1) Oil (the main internationally traded fossil fuel) is bought and sold in a world market, so the domestic price of oil in any particular country is largely independent of whether the oil is imported or not. Disruptions of a national economy caused by oil price spikes cannot be avoided by changing the mix of domestically produced and imported oil. (2) The main problem with imported fossil fuels is if the these fossil fuels are purchased from states that are actively or potentially hostile. Buying oil or gas from a hostile power enriches that state, to the detriment of the purchasing nation's security. It is economic strengthening of the hostile power that threatens national security, not the mere fact that the fossil fuels are imported.	No action - we make only one small mention of energy security; this is not the place for extended discussion.
11729	3	43	14	43	16	Yamaguchi et al. says that climate response needs the balance between the cost and benefit. This sentence should be deleted since such view point is lacking. 1.Yamaguchi et al.:[Climate change mitigation,P2-3], send attachment by another e-mail.	No action. Comment unclear
9497	3	43	14	43	16	delete this sentence - Climate policy should be chosen in consideration for both energy security and economy growth	No action. Disagree with comment/comment unclear.
10641	3	43	14	43	16	There is more cases where climate policy contradicts energy security. Yamaguchi et al discusses "balanced between energy security and mitigation reponses in his Climate Change Mitigation A Balanced Approach to Climate Change	No action. Disagree with comment
11011	3	43	24		29	Political feasibility cannot be meaningfully discussed in the abstract. It largely depends on how a proposed policy's expected distributional impact aligns with the distribution of power in the society? The latter, in turn, will hinge on the specifics of that society's institutional matrix such as the size of the selectorate relative to that of the total population and the ruling coalition (Bueno de Mesquita et al. The Logic of Political Survival, Cambridge, Massachusetts, MIT Press). Also, does the policy create economic rents, and can these rents, be used to purchase the support of a winning coalition of interest groups?	Good point. This has been added. We make this point explicit in 3.9.1.4
9806	3	43	3	43	16	Paragraph 3.9.1.3. should be elaborated more in detail. Understanding and controlling environmental objectives are crucial when deciding about the appropriate climate change policy.	No action. Sectoral and assessment chapters deal with these aspects. Consistency among framing chapters (e.g. 2 & 3) and sectoral/geographical assessment chapters is a continuous process.
17296	3	43				It is important to include sustainability objective.	No action. This issue is dealt with more in Chapter 4
8590	3	43				Similar to an earlier comment (about 3.9.1), the order of these sections does not make sense to me. Placing a discussion about the breadth of approaches of policy evaluation before all the discussions of economics would help address the enormous problems the chapter has in automatically giving econmics preference as a worldview through which to see the challenge of climate change policy. If this type of reordering is at all possible I would strongly recommend it.	Noted; organization and structure of chapter will be addressed in SOD

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
8826	3	44				the references in this section (quantitative approaches) are too focused on the work of economists. I suggest including insights from the decision sciences, including Keeney & Raiffa's Decisions with Multiple Objectives (1993) and Kleindorfer, Kunreuther, and Schoemaker's Decision Sciences: An Integrative Perspective (1993). In addition, this section should include a short discussion of the importance of facing difficult values-based trade-offs across objectives and the relevance of various techniques for helping stakeholders to address tough trade-offs; both references noted in the previous sentence include good discussions of this topic.	We added a paragraph and one of these references. We added this reference, at the end of section 3.9.2.1
13946	3	44	18	45	13	I would recommend to cite for models: "Inside the Integrated Assessment Models: Four Issues in Climate Economics" (2009). Elizabeth A. Stanton, Frank Ackerman and Sivan Kartha. Climate and Development 1:2, pp. 166-184. It is a nice article to clasify climate change models. It could help to shorten this section. Page 59, for example, DICE, RICE, FUND and PAGE can be categoried under Stanton (welfare maximization, general equilibrium, partial equilibrium, cost minimization and simulation models).	Added reference - see footnote near end of section 3.9.2.1
4499	3	44	27	44	27	The proper spelling is DeCanio (no space between "De" and "Canio". It is certainly appropriate to cite DeCanio (2003) in this chapter, but this is an odd placement for the citation, given that the arguments in DeCanio (2003) have mainly to do with flaws and weaknesses in conventional optimizing models, not with the failures of conventional bottom-up models. The DeCanio (2003) citation would be more appropriate in the following bullet point.	This has been fixed in SOD
9352	3	44	34	44	35	inp.44, line 34-35. Can it be added here that these models may not suit use for climate change where the future may be different, sometimes drastically different? The limitations of the models are not brought out clearly enough.	No action; there is no single best method (or model) for policy evaluation. Given the allocated words we have, we are doing our best to elaborate on the pros and cons of methods.
8398	3	44	22			I defer to the author's judgement in terms of the exact definitions, but we tend to think of GCAM as a hybrid approach that could also be cited here. See: Kim, S.H., J. Edmonds, J. Lurz, S. J. Smith, and M. Wise (2006) The ObjECTS Framework for Integrated Assessment: Hybrid Modeling of Transportation Energy Journal (Special Issue #2) pp 51-80.	We considered this reference and find that it would add only small amount.
9353	3	45	29	45	29	p.45 line 29 a method not included is deliberative approaches. Also a little more on the approaches which are qualitative oriented is warranted.	Good point; we we tried to take this into account in revising section but given the allocated space, we cannot elaborate on the pros and cons of every method.
8591	3	45		51		This discussion about metrics could be usefully integrated with the limited section on values earlier. This would have helped place some of the other dsicussions (such as of CBA) in a more appropriate context. I realize that reorganization at this late stage of development is usually not possible in the IPCC framework. However, based on the profound, possibly unsolvable, problems in this chapter I am strongly recommending that some reorganization is considered it at all possible. From my perspective it may be the easiest way to salvage this very difficult and problematic chapter.	Noted; will be addressed in SOD
8157	3	45		61		Metrics of Costs and Benefits Do you need all the material in this section. I found it a bit difficult to follow and see the connections with CBA and distributive/outcome justice. You might want to consider introducing an example to highlight key points regarding metrics and tie the discussion more closely to material in the earlier parts of the chapter.	Noted; will be addressed in SOD

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
18388	3	45		54		Section 3.10 is more realistic and points to the way metrics can affect the choice of trade-offs and can impact differentially on segments of the population and on other actors thus giving rise to the kind of dilemas that we currently fact between pumping more oil, searching for more gas, engaging in new such as fracking and greater use of methane.	Thank you for your comment.
12787	3	45		49		A classification or overview of the pros and cons of the metrics would be helpful as a summary.	No action - this is a good point, but we cannot add to this section by adding a summary. The section already is a summary of more complex issues.
17297	3	45				The costs of non-action may strengthen the arguments.	No action; we believe this is covered sufficiently
17166	3	45	30			Again there needs to be more linkage and cross-references between this section 3.10 and 3.3/3.4. Ideally, 3.10 would discuss proposals for more precise metrics for the many possible ethical targets discussed in ch. 3.3 and 3.4.	Noted; will be addressed in SOD
6314	3	45	36	46	3	Here, the authors are finally using the language of anthropocentric vs. non-anthropocentric. Use this language consistently throughout the chapter, rather than human and non-human values, as noted previously.	Noted; will be addressed in SOD
8827	3	45				the discussion of participatory approaches (section 3.9.2.2) is too brief. Important references are excluded (see work by Orwin Renn, such as his 1999 paper “A Model for an Analytic-Deliberative Process in Risk Management,” or the 2005 publication of the US National Research Council, Decision Making for the Environment.	No action - insufficient information. We searched multiple databases at online libraries, and could not find this reference.
17333	3	45	15	45	29	The literature about how participatory approaches can be used in "decision-support" and political negotiation processes is vast. This three paragraphs do not make justice of it. A good reference is the article by Nancy Roberts (2004) summarizing a lot of the literature. It can be found here http://arp.sagepub.com/cgi/content/abstract/34/4/315. Many references in the communicative planning literature as well.	We add this citation, and a sentence, but cannot possibly do justice to the vast literature in this short chapter.
10270	3	46		49		M. Amann et al.; GHG mitigation potentials in Annex I countries-Comparison of model estimates for 2020, (2009) IIASA Interim Report IR-09-034 is a gray literature, but the manner of MAC curves between CGE type models and technology rich models can be understood. The paper will be useful for readers.	No action; cannot cite grey literature
10271	3	46		49		For understanding differences in MAC (mitigation costs and potentials) among countries, the following paper will be useful in this section. T. Hanaoka and M. Kainuma, Low-carbon transitions in world regions: comparion of technological mitigation potential and costs in 2020 and 2030 through bottom-up analyses, Sustainability Science 7, 2012	No action; we feel this issue is adequately addressed by existing citations
10272	3	46		49		For understanding differences in MAC (mitigation costs and potentials) among countries, the following paper will be also useful in this section. K. Akimoto et al., "Estimates of GHG emission reduction potential by country, sector, and cost", Energy Policy 38, 3384-3393, 2010.	No action - hundreds of possible cites; we need to pick and choose. This is not the place to discuss in detail.
8158	3	46				There is a body of research in behavioral economics on why WTA may differ from WTP (See Chap. 14 of Boardman et al Cost Benefit Analysis: Concepts and Practice.)	No action; cannot cite grey literature
11535	3	46				There is a body of research in behavioral economics on why WTA may differ from WTP (See Chap. 14 of Boardman et al Cost Benefit Analysis: Concepts and Practice.)	No action; duplicate
11564	3	46	20	46	20	If it is true that multiple metrics of costs and benefits should be employed, the chapter should take the consequence thereof and focus on multiple metrics instead of primarily monetary cost and benefit.	No action; already addressed by comment 3372
4625	3	46	25	46	25	It's important to note that onlt a money metric may be used in benefit-cost analysis (see comment 36)	Noted; will be addressed in SOD
13269	3	46	27	46	28	In same cases, as in some Energy Efficiency appliances, GHG abatement could produce economic gains. These gains also have impact on people, distributtive effects and changes in prices and costs.	No action; we believe this is already covered.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
10838	3	46	27	46	27	"If GHG emissions are to be reduced, econmomic costs will be imposed on many actors". Surely this is an assumption? This, in my opinion, partially reflects a problem with CGE modelling in that it is assumed that the current state is in perfect equilibrium and thus (most) changes will therefore causes "costs". Perhaps there are win-win situations (as exemplified by the MAC curves in the following pages). Perhaps our models are a poor reflection of reality? Perhaps we, as a society, have missed an alternative development parthway or policy structure that makes GHG mitigation not cost (this is easy to imagine, since energy costs money and we generally like avoiding costs). Or perhaps, as you say, we have everything perfectly correct, and mitigation always costs! My suggestion is to weaken this statement so that you modestly acknowledge that GHG may not in fact cost (under the correct set of assumptions and society). E.g., some affect with "If GHG emissions are to be reduced, economic costs may be imposed on some actors while other actors may receive benefits, ..."	Noted; will be addressed in SOD
12558	3	46	33ff			There is a large psychology and behavioral economics literature on subjective well being that is in part acknowledged later on in the chapter, e.g., 3.11.2.1 and 3.11.2.2, which could be foreshadowed here, allowing for the possibility that metrics other than changes in income exist.	Noted; will be addressed in SOD
8251	3	46		52		In this section the authors describe different modeling approaches and their limitations to estimate the cost of GHG mitigation. It seems that the section mainly focuses on the limitation-side of different types of modelling structures. Describing these limitations is plausible in the sense that it can help a reader to understand the scope of models results based on their prescribed structures. However, the readers may also be interested know the merit of each model over others. This part can be extended in this subsection.	No action; good point, but we won't have space for expanded discussion.
8394	3	46	30	46	31	A further point is that, technological changes can also involve changes in institutions and various welfare changes	No action; this is a good point, but this is not the location to make this point.
12557	3	46	34			There is a large psychology and behavioral economics literature on the problems and limitations of contingent valuation measures, i.e., on both the discrepancy between WTP and WTA, and how to interpret responses on these measures in general. This literature deserves to be discussed or at least acknowledged.	No action; CV is covered later, on pages 56 onward.
10705	3	47	1	47	1	Footnote 30: A reference is given to section 3.6.3. which must - as far as I can see - be an error.	Noted; will be addressed in SOD
13270	3	47	1	47	2	the same comment as above. Some abatement measures could produce a reduction of the energy costs.	No action; already covered.
10706	3	47	14	47	16	It would be good if you indicate the impact on the results of including climate feedbacks and also give references to some IAM studies here.	Noted; will refer to later chapter on IAMs.
9355	3	47	15	47	16	line 15 16, very important; more focus on this	Noted; will refer to later chapter on IAMs.
9354	3	47	1onwards			p47 lines 1 onward: there is some repitition between this section and previous sections could be avoided.	Noted; will be addressed in SOD
4501	3	47	21	47	21	It should be noted that the "representative consumer" abstraction is highly questionable. See the article by Kirman, "Whom or What Does the Representative Consumer Represent" in the Journal of Economic Perspectives (1992).	No action. But of course it is questionable; its not meant to be "realistic".
12559	3	47	4			For this statement ('leading to a drop in demand") and elsewhere (talk about a "single representative consumer" in next paragraph) , the authors should (a) specify what the behavioral assumptions are on which their predictions about behavior in response to policy interventions are based, namely rational expectations and responses, and (b) consider how these predictions might change (at least directionally) when these assumptions of rational responses are relaxed or replaced by some the descriptive models of human choice described in Chapter 2, Section 2.2.	No action; here we use the eocnomic model. The next section coveres behavioral models.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
10704	3	47	1	47	1	Footnote 30: When you introduce the concept "CO2-equivalent" you could give a reference to AR5 WGI chapter 8.	No action - we don't feel that this would add significant information; too many cross-chapter concepts to mention every one
8253	3	47	10	47	28	There are limitations to the growth models too. A variety of growth models is based on steady-state calibration of the economy with a small number of sectors and regions. While these models can somehow describe the dynamics of abatement over time, they are not really calibrated to the business as usual state of the economy based on projections. The authors should highlight the pros and cons of the static and the dynamic model. Also, there should be some explicit discussions of recursive dynamic models.	No action; we say this already.
8252	3	47	17	47	23	The authors describe the general limitations of models regarding their assumptions on production and consumption activities. But, a notable point is that these models can always be extended to incorporate a spatial issue. For example, Sebastian Rausch et al. (2010) extended their EPPA model by different household groups to assess the distributional consequences of mitigation policy (see MIT Joint Program on the Science and Policy of Global Change report no 185). Also footnote 41 of chapter 3 refers to a study by Paltsev et al. (2007), in which they use EPPA model's results to estimate total cost of emissions abatement.	No action; cannot cite grey literature
15376	3	48				The statement about SO2 as a weakness of economic models leaves out the key studies by Ellerman, etc. Convery, Frank, Christian de Perthuis, and Denny Ellerman. “The European Carbon Market in Action: Lessons from the First Trading Period – Interim Report.” Center for Energy and Environmental Policy Research: 08-002, March 2008.	No action; cannot cite grey literature
11012	3	48	24		28	The opportunity exists to intervene to lower these costs. Most actual public policy is designed and implemented in less that optimal ways, often in far less than optimal ways. The models used in climate policy analysis cannot predict in advance what non-optimal policies will be implemented. There is, therefore, a tendency to model optimal policies. The result is a large and systematic downward bias in the estimates of abatement costs. This is a point on which policy makers should be cautioned.	No action; we believe we deal with this adequately.
9007	3	48	24	48	28	This is a good point: "The economic models generally involve an assumption of fully optimizing behaviour by economic agents. Therefore, aside from technological change, any reduction in emissions must be driven by changes in price." These are exactly the kind of explanations this chapter must contribute in to be true to its objective of being a "resource for policymakers and researchers who are trying to solve normative questions. In that sense, the chapter is policy-relevant but not policy-prescriptive" (page 8, lines 19-21). It is important to point out that fully optimizing individual behavior is a strong assumption often not true in practice because of imperfect information, monopolies on either the demand or supply side, and, especially in developing countries, unemployed resources.	Thank you for your comment.
11565	3	48	24	48	28	References should be made to chapter 4 and 13.	Noted; will be addressed in SOD
12560	3	48	24	49	2	Here is the first acknowledgement of the behavioral assumptions behind the economic models discussed previously. Probably better to move this discussion up to the beginning of the chapter. For the behavioural factors mentioned in this paragraph as having no scope in these models, at least one reference each should be provided.	No action; good point, but we do say things like this earlier in the chapter. And its not clear what location is recommended.
12092	3	48	1	48	2	"The conclusions resulting from the models depend on the assumptions made" - suggest also refencing this point as it is a crucial one - Weyant, J. (2000) An Introduction to the Economics of Climate Change Policy, Stanford University, Repetto, R. and Austin, D. (1997) The Costs of Climate Protection: A Guide for the Perplexed, World Resources Institute, Washington, DC.	No action; cannot cite grey literature

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
6315	3	48	24	48	25	The report states: "The economic models generally involve an assumption of fully optimizing behaviour by economic agents. Therefore, aside from technological change, any reduction in emissions must be driven by changes in price." Community-based social marketing models suggest that behaviour can be changed by non-economic means. Perhaps it is worth mentioning here.	No action; we believe the issue is already dealt with
12095	3	48	3	48	25	One important assumption has been missed here, - whether or not co-benefits, such as air pollution reductions, are considered in the economic modelling. According to the OECD (2008) Environmental Outlook 2030 - "van Harmelen et al found that to compliance costs for regional air pollution policy in Europe, are reduced by 50–70% when combined with greenhouse gas related policies. Similarly, in the shorter-term, van Vuuren et al. (2006) found that for the Kyoto Protocol, about half the costs of climate policy might be recovered from reduced air pollution control costs. The exact benefits, however, critically depend on how climate change policies are implemented and on the baseline policies that are used for comparison (Morgenstern, 2000). Most available studies do not treat co-benefits comprehensively in terms of reduction costs and the related health and climate impacts in the long-term, thus indicating the need for more research in this area (OECD, 2000; IPCC, 2007a)." References Harmelen, T. van et al. (2002), "Long-term reductions in costs of controlling regional air pollution in Europe due to climate policy", Environmental Science and Policy, 5(4), pp. 349-365.Vuuren, D. van et al. (2006), "Exploring the Ancillary Benefits of the Kyoto Protocol for Air Pollution in Europe", Energy Policy, 34, pp. 444-60. Morgenstern, R. (2000), "Baseline Issues in the Estimation of Ancillary Benefits of Greenhouse Gas Mitigation Policies", in Ancillary Benefits and Costs of Greenhouse Gas Mitigation, OECD Proceedings of an IPCC Co-Sponsored Workshop, 27-29 March 2000, in Washington DC, OECD, Paris. IPCC (Intergovernmental Panel on Climate Change) (2007a), "Summary for Policymakers", in, S. Solomon et al. (eds.), Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change, Cambridge University Press, Cambridge, United Kingdom and New York.	Noted; will refer to later chapter on IAMs.
12096	3	48	3	48	25	Recommend also including the key point from - Schneider, S. and Azar, C. (2002) 'Are the costs of stabilising the atmosphere prohibitive?', Ecological Economics, vol 42, issues 1–2, pp73–80 namely " Top–down (economic) models typically suggest that the cost of a 50% reduction of global CO2 emissions from baseline by 2050 would cost some 1–4% of global GDP, and a 75–90% reduction by 2100 would cost some 3–6%. But since these studies also assume that global income grows by 2–3% per year, this abatement cost would be overtaken after a few years of income growth. Thus, the cost of 'climate insurance' amounts to 'only' a couple of years delay in achieving very impressive growth in per capita income levels. To be ten times richer (than in 2000) in 2100 AD versus 2102 AD would hardly be noticed and would likely be politically acceptable as an insurance."	No action. Good point, but the table only is to show a set of results, not to review all literature. That is elsewhere.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
12093	3	48	3	48	4	After "A key determinant of the 3 economic cost of limiting GHG emissions is the feasibility and future cost of using non-fossil fuel 4 energy in electricity generation and in transportation." Please consider adding "Studies suggest that it is technically possible for many nations to transition to 80-100% of their electricity demand to be met by renewables by a certain date, usually by 2050". For an overview of this literature please see - Elliston B, Diesendorf M, MacGill I, 2012, 'Simulations of Scenarios with 100% Renewable Electricity in the Australian National Electricity Market'. Energy Policy 45:606-613. http://www.ies.unsw.edu.au/docs/diesendorf-simulations.pdf This paper provides an overview of the literature here.	No action. Good point. But this is not the place to review all IAM model results.
12094	3	48	4	48	4	The text here - "Another is the feasibility and cost of increasing energy efficiency in end uses." .....and please also note that the following Cambridge University team have assessed the practical limits of energy efficiency. Cullen, J., Allwood, J., Borgstein, E. (2011) Reducing Energy Demand: What Are the Practical Limits? Environ. Sci. Technol., 2011, 45 (4), pp 1711–1718 DOI: 10.1021/es102641n http://pubs.acs.org/doi/abs/10.1021/es102641n they found the following "They applied "best practice" energy efficiency changes to numerous energy end use systems. They concluded that 73 per cent of global energy use could be saved by introducing such changes." Also, many of the other IPCC chapters are assessing the feasibility and cost of increasing energy efficiency. So perhaps a table here would be good summarising what the other chapters have concluded for energy efficincy potential? NB - the IPCC AR4 and AR5 has found for that, for instance, the residential and commercial buildings had significant energy efficiency potential.	No action. Good point. But we can't review all results or add more cites here.
12561	3	49	14			Here and elsewhere in the chapter, should "abatement" be replaced with "mitigation", to use the term used in the WG3 title and other chapters?	No action - good point, but this is not necessary.
10707	3	49	16	49	16	Carbon or CO2-equivalents?	Noted; will be addressed in SOD
14375	3	49	20			Should look at results in Cline (2011) on alternative abatement cost functions and estimates of costs to meet the 450 ppm ceiling	No action; unclear what reference this is
12562	3	49	footnote 37			I would move this footnote into the main text and refer to Ch. 4	No action; disagree with comment
12563	3	49	footnote 39			There is no Section 3.6.4, not sure what section the authors have in mind here? Here or elsewhere, one could also add that such an assessment of the impact of behavioural factors on the cost of mitigation, while it may not exist, is an extremely important omission.	Noted; will fix mention of section 3.6.4. We talk about behavioral factors later.
4744	3	5		7		I notice that chapter 4 is dedicated to sustainable development, but I would have prefered that sustainable development is also mentioned in this 3rd chapter	No action. More appropriate in chapter 4
15358	3	5		76		see separate file: "wdavidmontgomery - general comments on Chapter 3.doc"	No action; do not have file referred to
6305	3	5		77		Generally speaking, this chapter employs a neo-classical economic perspective in framing many of the ethical questions. While this is not in principle inappropriate, much of the discussion is too detailed and could be shortened or more briefly summarized. For instance, shorten page 6, lines 38 to page 7, line 34, as one example, and/or reduce discussion of the various equations on pp. 21 ff ; or delete/shorten sections 3.3.3, 3.4.4, 3.4.4 and/or 3.4.5, considering that enough is said about these issues elsewhere. Generally, the authors should be encouraged to review the long and detailed explanations of specifics such as wellbeing functions.	The framing of the chapter has been made more explicit. But most of the detail remains because it seems necessary.
6953	3	5	10	5	10	Insert 'part of' before 'subject matter of ethics'.	Will be addressed in SOD
8574	3	5	12	5	31	The order of topics in the executive summary seems unusual. For instance placing the discussion of distributive vs procedural justice after the slightly random list of justice related questions? I think a careful reworking of the entire executive summary to ensure that the ideas are as integrated as possible, and that they flow in some sort of reasonable order would be an immensely valuable use of presumably short writing time.	Noted. It follows the order of the chapter, which is in flux.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
2200	3	5	15	5	17	Present emissions do not only affect quality of life; they kill future people in substantial numbers. Please see the file 'Nolt comments on IPCC WG III AR5 FOD' submitted separately to comments@ipcc-wg3.de	Noted.
16624	3	5	15	5	28	It may be possible to condense these questions into a smaller number. For example, these questions can be summarized by:	Noted.
3906	3	5	18	5	21	Who might be competent to determine an internationally just emissions tractory, and what ethical basis would they have for disregarding the views of those who disagree? And what level of force would be ethically acceptable to deploy against dissidents? A further question that should be asked in this paragraph is "how would this allocation be enforced if it did not coincide with the interests of the most powerful nations, politically and militarily"?	Noted.
5122	3	5	18		21	Need to allow for uncertainty and flexibility -- unrealistic to claim "once . . . agreed . . . then" as if the plan simple rolls out	No action. Addressed in chapter 2
2247	3	5	2	5	4	Well put. The ethics and economics that have been lavished on a proposition for which there is no scientific evidence is indeed deplorable. This entire Chapter is monumental nonsense. It should be omitted altogether.	No action. Chapter set by IPCC WGIII
17157	3	5	2	5	4	First sentence of Executive Summary strange and unclear (only gets clear through more extensive version in "3.1 Introduction").	Will be addressed in SOD
10784	3	5	2	5	4	Exec Sumary. What does this paragraph mean? Rewrite pls	Will be addressed in SOD
3907	3	5	22	5	22	Who is the 'we' in this sentence and should the coercive powers of the state be used to enforce 'our' views on those who dissent?	good point -- we should be careful about that (ie, the authors should be careful)
4745	3	5	23	5	23	Proposition to replace "compensatory" by "mitigation", it is a more positive way to address this issue	No action. The meaning is monetary or equivalent compensation, not mitigation (necessarily)
6954	3	5	29	5	31	This paragraph sits oddly in the text: why introduce the distinction here?	Will be addressed in SOD
3908	3	5	29	5	31	Should it be pointed out that procedural and distributive justice would normally be incompatible goals? A lottery might be fairly drawn, but the holder of the winning ticket might already be the richest entrant.	Will be addressed in SOD
8573	3	5	32	5	39	As mentioned in my general comments, the crux of the problem I see with this chapter is the lack of integration throughout. At no point is the connection between the legal systems and the previous discussion of justice addressed, leading readers to get the impression that all of these components have been thrown together, and making it more difficult for them to see why legal arguments may be important in this debate.	Noted; will be improved in SOD

