Expert and Government Review Comments on the IPCC WGIII AR5 Second Order Draft – Chapter 4

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
29574	4					The whole Chapter seems quite theoretical; it would help to add more concrete § or some Figures.	An effort is made in this direction, but this chapter is about framing concepts, the empirical analysis belongs to other chapters.
29575	4					For me, each Chapter whould either be self-sufficient, or refer to other Chapters/§.	Accepted.
33210	4					Suggestion to remove this table as this has now become redundant in a number of SD issues with Table 6.5 in Chapter 6 on co-benefits and risks. Instead, the chapter should acknowledge the usage of the different bottom-up indicators in the sectoral chapters and discuss which role they can play in assessing the sustainability/SD impacts of different mitigation options. See also other comment on the general framing role of Chapter 4.	Rejected. It is not redundant, covers more chapters and with a different perspective.
33215	4					Please refrain from the inclusion of empirical data unless they are subsequently discussed in depth in another chapter. Here, the figure should be replaced by one that is based on Chapter 5 data.	Taken into account. The figure has been deleted due to space considerations, although compatible data had been obtained from the relevant Chapter 5 author.
33216	4					Please refrain from the inclusion of empirical data unless they are subsequently discussed in depth in another chapter. Here, the figure should be replaced by one that is based on Chapter 5 data.	Taken into account. The figure has been deleted due to space considerations, although compatible data had been obtained from the relevant Chapter 5 author.
32159	4					make more concise	Accepted. We shorten substantially.
34435	4					A box highlighting key issues for LDCs as included in almost all other chapters should be added to the chapter.	Accepted.
20576	4					Cut by 25%.	Accepted.
24597	4					This section clearly and concisely explains the links between this chapter and the rest of WGIII and other AR5 reports. Suggest it is important to keep if shortening the chapter	Noted, it is shortened slightly
20577	4					Cut by 25%.	Accepted
33217	4					Please check for possible redundancies with Chapters 13 and 16 and provide cross-references to the relevant sections, in particular concerning the empirical data of the different funds discussed.	Accepted
32073	4					THERE IS A LACK OF REFERENCE FOR DEVELOPING WORLD AND WHY IT SEEMS THAT THOSE COUNTRIES HAVE A LESS GREENER AND LESS SUSTAINABLE PATTERNS. PERHAPS THERE IS A VICIOUS CIRCLE BETWEEN BASIC NEEDS AND PROMOTE ECONOMIC DEVELOPMENT AND ITS ACTUAL PATTERN OF DEVELOPMENT, AS WELL AS THEIR SOCIAL AND POLITICAL CONDITIONS, WHICH LEADS THEM TO SPEND EVEN DECADES TRYING TO DEFINE HIS WAY IN WHAT SEEMS TO BE A STATE OF PARALYSIS BY ANALYSIS, WHERE MOST ARE COMMODITIES PRODUCERS WITHOUT GIVING VALUE ADDED TO IT AND ALLOW BEING PENETRATED WITH DEVELOPED COUNTRIES CONSUMPTION PATTERNS THEY CANNOT AFFORD AND HOLD IN THE LONG TERM	Taken into account. Presumably the comment refers to Figure 4.4.1, which has now been deleted. There is actually very little litterature on sustainable consumption, especially in the better journals, from the developing world.
24598	4					This section is not as clearly linked to the focus of the chapter as other sections. In particular, there is little explanation of how statistics on consumption patterns and methods carbon accounting by carbon footprints (section 4.4.1 and 4.4.2) relate to the concepts of sustainable development and equity covered in the preceding sections- although FAQ 4.3 (p 40-41) does hint at why these statistics and methods are important to equity. Suggest that there is scope for more explanation of how these relate to the concept of SD and equity in this chapter, and concurrently room for the more detailed text (descriptions of consumption patterns and carbon accounting methods p 35-41) to be either moved elsewhere or significantly shortened. If moved elsewhere, 4.4.1 and 4.4.2 may be more useful as a concise a box showing an alternative method for assessing drivers and trends in chapter 5.	Taken into account. The role of 4.4 in the chapter is explained in 4.1 and in the beginning of 4.4.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
33218	4					Please liaise with Chapter 5 regarding redundancies (in particular with section 5.5) to identify text sections that may be shortened, shifted and/or removed.	Taken into account. Some coordination was done for the SOD and more was done for the Final draft. While Sec. 5.5. focuses on the long-term dynamics and drivers of consumption-based emissions, Sec. 4.4 relates theses emissions to sustainable consumption patterns and equity issues.