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
8999	3	5	32		39	The executive summary devotes much space to legal approaches, which would require "wrongful conduct" to assign responsibility. This is at least an error in emphasis. This emphasis is misplaced since climate change is by nature an international, inter-state issue. Except for some specific mechanisms such as the WTO's dispute settlement mechanism, there does not exist stable international law processes or an supra-international authority to enforce laws/agreements. Enforcement at the international level still relies heavily on force not on legal principles; for example the inequitable, arbitrary and unpredictable debt resolution system for developing countries relies on the power of the creditor community centered in developing countries to cut off all forms of financing to debtor countries. The law is an application of ethical principles on which the international system is still being established. It would be advisable for chapter to stay with treating law as an application of ethics and stay decisively in the realm of ethics, particularly in the executive summary.	No action. This comment seems to reflect a misunderstanding of the discussion of law in the chapter. The chapter does not directly address the question of legal liability for climate change. Instead, it looks to law in order to illuminate the issue of when our society treats people as responsible for certain kinds of actions, particularly when the actions are only shown by later information to be harmful. An earlier draft of the section did actually address on-going litigation about this issue, but that was deleted.
10785	3	5	32	5	35	responsibility under either common or civil law has other implications beyond "nuisance or negligence". Please rewrite paragraph to include other responsibilities	No action; comment unclear

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
3909	3	5	36	5	39	After of the order of a thousand years of common law decisions, it would be surprising to find that emitting CO2 by burning coal etc was a common law harm, but no one had noticed up to this point. So should it be clarified that the question the chapter is considering is whether a common law action NOW to declare it to be harm might be successful? A particular problem is the non-point-source-pollution problem - how does the plaintiff prove that the asserted harm was caused by the particular defendant in front of the court? Should not the authors consult and cite a legal authority on this point? Another very important point not made here is that a common law determination does not determine the outcome. What it does instead is determine who is in the right, and therefore what concessions either the plaintiff or the defendant subsequently need to make in order to achieve the other party's consent. The outcome (more or less pollution) is not therefore commonly determined by the common law itself. Since the focus of this chaper is on achieving an outcome (mitigation) this point seems to be potentially relevant.	No action. As with the prior comment, this reflects a misunderstanding of the chapter's discussion of the law. In terms of whether the law would find carbon emissions to be a tort, as I noted above there is on-going litigation about this issue, in the U.S. courts and elsewhere. I agree with the commenter that a substantial problem is posed by the multiple sources of carbon emissions. There is actually some very interesting legal precedent and scholarship on the issue of multiple polluters, which I would be glad to discuss. But it really falls outside the scope of the "historical responsibility" topic. I take it that the other part of this comment is a restatement of the Coase Theorem. Again, I don't think this falls within the historical responsibility topic. However, as Coase pointed out, transaction costs are crucial, and in the case of pollution, negotiation is unlikely because of the large number of parties involved.
5121	3	5	4		4	add social behaviours	No action; less significant
8575	3	5	40	6	6	The jump from the first sentence that accurately recognizes the limited ability of any form of economic representation of values, in particularly non-monetary values related to non-human nature, somewhat befuddlingly turns almost immediately into a detailed discussion of social welfare functions which then morphs directly into a detailed discussion of cost-benefit analysis. Any genuine consideration of the difficulties of assigning value to non-human nature, or any consideration of rights, is completely overlooked. This is deeply problematic and is indicative of the overwhelming tone of the chapter which gives great attention to economic debates, without any real appreciation of rights and non-human values or alternative metrics. If nothing else, the executive summary must bound the limits of economics more clearly. For instance, after the first sentence in this section a clearer recognition of the limitations of most social welfare functions (including the idea that they almost never are able to represent rights, or if they do, in curtailed ways) would be useful so that readers could see the boundaries of eocnomics before they get into the detailed discussions of CBA techniques.	The ethics sections of the chapter evidently did not show the correct emphasis. They have been improved in this respect. Chapter has been reorganized in response to this comment and others.
13562	3	5	40			I don't know that 'anthropogenic' is the right word as cultural and social values also relate to humans (suggest maybe 'monetary' / 'rational'?	No action. Disagree with comment; it is an anthropocentric measure.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
4475	3	5	42	5	45	It is not enough to say that different social welfare functions express different views about the value of equality. The concept of a social welfare function is itself questionable, because it necessarily involves making interpersonal comparisons of "utility". Second, whatever one's position on the "value of equality," a social welfare function may not capture it because SWFs typically are constructed from consumption, without paying any attention to the processes of production that are required to bring the goods into being. The most basic point here is that redistributive measures aimed at maximizing some kind of SWF may, by distorting the incentives to produce, result in a different set of goods to be "distributed."	This comment is mistaken in view of the content of the chapter. We will be more careful to clear up this issue in the executive summary.
9000	3	5	42			The executive summary highlights the social welfare function. This is an error in emphasis. As the chapter mentions later on, the philosophical-logical objections in the literature to the existence of a social welfare function are compelling. A more even-handed treatment of competing methodologies is advisable.	Will be addressed in SOD
16625	3	5	42			1. What are the effects of present actions to future generations?	No action; comment unclear
12778	3	5	45			In which sense and is "Equality" the norm?	No action; comment unclear
8572	3	5	5	5	11	I think that one of the areas in which changes could have the most impact would be in the executive summary. This is arguably the most important part of the document as it is most likely to be read by the largest number of people. I have marked these particular lines because I think they illustrate one of the ongong tendencies through the chapter - to take economics as "self-evident" and then cover the importance of ethics in vague terms. If language like "self-evident" is going to be used for economics, and the chapters is also supposed to give full credence to the importance of ethics, then the language used for the two components needs to be more closely equivalent in tone and emphasis. There is no reason why stronger language for the ethics part of this could be used. For instance, "the significance of ethics to climate policy decision-making is equally significant and central: decisions about climate policy will have profound implications on human and non-human well being and involve judgements about human values and interests. This chapter covers the literature focused explictly on the inevitable importance of ethics in climate change decision-making" would be one way of balancing attention.	Very good point. Will try to balance.
18384	3	5	5			One can question whether the importance of economics is always so self-evident eg. In cost-benefit analysis much depends upon assumptions. I would rephrase.	Will rephrase self-evident
10690	3	5	9	5	9	The wording "…reasonable people have differing views on this issues…" sounds strange. Please consider rewording or removing this.	No action; this is standard terminology
17072	3	5	14	5	15	After “environment protection” add “and social equity”(Artaraz, M,2002) Artaraz, M (2002) Teoria de ñas tres dimensiones de Desarrollo Sostenible. Escuela Universitaria del Pais Vasco-Euskal. htpp//www-acet.org/ecosistema	No action. Comment unclear; page and section reference numbers incorrect
17073	3	5	14	5	15	After”environment protection” add “and social equity”(Kirby,Oeefe and Timberlake, 1995;Sachs,1999) Kirby, J. P. O’Keefe, and L. Timberlake, 1995, Sustainable Development: An Introduction”, in J. Kirby, P. O’Keefe, and L. Timberlake, eds., The Earthscan Reader in Sustainable Development, Earthscan: London. Sachs, W., 1999, Planet Dialectics. Explorations in Environment and Development, Zed Books, London, Chapters 9, 10, 11, and 12.	No action. Comment unclear; page and section reference numbers incorrect
17071	3	5	14	5	15	After “environment protection” add “and social equity”(Artaraz, M,2002)	No action. Comment unclear; page and section reference numbers incorrect

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
3905	3	5	12	5	39	The executive summary identifies three normative questions, the answers to which need to be tested ethically. However, it does not indicate what the chapter's answers are to these three questions. As a result it cannot and does not examine these answers from an ethical perspective. Should not an executive summary aim to save the busy executive from having to read the full chapter in order to find the answers to the posed questions?	No action. We don't answer normative questions. We provide the framework for others to use with their own values.
17156	3	5	1			Although there seem to be three topics addressed in this summary (ethical questions of climate policy, explanation of the welfare economic approach to climate policy evaluation, and pointing out the limitations of economic approaches in terms of general political objectives), this does not immediately get clear. Particularly the end of the Summary is confusing, unstructured, without clear message. PROPOSAL: Shift the third part of the Summary to p. 5 l. 40, that is: below introduction of ethical questions. Argue that from most ethical approaches we can derive a variety of societal/ political general targets relevant to climate policy - not only the target of economic efficiency. Then make clear that the role of economics primarily is to analyze efficiency (not so much the other objectives, which are for instance simply taken as "guardrails" in IAMs). But economics can also, in addition, inform questions of equity, etc.	Will be addressed in SOD; we need to underscore the positive nature of economics and the limits of using it for normative purposes.
9529	3	50				Please, make graphs smaller.	Noted; will be addressed in SOD
18601	3	50				McKinsey curves are discussed on p 50 … . More or less dismissed since it not built refereed literature – said to be highly controversial. Misses the point more or less. The basic idea was to sort out cost and volumes by using existing knowledge and make assessments bottom-up in a transparent way. Thereby making it easier to identify the areas where policy action was really needed (and also avoid spending most of the resources on areas without any real potential). The approach is simplistic and static but still it gives an overview. One interesting result was that "negative costs" showed to be quite large. In reality since transaction costs, information costs etc was excluded to show what sort of difference policy can make (tose costs are to a big extent policy dependent).	Noted; will be addressed in SOD
14376	3	50	5			Need to identify sources	Noted; figure can refer to chapter 6.
15377	3	51				McKinsey's statements about the cost of mitigation should not be included in AR5, their marketing materials are not even gray literature. McKinsey has refused to submit their methodology to peer review, has not shared data or even stated the nature of the analysis done to construct the curve. There are a large number of studies, for example EPRI's excellent review of studies of the cost of the Waxman-Markey bill, that should be discussed in AR-5 if the door is opened this far for studies not published in peer-reviewed books and journals. I applaud the author's intention to use the mention of the McKinsey work to point out its many flaws, but I think that the risk of legitimizing it by mention in AR5 as well as the precedent of including work whose authors have refused to submit to normal peer review outweigh the satisfaction of critiquing it. To make the points about errors in studies claiming negative costs for mitigation measures, I recommend use of some of Mark Jaccard's excellent published work. See: Rose Murphy and Mark Jaccard, "Modeling Efficiency Standards and a Carbon Tax: Simulation for the US using a hybrid approach". The Energy Journal. Vol. 32 (Special Issue 1). October 2011.	Noted; will be addressed in SOD

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
3275	3	51		52		As explicitly mentioned in the body text, "The McKinsey curves have been highly controversial representations of mitigation potential". Posting Figure 3.6 here can give a false impression to the public. Energy Modeling Forum examined this issue and published report (EMF 2011). You can cite Figure 4 of this report because it compare the McKinsey's results with other study results. Energy Modeling Forum, Stanford University, 2011. Energy Efficiency and Climate Change Mitigation, EMF Report 25 Volume I.	No action; cannot cite grey literature
10228	3	51	11	51	11	Text refers to Figure 3.6 using "US$ per ton of CO2e", but the Figure uses € per [metric] tonne CO2e	Noted; will be addressed in SOD
2210	3	51	11	51	11	Currency should be EUR	Noted; will be addressed in SOD
10708	3	51	11	51	11	The unit "CO2e" is used here without any explanation of what this means and how it is calculated. Usually this is based on GWP100 and this should be mentioned.	No action; it is defined earlier in the text
10229	3	51	12	51	12	Text refers to the 2030 curve though the 2015 version is shown	Noted; will be addressed in SOD
2209	3	51	12	51	20	Recommendation to use the 2030 as that one has been used more regularly. In any case, make the year of the exhibit consistent with the year mentioned in text	Noted; will be addressed in SOD
10231	3	51	20	51	20	Text referring to 2015 should be changed to 2030	Noted; will be addressed in SOD
9808	3	51	20	51	21	This metrics can also be used on a company level. Projects can be ranked along their reduction resp. the monetary value involved. Thus an economic-ecological optimization can be reached.	Noted; will be addressed in SOD
16357	3	51	3	52	14	Box 3.6. The general tone of this box seems rather negative. Are there studies that go into the details of at least some of the numbers presented by McKinsey and finds that these are wrong ? In this case, please provide additional references. Regarding barriers: did McKinsey ignore barriers in its reports ? Could the existence of barriers turn the curve into an useless picture, or could we conclude that it is very important to address barriers, as net costs in themselves are low for a number of technologies?	Noted; will be addressed in SOD

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
3057	3	51	3	52	14	There is a fundamental flaw in the McKinsey curve and MAC curves generally. The flaw is in treating demand-side measures as if they were part of what is effectively a supply curve. Energy efficiency gains are treated as equivalent to the provision of clean energy supply. More efficient lighting, insulation, and "efficiency improvements other industry" are examples of this. But supply and demand are fundamentally different microeconomic concepts, are separate parts of the market-clearing equilibrium mechanism, carry differing dynamics, and should not be mixed together like this. The quantities showing on the x-axis for demand-side measures are usually derived from perceived engineering efficiency gains. But aside from the implementation shortfall problem already noted in the text, there is the thorny problem of rebound mechanisms. For example, the segment of this "supply" curve showing as "efficiency improvements other industry" is subject to substantial rebound according to various analyses, so the horizontal length of this segment needs to account for this. Unfortunately, this length will depend on numerous determining elements including all factor prices, factor technology gains, and factor substitution elasticities. Without projecting, say, wage rates, the length of this segment will be mis-specified. Similarly, the segment showing as "lighting - switch incandescent to LED (residential)" is mis-specified owing to rebound effects. The Journal of Physics article on solid-state lighting referenced above shows the perils of assuming such a switch would have any effect at all on lighting-associated energy use over the long run [Tsao, J.Y., Saunders, H.D., Creighton, J.R., Coltrin, M.E., Simmons, J.A., 2010. "Solid state lighting: an energy-economics perspective." Journal of Physics D: Applied Physics 43 (35), 354001]. Similar rebound arguments apply to insulation. A further difficulty with such MAC curves is that it is frequently assumed that the supply options showing as "above cost" to the right will come at no cost to economic welfare if implemented, or at least these broad economic costs are rarely, if ever, accounted for in MAC curves. But simply put, one cannot force a more expensive energy supply into the system to displace a less expensive energy supply without reducing economic welfare. Such a strategy may be advantageous socially, environmentally, and even economically if climate change impacts forestalled are large enough, but these narrowly-construed economic welfare losses and costs need to be explicitly accounted for in specifying the associated costs on the y-axis if a true picture is to be given for policy makers. Numerous researchers account for such welfare losses as associated with, say, a carbon tax, but MAC curves rarely seem to.	No action - Good point; however, we can't get into a whole analysis of the McKinsey curve, and do our own analytical review of it, and cannot cite grey literature
10234	3	51	8	51	8	The text uses the phrase "highly controversial" with regard to the McKinsey cost curve analysis. We acknowledge there is debate around our approach, and indeed have engaged in discussion with numerous partners in academia, NGOs and international institutions on how to continue to improve it. The cost curve has been well received and proven a useful tool (one of many tools) for various constituencies. We would also welcome further debate with you and benefit from your expertise	Noted; will be addressed in SOD
17275	3	51	8	51	10	I agree with the fact that the weak point of the McKinsey cost curve is the lack of transparency, but if it is stated that it is controversial, there should be a reference to situations, reports, conferences, etc. where that is discussed. Otherwise, it should be just noted that lack of transparency is a weak point.	Noted; will be addressed in SOD
17276	3	51	8	51	10	The negative cost part is indeed heavily debated in the literature. Here lots of references can be provided (including earlier IPCC reports!).	No action; already addressed by other comments
2211	3	51	8	52	2	Avoid duplication of statements around "highly controversial" and respective reasons. Also not obvious why the McKinsey curve is regarded as "highly" controversial, compared to other work in the field, e.g. where customized CGE models are used to create cost curves. Two comments in the next lines of this xls	No action; already addressed by other comments