20578	4					Cut by 25%.	Accepted
35403	4					There should be a explicit reference to the experience of decoupling material consumption and material efficiency from economic growth in Taiwan, where this has been specially successful: waste generation dropped from 8.7 to 7.95 million tons between 2000 and 2010, despite a 47 percent increase in GDP in the same period. Amongst the key factors that made that possible, it should be noted: a. Higher awareness and motivation on the part of individuals and community groups to work towards waste prevention and recycling. b. Widening gap between rich and poor concentrated much of the wealth gain in a small subsection of the population. c. Successful waste prevention policies, including: 1. Minimizing Packaging and Disposables: TEPA´s approach to waste prevention put a strong emphasis on Extended Producer Responsibility (EPR)—making producers responsible for changes in design and production to reduce the waste generated by their products and packaging a. Restricting the weight of boxes. b. Banning disposable tableware at schools and government agencies. c. Reducing plastic bags and plastic packaging. d. Encouraging a reduction in disposable chop- sticks. e. Reducing disposable cups. 2. Maximizing Recycling: TEPA created the Resource Recycling Management Fund. Manufacturers and importers of mandatory recycling items report them, label them, and pay a fee to the Resource Recycling Management Fund, which covers collection and recycling costs and provide subsidies to companies and governments to develop reuse and recycling systems. a. Mandatory beverage container take-back. b. Mandatory e-waste take-back. In 2010, the government passed legislation that requires retailers selling electronics and electric products to take back and recycle these products. 3. Separation at Source: In 2005, Taiwan adopted a two-phase program under the Waste Disposal Act, which required people to separate waste into recyclables, food waste, and residual waste. 4. Food Waste Recovery: By 2009, 319 townships had food waste recycling systems. The total volume of food waste collected per day rose from 80 tons in 2001 to 1,977 tons in 2009. Approximately 75 percent of the recovered food waste is sold to pig farms for about NT $400 (US $13.70) per ton. See the case study in 'On the road to zero waste. Successes and Lessons from Around the World, by GAIA Global Alliance for Incinerator Alternatives, 2012.	Noted. More references on waste have been included, including the one suggested by the reviewer.

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35457	4					There should be a explicit reference to the experience of decoupling material consumption and material efficiency from economic growth in Taiwan, where this has been specially successful: waste generation dropped from 8.7 to 7.95 million tons between 2000 and 2010, despite a 47 percent increase in GDP in the same period. Amongst the key factors that made that possible, it should be noted: a. Higher awareness and motivation on the part of individuals and community groups to work towards waste prevention and recycling. b. Widening gap between rich and poor concentrated much of the wealth gain in a small subsection of the population. c. Successful waste prevention policies, including: 1. Minimizing Packaging and Disposables: TEPA´s approach to waste prevention put a strong emphasis on Extended Producer Responsibility (EPR)—making producers responsible for changes in design and production to reduce the waste generated by their products and packaging a. Restricting the weight of boxes. b. Banning disposable tableware at schools and government agencies. c. Reducing plastic bags and plastic packaging. d. Encouraging a reduction in disposable chop- sticks. e. Reducing disposable cups. 2. Maximizing Recycling: TEPA created the Resource Recycling Management Fund. Manufacturers and importers of mandatory recycling items report them, label them, and pay a fee to the Resource Recycling Management Fund, which covers collection and recycling costs and provide subsidies to companies and governments to develop reuse and recycling systems. a. Mandatory beverage container take-back. b. Mandatory e-waste take-back. In 2010, the government passed legislation that requires retailers selling electronics and electric products to take back and recycle these products. 3. Separation at Source: In 2005, Taiwan adopted a two-phase program under the Waste Disposal Act, which required people to separate waste into recyclables, food waste, and residual waste. 4. Food Waste Recovery: By 2009, 319 townships had food waste recycling systems. The total volume of food waste collected per day rose from 80 tons in 2001 to 1,977 tons in 2009. Approximately 75 percent of the recovered food waste is sold to pig farms for about NT $400 (US $13.70) per ton. See the case study in 'On the road to zero waste. Successess and Lessons from Around the World, by GAIA Global Alliance for Incinerator Alternatives, 2012.	Noted. We incorporate the suggested reference "case study in 'On the road to zero waste. Successess and Lessons from Around the World, by GAIA Global Alliance for Incinerator Alternatives, 2012."