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
2212	3	51	8	52	2	1) On the comment of "metholodogy is proprietary the following should be noted: a) The general methodology is described on several pages in the reports, e.g. "McKinsey & Company, Pathways to a low-carbon economy - Version 2 of the Global Greenhouse Abatement Cost Curve, January 2009", Pages 145-149, b) The same report has a comprehensive appendix on input assumptions, pages 160-189, c) To enable transparency of methdology, assumptions and results for academics and other groups, McKinsey has put all calculation logic for each lever and all input assumptions by lever, region, time online in the webservice "Climate Desk" (solutions.mckinsey.com/climatedesk). Academic institutions have free access to the webservice- it requires a short registration registration process. McKinsey has contacted all IPCC WGIII directly to make them aware of this free service, some are using it.	Noted; will be addressed in SOD
2213	3	51	8	52	2	2) On the comment of "not emerged from the refereed literature". Let me state what McKinsey did. An overall academic review panel has been formed for the entire report referenced above (which has been serving as the "blueprint" for the national studies) incl. several IPCC WGIII members, see page 139. This review panel has interacted intensively with the McKinsey team over the entire period of the study. For each sector, expert groups have been formed from industry, associations, and academics (incl. IPCC WGIII members) which have been developing and reviewing the methodology and assumptions for each lever, time and region (see page 140).	Noted; will be addressed in SOD
15447	3	52		54		This an excellent summary of metrics, but the policy-relevant points could be brought out more clearly, to respond to the focus of 4/CMP.7: "the GWP was not designed with a particular policy goal in mind and, depending on the specific policy goals, alternative metrics may be preferable." Some reference to one or more specific policy goals and their relationship to metrics therefore would be useful. It would be useful to have a couple of paragraphs on the question of the treatment of short lifetime gases, since this is a specific aspect that is to be covered in the 2015 SBSTA review . (4/CMP.7 " notes the limitations in the use of GWP based on the 100-year time horizon in evaluating the contribution to climate change of emissions of greenhouse gases with short lifetimes") There is clearly a policy discussion to be had on the broader issue of short versus long lifetime gases . There has been some discussion in the literature on short lived climate forcings - of which in the Kyoto basket, methane is the relevant one. The obvious specific policy goal here is limitation of global warming to a temperature target such as 2 degrees above pre-industrial levels or to a concentration target.	Noted; will be addressed in SOD
10232	3	52	1	52	1	The text uses the phrase "highly controversial" with regard to the McKinsey cost curve analysis. We acknowledge there is debate around our approach, and indeed have engaged in discussion with numerous partners in academia, NGOs and international institutions on how to continue to improve it. The cost curve has been well received and proven a useful tool (one of many tools) for various constituencies. We would also welcome further debate with you and benefit from your expertise.	Noted; will be addressed in SOD
11730	3	52	1	52	2	Delete.Same as the L8-9 at P51.	Noted; will be addressed in SOD
9530	3	52	1	52	2	Please, delete here due to duplication of line 8, page 51.	No action; already addressed by comment 11730
8254	3	52	1	52	14	Another important drawback of MAC curves not mentionned in the paragraph is that they often include several abatement opportunities that, once adopted, make others ineffective. For instance, using the McKinsey MAC curve of Figure 3.6, if nuclear technology as a mean of producing electricity is adopted, the solar technology won't present an opportunity for reducing GHG emissions anymore. These interactions between abatement opportunities are often not specified in MAC curves.	Noted; will be addressed in SOD

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
16244	3	52	1	52	14	An additional, not mentioned, limitation of the McKinsey curves is the lack of addressing temporal aspects explicitly (or even stating the temporal assumptions explicitly), e.g, abatement costs for buildings with a very high energy consumption might be much lower than for energy-efficient buildings, however, this potential is declining over time once buildings are retrofited.	Noted; will be addressed in SOD
7381	3	52	15	55	3	This section is a nice text book introduction on metrics, but it is not a comprehensive assessment of the metrics literature nor does it derive policy-relevant conclusions. It misses key aspects of the recent metrics literature, such as the potential for 2-basket approaches (Smith et al 2012), the use of metrics for Lifecycle Assessments (e.g. Peters et al 2011), the implications of metrics for the distribution of mitigation costs and potentials across regions (Reisinger et al 2012, accepted for Climatic Change). Also the links between metrics (not just Tol et al, also Azar and Johansson 2012, Peters et al 2012, Boucher 2012), and the key distinction between end-point and integrated metrics, and what this implies for the underlying policy goals and values. The draft is an introduction to metrics but not a policy-relevant assessment - all the assessment of whether and how important metrics actually are in a policy context, and who is most affected by different metrics choices, is currently contained in 5 lines on P54 L34-39. That's insufficient. It requires a fundamental re-structuring to shift from presenting the theory to assessing the implications.	Noted; will be addressed in SOD
7382	3	52	15	55	3	I'm looking for take-home policy messages from this section (how much do alternative choices matter, and to whom, and under what conditions), and find very few in the current draft. The authors should work to ensure there are real policy-relevant conclusions in this section, building on the literature (which is much wider than what the authors have reflected in their current draft). My suggestions for policy-relevant conclucions would be: in a first-best policy world, metrics are economically unimportant from a global perspective, but could be far more important on a regional and sectoral perspective. On the latter we have very little literature. A change in metrics would result in a large shift in the perceived contributions of different sectors to climate change, and hence their perceived need to participate and timing of their participation. It thus also interacts with R, D, D & D cycles. The latter has not been explored at all. Also the political economy of metrics, and of changing metrics, may be as important in considering metrics as the choice of metrics itself. Also consider implications of metrics changes on CDM projects and their viability.	Noted; will be addressed in SOD
7383	3	52	15	55	3	To make policy-implications of metrics more tangible, delete the table and simply reference Tanaka et al 2010 (and presumably Deuter et al 2012). Instead, spell out actual exchange rates under different metrics, and present a pie chart of the contribution of different sectors to current global emissions using different metrics to illustrate the importance of metrics on how different sectors and gases are perceived. Check whether chapter 5 does this and make sure it is done either there or here. The apparent major differences for different sectors under different metric choices chould then be ontrasted with the relative unimportance of metrics in a first-best policy world from an economic perspective. However, the section should emphasise that most if not all economic evaluations of metrics have been based on first-best policy worlds, but that their relevance in second-best worlds, and their interaction with politics and behavioural change, has not been explored in detail at all (although there will be more literature coming out shortly, and the structure of the chapter should cater for that).	Noted; will be addressed in SOD
4322	3	52	17	52	17	"unit for unit" in this context is the expression not to use! You should state explicitly the unit you're talking about (presumably RF per unit concentration ?).	Noted; will be addressed in SOD
10717	3	52	17	52	18	The sentence "Unit for unit, methane is…" needs rewording. What is the unit? Per molecule in the atmosphere the ratio is roughly 25, but if you relate this to emissions the picture is more complicated due to the differences in time scales of removal. Then the time horizon issue is introudced, and as you discuss later, should the effects be measured by RF, integrated RF, dT etc?	Noted; will be addressed in SOD

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
4323	3	52	18	52	19	The issue of climate metrics has been and should be extended to short-lived species which are not greenhouse gases (eg black carbon). So the question here should be wider.	Noted; will be addressed in SOD
10718	3	52	19	52	19	Is this needed "(of which there are many)"? If so, make that clear earlier in the chapter.	Noted; will be addressed in SOD
4324	3	52	22	52	23	You provide two examples here, but are these the best examples? There is only 1 or 2 multi-gas emission trading scheme to my knowledge (CDM and New Zealand). One also needs an exchange rate in the case of a GHG tax. Moreover there is a question whether the same exchange rate is to be used for all these different usages (a question I do not really have the answer for).	Noted; will be addressed in SOD
4325	3	52	29	52	29	C- D or C+D. If damages are counted as a positive cost, then shouldn't it be C+D that you're trying to minimise?	Noted; will be addressed in SOD
12788	3	52	29	52	29	Equation 3.7 should be adjusted to equation 3.8, i.e. the variables should be the same.	Noted; will be addressed in SOD
2214	3	52	3	52	14	On the notion of negative cost opportunities. It would be helpful that IPCC would include a bit more "flavor" from the elaborations from McKinsey on the matter (pages 39 to 41 in the McKinsey report). 1) the costs shown in the cost curve are pure technical project costs and exclude transaction and program costs (those were estimated with a wide range of 1-5 EUR/tCO2e). Also, the curve takes a societal perspective, a decision maker curve will experience changes in the costs (and to a lesser extent potentials). Also reasons for the implementation of efficiency solutions are mentioned. (Note: McKinsey likely publishes a v3.0 update in fall 2012, which has addressed several of those points with additional research.)	Noted; will be addressed in SOD
10719	3	52	31	52	31	Add "change" after "climate".	No action; do not feel this is essential
10839	3	52	32	52	33	"defines the appropriate exchange rate". This is an assumption, right? The assumption being Equation 3.7 is the only correct way to specify the problem. If that is the case, then okay to use "define", however if not the case, then I think the language needs to be weakened by replacing "define" with something like "is one way to determine"	Noted; will be addressed in SOD
4326	3	52	34	52	36	This is a very important point. A lot of the information that is needed is information on the future (climate change, emission pathway, etc). Foresight is needed to the "benevolent planner" to find the optimal solution, but foresight is also needed to the stakeholders on how the cost of carbon and the exchange rate will change in the future. The point that the optimum requires the exchange rate to evolve in time should be made more clearly.	Noted; will be addressed in SOD
10849	3	52	34			"The problem with 3.7 is that a great deal of information … is needed". Like what? Discount rate is an assumption. C as a function of emissions can be determined via a variety of means, such as SCMs coupled to economic models, and D could be estimated in a myriad of defendable ways. I therefore do not see what is stopping anyone from using it? In any problem we required a " great deal of information, some of which is not readily available, ", but that does not stop us making some simplifications and solving the problem the best we can. What is stopping us from doing this here? Because it is "difficult" do we just drop this approach and take an alternative?	Noted; will be addressed in SOD
10720	3	52	36	52	36	The term "second best metrics" is unclear. As I see it, the use of metrics is, in principle, second best, since in the case of optimal trajectory metrics for comparing emissions and deciding which gases to abate would ideally not be needed. So it is rather a second best _approach_ compared to the optimal trajectory. So the thinking behind the application of eq 3.7 and the exchanges rates or weights obtained should be made clear. If the point is to use these weights (i.e. distribute to the emitters) to obtain an approximation to the optimal trajectories then this should be made clear.	Noted; will be addressed in SOD
10841	3	52	36	52	36	"second best". What is the rationale that 3.7 is the first best and the others are simply poor alternatives? Clearly, the definition of which is best is a value judgement, so I think you need to state what values you use to define the "first best", or approach this from a different angle.	Noted; will be addressed in SOD

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
4502	3	52	5	52	5	Characterizing the negative net cost emissions reductions as a "free lunch" is unnecessarily pejorative, because everyone is familiar with the aphorism that there is no such thing as a free lunch. It should be pointed out that while such negative net cost possibilities may exist, there is no way that the goal of limiting temperature rise to 2 degrees C or less can be achieved without incurring substantial costs.	No action; we believe this is clear enough.
10233	3	52	6	52	14	The text mentions that McKinsey's analysis of negative cost abatement opportunity "may be flawed" and that it ignores the distribution of costs and benefits that accrue to parties involved in implementing such abatement measures. We would like to clarify that the curves show technical potential and we acknowledge that regulatory and financial support are needed to actually capture this potential. We acknowledge the barriers 'in the field' to the implementation of technical abatement levers, including market imperfections such as agency issues (the accrual of benefits to parties who do not bear the costs, which you mention), lack of information for parties who would benefit and insufficient financing for upfront investment and also examine some of the ways in which these barriers can be overcome to realise the abatement potential identified (through for instance new policies, regulations, information campaigns and financing mechanisms). In our US Energy efficiency report (with EPA/DOE), for example, we explicitly dive into the negative cost portion and lay out why the potential is there, what the barriers are, and scenarios about how much of that potential might be realistically captured. For more detail please also see in particular pages 41, 56 and 110 in the publication "Pathways to a low carbon economy" at the following link: http://www.mckinsey.com/client_service/sustainability/latest_thinking/pathways_to_a_low_carbon_economy We would very much welcome a call with you to discuss this further	Noted; will be addressed in SOD
4321	3	52		55		I found the "emissions metrics" section to be relatively well written. It certainly reflects the state of affairs in the literature. However I would have expected the authors to i) discuss more the implications of using different metrics and ii) take sides a bit more (what do you think as informed Lead Authors is the right metric/approach to use?).	Noted; will be addressed in SOD
4327	3	52		55		The flow of the section could be improved. First the authors discuss metrics as an "exchange rate" (page 52, line 20ff), then the concepts of absolute metric and relative metric (ie the exchange rate previously discussed) are introduced (page 53, top), and then the discussion returns to the issue of exchange rate (or relative metric) on page 53, line 27 without really saying it.	Noted; will be addressed in SOD
10716	3	52				It would be good with stronger links to physical metrics. (Some work has been done on this; e.g. Boucher 2012 (ESD) and Fuglestvedt et al. 2003, Climatic Change (pages 299-301)	Noted; will be addressed in SOD
10840	3	52		53		I do not understand the use of equation 3.7 AND 3.8. Are they analgous or alternatives? One includes costs, one doesnt? You confidently state (or imply) that 3.7 is the way to do things, and then come back to Equation 3.8. Logically, this would imply that they are analogous in which case you need only one. On the other hand, if they are different, when do I use one and when do I use the other? A few words on the connections betwee these equations and how one leads to the other would be useful.	Noted; will be addressed in SOD

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
10855	3	52		54		Overall, I feel this is an important section. Metrics have generally been the domain of WGI (though this is an unusual choice) and WGIII generally has little knowledge of metrics, despite the fact that the use of GWP100 is prevalent (such as in Life Cycle Assessment) and many economic models implicitly have metrics. This section, I believe, is extremely important to raise the importance of metrics in the WGIII community. At the moment, this section does not say much more than WGI and I see this as a missed opportunity. I think it is important to state how metrics are used in WGIII (links to many chapters, such as Life Cycle Assessment in many chapters, economic models, emission trading, etc, etc). Thus, it is imperative that WGIII has a deep and meaningful understanding of metrics and their issues. I think it is okay to show the different assumptions behind metrics, but at the moment the discussion is scattered, there does not seems to be a clear path linking 3.7, 3.8, GDP, CGP, cost effectiveness, etc. I think a systematic and more structured approach is needed (at the moment it seems to jump backwards and forwards).	Noted; will be addressed in SOD
10709	3	52	15			I support that you approach the metric issue from a general perspective and then present some specific metrics (GWP, GTP and GDP) within this framework. But it would be good with some more “bridges” to or common ground with WGI. Thus, WGIII could give some more attention to the physical metrics and assess these from the point of view of economics. More focus on application of metrics in policy analysis and design of policies is, in my view, needed. I think direct references to the metric sections in chapter 8 of WGI would be useful. I also suggest that the authors read the section on metrics in WGI - and contact relevant LAs - to ensure consistency accross working groups in AR5.	Noted; will be addressed in SOD
10710	3	52	15			The discussion on metrics could go deeper in to the material published in the literature and do more critical assessment (and not only review). Some attention to which applications particular metrics are meant to serve would be useful. I also miss more discussion and assessment of how the various metrics behave and how they could function in various policy contexts.	Noted; space constraints are a real problem for us.
10711	3	52	15			To me it is not clear how the authors assess the state of the science in this field and the adequacy of the various metrics. Since metrics (i.e. GWP) plays a crucial role in calculations of contributions of various emissions, sectors/activities, nations, regions etc to climate change - as well as in design of policy regimes - it is of great importance to have this field properly assessed by other disciplines than natural science alone. There are many implicit value based choices in the design and application of metrics – and many users are not aware of this. Thus, I think, these aspects of metrics need to be made clear and discussed in an assessment like this.	No action; it's unclear how to make this point operational. The comment wants to make the assessment more clear, but the comment is not clear about how to do that.
10712	3	52	15			Furthermore, I think you could discuss more the use of fixed time horizons (which is common practice for GWP) vs use of a varying time horizon. Since GWP is the most common metric I think it would be good to give some more attention to this, and also show the formula, with a more explicit discussion of the weighting of effects over time. The adequacy of GWP in the context of a 2 deg C target should be assessed.	Noted; will be addressed in SOD
10713	3	52	15			The metric section would also benefit from more quantifications and examples; e.g. effects of using different metrics, different choices of discount rate or time horizon, different background conditions, damage functions etc. A table with some metric values would also be useful. This could be done for CH4, N2O, CF4 and some short-lived HFCs.	Noted; will be addressed in SOD

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
11323	3	52	15	55	3	To some extent this section overlaps a bit too much with the metric section in the WG1 report and it overlaps especially with the sub-section about new and refined metrics in the WG1 report. Not that I am against a metric discussion in WG3 as such, rather I think it could be very useful, but as the section is written now the overlaps are notable. Also, the beginning of the section is focused on placing metrics in a relative abstract economic framework. In principle I have no problem with that, it would be fine for a research paper or a textbook in climate economics, but I cannot see the point with doing it here, especially since the aim with chapter 3 is " intended as a resource for policymakers and researchers who are trying to solve normative questions. In that sense, the chapter is policy-relevant but not policy-prescriptive.". The introduction of section 3.10.3 it simply too abstract as it is now. Also, I think the section would benefit from a discussion on how one would can approach the mutligas problem in a policy context, i.e., a gas by gas approach, several different basket where gases with similar lifetimes are grouped in the same basket or one basket with the most important greenhouse gases (such as the approach is in the Kyoto protocol). As I presume the author(s) of the section is aware of there have been some recent papers written about this. Finallly, I think table 3-3 is an nice overview, but it needs some editing, see below for details about this.	Noted; will be addressed in SOD
6888	3	52	15			Suggest to have a look at and refer here to the WGI AR5 assessment of the physical science basis of emission metrics in Chapter 8, WGI AR5.	Noted; will be addressed in SOD
11324	3	52	27	52	35	Suggest deletion of this part plus equation 3.7. This is too theoretical and does not add much to the rest of section 3.10.3	Noted; will be addressed in SOD
12249	3	52	16			This section is on a completely different complexity level than the previos sections. I would recommend to skip the mathemathics, and stick to qualitative discussions as done in all previos sections.	Noted; will be addressed in SOD
10845	3	53	17	53	20	You say that the results will be different, but it really matters if they are slightly different or significantly different (you write "important difference"). Some references on this would be good. IPCC994 Report on Radiative Forcing, page 219, discusses this. They refer to a difference of 15% being small. Is 15% an "important difference"?	Noted; will be addressed in SOD
10842	3	53	20	53	23	I do not think there is anything necessarily wrong with this section, but I think it is fair to say that the metric literature would not phrase it this way. The reason for a fixed time horizon had absolutely nothing to do with discounting, but everything to do with the long-term behaviour of co2 making it a divergent problem. See, for example, your ref to Lashof and Ahuja (1990) and other literature around that time, including IPCC 1990. For more background, the GWP was based on the ODP which integrated to infinity and this is how the literature develops the concept of the GWP. See introduction and citations here, for example, Peters, G.P., Aamaas, B., Berntsen, T., Fuglestvedt, J.S., 2011. The integrated global temperature change potential (iGTP) and relationships between emission metrics. Environmental Research Letters 6, 044021.	No action; not clear what are the operational implications.
10721	3	53	22	53	23	The different ways of weighting effects over time needs more dicussion. And it is important to make it clearer how this is done in GWP which is used in almost all multi-gas assessments and comparisons of impacts of emissions and emission reductions.	No action; we discuss discounting earlier, and little space here.
11358	3	53	24	53	26	Choices of impact parameters etc. are discussed in Tanaka et al. (2010, Carbon Management, doi:10.4155/cmt.10.28), which can be introduced in this paragraph.	Noted; will consider this reference
10722	3	53	25	53	26	As this is written now it does not add much to the assessment of metrics. So I suggest telling more about what the Deuber et al study finds.	No action; space is limited. The point of the citation is for readers to go there for more detail.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
10723	3	53	27	53	36	It would be good to explain more why GDP has a uniqe postion among the metrics. Since this chapter should also be (I assume) written for non-economists, it would be good with some more introduction to this. In addition, an assessment of how such a metric would function in various policy contexts is needed.	Noted; will be addressed in SOD
10850	3	53	27			"From an economic point of view". I am not sure you have the answer, but at least worth considering, what would one do from a "non-economic point of view"?	No action; that's the rest of the subsection, e.g. "physical metrics."
10851	3	53	27			"the first best approach", which was earlier stated to be Eqn 3.7? Thus, 3.7 is the GDP by deduction? If so state. If not, please explain why we have to "first best" approaches.	Noted; will be addressed in SOD
12252	3	53	29	53	29	If it is possible, it would be nice to use a different abbreviation for the "Global Damage Function". It is standard to use GDP for Gross Domestic Product, and it is used as such other places in this chapter. Even though it is ulikely that the two would be mixed up, it is better that GDP only means one thing throughout the chapter	Noted; will be addressed in SOD
10843	3	53	31			It is a problem, I think, that GDP also means Gross Domestic Product. This section is so short, just write Global Damage Potential in full and drop the GDP	No action; already addressed by comment 12252
10844	3	53	37			A couple of words on why it is difficult to operationalise would be beneficial	Noted; will be addressed in SOD
4328	3	53	39	53	39	Unless I'm mistaken you mean "cost-benefit" here.	Noted; this is incorrect, but the reference to cost-effectiveness can be better explained or else eliminated. .
10852	3	53	39			Why is "cost effectiveness" a second best economic approach? Surely this is an assumption? Perhaps society would rather doing something in the cheapest way possible? I am not an economist, but the choice between GDP and cost-effectiveness seems more like an assumption than some undisputed law of nature (economics)? It would be good to expand on the reason for the choices here. This also gets mixed in with what is "politically feasible", and thus the economically preferably may not be politically feasible.	Noted; will be addressed in SOD
12250	3	53	4	53	6	The variables I and r are introduced, but they are never used again in this chapter. This leads to confusion, as one expects to find the variables just introduced in the subsequent equation. If this sentence is ment to be a more general description, it is not necessary to give the "pertubation" and the "pathway" variable names. It is also hard to find any link between this sentence and the equation it leads up to.	Noted; will be addressed in SOD
10853	3	53	40			But damges could be included physically (number of deaths from climate change) or in money (value of statistical life, for example) or other measures of damages as used in the GDP. Thus, I do not see that this class of metrics cant consider damages?	Noted; will be addressed in SOD
10724	3	53	43	53	44	Is it correct to say that scenario uncertainty is avoided if you use a constant background? This is also a scenario (although a very unlikely one).	Noted; will be addressed in SOD
11359	3	53	43	53	44	An exception is the TEMP (Tanaka et al., 2009, Climatic Change, 10.1007/s10584-009-9566-6), which is defined by using actual emission trajectories. The idea of the TEMP is to equate the temperature consequences on realistic emission trajectories (Shine, 2009, Climatic Change, 10.1007/s10584-009-9647-6). Changing background concentration is also discussed in literature dealing with physical metrics (e.g. Gillett and Matthews, 2010, Environmental Research Letters, http://stacks.iop.org/1748-9326/5/i=3/a=034011; Reisinger et al., 2011, Environmental Research Letters, http://stacks.iop.org/1748-9326/6/i=2/a=024020).	Noted; will consider this reference
10854	3	53	44	53	46	A constant background is a choice, which may have valid reasons? A metric need not represent reality, but may be a defined set of rules (a game) for making comparisons. In any case, it is quite feasible to use a varying background and examples of this are in many places in the literature. Thus, if this is a "weakness" then it can be easily fixed.	Noted; will be addressed in SOD

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
12251	3	53	9	53	9	Probably just a fomatting error: Equation 3.8 is repeated twice on this line.	Noted; will be addressed in SOD
11325	3	53	21	53	21	Please make clear that the "standard approach" IN ECONOMCIS "would be to use exponential discounting". Exponential discounting may not be the standard approach outside economics.	Noted; will be addressed in SOD
15449	3	54	1	54	2	The fact that policy makers have used these metrics for purposes beyond what scientists envisaged should be brought out (through reference to recent material) and this will be helpful for the 2015 metrics review to increase awareness among the policy community of policy-metrics relationships that could be examined as part of this review.	Noted; will be addressed in SOD
7384	3	54	1	54	2	This could be strengthened - 100-year SAR GWPs are used near universally wherever different GHGs need to be compared or aggregated. They are also used for reporting under the UNFCCC, life cycle analysis, industry reporting tools, etc etc. Would be helpful to add and make clear that the IPCC never recommended using 100-year GWPs but presented them initially (Shine et al, 1990) to highlight the difficulties of aggregating gases via a single metric.	Noted; will be addressed in SOD
10732	3	54	16	54	17	"…excludes short- and medium time scales (as in the case of GTP)" needs rewording. The GTP may very well capture the effects on very short, short and medium time scales. That depends on which time horizon that is chosen.	Noted; will be addressed in SOD
10846	3	54	16	54	17	The temporal weighting function in the GTP. What is it? You mean the temperature IRF, then word it as though it is a physical weighting and not an economic discounting.	Noted; will be addressed in SOD
10733	3	54	26	54	28	It would be good if you could discuss the differences (pros and cons) of analytical and transparent metrics and model based metrics; see 8.7.1.5 and 8.7.1.6 in WGI chapter 8.	Noted; will be addressed in SOD
15448	3	54	29	54	39	These paras appear to assume a watertight, prefect, complete scenario. The discussion needs also to cover less than perfect scenarios- which is the policy-relevant world. Scenarios with less than 100 percent coverage of sectors and of gase are more likely.	Noted; will be addressed in SOD
10967	3	54	29	54	33	Metrics for comparing GHGs are very significant in the policy process and are still not being treated comprehensively in the IPCC assessments, despite the cross-WG meetings that have been held. But a more specific comment for this paragraph is that it should consider the recent evolution of ways for comparing CO2 and methane in the context of RCPs or stabilisation scenarios. For example, I recently reviewed and supported the paper: Lauder, A., I.G. Enting, J.O. Carter, N. Clisby, A.L. Cowie, B.K. Henry, and M.R. Raupach, "Offsetting methane emissions --- an alternative to emission equivalence metrics", International Journal of Greenhouse Gas Control, (submitted), 2012. This shows a credible way in which one-off sequestration of CO2 can offset continual emissions of methane, and is an extension of the treatment of the forcing equivalence index (FEI) in the context of stabilisation done in: Manning, M., and A. Reisinger, Broader perspectives for comparing different greenhouse gases Philosophical Transactions of the Royal Society A, 369, 1891-1905, 2011. In both cases variations in emissions that maintain a stabilisation scenario were being considered rather than the more academic approach of comparing pulse emissions of gases.	Noted; will be addressed in SOD
7385	3	54	29	54	39	The draft is silent on a range of other things we also know about metrics in a first-best policy world (cite Reisinger et al 2012, amongst others): global cost differences are small; but effect on regional costs and production can be more significant, especially if metrics are considered in the context of global trade; metrics also affect the timing of cost-effective peak CO2 emissions to reach a defined long-term goal (i.e. higher metric value for CH4 allows a small delay in peak of CO2 emissions); metrics have a small but distinct effect on the amount of overshoot to meet a defined long-term goal in a cost-minimisation framework. These are all important and highly policy-relevant conclusions that are in the literature and need to be brought out in this section if it is to be a comprehensive policy-relevant assessment. Note all these are for a first best policy world.	No action; this section is not to be a comprehensive policy-relevant assessment.
11360	3	54	3	54	3	It is good to have an acronym comparable with other metrics, but the "price ratio", the original name proposed by Manne and Richels (2001, Nature, doi:10.1038/35070541), can be mentioned here.	Noted; will be addressed in SOD

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
10734	3	54	31	54	31	"shorter than that of CO2" needs rewording since CO2 does not have one single lifetime	Noted; will be addressed in SOD
4333	3	54	32	54	32	Please cite the final revised paper rather than the Discussions paper: Boucher, O., Comparison of physically- and economically-based CO2-equivalences for methane, Earth System Dynamics, 3, 49-61, 2012.	Noted; will be addressed in SOD
10735	3	54	32	54	33	Is it really as simple as this?	Noted; will be addressed in SOD
7386	3	54	32	54	33	The way that Reisinger et al 2012 is cited here is potentially misleading. That study explored higher values for CH4 in the context of a time-dependent GTP; hence the emphasis on CH4 gradually increases over time and becomes much higher only towards the end of the 21st century. Reisinger et al did not consider high metric values up-front as the current sentence could be seen to imply.	Noted; will be addressed in SOD
4330	3	54	33	54	33	and therefore on some countries.	Noted; will be addressed in SOD
10968	3	54	34	54	39	Table 3.3 is a very useful summary but another review paper on metrics is about to come out in Climatic Change and it has a very similar table covering some additional forms of comparison. See Tanaka, K., D.J.A. Johansson, B.C. O'Neill, and J.S. Fuglestvedt, Emission metrics under the 2°C climate stabilization, Climatic Change Letters, (submitted), 2012.	Noted; will be addressed in SOD
7387	3	54	34	54	37	This is the only really policy-relevant conclusion in the current draft, i.e. it tries to answer the question "so how much do different metrics actually matter?". Note it should not be "less than 5%" but "about 5%" once all relevant literature is taken into account, see Reisinger et al 2012 and Johansson 2006, 2012.) Please provide a confidence qualifier for this conclusion (given the number and consistency of studies, and consistency with theoretical expectations, I'd suggest "high confidence", but at a minimum "high agreement, robust evidence"). Also cite van Vuuren et al 2006, as the multi-model intercomparison further justifies the suggested high confidence rating.	Noted; will be addressed in SOD
10736	3	54	35	54	35	There is a recent paper by Reisinger et al (Climatic Change) that may be referred to here.	Noted; will be addressed in SOD
4331	3	54	37	54	37	5% in the global mean. Is this small or large in relation to other imperfections of a real world climate mitigation policy? What about differences in costs at the country level?	Noted; will be addressed in SOD
7388	3	54	38	54	39	That's hardly the point; I think we have enough literature and detailed model studies to be highly confident that in a first-best policy world, metrics have little effect on global economic costs, and I doubt we need more studies to further assure us of that point. What has been far less explored and does deserve and require more study is (a) the regional and sectoral (rather than global) implications of metrics, and (b) to consider those implications within second-best policy scenarios, and (c) to link economic model studies with the political economy of mitigation, i.e. how metrics change the perceived importance of different sectors and their contribution to collective mitigation efforts.	Noted; will be addressed in SOD
10730	3	54	7	54	7	The Tol et 2008 paper has been revised and resubmitted.	Noted; will be addressed in SOD
4329	3	54	8	54	10	You should make it clear that you're *not* talking about the GTP with a fixed time horizon here, but a GTP with a decreasing time horizon as one approaches a target year (in comparison with a time-evoleving GCP along an optimum trajectory). Implicit here is the fact the exchange rate changes in time, which is something stressing as probably not obvious to most readers.	Noted; will be addressed in SOD
10731	3	54	8	54	8	The similarity between GCP and GTP applies for a slightly different version of GTP and not the original standard version using chosen time horizons (e.g. Shine et al 2005 (Climatic Change)). In Shine et al. 2007, the GTP is given with a time horizon that is determined by the proximity to the target year. It is this version of GTP you refer to here, which should be made clear. The wording "...temperature change induced at a given point in time in the future..." needs to be changed.	Noted; will be addressed in SOD
11326	3	54	21	54	39	I think this part of the metrics section is relevant and do add to the discussion in the WG1 report and could be expanded in the WG3 section about metrics.	No action; not clear how to operationalize this comment.
8395	3	54	37	54	37	While it is accurate to say < 5%, many of these results are far less than 5%. An altered wording that conveys this would be useful.	Noted; will be addressed in SOD

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
8396	3	54	37	54	39	We have just published such a study which demonstrates that the impacts are quite small. In part this is due to inclusion in the IAM of indirect emission reductions that occur in methane due to the comprehensive climate policy. Reference: Smith SJ, JF Karas, JA Edmonds, J Eom, and A. Mizrahi (2012) Sensitivity of Multi-gas Climate Policy to Emission Metrics Climatic Change (2012, published on-line). DOI 10.1007/s10584-012-0565-7	No action; cannot cite grey literature
10737	3	55				Regarding the two first rows: It should be proportional to integrated RF not just RF.	Noted; will be addressed in SOD
10738	3	55				Add "change" before "potential" in the GTP.	Noted; will be addressed in SOD
10739	3	55				The version of GTP that is given with a time horizon determined by the proximity to the target year should also be inlcuded in the table (See figure 8.29 in WGI)	Noted; will be addressed in SOD
10740	3	55				The metric integrated Global Temperature change Potential (iGTP) introduced by Peters et al. 2011 (Environmental Research Letters)	No action; comment unclear
10847	3	55				I like this table, though, I have many comments. References are not in the reference list. GWP, "constant" I think might be incorrect. Check. From SAR it is definitely constant, but I dont think for FAR. GWP-LA is used mainly in one paper, and most would not agree to this approach in this context. There are also problems with this, as described in Fuglestvedt et al 2003 Climatic Change, in that different components require different discount rates. GTP, "exogenous scenario", I am not sure where you get that from, but generally, GTP IRFs are taken from existing literature and the most used by Boucher and Reddy is based on a 2xCO2 experiment. Or perhaps you meant this? MGTP uses constant and scenarios. Also see (Peters, G.P., Aamaas, B., Berntsen, T., Fuglestvedt, J.S., 2011. The integrated global temperature change potential (iGTP) and relationships between emission metrics. Environmental Research Letters 6, 044021.). More generally, the MGTP is just the integral of GTP in absolute form, and renormalised, and so it has the same background as GTP. Since GTP requires CO2 and temperature IRFs, then the background of CO2 is relavent to GTP. What is "theta"? I have never heard of "EGWP" and why do you reference it? A new column in the table which states which metrics are used often and which have been used once, or a few times, etc would be good. This would show GWP and GTP as the most important, currently. The point is, it is perhaps not so useful to alert people to metrics which have been otherwise disgarded or ignored in the literature, unless there is good reason to include them. Overall, keep the table, but make it better than it already is!	Noted; will be addressed in SOD
11361	3	55		55		To make the table more comprehensive, FEI can be added (Wigley, 1998, Geophysical Research Letters, 10.1029/98gl01855). As far as I am concerned, Gillett and Matthews (2010) is the first study that proposes a metric which has a form of the MGTP as correctly cited. MGTP is also called "integrated Global Temperature change Potential (iGTP) (Peters et al., 2011, Environmental Science and Technology, 10.1021/es200627s) or (IGTP) (Azar and Johansson, 2012, Earth System Dynamics Discussion, 10.5194/esdd-3-113-2012)).	Noted; will be addressed in SOD
9809	3	55	22	55	24	Not all impacts can be measured directly in terms of monetary values. Your example of heat stress might have an impact on productivity of the workers or it might cause more diseases and thus have an impact on the health system costs.	Noted; will be addressed in SOD
11327	3	55	2	55	3	This table is nice and presents a nice overview, but all the parameters and variables need to be explained clearly. Also, I do not see the point why theta is divided by H for GWP (correct for MGTP though) and why the discount factor (exp-rt) is multiplied r in the temporal weighting functions. Also, I think (although I have only spent a minute on this) that the temporal weighting function for CETP should be written as theta(t-tx)*exp(-rt), where tx is the year the stabilization target is reached.	Noted; will be addressed in SOD
8592	3	55	5	57	19	This is a better discussion of WTP although it still glosses over the limitations of it. I would argue that the previous section be deleted (why have it discussed in two places in the same chapter), or at the very least, clearly pointing to this stronger coverage of the same ideas.	Noted; will be addressed in SOD

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
6316	3	55	5	55	6	This sentence sounds overly definitive and yet, is open to dispute. As it stands, it reads: "In order to assess a proposed mitigation policy, one needs to compare an economic measure of its 5 costs with an economic measure of its benefits." As chapter 2 amply shows, there are other ways of assessing mitigation policies than performing CBA. Re-word.	Noted; will be addressed in SOD
13947	3	56	3	56	8	WTP and WTA are already dealt with at the beginning of the chapter. No need to discuss it again.	Noted; will be addressed in SOD
14849	3	57				This section, and the table 3-4, may be very problematic. First, it should be heavily caveated, explaining fully the numerous ways in which these estimates are idealized formulations, based on minimal empirical data, include only a subset of sectors, exclude the possibility of major non-linearities, high level of spatial aggregation, rely on paraeters that are completely uncalibrated, in many cases rely on estimates known to be hopelessly out of date and overtaken by science, etc., etc. As these figures tend to be grossly underestimated. It is quite easy to envision this table being grossly misinterpretted in shorter, less careful written pieces (as in the media) of the results of the WGIII report.	Noted; will be addressed in SOD
8255	3	57				To better illustrate how Integrated Assessment Models work, section 3.10.5 should contain a diagram illustrating how assumptions about climate, the economy and technology impact results.	No action; wgIII has a whole chapter later on IAMs. This is not the place.
7301	3	57	21	59	5	Section 3.10.5 includes important information on possible economic impact of climate change. Unfortunately, the information provided in the Table 3-4 lacks sufficient explanation as well as discussion. The major conclusions that could be made from the table are also unclear. It would help, if more explanation is provided to the information included in the Table 3-4.	Noted; will be addressed in SOD
12253	3	57	20			Please consider to shorten this section	Noted; will be addressed in SOD
12257	3	59	11	59	12	"… which are variables like temperature, precipitation, for costal areas, mean sea level etc."- It is confusing and uneccesary to specify "for costal areas". The way it is written now it is listed as one of the variables.	Noted; will be addressed in SOD
12258	3	59	15	59	16	"The damage measurement starts where the the climate modeling leaves of, with the Wckt's, and involves two mappings" - Fragmentet and difficult to understand.	Noted; will be addressed in SOD
12259	3	59	17	59	17	"… the that impact…" - Remove "that"	Noted; will be addressed in SOD
12260	3	59	18	59	18	Wrong indexing on the "W".	Noted; will be addressed in SOD
12261	3	59	18	59	18	Don't use T as a mapping. It is already used as a time-symbol: -T=starting time. The confusion becomes complete when the indices are removed in equation 3.9.	Noted; will be addressed in SOD
12262	3	59	18	59	18	Remove one of the "may depend"s.	Noted; will be addressed in SOD
12263	3	59	18	59	21	Please shorten this sentence. It would also be much easier to read if the variables were not mentioned with symbols.	Noted; will be addressed in SOD
12266	3	59	19	59	19	Same as above, but for the time index. In addition "tau<t" is not necessarily the past. t=0 is the present (as said in line 8), thus "tau<0" will be the past.	Noted; will be addressed in SOD
12264	3	59	20	59	20	Is upslope a different location?	Noted; will be addressed in SOD
12265	3	59	20	59	24	Why is it specified that the damage can happen at a place l different from k. k can be any location, so it is redundant to specify l as a location different from k.	Noted; will be addressed in SOD
12267	3	59	24	59	24	Footnote 55: The mappings in the equation are not called G and F, but V and T.	Noted; will be addressed in SOD
12268	3	59	28	59	30	Here it is referred to table 3-5, which does not exist. I presume it is suppose to be table 3-4?	Noted; will be addressed in SOD
12254	3	59	3	59	3	Please explain what an "IAM" is.	Noted; will be addressed in SOD
9008	3	59	3	59	5	Despite the claim these models are not in the summary Table 3-4: "These are the DICE model (Nordhaus, 2008, 2010) 3 and its regional cousin, RICE (Nordhaus and Boyer, 2000); the FUND model (Tol and Yohe, 2009); and the PAGE model (Hope, 2006)."	Noted; will be addressed in SOD
12269	3	59	40	59	40	Wrong variable names are used: The mappings are not called G and H, but V and T.	Noted; will be addressed in SOD

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
4503	3	59	5	59	5	Footnote 54 referencing Ackerman et al. (2009) is entirely misleading. The Ackerman et al. paper was a critique of integrated assessment models. While it is true that the paper mentions models other than the ones listed in the text, the main point(s) of the Ackerman et al. paper had to do with fundamental limitations of all such models. Footnote 54 makes it appear that Ackerman et al. were entirely comfortable with the IAM approach to benefits estimation. The chapter should cite Ackerman et al., of course, but should put more emphasis on the weaknesses of the IAM approach to climate policy analysis.	Noted; will be addressed in SOD
12255	3	59	6	59	24	This entire paragraph needs to be rewritten as it is barely understandable as is. The "need to fix" are highlighted below.	Noted; will be addressed in SOD
12256	3	59	7	59	8	"...groups of decades, such as decades"	Noted; will be addressed in SOD
4476	3	6	1	6	6	This paragraph seems to imply that utilitarianism and prioritarianism are the only possible ethical stances. But this is surely wrong. What about ethical systems involving absolute rights, transcendental values, and/or obligations that cannot be gauged in material terms? It may be more straightforward to justify action to stabilize the climate on religious grounds than on utilitarian grounds, for example.	Noted; will be addressed in SOD
8576	3	6	1	6	26	At no point is this fairly detailed discussion of CBA framed within the substantive literature on the limitations of CBA for complex decisions like climate change and the ethical challenges of doing this! Considering that this chapter is supposedly an integration of discussions of ethics and economics this is a profound problem. By simply jumping into CBA discussions without any caveats, the IPCC is essentially imposing a framework in which CBA is the default option for assessing decisions, and in which the profound limitations of CBA for non-linear and multi-dimensional contexts become invisible in debate. Considering the attention the IPCC has invested in communicating uncertainty elsewhere, overlooking these discussions of how econonimcs deals with uncertainty (of multiple kinds) is problemtic.	The chapter has been reorganized in response to this comment and others like it, to make the limitations of cba more explicit.
10962	3	6	1	6	26	The Executive summary puts too much emphasis on discounting. This does not reflect the balance of issues being covered in the whole chapter, but also my reading of the literature in this area suggests there is now growing recognition that discounting ignores intergenerational equity and so is not a sensible basis for long term planning. Even from a more practical basis, investment in infrastructure that has to support an increasing population for more than 100 years can be seen as appreciating in value, not depreciating.	No action; disagree with comment
16626	3	6	1	6	11	2. How to allocate the costs of action or inaction amongst states or countries?	No action; comment unclear
4746	3	6	11	6	11	Add "and people" at the end of the sentence.	Will be addressed in SOD
12130	3	6	12	6	13	This implies that discounting is *necessary* for comparison. But comparison is possible with a zero D.R.	No action. Disagree with comment; this is still discounting
3911	3	6	14	6	14	What would be the ethical basis for using a discount rate chosen by a policy elite to determine what sacrifice voters today should make 'for the benefit of future generations'? Surely, the role of the policy elite is to explain the trade-offs and allow citizens to determine for themselves what sacrifice they are willing to make, both in the form of personal initiatives and through collective processes?	No action; comment unclear
4747	3	6	15	6	19	A reference to Stern report may be useful according to me.	No action. It is referenced in the text, though it is grey literature
3912	3	6	15	6	17	This sentence also has a connotation that a policy elite is capable of making decisions about a discount rate in order to determine what sacrifices today's voters should make, whether they like it or not. Again the question arises as to the ethical and democratic basis for such an attitude to democratic decison-making.	Will be addressed in SOD; this is not our intended meaning

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
4618	3	6	17		17	It should be pointed out that efficient intertemporal allocation of resources is the purpose of the discount rate and not intergenerational equity; the discount factor is the price (trade-off rate) of present consumption in terms of future consumption a spointed out on p. 27 (l. 28-30); it's the social welfare function which deals with distributive justice	No action. Disagree with comment
3910	3	6	2	6	2	Is not the word 'appropriately' a cop out? Is not any weighting scheme fundamentally arbitrary from an ethical perspective? Is it ethical to propose that one person's well-being is more important than another's, and if so what implications does this have for the democratic notion of universal suffrage based on one vote person? My impression is that the mainstream view in economics is that any given social welfare function is subjective, making the choice between them fundamentally arbtitrary. If the chaper envisages that the choice is made through political processes then doubtless, it will reflect the preferences of those with the greatest political clout at the time. Would not it be useful for the chapter to comment on the ethical basis for thus politicising such decisions?	No action. Mistaken comment; chapter discusses what is appropriate
4477	3	6	20	6	26	Invoking the "Ramsey rule" as a way of normatively determining the appropriate discount rate is simply incorrect. The Ramsey rule must be generalized in the real-world in which there are different investments having different risks and different rates of return (including insurance that may have a negative rate of return). The discount rate also depends on the degree of substitutability of different goods, present and future. The different goods (such as produced goods and the unproduced environment, for example) may have different discount rates appropriate for comparing present and future values. Finally, the entire expected utility framework within which Ramsey-like discount rates are derived may break down if there is some potential for future catastrophic events (see the alternative approaches to the catastrophic risk issue of Weitzman and Chichilnisky, for example).	No action. The Ramsey rule determines a normative discount rate for safe project. It just states “price=MRS”, an efficiency condition that holds independent of the existence of risk, insurance, multiple goods, and so on. As shown for example by Gollier (JET, 2010), but also many other authors before him (Sterner, Guesnerie,…), it is equivalent to use a single DR on money together with a set of relative prices of goods that evolve over time, or to use a set of different DR, one for each good. So, there is no mistake here. We are not going to talk about Weitzman or Chichilnisky in the executive summary. More on this in the main text.
3914	3	6	24	6	26	Given the interest in this chapter on distributional issues, should it not point out that low income investors are more likely to be paying credit card rates of interest on debts than they are to receiving returns on bills and bonds? Expressed more technically, the rate of return on bills and bonds is not an opportunity cost for those who don't own bills or bonds. The opportunity cost to this group of an extra dollar spent on fuel bills, for example, might be more like a credit card rate of interest.	No action; comment unclear
16629	3	6	27	6	27	Link this discussion to the previous discussion on social welfare functions. Merge these two paragraphs together into a shorter paragraph. Maybe delete the sentence that starts in line 3 and ends in line 5.	Will be addressed in SOD
5123	3	6	27		32	Unlike above comment, this para usefully notes the need for flexibility, but presents it a static when a more likely scenario will require dynamic adjustments in the suite of policies in use	Will be addressed in SOD
4748	3	6	33	6	35	I was wondering of the term "social" or "societal" should be included. Is it also behind the term "environmental"?	No action; goes in distributional or institutional.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
8577	3	6	33	6	43	I am very confused by the discussion on policy evaluation. Is this trying to say that tehse are the criteria countries SHOULD use? That they are using? That they are 'allowed' to use?	No action; see longer section for more detailed discussion on criteria that countries are using
13564	3	6	33		39	wondering if it would be useful to clarify how 'mitigation' policy and 'carbon' policy are being defined as they're both being used	No action; carbon policy is somewhat broader than mitigation policy. But this is clear in the text.
6083	3	6	33	6	34	Criterion of promotion effect of technological innovation and diffusion is missing. In line 21-24 of page 6 of Chapter 3, there are sentences such as "Meeting aggressive emission reduction targets will be difficult without major changes in the technology of producing and consuming energy" and "Markets, left to their own devices, will underprovide technological change, even in the presence of a carbon price. Studies suggest that environmental and technology policies work best in tandem". Also in Chapter 1 (page 3, from line 47), there are sentences that "it is likely that deep cuts in emissions will require a diverse portfolio of policies and technologies. It is very likely that here are many different development trajectories, but it is virtually certain that the ability to meet those trajectories will be constrained if particular technologies are removed from consideration or are given excessive emphasis". Also in Chapter 2 (page 38, lines 23-24), there is a description that "Several researchers suggest that future pathways for RDD&D will be the determining factor for emissions reductions (Prins and Rayner, 2007; Lilliestam et al., 2012)". In any case without rapid technological innovation and diffusion, deep emission cut will be impossible. This is pointed out in Chapter 6 (6.4.1) that "autonomous technology might not be sufficient to limit climate change and dedicated resources and policies might be needed to induce it" (p.60, lines 22-23). It is highly appreciated that this Chapter has an independent section (3.12) on technological change. As pointed out in that section, policy can play a key role in shaping both the derection and magnitude of climate-friendly technological change. With this in mind, whether a certain policy has such effect as to promote technology innovation/diffusion is absolutely important criteria for policy evaluation. Please add "promotion effect for technological innovation/diffusion as fifth criteria.	We added mention of technology, as part of economic efficiency, but must point mostly to other sections for more substantial discussion; see section 3.12
11005	3	6	41		43	Delete ‘legitimately”. As a description of reality the sentence is fine. ‘Legitimately’ turns statement into a normative judgment, and it is not IPCC’s role to say what is or is not legitimate policy for any state.	Will be addressed in SOD
8578	3	6	44	6	48	This paragraph is confusing. The first lines seem to discuss behavioural changes. The rest of it discusses WTP without any recognition of the severe limitations of these techniques for valuation. Again, this paragraph illustates the ongoing tendency of this chapter to jump into hihgly contentious economic metrics (from the perspective of many discussions of ethics and from the perspective of the practical and methodological challenges of using these metrics of value) without any recognition of these debates, of the limitations of the techniques or of some of the implications of these limitations. Not only does the paragraph not make logical sense, but also does it not help in a respectful integration of ethics and economics.	No action; comment unclear

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
13565	3	6	44		48	In addition to pertaining to this specific section, this comment is more of an 'overall' comment on my behalf - while the text points out that that GHG emissions aren't only a technical issue, metrics used to ascertain impacts of 'behaviour' and 'substitution' stem from economics (change in income, Willingness To Pay, etc). Economics are obviously important, but it seems rather heavily skewed towards modes of measurements used in economics - there are other dimensions and disciplines uesd to determine the role of other factors (e.g. social, culture, political). Justice and equity are a part of this (as is noted) but also would like to flag alternative lenses. For instance, more systematic approaches to assessing steering change (including reducing GHG levels on a grand scale) include the work of Geels and others (e.g. http://pubs.e-contentmanagement.com/doi/abs/10.5172/impp.2004.6.2.344) and transitions; Smith et al (2005) Research Policy http://www.sciencedirect.com/science/article/pii/S0048733305001721; and Rogers (2003) Diffusion of innovation which attempt to examine socio-technical 'fit'. See also chapter 1 Ockwell and Mallett (2012) "Introduction: Low carbon technology transfer: from rhetoric to reality" in Ockwell and Mallett (eds) Low Carbon Technology Transfer: from Rhetoric to Reality. Routledge: Abigndon. http://www.routledge.com/books/details/9781849712699/	No action; no change implied -
5124	3	6	44		48	A massive literature now exists ciriticising an economic definition of wellbeing. See, eg: MJC Forgeard, et al. 2011. Doing the right thing: Measuring wellbeing for public policy. International Journal of Wellbeing 1(1), 79-106; and Stiglitz, Sen and Fitousi. 2009. Report by the Commission on the Measurement of economic performance and social progress. Later uses in the chapter recognise the broader definition of wellbeing in principle, but the default remains economic.	No action; we do not believe this issue is appropriate to address in this chapter
4478	3	6	47	6	48	WTP and WTA may not be appropriate measures (and may not even exist) for certain kinds of problems, including the possibility of environmental catastrophe. WTP and WTA implicitly assume substitutability of income and everything else, and WTP and WTA are wealth-dependent. Respondents in contingent valuation surveys have been known to case "protest votes" by answering "zero" to a question about their valuation of some event that is either inconceivable or so far outside their experience that they are unable to put a dollar value on avoiding it.	No action; disagree with comment
4749	3	6	48	6	48	Please explicit acronyms: WTP "willingness to pay", and WTA "willingness to accept"	Will be addressed in SOD
3913	3	6	5	6	6	Should a sentence be added that points out in this context that future generations are commonly projected to be wealthier than today's generations?	No action. We do mention this in the text.
16627	3	6	8	6	8	Authors could also choose to include individuals and/or a time component in the second question above.	No action; comment unclear
16628	3	6	9	6	11	Before the discussion about social welfare functions, add a sentence that explains why it is important to have economics provide an anthropocentric measure of value and how this can be an input to decision- or policy-making. This sentence can help lead the discussion of social welfare functions and the following concepts.	Noted; will be addressed in SOD
12272	3	60	12	60	26	Check the wording of this paragraph. There are several strange choices of words which might make the reader draw the wrong conclusions, e.g. "...extrapolation from studies in literature to other countries and regions." and "damages from energy".	Noted; will be addressed in SOD
12270	3	60	3	60	3	Wrong variable names are used: The mappings are not called G and H, but V and T.	Noted; will be addressed in SOD
12273	3	60	32	60	33	Please remove the reference to "Jensens's inequality". Few people will know the inequaliy in question, and the reference is not necessary.	No action; disagree with comment
12274	3	60	33	60	36	"…expected damages of" This sentence is incomplete.	Noted; will be addressed in SOD
12271	3	60	7	60	7	If Equation 3.11 is suppose to be presented, the parameters a and b needs to be explained.	Noted; will be addressed in SOD
8828	3	61				the discussion of “behavioral economics and culture” should also include citations to Kahneman’s 2011 book, Thinking, Fast and Slow and to the 2008 book by Thaler and Sunstein titled Nudge: Improving Decisions about Health, Wealth and Happiness.	AGREE action will be taken

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
9356	3	61	10	61	11	p61line 10: this very important argument with respect to ' fat tails' does not come up very clearly: expand it	Noted; will be addressed in SOD
4505	3	61	13	61	24	The Weitzman approach should also be mentioned here; Weitzman develops the consequences of employing a Bayesian framework for learning about the structural uncertainties.	No action; comment unclear
12275	3	61	18	61	18	What is "...rate of time preferences..."?	Noted; will be addressed in SOD
4506	3	61	20	61	20	Again, the Ackerman et al. paper cited in footnote 60 is not the same as the one given in the bibliography.	Noted; will be addressed in SOD
12276	3	61	22	61	24	Fragmentet sentence: "...this approach, which was adopted by… and is computatationally more demanding."	Noted; will be addressed in SOD
13948	3	61	25			Behavioural economics and culture section is too long. At least suggest deletion of Box 3.7 and 3.8	AGREE action will be taken
9187	3	61	25	68		good text on behaviorial economics. Please mention to efficiency regulation and energy management systems, if possible. My chapter Ch 15 has a lot of relevant discussons. (15.5.2 regulation and information section), also relevant are 15.5.5 Voluntary agreement, and 15.13 Frequently asked questions. - please take a look.	Noted.
9214	3	61	25	68		please also summarize the following terminologies - organizational economics, evolutionary economics, new institutinoal economics, to the extent they are relevant with the energy efficiency policies. Much energy efficiency policies (such as energy audit , enegy management systems, see ch15 for details) are meant to influence on the bevariour of organiations (such as firms), not individual citizen.	NOTED general action in other sections of the chapter
4504	3	61	3	61	12	The findings reported in footnote 59 are more important than a footnote and should be included in the text itself. (In addition, the chapter authors should check the Ackerman reference; the paper by Ackerman and co-authors that makes the point discussed in footnote 59 it is not the same as the Ackerman et al. (2009) reference given in the bibliography. The papers are different and the co-authors are different.) In addition, it is not entirely accurate to say that the Weitzman results stem from a fat right tail in the probability distribution of temperature increases and damages. The Weitzman result arises from a combination of deep structural uncertainty and the impossibility of learning enough about the underlying structure within the necessary decision-making time frame.	Noted; will be addressed in SOD
9810	3	61	35	61	38	See the systematic review on LCC: Eric Korpi, Timo Ala-Risku, (2008) "Life cycle costing: a review of published case studies", Managerial Auditing Journal, Vol. 23 Iss: 3, pp.240 - 261	AGREE action will be taken
8084	3	61	22	61	24	As the alternative approach mentioned here is an important one, both methodologically and computationally, it could be useful to add in the list of papers mentioned on line 24 : “Bréchet, Thénié, Zeimes and Zuber (2012)” and, space permitting, it would be instructive to add the comment: “these last authors obtain the result that cooperation among countries induces risk reduction.” Reference:Bréchet, Th., J. Thénié, Th. Zeimes and S. Zuber (2012). The Benefits of Cooperation Under Uncertainty: the Case of Climate Change, Environmental Modeling Assessment 17,149–162. DOI 10.1007/s10666-011-9281-3.	Noted; will be addressed in SOD
8593	3	61		63		This is a better discussion than some of the previous ones. It could be helpful to tie it to some of the earlier sections (ie. pointing out the gaps between theoretical ideals of how neoclassical economcs should work in terms of providing advice, and how people actually behave). Clearer road marking to this section would help authors develop text that more appropriately establishes the boundaries of economics knowledge about climate policy.	AGREE action will be taken
7936	3	61				This is an innovative section that raises new and interesting points (with respect to SAR, TAR, and FAR). The results of 3.11 should encroach on the preceeding sections.	AGREE

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
3140	3	61	25			Section 3.11 seems like a grab bag of issues. Can they be woven into the text earlier; put in the later chapter on energy systems (e.g., the discussion of consumer undervaluation of energy costs), etc. There is a huge overlap with chapter 4. I suggest that authors of both chapters review the other carefully and make some decisions about the strategy. The discussion of policy infeasibilty is very important but highly diffuse. To narrow, let me repeat a comment I make in chapter 6: "BECCS plays a huge role in the IAMs that can meet goals like 2 degrees. Given that, why not use BECCS as a case study/box in chapter 3 since that would help tie together the issues discussed there with the large role that is assumed for BECCS in some scenarios. □	AGREE with first and second comment, action will be taken. Third point in the comment unclear.
8393	3	61	37	61	36	The section seems to assume that "experienced utility" ("subjective well-being" of happiness studies) is the conception of wellbeing that policy should foster. This is not the usual view in economics, which is that welfare is the satisfaction of preferences, not subjective wellbeing. So there is some tension between this part and section 3.4.3 where it is stated that "we do not try to assess these differing views about the nature of wellbeing." it would help to make the conflicting goals of happiness-maximization vs. preference-satisfaction explicit to see how this part relates to the main body of the chapter on values and policy objectives (cf. Fleurbaey, M. (2009). Beyond GDP: The quest for a measure of social welfare. Journal of Economic Literature 47(4), 1029–1075, particularly section 6.3.)	AGREE action will be taken
8397	3	61	27	61	27	Not clear what "the positive dimensions .." means. Suggest re-wording.	AGREE action will be taken
8159	3	61		62		See the discussion in the FOD Chap. 2 Sect. 2.4.4.3 for a more detailed discussion of some of the behavioral biases that impact on investment in energy-efficiency appliances as it relates to System 1 behavior.	AGREE action will be taken
11536	3	61		62		See the discussion in the FOD Chap. 2 Sect. 2.4.4.3 for a more detailed discussion of some of the behavioral biases that impact on investment in energy-efficiency appliances as it relates to System 1 behavior.	No action; duplicate
12564	3	62	11	62	18	An ACEE white paper (http://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&sqi=2&ved=0CB8QFjAA&url=http%3A%2F%2Fwww.aceee.org%2Ffiles%2Fpdf%2Fwhite-paper%2Fcomments-on-is-there-an-energy-efficiency-gap.pdf&ei=YhtSUPzYMYjZ0QG1kYDACQ&usg=AFQjCNGiGZ5RlDty-ZdF-fZGCr81cyDTQw) makes the point that both this Alcott paper and the Alcott & Greenstone 2012 paper make "selective and otherwise misleading citations to the literature to make their case" [for more rationality on the part of energy consumers than is, in fact, observed]. these concerns should be acknowledged somewhere, or use of these references reduced. If there are unobservables that make it difficult to prove that consumers are misoptimizing, then surely the same applies to the claim that they are optimizing?	NOTED general action.
11013	3	62	42		44	At the same time, low costs to the operator may be accompanied by high net costs to society. The costs of such programs are often obscure to both the policy maker and the public. As a result, mistakes are quite possible. Furthermore, the public often has great difficulty in assessing the costs and benefits of non-market policies (Arnold, R. Douglas. The Logic of Congressional Action. New Haven: Yale University Press, 1990). The result may be that the normal institutional checks on ill-advised public policies may function poorly or not at all.	NOTED general action
12565	3	62	42			the person to reference for social norms and energy use is robert (bob) cialdini and his collaborators, not Alcott, who is only one of many people who have since discussed this work.	NOTED general action.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
13685	3	63	19	63	19	Insert after "... Administration 2010.": "The possibilities of a voluntary reduction of consumption have been assessed by Jackson (2005) and Schrader and Thøgersen (2011)." References: Jackson, T. (2005): Live better by consuming less? Is there a double dividend in sustainable consumption, in: Journal of Industrial Ecology 9, p. 19-36, and Schrader, U.; Thøgersen, J. (2011): Putting Sustainable Consumption into Practice, in: Journal of Consumer Policy, 34, p. 3-8	AGREE action will be taken
9399	3	63	28		30	The authors lay emphasis on the "deviations from the neoclassical model". Yet, they do not develop or cite alternatives, i.e. theories on public goods (climate is a public good) or theories on the commons.	NOTED general action will be taken in others sections of the chapter.
12568	3	63	32	63	35	Chapter 2's Section 2.2.1.1 Learning from personal experience vs. statistical description is clearly very relevant here, as it makes the point that the phenomenon described in this paragraph (that people overweight low probability events (e.g., catastrophic events as the result of climate change) is only true when people learn about such events by statistical description. The opposite (i.e., an underweighting of low probability events) is true when people learn about such events by personal experience, and also when personal experience is paired with statistical summaries. Given that personal experience with local weather has a strong influence on predictions of climate and climate change (see e.g., Psychol Sci. 2011 Apr;22(4):454-9. Local warming: daily temperature change influences belief in global warming. Li Y, Johnson EJ, Zaval L.), one would predict that policy makers and voters will be less receptive to climate policy, the opposite of what this paragraph predicts, but more in line with reality.	AGREE action will be taken
12569	3	63	36	63	43	This section on loss aversion may want to refer back to Chapter 2's section 2.2.3 on the topic, and also remind repeat the point made there that it is loss aversion that is at least in part responsible for the strong status quo biases exhibited by both policy makers and the general public. Related to the last point that it is not clear how empirally relevant behavioral factors are to climate-related decisions, there is a small but growing psychological literature onthe impact of green vs. grey/brown defaults on energy decisions with climate change impacts, both in the lab (e.g., on CFL purchase decisions, Dinner, I., Johnson, E. J., Goldstein, D. G., & Liu, K. (2011, June 27). Partitioning Default Effects: Why People Choose Not to Choose. Journal of Experimental Psychology: Applied.17(4), 332-341) and in field settings (e.g., on paying for green energy providers, Pichert, D., and Katsikopoulos, K. V. (2008). Green defaults: Information presentation and pro-environmental behavior, Journal of Environmental Psychology, 28,63-73)	AGREE action will be taken
5324	3	63	7	63	10	Enhancing by changing the consumers' preferences deviates from the fundamental principle in welfare economics of consumer sovereignty. The statement also rests on the heroic assumption that education of consumers and influencing their preferences is costless.	AGREE action will be taken
12566	3	63	9f			Fortunately economic science (which has little to say about persuasion and marketing programs) is not the only social science at the table, and other sciences do, so perhaps refer the reader to other sections in other chapters?	AGREE action will be taken
6317	3	63	3	63	4	The sentence that currently reads: "consumer expenditures on energy efficient products may be unobserved, as well as the 3 time spent to turn lights off or guilt from being informed that they waste energy" - seems unclear to me. I suggest re-wording.	AGREE action will be taken
7937	3	63				One should not equate commitments and/or moral obligation to reduce emisisons with altrusitic behavior. To fulfil moral or legal norms ist not just altruistic behavior. There is a categorial difference between these types of actions	NOTED general action will be taken in others sections of the chapter
8160	3	63		64		There are a number of other biases related to lp-hp events (e.g. a tendency to say it will not happen to me if it is below a threshold level of concern); myopic behavior so that climate change is not on the agenda. These are discussed in the FOD Chap. 2 Sect. 2.2.4	AGREE action will be taken

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
11537	3	63		64		There are a number of other biases related to lp-hp events (e.g. a tendency to say it will not happen to me if it is below a threshold level of concern); myopic behavior so that climate change is not on the agenda. These are discussed in the FOD Chap. 2 Sect. 2.2.4	No action; duplicate
12567	3	63				a good summary of human barriers to the understanding of climate change can be found in Weber, E.U. & Stern, P. (2011). The American public's understanding of climate change. American Psychologist, 66, 315-328.	AGREE action will be taken
17334	3	63	27	64	5	This session should make a cross-reference to Chapter 2 where the issue of human ability to understand climate change is explained at length.	AGREE action will be taken
6318	3	63	27	68	26	Finally: some discussion of ethics that does not rely upon a neoclassical economic model. This whole section of the report is refreshing and frankly, it reflects ways of thinking that are operating in a force way amongst communities, NGOs etc. Readers of the draft IPCC report who are similarly inclined toward a neoclassical economic model may suggest shortening this section of the report. I strongly urge against any cutting here but on the contrary, welcome the discussion and feel strongly that it must be preserved and even enlarged.	NOTED Thank you.
8829	3	64				the discussion of Social and Cultural Issues should also include recent work by N. Pidgeon and A. Corner on public perceptions of GeoEngineering and other policies that are under consideration as a response to climate change.	AGREE action will be taken
13579	3	64				akin to comment 4 just to flag that there are a number of alternative lenses (Rogers 2003, transitions literature, etc.) - in other words suggest examining these other lenses -- otherwise it appears very skewed towards economics	Noted (comment unclear).
12570	3	64	1	64	5	the first sentence here is ambiguous. It could be read to suggest that in "other parts of the world" public assessments of climate change DO agree with scientific assessments, which is by in large not the case. Instead, public assessments diverge from scientific ones, and increasingly so over time, contrary to rational Bayesian updating, in pretty much all parts of the world where public assessments have been collected, albeit to different degrees. The statistics in the second part, which come from a relatively small sample by Leiserowitz et al., 2011, could and probably should be replaced by the larger Gallup and Pew poll results. Some of such figures are cited in the Weber & Stern reference in Comment 11 above.	AGREE action will be taken
12571	3	64	11	64	22	This paragraph needs references to its various assertions and also some examples, e.g., what experiences with indigenous people, what cultural movement initiatives that provide new meaning? Refer to Section 3.11.2.3 for the point on gender equity.	AGREE action will be taken
9811	3	64	12			The study "Europeans' attitudes towards climate change" Special Eurobarometer 313 and 322, Brussels 2009 should be referred to.	AGREE action will be taken
11218	3	64	13			add s to people, ie experiences with indigenous peoples.	AGREE action will be taken
13684	3	64	13	64	13	Insert after "... life is conducted": "For example, household energy use patterns for space and water heating differ massively between Japan and Norway due to a frugal lifestyle with regards to space heating in Japan compared to profligacy in Norway, but a massive energy use for hot baths in Japan not seen in Norway (see Wilhite et al. 1996). Even within cultures, differences between social groups can be massive (see Gram-Hanssen 2010)." References: Wilhite, H.; Nakagami, H.; Masuda, T.; Yamaga, Y., Haneda, H. (1996): A cross-cultural analysis of household energy use behaviour in Japan and Norway, in: Energy Policy, 24, p. 795–803. Gram-Hanssen, K. (2010): Residential heat comfort practices: understanding users, in: Building Research & Information, 38, p. 175-186	AGREE action will be taken

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
17141	3	64	16			Reference to Wallerstein 1998 is very outdated - a lot of literature exists on indigenous peoples and climate change mitigation that is more relevant/recent. For instance: Kronik and Verner (2010) The Role of Indigenous Knowledge in Crafting Adaptation and MItigation Strategies for Climate Change in Latin America. In Social Dimensions of Climate Change: Equity and Vulnerability in a Changing World. Edited by Robin Mearns and Andrew Norton. The World Bank Washington DC. See also: Russell-Smith, J., Whithead, P., Cooke, P., (2009) Culture, Ecology and Economy of Fire Managemnet in North Australian Savannas: Rekindling the Wurrk Tradition	AGREE action will be taken
9400	3	64	24		42	"Buen Vivir" is also part of the discussion of chapter 4. In the context of ethics, it would be more appropriate to cite recent approches in virtue ethics which elaborate on attitudes which mirror "respect for nature". There are authors who work on "virtue ethics and the environment".	DISAGREE "Buen Vivir" doesn't refer only to respect for nature as a virtue ethic, because that approach stills anthropocentric. Buen Vivir and Vivir Bien have in its bases a biocentrism approach, so they mean much more than respect for nature as a virtue, they refer to another conception of nature.
6088	3	64	24	64	25	This attitude is quite common throughout the world except region that believes in monotheism. You may be able to cite from Buddhist country literatures.	DISAGREE We don't think that a religious discussion is appropriate here.
7938	3	64	6	67	44	Please outline the consequences for climate policies from the different perspectives briefly portrayed here. Wouldn't they reject neoclassical calculation of maximizatzion of welfare altogether?	AGREE action will be taken
8594	3	64	6	67	44	A better integration of this section - and moving it to earlier in the chapter - would be helpful in presenting a more balanced palate of options for thinking about value and what is important to measure and consider in climate policy than is currently included in the chapter. Also -- the better discussion of indigenous people and gender issues could be used to balance the earlier significantly weaker sections on distibution within economic analysis (bc any recognition of the characteristics of individuals that influence distirbution was entirely excluded in BOX 3.5 on page 40).	NOTED general actions will be taken in other sections of the chapter
13578	3	64				on Buen Vivir, I recently (August 2012) was a PhD external examiner for an interesting thesis which examined the inherent contradiction involved in attemtping to incorporate Buen Vivir into aspects of Bolivia's industrial strategy based around developing lithium (University of Zacatecas, Roberto del Barco, the role of Lithium in Bolivian Development (in Spanish)	Noted.
15125	3	64	23	64		3.11.2.1 Buen Vivir, Vivir Bien	AGREE action will be taken
15126	3	64	24	64	41	There is a difference betwen Vivir bien (Bolivia) and Buen Vivir (Ecuador), It will be a good practice to distinguish both concepts or write both words.	AGREE action will be taken
15127	3	64	41	64	42	"Whether such an approach has any effect on GHG emissions without reducing quality of life is unclear". It´s just a commentary.	AGREE action will be taken
8830	3	65				The section on measures of “Gross National Happiness,” although interesting, again seems to be a tutorial and should be omitted from this chapter.	Noted.
17312	3	66		67		I don't think that it makes sense to treat gender within this chapter. "Women as a sector of society" (page 66 line 45) sounds weird. Gender is a cross-cutting issue and relates to women and men in terms of their respective roles in society. Gender indicates the differences between women and men that are socially constructed. It involves gender identities and attributes, roles and relationships, including power relations. Gender roles vary substantially across different cultures and societies and can be changed over time. The gender dimension of mitigation should receive more attention, e.g. by including a separate chapter.	Noted.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
9401	3	66				Indigenous communities are portrayed in a very rosy picture. Other authors say that they are particularly endangered and vulnerable. Even though the authors mention this, it looks as if indigenous communities are in a situation to carry burdens regarding climate change. I doubt this. Moreover, not all practices of indigenous communities really contribute to the preservation of nature.	Noted.
7448	3	66	1	66	21	This blueprint should be a goal for every country.	NOTED but this comment could be policy prescriptive.
7449	3	66	24	66	47	This is an excellent example of what some people can do.	NOTED Thank you.
7450	3	66	24	66	47	If the vast areas of forests are to be managed better, their ownership should be vested with the local people. Simple training for such people should be provided.	Noted.
12572	3	66	34	66	44	In the context of "strong geographic identity" and "alternatives to monitoring at the local scale", i would definitely cite the work of Elinor Ostrom and different empirical studies inspired by it, as summarized or collected, for example, in her book that downscales the "tragedy" of the commons to a "drama": Ostrom, E., Dietz, T., Dolsak, N., Stern P. C., Stonich, S., & Weber, E. U. (Eds.) (2002). The Drama of the Commons. Washington, D. C.: National Academies Press. This work is also very relevant for the final (very short) section 3.11.3 on Institutions for collective social action.	Noted
17142	3	66	37	66	39	For more accuracy consider rephrasing to: Some indigenous peoples are integreated into dominant societies and other continue to exist on the margins of dominant society and many have reproduced and safeguarded their cultures to various degrees.	Noted.
17143	3	66	39			Might be relevant and important to note that indigenous peoples also own 11% of the worlds territories where a majority of climate mitigation projects are being implemented - for full reference see: Sobrevila, M. (2008). The Role of Indigenous Peoples in Biodiversity Conservation: The Natural and Often Forgotten Partners. Washington DC: The World Bank.	Noted.
17313	3	66	46	66	47	Today, much more recent literature on gender and climate change is available. A review of existing literature related to industrialized countries is provided in EIGE (European Institute for Gender Equality: "Review of the Implementation in the EU of area K of the Beijing Platform for Action: Women and the Environment Gender Equality and Climate Change", 2012, available at http://www.eige.europa.eu/sites/default/files/Gender-Equality-and-Climate-Change-Report.pdf	AGREE action will be taken
12145	3	66	46	66	47	Needs to specify how 'the relation[ship] between communities and the environment is not gender-neutral'.	AGREE action will be taken

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
11219	3	66	30	66	44	The following material is a suggested rewrite for the part of this section on indigenous peoles (lines 30-66). It expands on the points made in the original text, adds more references and includes their rights vis a vis mitigation activities. Indigenous peoples, numbering around 500 million across the globe (Chao 2012), are peoples who self-identify as a collectivity based on their distinct culture and history, and have priority in the occupation and use of the customary land and natural resources (Daes 1996) on which they depend primarily for their livelihoods. Land and the natural environment are integral aspects to indigenous peoples' sense of identity, culture and belonging, and hold fundamental importance for their collective physical and cultural survival as peoples (Gilbert 2006:115; Xanthaki 2007: 237 - 279). The rights of indigenous peoples are enshrined in international law and most clearly expressed in the United Nations Declaration on the Rights of Indigenous Peoples which gives prominent place to indigenous peoples' rights to lands, territories and resources (UNDRIP 2007 inter alia Art. 3, 4, 8, 11, 19, 25 – 29, 32) and requires States to obtain the right to Free, Prior and Informed Consent of indigenous peoples (as an expression of their right to self-determination) prior to any development on their lands and territories (UNDRIP, Art. 32). The customary lands of indigenous peoples contain 80% of the earth's remaining healthy ecosystems and global biodiversity priority areas, including the world's largest tropical forests in the Americas, Africa and Asia (GEF 2008, Sobrevila 2008:xii). Primarily dependent on natural resources and inhabiting biodiversity-rich but fragile ecosystems, indigenous peoples find themselves particularly vulnerable in the face of climate change, with little access to resources to cope with these changes (Henriksen 2007, UNPFII 2008). They continue to be marginalised in decision-making and unable to participate fully and actively in local, national, regional and international climate change mechanisms (Tauli-Corpuz & Lynge 2008, Griffiths 2009; Dooley et alii 2011). And yet mitigation is not only critical to the preservation of their environment, but to that of their traditional knowledge, culture, livelihoods, food security, customary lands and self-determined development, all of which are protected under international human rights law (Tauli-Corpuz et alii 2009). Climate change mitigation is therefore not only an environmental issue but also a human rights issue in which indigenous peoples are key stakeholders (Kang Kyung-wha 2008, Diaz 2008, Rogue 2009) and where international standard-setting processes that affect indigenous peoples, such as those related to climate change, should abide fully to the standards of the United Nations Declaration on the Rights of Indigenous Peoples, both in terms of the participation of indigenous peoples in these processes and their results (Anaya 2012). At the same time, it is increasingly recognised that valuable insights into mitigation can be drawn from indigenous peoples' customary knowledge of environmental phenomena and change, which they have accumulated over centuries of coexistence with and inter-dependence with, the natural environment (Nakashima et alii 2012). Successful strategies of adaptation, such as community-based forest governance (Friends of the Earth 2008, Persha 2011, Nepstad 2006, Hayes 2008) and the management of ecosystem services (Galloway McKlea	AGREE action will be taken
17335	3	66	45	67	8	One additional half line could be added somewhere here to say that studies using demographic categories for analysis (not only gender but also age) can allow visualization of so far invisible aspects that may prove important (targeting education, and policies) for mitigation efforts.	AGREE action will be taken
12146	3	67				The discussion of social capital is the passage in this report that seems to me the best candidate for cutting. That's not to say that social capital might not be worth discussing—however, the present treatment contributes little of value.	NOTED coordination across framing chapters will be taken
4508	3	67	1	67	8	This paragraph appears to be largely a statement of feminist ideology rather than any sort of scientific contribution (e.g., "the social construction of gender").	Noted.
12147	3	67	1	67	8	This paragraph either needs to be expanded or deleted. As it presently stands, it's not clear what it's talking about.	Noted.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
12148	3	67	14	67	23	This vaguely written passage fails to convey a clear definition of what social capital *is*. What does 'with tempora and spatial variability' mean? Wouldn't '[t]he sum of all the resources of each individual or social group in relation to their position in the social structure and their way of establishing social relationships' refer to just about anything an individual or group could possess? How does anyone ever interact except as part of an 'associative network of iindividuals [or] groups'? How is 'solidarity' defined and measured?	Noted.
12149	3	67	28	67	29	The causal logic of this claim needs to be specified. If A (social capital), B (human capital) and C (social development) all cause fluctuation in D (community empowerment), this does not ipso facto imply feedback effects among A, B, C and D. Such feedback may exist, but the passage needs to explain how.	Noted.
12150	3	67	30	67	43	The link to climate change needs to be made more explicit. Is the point that social capital can assist communities in adapting, or what?	Noted.
11220	3	67	7			I disagree with the statement that it is unclear how effective a gender approach to mitigation will be. Women from rural poor communities are and will, in general, suffers disproportionately from climate change, due to changes in seasons, rainfall, temperature etc. Without careful planning, such women will also be negatively affected by mitigation activiites, losing access to lands, forests, water etc. On the other hand, successful mitigation activities in forests under threat from large scale clearance will be most successful where the women who presently depend on those resources are closely involved in mitigation efforts..	Noted.
18604	3	68				Technological Change is discussed (p 68 ….) but should be linked to social change and social innovation (the social element is probably huge but hard to measure and when it comes to cc values will have to be a driver). Policies are needed to price emissions (?). Would be really interesting to compare what can be the expected outcome of a strategy/approach without any direct element pricing externalities (i.e. beyond supporting R&D) and an approach with a combination of “social” and technological innovation	No action; these aspects are addressed in either previous chapters (eg. 2) or subsequent assessment chapters (e.g. 13, 15)
4626	3	68	26	68	26	The concepts of social learning and policy learning are relevant here. Social learning is the set of activities which depend on the participation of the group members in discourse, imitation, or shared collective or individaul actions while policy leazrning is adaptation to external change by organizations which attempt to retain and strengthen their own objectives and their domination over existing socio-economic structures; policy learning can be done through new new coalitions of advisors and technical knowledge (Adger W.N. and P.M. Kelly, Social vulnerability to climate change and the architecture of entitlements, Mitigation and Adaptation Strategies for Global Change, 1999, 4:253-66)	AGREE action will be taken
13949	3	68	28			The Technology section is far too long. It may be shortened by reorganizing it under 2 main subsections: efficiency considerations and equity considerations.	Will be addressed in SOD
13581	3	68	39			You may wish to have a look at Ockwell and Mallett (2012) (eds) book Low Carbon technology transfer from rhetoric to reality (chapter 1) as one thing that is argued that low carbon techs are unique in certain aspects (urgent - cannot 'wait' for the market; climate change is a public good; and many of these technologies are at varying stages of development - points particularly germane to developing country settings)	Dealt with better in other chapters

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
13582	3	68	39			Like comment 4, just to point out that while a lot of attention goes on market failures alternative lenses take a more systematic approach (Mallett 2012 Technology Cooperation for Sustainable Energy– a review of pathways, Wiley Interdisciplinary Reviews on Energy and Environment (WIREs); Ockwell and Mallett (eds) book above; Rogers (2003) Diffusion of Innovations on social aspects; co-evolution (Smith, Sterling); carbon lock in (Unruh 2000 Understanding Carbon lock-in Energy Policy http://www.sciencedirect.com/science/article/pii/S0301421500000707); etc. These more systematic approaches try account for 'energy systems' and hence the various infrastructure and actors in place to do directly or more marginally with these technologies	Dealt with better in other chapters
6089	3	68	44	68	44	Very minor point. The text says "because pollution is not priced by the market". This should be changed to "because pollution is not fully priced by the market". Reason; There exists EU ETS. Also even under direct regulations, firms spend money to reduce pollution. This means pollution is partially priced, though it is not through market.	Addressed in SOD
12573	3	68				see comment 16	No action; comment unclear; don't know what comment 16 is
17336	3	68	2	68	26	What are the structures that could give impetus to action? The question for example of the role that media has in creating interest around the topic of climate chage is here not mentioned or elaborated in any manner. However, the media in general have had episodes of rising alertness toward climate followed by total avoidance of the topic. There most be some studies reflecting on the effects on public perceptions given this patterns. The strong role media has played in the difussion of climate information is not discussed in the report in any manner. This is like omitting the elephant in the room. This session offers a space where to have a substantitated in research paragraph about this.	AGREE but media role should be discussed in other sectorial or assessment chapters. Perception from a conceptual point of view is treated in section 3.11.1.4.
8161	3	68		76		Technological Change. This is a well-written section that provides a complementary perspective to some of the material in Chap. 2 on choice and design of policy instruments under certainty (FOD Chap 2 Sect. 2.4.4)	Thank you for your comment.
17298	3	68				The concept that changes in technology enhances interactions and communication, which strengthens societal exchanges and optimizes pricing.	No action; no change implied, confirming
3288	3	68	27	75	11	This is good, solid, strong material and should not be shortened.	Thank you for your comment.
13580	3	68	27			while some may consider this aspect to be a part of diffusion, just to note Rogers (2003) diffusion of innovations that a distinction is made between initial use and confirmation -- when the person decides to continue using the technology or note. Others also flag that this confirmation concept may change over time and that a negative experience may have further, deeper negative implications on a technology's use than a positive one (see Mallett (2007) the social acceptance of renewable energy innovations: the role of technology cooperation in urban Mexico, Energy Policy 35, 2790–2798	Not central to section
10788	3	68	27			The whole section could be replaced with a table summurizing the different technology systems	Noted for reorganizing section in SOD
11407	3	69	1-5&26			the argument here and in other paragraphs of this chapter center on the compensation of the original innovator, and seems to overlook the impact of appropriation regimes on follow-on innovators: 'Since every generation is both 'the first' to future producers, and 'the second' to prior producers, the conflict is pervasive and sets limits on the extent to which, even in a dynamic analysis, it is efficient to recognize and enforce rights in information products. As Arrow put it, 'precisely to the extent that [property rights in information are] successful, there is an underutilization of the information (Benkler, 2001: 270). The impact of lead-time (now only mentioned in lines 28-29) should also be referred to in lines 1-5.	No action - not central to section
12151	3	69	33	69	33	Please define the 'winner's curse'.	Will be addressed in SOD

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
12530	3	69	9			"Appropriability" is not a constraint in network economics. This is particularly important for innovation and diffusion of knowledge. However, development is subject to path dependence. These insights are particularly important in assessing and accelerating learning as an adaptive governance and management strategy for climate response. See Yochai Benkler, Coase's Penguin, or, Linux and "The Nature of the Firm," The Yale Law Journal, Vol. 112, No. 3 (Dec., 2002), pp. 369-446.	Will be addressed in SOD
18605	3	69, 76				The IP "problem" is discussed on p 69 (indirectly) – no clear conclusions The same issue is also discussed on page 76. IP is discussed in several chapters (among them 3 and 15). Different material is used and different conclusions are drawn.	Addressed elsewhere as cross-referenced
8579	3	7	1	7	20	This entire section needs to be reframed. As it stands lines 19-20 are tacked on without any context allowing the reader to see what the point it -- that sometimes we would like to have information about aggregate wellbeing and that there are many ways of trying to do this. ONE (among many) ways of trying to generate information about wellbing is to use income as a partial indicator of wellbing and then model is in MAC curves. Other ways of looking at wellbeing might include measurements of happiness, such as those in Bhutan. Any model of aggregation necessarily imposes assumptions about what is important and how it should be measured. And then it could get into the details of the neo-classical eocnomics worldview.	Will be addressed in SOD
10692	3	7	11	7	13	I think the word "emission metric" and the concept GWP should be mentioned in this para in order to make this more concrete and related to applications.	No action. It is in the text; this is just the executive summary.
10963	3	7	11	7	13	Methods for considering tradeoffs between CO2 and methane are not being very well considered in this chapter - see my comments on pages 54 & 55, but I think that the text can be clearer here without being much longer. For example, the current UNFCCC approach has become locked into the use of GWPs which were never designed to achieve climate stabilisation.	No action; we already address these tradeoffs.
14838	3	7	14			"Aggregate measures…" this is a particularly important statement, with implications for use of economic methods such as CBA and E(U) that should be drawn out.	No action. It is in the text; this is just the executive summary.
11006	3	7	16		18	But there is also much evidence that many public policies decrease welfare. There are several ways in which policies purporting to avoid non-optimal energy consumption can lead to net welfare losses. Regulators may misread either consumer preferences or producer costs. Standards based on broad averages may deprive some consumers of valued options. Standards may also act as entry barriers that augment producer market power. Thus, as Coase long ago warned in "The Theory of Social Cost", the simple existence of a market failure is insufficient grounds for state intervention. The costs of the likely policy imperfections must be weighed against the costs of the market failure.	Noted; will be addressed in SOD
6955	3	7	19	7	20	Integral to what?	Will be addressed in SOD.
4750	3	7	21	7	22	According to me, not only "energy" should be mention … other sources/sectors should be addressed	Will be addressed in SOD
10420	3	7	25	17	11	This section is too theoretical. I do see some applicability of social justice here, but applied research in climate change of this social justice concept should be the focus here.	Noted. This is a difficult section and we are trying to increase the use of examples.
7903	3	7	26	7	45	Please make more clear at this point that economic theory entails normative assumptions and, hence, ethics. These assumptions must be made explicit and analysed. There is a huge literature on the normative foundations of economics (instead of many see Hausmann/McPherson 1996). Since the 90ies there is an ongoing discussion of the ethical basis of climate economics and problems that arise if one tries to calculate an "optimal" climate policy. See comments 36 and 44.	No action. This suggestion is too vague to be of use. We treat ethics and economics at some length in the chapter.
2107	3	7	28	7	29	*Resolved* how? This might not be obvious to those unfamiliar with previous IPCC reports.	wording will be clarified in SOD
15279	3	7	29	7	29	"peoples" to be "people"?	Will be addressed in SOD

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
8416	3	7	31	7	32	It would be fantastic if we could say that the primary questions confronting the society with regard to climate change are issues of economics and ethics, and that the people is aware of what is happening to the climate. Unfortunately, in the society there are widespread doubts related to the reality of climate change and the responsibilities of human activities, and this has a great influence on mitigation actions. There are a lot of references that show that an important part of our society, between 20-25% (In Europe – see Eurobarometer surveys) and 40-45% in USA (i.e. see works by Leiserowitz – Yale University http://environment.yale.edu/leiserowitz/climatechange/US.html) doesn't see climate change as a very serious problem. There are a lot of reasons why people don't recognize the gravity of the climate crisis; and also it is of great importance from an ethical perspective an analysis of how should the public be informed on the climate problem (see. Sommerville R. , 2010, How much should the public know about climate science?, Climatic Change, editorial) I suggest that the chapter considers this issue, discussing also the necessity to face the problem at the root, evaluating whether to find remediation to the climate crisis, together with technological and economical matters actions to combat climate changes, is necessary bring into question a deeper level, a thinking over the meaning of this continuous run to the increase of productions, consumptions and the use of Earth's no renewable resources. (see Caserini S., 2008, Climate denialism evolution and the delay of mitigation actions. VI International Conference on Ethics and Environmental Policies. Ethics and climate change scenarios for justice and sustainability)	No action. Commenter makes a good point but communication of IPCC summaries and natural science research is not the subject of the chapter.
4920	3	7	31		32	I question this very categorical argument e.g. because of huge sci. tasks related to the future behaviour of the climate system at global and regional level that is crucial for setting proper actions. "primary questions confronting society with regard to climate 31 change are issues of economics and ethics, not natural science."	wording will be clarified in SOD
12131	3	7	31	7	32	Such a claim would not be very persuasive, because while there is little doubt that climate change is occurring, there remains the crucial questions of how much and what kinds.	Good point. Will be reflected in SOD.
2108	3	7	35	7	38	Shouldn't *benefits*, and not only costs, also be mentioned here?	That is what is meant by the costs of inaction. Will try to clarify in SOD.
7904	3	7	37	7	40	Mitigation of and adapting to climate change will contribute to poverty alleviation stratagies and related social goals. Unmitigated climate change will only worsen the situation of the global poor. The IPCC should not adopt the artificially cunstructed trade-off between mitigating/adapting to climate change and other valuable social goals. See also comment 36.	No action. This is not something we can address here
10693	3	7	43	7	43	The wording "…reasonable people have differing views on this issues…" sounds strange. Please consider rewording or removing this.	Will be addressed in SOD

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
15632	3	7	44		45	The text could make a clearer statement here or in section 3.2. or 3.3 about how its role in reviewing the literature compares with previous efforts to do the same in earlier IPCC assessment reports. Is it principally providing an update on the literature since AR4, or is it attempting to provide a more comprehensive review than any previous ARs, in which case it would be valid to reach further back into earlier literature? It seems that both objectives would be valid (a still valid but less valuable task would be simply to provide a 'primer' on the issues solely for the purpose of framing future chapters - at times the ethical discussion seems to be doing little more than this). However, in doing so the chapter should demonstrate more clearly the sense in which it is building on previous ARs. It seems to me that the major advances that the IPCC can make in the overall area of equity are more in the quantitative comparison of different ways of translating moral principles into specific burden-sharing approaches (this is more a matter for Chapter 4). However, chapter 3 could still make some important contributions at the level of overall ethical principles. For example, it could give more of a sense of how some key moral principles have been most recently understood. eg have there been any advances in the last 5-6 years on how the polluter pays principle is understood, or have any objections to it been strengthened or refuted? A further contribution that the chapter could make is highlighting ways in which certain principles may take on particular salience in the light of recent trends, including (a) changing patterns of emissions across developed / developing countries; and (b) increasing realisation of the urgency of mitigation (which may have considerable implications for whether a "fair" approach - such as one including full historical responsibility - is even feasible (see eg Tavoni, M., S. Chakravarty, and R. Socolow. 2012. Safe Vs. Fair: A Formidable Trade-Off in Tackling Climate Change. Sustainability 4 (2):210-26).	Since this is a framing chapter and since there have not been ethics and economics chapters before, we are not simply doing an update from AR4. Will make this clearer in SOD.
10694	3	7	45	7	45	I suggest adding "…and assessing" after "reviewing". (See also my comment on the need for more assessment and not only review).	Will be addressed in SOD
4479	3	7	6	7	10	This paragraph asserts a tautology with "low confidence." Either the negative net cost opportunities exist or they do not, with the magnitudes in dispute in either case. How can there be "low confidence" in a statement that covers all possibilities?	Good point; will be addressed in SOD. The modifier applies to the existence of negative costs as well as why they might exist.
10691	3	7	7	7	7	"carbon emissions" is often used synonymously with GHG emissions. When possible, I think one should use the latter since there are significant contributions from non-CO2 gases. In any case, the terms used need to be clearly defined.	Will be addressed in SOD
17330	3	7	30	7	30	…solutions that are both just and cost effective". What about socially acceptable?	Socially acceptable is implicit in "just" though we will try to clarify in SOD.
13931	3	7	41	7	45	I think that the distinction between economics and ethics is not very clear on this page. I say so because the paragraph I mention states: "What ought to be done, at least in contexts that involve values and human interests, is the subject matter of ethics". I would say the same of economics. Economics states what markets do (what "is") and what "ought to be done" to fulfill pareto optimality (efficiency in resource allocation considering costs and benefits) or minimize costs to reach a given environmental goal. You may need to rephrase that sentence to make differences among normative statements in economics and ethics clearer. This is correctly done on page 8 lines 11 to 21.	Good point. Will be reflected in SOD.
6306	3	7	41	7	42	The report states: "One might ask why there is a discussion of ethics in an IPCC assessment. The answer is simple." It seems eminently reasonable to me (and many others) that there be a discussion of ethics in the IPCC assessment. The authors' statement here implicitly undervalues the role of ethics by making it sound as if it is unreasonable to include it. I suggest re-wording, to say something like: "Discussions of ethics constititute an essential part of an IPCC assessment because...."	Will be addressed in SOD

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
13263	3	7	19	7	19	Ecuador also as example of coutries including direct reference to life integrity in its constitution	Will be addressed in SOD. Text can be modified as follows: Several countries (such as Bhutan, Ecuador and Bolivia) have embodied these comments in law.
17329	3	7	19	7	20	This reads as a very vague statement not worth for an executive summary. If policy makers are to read only the Summary, then it is only just to make the issue that alternative worldviews focusing on lifestyle changes and attitudes toward nature have gone from debate form to become specific "constitutional" mandates in a couple of countries. What is missing is a better formulation at the moment. Consider re-writing.	Will be addressed in SOD
3263	3	70	43	71	5	Dechezleprêtre et al. (2011) cites China as the 4th most important inventor country ahead of many industrialized countries, therefore the claim here that "most climate friendly innovation occcurs in developed countries" fails to provide a full picture of the actual story.	Will be addressed in SOD
13583	3	71	1			another study (Abdel Latif 2012 Chapter 5, the UNEP-EPO-ICTSD study on patents and clean energy: key findings and policy implications in Ockwell and Mallett (eds) low carbon TT, also echoes that while low carbon / clean tech patents are concentrated in developed countries when assessed vis a vis patenting activities as a whole, some emerging economies have been leaders (India on PV, and Brazil and Mexico on hydro and marine)	Addressed elsewhere
13584	3	71	34	73		much discussion on exogenous versus endogenous growth tends to focus on firms versus people and households and other institutions (e.g. schools, hospitals), communities, etc. and other actors which have different characteristics and motivations than firms. See IPCC 2000 Section 1.5 Methodological and Technical Issues on TT	No action; not central to section
9812	3	71	36	71	40	The use of the terms exogenous and endogenous is opposite to their usual meaning, exogenous meaning coming from outside, whereas endogenous means coming from inside: "Exogenous technological change is assumed to progress at a steady rate over time, independent of changes in market incentives. One drawback of exogenous technological change is that it ignores potential feedbacks between climate policy and the development of new technologies. Models with endogenous technological change address this limitation. Endogenous technological change models relate technological improvements in the energy sector to changes in energy prices and policy." and thus might be misleading.	We believe this is clear
15379	3	72				This is a good mention of Nordhaus critique, that due to multi-collinearity we have no idea whether LBD happens in general or in the way described	Thank you for your comment.
12791	3	72	5	72	5	You might like to add some more words on the Nordhaus-Model (DICE) as it is mentioned a lot of times.	Addressed elsewhere
12152	3	73	33	73	33	The phrase 'productivity of fossil fuels' is confusing: One can easily take it to mean how much a given unit of fuel *contributes*. Would it be better to say *production*?	Will be addressed in SOD
17299	3	73				The example of cell phone technology in developing countries is worth noting.	No action; out of the scope of section
10952	3	73	39	75	11	Confer: Fischer, Torvanger, Shrivastava, Sterner, Stigson (2012), How should support for climate-friendly technologies be designed?, Ambio, 41(Suppl. 1), 33-45.	Relevant to other chapters
4509	3	74	19	74	23	Work by Nathan Lewis suggests the opposite---that there is quite adequate room for deployment of solar sources. Lewis's work should be cited and the contrast noted.	Will be addressed in SOD
13585	3	74	35		36	I think this point is very important and so would suggest highlighting it earlier on, and more throughout so that the message doesn't get 'lost in the weeds'	Will be addressed in SOD

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
7310	3	74	44	74	45	"waste to energy technologies which are further from being competitive with traditional energy technologies". This statement is not correct. Several "energy-from-waste" technologies have been "competitive" for many decades, including 1) waste combustion systems for district heating, elec. gen. in Europe, Japan and elsewhere; 2) landfill gas recovery for biogas use, elec. gen. [fully commercial since the first U.S. project in 1975]; and 3) anaerobic digestion of wastewater and wastewater biosolids for biogas production & use. Please update; suggest using references in AR4.WGIII.Chapter 10.	Will be addressed in SOD
13417	3	75		76		This subsection on technology transfer is far too brief, since it is a critical issue in the discussion of climate change and climate negotiations and agreements. It was agreed that Chapter 3 as a framing chapter would give the fundamental concept and treatment of this issue. Providing less than 2 pages out of 77 pages to this topic is too little. (See general comments on chapter for more comments on this)	Good point, but this issue is addressed in more detail in subsequent assessment chapters (e.g. 13, 14, 15 and 16)
15380	3	75				This is a good conclusion	Thank you for your comments.
18389	3	75		76		I found the whole section on technology transfer very week, old fashioned, impling that developing countries have benified from the evolution of the patent systems when they, with the liited capacities they have to engage in research or learn through licensing have little access to the knowledge they need to innovate and where their engagement in international collaborative research has mainly consisted of accepting to be in projects they have not designed and projects in which the research is mainly carried out in the industrialized countries. There are exceptions, of course (see the Global Energy Assessment (2012) Cambridge U.P. especially section 25.7) and it would be useful to revise this small section and provide some examples of what could , in fact, be done.	We believe this is adequately addressed
2336	3	75				There are some consideration when technological is transferred to developing countries. 1. Appropriate technological transfer- some methods and equipment are not bearable or cannot be maintained in long run by developing countries themselves. 2. There should be financial aid for technologies which are already innovated in developing countries. □	No action; we believe the issue is already dealt with adequately
13586	3	75	1		2	while it is not clear exactly where political feasibility is captured (perhaps that is how institutional aspects mentioned on page 6 in Chapte 3 - suggest making clearer) I would suggest that this point be stressed. As an example, in our NBS study (Auld et al. 2011) - we found from Sawin 2004 there was a program to promote Renewables in the Netherlands which was cancelled as 75% of the credits and subsidies were being given to foreign versus domestic players Sawin, Janet L. 2004. Policy Lessons for the Advancement & Diffusion of Renewable Energy Technologies Around the World. Paper presented at International Conference for Renewable Energies, Bonn.	Good point, but this issue is more relevant to subsequent assessment chapters (e.g. 15 and 16)
13588	3	75	19		26	I think Comment 20 is relevant here (that low carbon technologies are unique in a number of ways as stated above)	No action; addressed elsewhere
13589	3	75	19		26	Haselip et al 2011 make a distinction between transfer and diffusion http://www.tech-action.org/Guidebooks/TNA_Guidebook_OvercomingBarriersTechTransfer.pdf	Grey literature
14850	3	75	2			The sentence "However…" seems to directly contradict the sentence on p. 74 line 24 "in general,…"	Will be addressed in SOD
13591	3	75	22		24	How is trade being defined? E.g. where can the work of NGOs / communities (capacity building, equipment, skills, etc.) be captured?	No action; not relevant to section.
11408	3	75	22			it is misleading to state that 'trade in products' is a modality of transfer of technology, which requires the transmission of knowledge and the opportunity for the recipient to actually learn why and how a certain technology works. The chapter should be based on a more rigorous concept of transfer of technology. For instance, the Draft International Code Of Conduct On The Transfer Of Technology [1985 Version] defined it as follows: "Transfer of technology … is the transfer of systematic knowledge for the manufacture of a product, for the application of a process or for the rendering of a service and does not extend to the transactions involving the mere sale or mere lease of goods."	Adequately addressed

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
13590	3	75	31		33	Sauter and Watson's report on Leapfrogging (which is noted in Chapter 14, page 48 lines 1-2) http://www.ingentaconnect.com/content/ind/ijtg/2011/00000005/f0020003/art00001 and Gallagher (2006) http://www.sciencedirect.com/science/article/pii/S0301421504001739 may be helpful	Will be addressed in SOD
11409	3	75	33			technological 'catch up' is not equivalent to 'leap-frogging' as suggested here. The latter concept assumes that certain stages of technological development and learning can be omitted; Carlota Perez, for instance, has argued that this is only possible when new techno-economic paradigms emerge.	Will be addressed in SOD
13592	3	75	40			suggest alternative word such as appropriate, relevant, pertinent, versus 'right'	Will be addressed in SOD
13593	3	75	40+			Suggest having a look at Bell (1990) cited in Ockwell et al. 2007 UK-India Collaborative study on technology transfer. Phase I http://www.sussex.ac.uk/sussexenergygroup/documents/uk-india-full-pb12473.pdf and also Sanjaya Lall's - awareness, know how and know why skills (http://www.g24.org/Publications/Dpseries/28.pdf	Grey literature
13587	3	75				Just to say that while the term technology transfer is still prevalent, alternative terms such as technology cooperation are gaining more currency -- see Heaton, G. R., R.D. Banks, D. W. Ditz (1994). Missing Links: Technology and Environmental Improvement in the Industrializing World. Washington D.C., World Resources Institute (WRI): 1-53.; Martinot, E., J. E. Sinton, B. M. Haddad (1997). "International Technology Transfer for Climate Change Mitigation and the Cases of Russia and China." Annual Review of Energy and Environment 22: 357-401. (as also noted in IPCC 2000) - also Mallett (2007) the social acceptance of renewable energy innovations: the role of technology cooperation in urban Mexico, Energy Policy 35, 2790–2798 and Mallett 2012 Technology Cooperation for Sustainable Energy– a review of pathways, Wiley Interdisciplinary Reviews on Energy and Environment (WIREs) http://wires.wiley.com/WileyCDA/WiresJournal/wisId-WENE.html	Not central to section
3289	3	75	12	76	38	This should be deleted because of overlap and replaced by a reference to chapter 13, International Cooperation	Only the framing is maintained here
17300	3	75				Informal Research and development as practiced by non-literate farmers with seeds or fertilizer applications and observation to climate stress offer interesting examples. In fact some of these informal technology development could be extremely significant. These can be of major economic value. These are not patented hence can reach other farmers faster.	Not central to framing chapter
18606	3	76				Page 76: "As is clear from even a causal reading of this chapter, there are many questions that are not completely answered by the literature." What sort of conclusion should be drawn from that statement? The conclusion drawn here is to try to formulate issues/themes where research is needed during the coming decade as a prep. action for AR6 (!!!) so it can say more about the ethics and economics of climate change (the chance is slim! Some issues raised have no single answer and have been discussed/penetrated for 100s or 1000s of years).	Noted; this section has not been written yet. Text is a placeholder.
11414	3	76				More generally, the chapter fails to reflect important academic work regarding the limitations of IP as an incentive for innovation. One increasingly widespread view is that the role of the patent system in promoting innovation is less substantial than usually claimed (Landes and Posner, 2003; Levin et al., 1987). Patents may even stifle the very innovation they are supposed to foster (Jaffe and Lerner, 2004). There is compelling evidence indicating that 'collective invention' based on sharing innovations is more efficient than patenting them (Bessen and Meurer, 2008); some studies suggest that innovation not only thrives in a competitive environment, but that more profit can be generated by inventors in a system based on the broad diffusion and common use and improvement on innovations (Torrance and Tomlinson, 2009).	Addressed elsewhere as cross-referenced

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
13594	3	76	1		4	Suggest a line denoting that IPRs are more than patents (trademarks, copyright, etc.) but that most discussion to do with low carbon technology focuses on patents due to the potential for preventing access - you may wish to have a look at Mallett et al. 2009 UK-India Collaborative study on technology transfer. Phase II for further discussion on IPRs and how carbon technology http://www.sussex.ac.uk/sussexenergygroup/documents/decc-uk-india-carbon-technology-web.pdf	Good point, but this issue is addressed in more detail in subsequent assessment chapters (e.g. 13 and 15)
11411	3	76	12			the reference to 'adjustments' excludes the consideration of an overhauling of the IP system to respond to current social, economic and technological needs, as well as alternative models to promote innovation, such as open innovation systems that are proving to be efficient in various areas (e.g. medical research, food and agriculture, software)	Will be addressed in SOD
13419	3	76	14	76	21	This paragraph is taken from the zero draft. However in the zero draft the paragraph is part of a long discussion on the debate in the literature on the significance and effects of IPRs on climate related technologies. This paragraph describes the argument that IP is not a problem. This had been followed by several paragraphs in the zero draft that dealt with findings in the literature on why and how IPRs are and can be a barrier to technology development and transfer. However all these other paragraphs have been eliminated, thus giving the mislead. Also, paragraphs in the zero draft on the potential use of flexibilities in the IPR regime and the regulation of conditions in voluntary licenses have been eliminated.ing impression that the literature does not recognize the potential of IPRs to be a barrier.	Will be addressed in SOD
7364	3	76	14	76	24	Despite referring to only one study in contrast to three, much more discussion is dedicated to the argument that IP regimes assist technology transfer. It would be helpful to draw out more of the analysis of how they (IPRs) may hinder technology transfer.	Will be addressed in SOD
11412	3	76	19	76	21	the reference to Barton's study does not properly take into account other considerations made by the author on barriers to the access of climate change relevant technologies.	Will be addressed in SOD
13420	3	76	22	76	24	This very short paragraph is all that remains from the zero draft which had given details of research findings on the barriers that IPRs can pose to technology transfer.	No action; already addressed in 13419
13595	3	76	22		24	As a follow up to my colleague David Ockwell's work, Phase II http://www.sussex.ac.uk/sussexenergygroup/documents/decc-uk-india-carbon-technology-web.pdf shed some further insights which may be helpful. 1) that IPRs weren't preventing access to these technologies but were playing a role on the rate of diffusion (NOTE a number of sources indicated that this may change and that access would likely decrease as Indian firms moved farther up (and down) the value chain 2) that internationa lsources of R&D cooperation were increasing rates of development and diffusion (e.g. university or industry experience abroad and coming back to India; Indian firms acquiring the majority share or outright ownership of firms in developed countries; that there were strong linkages which may not be as apparent on the surfacesuch as diaspora communities e.g. one interviewee told me pl. 72 of Phase II that 60-70% of researchers working on PV in the US (firms, govt institutes, unis) were of India origin more or less, and 3) a creative way in which to attend to IPR concerns and R&D efforts are to establish collaborations early on between partners and where the role of IPR-sharing (or not) is made clear at the outset -- see Phase II for details	Noted. We avoid grey literature.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
11658	3	76	22			The IPRs are not the only barrier to technology transfer and diffusion. As shown in Ockwell et al. 2010 and UNEP, EPO&ICTSD 2010, other issues, such as absorptive capacity of recipient firms, infrastracuture, initial cost of new technologies and market conditions will play an eually important role in facilitating access to technology. As Chapter 13 also describes the relationship between IPRs and technology transfer, the related text in Chapter 13 should be referred in Chapter 3. Reference: Ockwell et al. (2010) Intellectual property rights and low carbon technology transfer: Conflicting discourses of diffusion and development, Global Environmental Change, 20, pp. 729-738, UNEP, EPO and ICTSD (2010) Patents and clean energy: Bridging the gap between evidence and policy, UNEP, EPO and ICTSD.	Good point, but this issue is addressed in more detail in subsequent assessment chapters (e.g. 13 and 15)
11413	3	76	22	76	24	this brief reference to IP as a potential barrier is insufficient to reflect the view of developing countries' governments and academics who have highlighted how IP can be a barrier for access to technology in this and other fields, as shown by Watal, 1998, Anderson &Sarma, 2007, Zhou Yuanchuan, Zou Ji et Wang Ke (2010), among others.	Addressed elsewhere as cross-referenced
13418	3	76	3	76	4	Although the subject title is technologies in the public domain and patented technologies, there is no treatment of the significance of technologies in the public domain, or expansion of public domain technologies. References to this in the zero draft were eliminated.	Good point, but this issue is addressed in more detail in subsequent assessment chapters (e.g. 15 and 16)
13421	3	76	32	76	38	This paragraph is retained from the zero order draft but the reference to Correa (2011) as the source of this paragraph's ideas should be re-instated. The two other subsequent paragraphs in the zero order draft that give examples of innovative technology cooperation models, and on establishing R and D networks of research institutions in developing countries are significant and may be re-instated. Shortage of space should not be a reason for such a brief treatment to the technology transfer issue.	Addressed elsewhere as cross-referenced
11410	3	76	7			the statement that 'It is widely accepted that patents have the function of providing incentives for innovation…' needs to be qualified, since this function is strongly dependent on the context where the IP regime applies. IP does not work in the same way in a country with a sophisticated R&D infrastructure, availability of human resources and risk capital and in poor countries where IP has no real impact in promoting innovation.	Will be addressed in SOD
14851	3	76	1			This section is important and could be elaborated.	Noted for reorganizing section in SOD
6319	3	76	22	76	24	Could the authors add one additional sentence to explain how, or to provide an example, as to how IP protection can prove to be a barrier to technology transfer?	Addressed elsewhere as cross-referenced
14852	3	76	25			This section is important and could be elaborated.	Adressed elsewhere as cross-referenced
4354	3	77		111		The bibliography omits Donald Brown et al., 'White Paper on the Ethical Dimensions of Climate Change', College Park: Rock Ethics Institute, Penn State University, 2006, and this is a serious omission.	No action; this is grey literature, and cannot be used in the report
12792	3	77		77		You may like to add that a just distribution of costs and benefits is a central point of discussion in international climate change negotiations. Regarding COP15 it even hampered the negotiation.	Good point
12793	3	77		77		What about the justice motive?	Answers to FAQs are inevitably abbreviated.
12794	3	77		77		Maybe there is more to mention than "poverty".	No action. This is not meant to be an exhaustive list.
6090	3	77	22	77	30	Add as fifth category "technological promotion aspect".	No action. That is covered in the text.
11221	3	77	27			It will also need to respect the right of indigenous peopels and local communities in threatened forest areas to play a decisive role in mitigation planning and implementation, so that they are not empoverished or disadvantaged, and so that their knowledge of the ecosystem is incorporated into mitigation activities.	No action. Already covered in text.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
14853	3	77	9			The answer to the FAQ 3.2 is not sufficient. The distinguish between states and firms (or individuals) is relevant.	Answers to FAQs are inevitably abbreviated.
3915	3	77				FAQ 3.1 says that the chapter reviews how the literature views the ethical aspects of what should be done about climate change, but FAQ 3.2 and FAQ 3.3 don't invoke any ethical issues.	No action. Ethics is not the only subject of the chapter.
6320	3	77	2	77	30	Given the fact that the authors have described the value of indigenous perspectives, could a question be added regarding the need to respect cultural differences in discussions of climate change policy?	No action; that is embodied in the first FAQ
12153	3	79	20	79	20	I cannot find any evidence that Arrhenius 2011 has yet appeared in print.	Noted; it was accepted long ago by the publisher. The author promises it by 2013 or early 2014.
8821	3	8				at the top of this page a focus on individual well-being is clearly stated, yet communities also can be impacted – and values or ethics of communities can be quite different from those of individuals, as can the required evaluation mechanisms.	This is mentioned in the text of 3.4, and now with more stress.
13001	3	8	1	8	10	It would be helpful to signal that other matters, such as rights and nonhuman nature (e.g., animals, plants, species), are relevant too. These are mentioned later, but are significant enough to warrant inclusion from the outset.	No action. As noted, these are already addressed.
8788	3	8	11	8	14	Questions of at least conventional economics are always at least based on normative ethical assumptions. That is, in examining 'how firms have reacted in the past to cap-and-trade programs for limiting emissions' is done through the lens of economics would typically look at the relative increase or reduction in utility, GDP or simply money. A deontological approach could look at whether legal duties have been met and whether there has been a change more generally in considering and abiding by duties, rights and responsibilities. A virtue approach could consider whether individual and groups have a better understanding of virtue, have acted more virtuously in the specifics and more generally. With great hazard of being misunderstood, but to put the last point in language that economists and those committed to that ethical position might understand; have and will virtues such as wisdom (or prudence), humility, justice, compassion, courage and moderation of consumption increased or decreased. To summarise, questions of economics are never 'positive', they are always normative and this applies throughout the draft AR5 reports and previous IPCC reports.	No action. Wording is adequate in text.
8789	3	8	17	8	19	It is stated 'This chapter does not attempt to answer normative questions, but rather provides policymakers with the tools (concepts, principles, arguments and methods) to make such decisions using their own values.' As already stated the chapter itself is framed by barely recognised ethical and epistemological assumptions which are likely to reinforce the assumptions of many of the most influential policy making organisations and policymakers which are unlikely to be the assumptions the majority of the global population. Popper's 'Open Society' raises questions about the possibility and benefits of separating normative questions from social science and the dangers of this turning into historicist justification for closed totalising ideologies. Whether this is the case with the dominance of conventional in current policy processes I will leave the reader to judge.	No action. Outside the scope of the chapter.
3917	3	8	17	8	21	The ethical basis for the proposition in this sentence that decision-makers should make public policy decisions using their own values should be examined in this chapter. The implication is that the policy makers' values are more important than voters' values. This may be particularly dangerous for civil society when dissenting voters' values are strongly held. Another problem is that the rest of the chapter seems to fail to provide the promised guidance. For example, where in the chapter does it tell policy makers how to use their own values to determine an 'intergenerationally just emissions trajectory" (see line 18 on page 5)?	We agree with the comment and the wording will be changed for the SOD.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
9012	3	8	18	8	21	The self-stated claim of the chapter is "not to attempt to answer normative questions" (line 17 page 8). The authors intend the chapter to be a "resource for policymakers and researchers who are trying to solve normative questions. In that sense, the chapter is policy-relevant but not policy-prescriptive". The chapter as written privileges market-based policies that are effective mainly in developed countries. Because of this bias, much of the literature it surveys is irrelevant to its self-stated intention. There is a need to recognize more of the literature to pertains to development.	No action. We state the limits of our discussion but we are constrained to look at the existing literature.
4933	3	8	20		21	This is a common principle for the whole IPCC work: "In that sense, the chapter is policy-relevant but not policy-prescriptive.", i.e. it could be e.g: "In that sense, the chapter closely follows the general IPCC guidelines on being policy-relevant but not policy-prescriptive."	Good point. Will be reflected in rewriting for SOD.
8144	3	8	22		26	Where does descriptive behavior fit into the characterization of ethical issues? Individuals may behave differently than either normative or positive models suggest they should act.	No action. We discuss this in section 3.11
11531	3	8	22		26	Where does descriptive behavior fit into the characterization of ethical issues? Individuals may behave differently than either normative or positive models suggest they should act.	No action; duplicate
6956	3	8	26	8	26	outcome-based' is a better term than 'criteria-based'.	Will be addressed in SOD
13563	3	8	27		28	in supporting the above comment, and to do with consistency, the text here states that human values include wellbeing and cultural values	No action; same comment as previous comment.
4934	3	8	33			{Add} mitigation of greenhouse gases {}emissions	Will be addressed in SOD
3918	3	8	44	8	45	This presentation is a bit confusing. Can ethics really determine that outcomes are ethically unfair if the process has been ethically fair? If so, how can ethics to choose between an ethically unfair process leading to the ethically fair outcome and the opposite conjunction?	No action. The text assumes that the outcome of a fair (e.g. democratic) decision procedure can be unjust (e.g. by denying human rights to a minority of the inhabitants or by externalizing the costs of a decision on people who had no say in the decision)
7905	3	8	46	9	3	Please clarify the relationship between axiological and deontological dimension of ethics. In our opinion it is claerly misleading to see justice as one value among others. At least to Kantians and Rawlsians justice is on another level as "values of different sorts".	More space has been given to the variety of views about the relation between justice and value.
3916	3	8	9	8	10	Can any authority be cited in support of the assertion that developing real policy solutions inevitably involves creating efficient, just and fair policy solutions? A Google search of the words 'Pork Barrel US Congress' or earmarks with demonstrate the very real concerns about the tendency for legislators to favour interest groups at the expense of the overall public interest, even in the US. Again this sentence suggests the absence of a positive theory of government action.	wording will be clarified in SOD
6307	3	8	11	8	14	I suggest rethinking the reliance upon the notion of the term "value-neutral." The example given here of "how firms have reacted in the past to cap-and-trade programs" may not be as value-neutral as it first appears. After al the term "how" may imply value (i.e. was it a "good" reaction or a "bad" one?!) Perhaps using terms such as "empirically descriptive" would avoid challenges of finding truly "value-neutral" examples.	Slight rewording necessary for SOD. ,
15633	3	8	25			Re "historic responsibility" - I believe "historical responsibility" is the more common (and preferable term) despite the former being used in some literature (e.g. Mueller et al 2009). For example, "historical responsibility" is the term used in the Cancun Agreements (LCA decision, Part III A, Preamble). It is also used elsewhere in the chapter (eg heading for 3.3.4).	Word changed noted.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
6308	3	8	27	8	28	This chapter makes an awkward distinction between "human" and "non-human" values. I would suggest that all values are human, although of course, non-human objects (animals, ecosystems, the planet) can, of course, be "valued." Here, as in chapter 2, I would opt for the anthropocentric (or human-centred) vs. non-anthropocentric (or ecocentric or biocentric) distinctions, rather than using inaccurate terms such as "non-human values."	Will be addressed in SOD
10786	3	8	40			Leonardo Boff, the Brazilian philosopher, has raised some ethical principles to be applicable to humanity, life, nature, and the environment, with startling views on the Earth planet. Please refer to his several papers in English and other languages.	We considered this point but feel no reference to Boff required. Boff is known for ecologically-oriented liberation theology; the points he has made about ecology are much broader than the issues on mitigation we cover, and we are not aware of a specific contribution by Boff that is of particular relevance for Chapter 3.
15634	3	8	41			This comment encapsulates what I see as a fundamental structural issue that the chapter needs to address. The conceptual framework for the discussion of ethics is unclear and impedes the clarity of the overall discussion in this chapter. While it makes sense to distinguish broader questions of value from more specific questions (eg justice), several problems remain. The first is that key concepts such as "justice", "equity" and "fairness" are not defined or placed in a clear relationship to one another. Second, it is arguably erroneous to treat fairness as "a part of justice" (page 9, line 3). Despite Rawls's well-known theory of "justice as fairness", Rawls himself did not see the two as purely synonymous (Rawls [1999]. A theory of justice. Revised edition, p.11), nor did he see fairness as a subset of justice. If anything, Rawls saw fairness as potentially reaching beyond justice to broader considerations of what is "right" (Rawls 1999, p.15). This distinction is not of merely theoretical interest but is of broader relevance to the applicability of discussions of justice and fairness to climate policy. The framing of climate change as a matter of "justice" may be theoretically valid, but the question of its scope beyond national borders is subject to considerable debate among theorists. Moreover, the applicability of ideas of justice in policy arenas is highly contentious (as evinced by the reluctance of developed countries to countenance many positions advocated by the civil society "climate justice movement"). By contrast, the principle of "equity" is firmly enshrined in the UNFCCC. "Fairness" is arguably also widely accepted as a criterion that is synonymous with equity. However, if fairness (and by implication equity) is seen as a subset of justice, there is a risk that those who reject the frame of justice will be more inclined to find considerations of equity and fairness unpersuasive. The more preferable view I believe is the converse view, namely that justice is a part of fairness (or, at a wider degree of consensus, that they overlap but are not identical). Accordingly, if the concept of justice is defined as giving people their due (Campbell (2010), Justice, 3rd edition, p.13), or what they are owed / have a right to, and fairness is defined as a broader criterion of even-handedness or proportionality in the treatment of people, then it becomes clearer that not every instance that is unfair is thereby also unjust (whereas the converse could hold true).	Some further explanation of the concepts has been added. Only a few theorists share the commentator's understanding of justice and fairness. Some wording has been altered to allow for it.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
16959	3	8	41			To supplement my previous comment about the relationship between justice, equity and fairness, note that the structural distinction between outcomes and process could apply to fairness as well (as in the distinction between substantive and procedural fairness). I do not suggest jettisoning the discussion of justice, particularly since much research on climate ethics is framed in terms of justice. Rather it should be noted that principles discussed with specific reference to climate "justice" could also inform broader considerations of fairness as well, such as the polluter pays principle, ability to pay and so on.	See response to 15634
6309	3	8	46	9	4	Distinguishing between criteria of value (strange term) and criteria of justice seems awkward to me. I recommend deleting these lines. Separating issues of justice from "values" is hardly uncontroversial.	No action. This text is just explaing how the chapter is organized
4332	3	82	20	82	21	Please cite the final revised paper rather than the Discussions paper: Boucher, O., Comparison of physically- and economically-based CO2-equivalences for methane, Earth System Dynamics, 3, 49-61, 2012.	Noted; change made in SOD
9382	3	9				The interpretation of ethics as primarily being focused on human well-being and fairness is quite contested. Ethics is about normative standards of what each person deserves and about principles which mediate between ecological necessities and justified claims. This includes approaches from the camp of pollitical ethics.	No action; comment unclear
8580	3	9	13	9	25	One of the problems of this chapter is that the conversation repeatedly gives preference to a neo-classical perspective without balancing or even recognizing that it is doing it. For instance, dividing the ethics as "theoretical" and the economics as "practical" is deeply problematic. This language infers that ethics has nothing useful or real to contribute (this attitude permeates this chapter in so many small ways I simply cannot identify them all). If nothing else this movement from broad discussion of a range of values and a range of ways of thinking about values to a very narrow focus only on those values that are represented in social welfare functions and then an even further narrowing into CBA should be acocmpanied by CLEAR and explicit recognitions of teh limitations of this. The text could read something like, "Sections 3.3.3 to 3.3.6 concentrate on the value of human wellbeing. This is a more narrow focus that excludes many values, such as that of non-human nature. However, this more narrow focus can be useful in certain sitations because it can more easily accomodate the aggregation of human wellbeing, as long as this is represented in constrained terms such as income". This much more appropriate indicate clear understanding of the limitations and narrowing of the chapter. As for lines 22-25 - why is CBA "particularly crucial for climate change"? This seems like a strong NORMATIVE statement when in fact the utility of CBA for situations as complex as cliamte change as been well disputed in both the ethics and economics literature. This would be much more accurately framed as ; "Section 3.5 then focuses on assessing the strenghts and weaknesses of one specific strategy that has been used in climate change policy making, CBA". Also - why is discounting the only debate covered in this section when the representation of rights and the challenges rights pose to aggregation is another central debate in ethical reflections on the use of CBA?	Some of this comment represents a misreading, particularly the comment on 22-25. However, the comment rightly identifies the progressive narrowing of the analysis, which leaves out particular considerations at each point. This structure of assumptions has been given more stress.
9799	3	9	26			I really enjoyed reading this section from a scholars point of view. For decision makers it might be too much like a textbook. Stress for each section why this chapter is important for the IPCC AR5 and the decision makers it addresses.	Will add practical examples in SOD
2109	3	9	26	9	26	Something seems to be wrong with the numbering here (should be 2.3?)	Will be fixed in SOD
10696	3	9	29	9	29	I suggest adding "… and assess" after "review" and that you put more emphasis on this.	Agreed
9337	3	9	3			tFairness as a part of justice??? The idea contained in this needs to be explained	This sentence has been removed
9384	3	9	32		34	In the context of climate change, concepts of environmental justice and ecological justice are equally important. They are not exclusively inter-personal concepts, but integrate justice to the environment.	Will be addressed in SOD

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
8792	3	9	36	9	39	Despite considering justice 'a political virtue' this chapter does not appear to consider virtue notions of justice. This severely limits the chapter's attempts to 'indicate where there are differences of opinion in the literature' about justice and clearly makes the 'review of the literature in this section ... policy relevant [and] policy prescriptive'.	Will be addressed in SOD
16674	3	9	36			Why the scare quotes on 'just' and 'correct'?	Agreed. Will remove scare quotes
11008	3	9	36		37	The authors note the great diversity of ethical views. However, in framing ethical issues, the draft relies heavily on what appears to be a fairly limited slice of the western philosophic tradition. In fact, many of the leading lights in the history of western ethical thought would reject the entire framework in which the discussion is cast. The Buddhist or Confucian traditions might tend to the same result. What grounds are there, other than convenience for selecting this ethical framework rather than some other?	Noted.
15635	3	9	4	12		The categorisation of forms of justice could be considerably clearer. First, the forms of justice could be mapped more clearly onto the distinction made on the previous page between processes and outcomes. A more systematic and coherent classification would be as follows: justice is composed of the following forms: (a) outcome-focused justice [or "substantive" justice] which includes (i) distributive justice and (ii) compensatory [or "rectificatory" / "corrective" justice; and (b) procedural justice. Second, referring to "rectificatory" or "corrective" justice rather than "compensatory" justice arguably avoids the implication that compensation is the exclusive remedy for this type of injustice (when other remedies such as restitution or preventing future harm may be possible or preferable). In addition, it is common among luck egalitarians to see compensation as a part of distributive justice (as in the idea of compensating for undeserved inequalities).	We do distinguish outcome justice and procedural justice. Section 3.3 contains a taxonomy of forms of justice
4935	3	9	41			Avoid interpretation that the goal is the GHG-emission, instead: .. benefits from various activities which (unintentionally) also generate GHG-emissions	Will be addressed in SOD; will rewrite this sentence
10697	3	9	42	9	43	The statement "…, it makes no difference where on the globe the emissions occur" is only true for long-lived and thus well-mixed GHGs. For the short-lived gases (and aerosols like black carbon) the location of emissions is very important. There is an extensive literature on this and there are many papers I could refer (some examples are given below). I suggest adding a clarification in the text of this issue (with references) and that you also point to chapter 8 of IPCC WGI report.	Agreed. Will delete this sentence
10698	3	9	42	9	43	1) Berntsen et al., 2006. Abatement of greenhouse gases: Does location matter?. Climatic Change, 74 (4): pp. 377-411. 2) Collins et al., 2012: Global and regional temperature-change potentials for near-term climate forcers. Atmos. Chem. Phys. Discuss., 12, 23261-23290, 2012	Noted. As we deleted the sentence we do not review this literature
2201	3	9	43	9	44	The term 'several decades' denotes a misleadingly short interval. Climate continues for centuries, probably millennia.	Agreed. Change to 'long after'.
17701	3	9	44	10	5	Could some countries from the North could possibly even benefit from climate change. Deicing of permafrost, better agriculture, etc?	Agreed. Added 'and even some benefits'
10699	3	9	45	9	45	In addition to the reference given here there are other references that may be used; see next comment	No action; will be addressed by comment 10700
10700	3	9	45	9	45	Two relevant references: 1) Höhne, N. et al., 2010. Contributions of individual countries' emissions to climate change and their uncertainty. Climatic Change, 106 (3): pp. 359-391. 2) den Elzen, Michel, Jan S. Fuglestvedt, Niklas Höhne, Cathy Trudinger, Jason Lowe, Ben Matthews, Bård Romstad, Christiano Pires de Campos and Natalia Andronova, 2005. Analysing countries' contribution to climate change: Scientific and policy-related choices. Environmental Science and Policy, 8 (6): pp. 614-636.	Will consider these references

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
9383	3	9	5			The distribution of costs and benefits is pivotal in a utilitarian framework in ethics; yet, in Kantian or Aristotelian approaches to ethics it is not accepted as part of the ethical framework, but criticized as a pragmatic parameter.	This is not appropriate objection to the mention of costs and benefits at this point.
3606	3	9	6	9	7	The issue of "common, but differentiated responsibilities" should already be mentioned here going beyond the historical emissions.	No action; "common, but differentiated responsibilities" is a conception of responsibility to be introduced later in text (as we do)
7906	3	9	6	9	7	In our understanding the historical dimesion is important but not central.	The word 'central' has been changed
8791	3	9	7	9	10	The section numbering here appears to be incorrect - there is no 3.2.1 to 3.2.7 as discussed.	Cross-referencing has been corrected
10695	3	9	7	9	8	The references to sections here seems to be wrong.	Cross-referencing has been corrected
3919	3	9	8	9	10	Should all these section 3.2 references be to section 3.3?	Cross-referencing has been corrected
6310	3	9	14	9	14	Again, it is awkward language and problematic to describe biodiversity as a "non-human value." At best, refer to is as a non-anthropocentric set of values or something of that nature. See comment #10 above.	Anthropocentric' and 'non-human' appear to be synonyms in this context. This has been made explicit.
4353	3	9	4	9	12	The execution of this programme is apparently absent from the draft text.	Cross-referencing has been corrected
8247	3	9	4	9	25	The references about sections and subsections provided in these lines are not matching with the contents of this chapter	Cross-referencing has been corrected
10964	3	9	26	15	10	I think that this section is too long. A good range of the literature is being mentioned but it could be summarised more briefly and the key point is that equity issues do not seem to be able to achieve any simple form of consensus. Sometimes it can be more an issue of what is an acceptable level of inequity, before a revolution starts.	Organization of the multiple ethics sections and lengths needs discsussion
17155	3	9	26			Balance of ethical topics inappropriate: reduce the length of all the sections on historical emissions and compensatory justice (within ch. 3.3) by about 50 %. This is of course an important climate ethical topic (particularly from the perspective of developing countries). But compared with other climate ethical topics discussed in the literature, it bulks quite large in ch 3 here! Compare in contrast, for example, the only little space dedicated to procedural justice. Moreover, there are some ethical approaches denying that compensatory issues should play any role at all (on a general ethical level). For instance: Kowarsch, M./Gösele, A.: Chapter 7: Triangle of Justice, in Edenhofer, O./Wallacher, J./Lotze-Campen, H./Reder, M./Knopf, B./Müller, J. (eds.): Climate Change, Justice and Sustainability: Linking Climate and Development Policy, Dordrecht: Springer 2012, pp. 73-90.	Only issue relevant here is balance and length of ethics sections (see comment 10964). Reference is grey.
10787	3	9	26			The section 3.3 is written in a highly theoretical manner without reaching a meaningful conclusion. It could be rewritten in Plain English.	Will be addressed in SOD
17331	3	9	38	9	39	repetitive consider erasing.	Will be addressed in SOD
15636	3	9	42			"effects of GHG emissions" - should specify that these are the effects 'on global temperatures' (or the like), as GHG emissions may have various other local effects (e.g. particulate pollution).	Will be addressed. This point is strictly correct. The sentence will be deleted.
13264	3	9	41	10	7	It is not easy to assess how much damage a country, developed or developing, will suffer from climate change. Maybe it is easier to express the idea in terms of how vulnerable regarding climate change is a country, as vulnerability is a combination of the natural phenomena and the preparedness to cope with it from each country. The consequences of an huracan or a typhoon in a developing and a developed country are good examples of this difference	Will be addressed in SOD; will add 'vulnerability' in the text, as appropriate