29551	4					There should be a explicit reference to the experience of decoupling material consumption and material efficiency from economic growth in Taiwan, where this has been specially successful: waste generation dropped from 8.7 to 7.95 million tons between 2000 and 2010, despite a 47 percent increase in GDP in the same period. See the case study in 'On the road to zero waste. Successess and Lessons from Around the World, by GAIA Global Alliance for Incinerator Alternatives, 2012.	Noted. We incorporate the suggested reference "case study in 'On the road to zero waste. Successess and Lessons from Around the World, by GAIA Global Alliance for Incinerator Alternatives, 2012."

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26965	4					There should be a explicit reference to the experience of decoupling material consumption and material efficiency from economic growth in Taiwan, where this has been specially successful: waste generation dropped from 8.7 to 7.95 million tons between 2000 and 2010, despite a 47 percent increase in GDP in the same period. Amongst the key factors that made that possible, it should be noted: a. Higher awareness and motivation on the part of individuals and community groups to work towards waste prevention and recycling. b. Widening gap between rich and poor concentrated much of the wealth gain in a small subsection of the population. c. Successful waste prevention policies, including: 1. Minimizing Packaging and Disposables: TEPA´s approach to waste prevention put a strong emphasis on Extended Producer Responsibility (EPR)—making producers responsible for changes in design and production to reduce the waste generated by their products and packaging a. Restricting the weight of boxes. b. Banning disposable tableware at schools and government agencies. c. Reducing plastic bags and plastic packaging. d. Encouraging a reduction in disposable chop- sticks. e. Reducing disposable cups. 2. Maximizing Recycling: TEPA created the Resource Recycling Management Fund. Manufacturers and importers of mandatory recycling items report them, label them, and pay a fee to the Resource Recycling Management Fund, which covers collection and recycling costs and provide subsidies to companies and governments to develop reuse and recycling systems. a. Mandatory beverage container take-back. b. Mandatory e-waste take-back. In 2010, the government passed legislation that requires retailers selling electronics and electric products to take back and recycle these products. 3. Separation at Source: In 2005, Taiwan adopted a two-phase program under the Waste Disposal Act, which required people to separate waste into recyclables, food waste, and residual waste. 4. Food Waste Recovery: By 2009, 319 townships had food waste recycling systems. The total volume of food waste collected per day rose from 80 tons in 2001 to 1,977 tons in 2009. Approximately 75 percent of the recovered food waste is sold to pig farms for about NT $400 (US $13.70) per ton. See the case study in 'On the road to zero waste. Successess and Lessons from Around the World, by GAIA Global Alliance for Incinerator Alternatives, 2012.	Noted. More references on waste have been included, including the one suggested by the reviewer.
26070	4					Perhaps a reference to the Guidelines for Social LCA would be useful here (Benoit et al, 2009, Int J LCA) and perhaps some more updated reference, since the methd is developing fast.	Noted.
23122	4					Please add text regarding the importance of voluntary choice of frugal lifestyles, often linked to religious beliefs (see e.g. Lastovicka, J.; Bettencourt, L.; Shaw Hughner, R.; . Kuntze, J. (1999): Lifestyle of the Tight and Frugal: Theory and Measurement, in: Journal of Consumer Research, 26, p. 85-98; Pepper, M.; Jackson, T.; Uzzell, D. (2009): An examination of the values that motivate socially conscious and frugal consumer behaviours, in: International Journal of Consumer Studies, 33, p.126–136); Shaw, D.; Newholm, T. (2002): Voluntary simplicity and the ethics of consumption, in: Psychology and Marketing, 19, p. 167–185; Etzioni (1998): Voluntary simplicity: Characterization, select psychological implications, and societal consequences, in:Journal of Economic Psychology, 19, p. 619-643.	Rejected. The evidence actually does not suggest frugal lifestyles to be a very important trend in terms of size or impact, so considering the space limitations we chose not develop this discussion further.

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35404	4					Case studies about materials efficiency policies in Taiwan, Flanders, San Francisco show how they have achieved a successful change of attitude from consumers towards producing less waste and increasing recycling rates. Aggressive standards and incentives for both individuals and businesses in the Flanders region of Belgium, for example, have achieved 73 percent diversion of residential waste form landfill, the highest regional rate in Europe. Likewise, through incentives and extensive public outreach, San Francisco has reduced its waste to landfill by 77 percent—the highest diversion rate in the United States—and is on track to reach 90 percent by 2020. See the case studies in 'On the road to zero waste. Successes and Lessons from Around the World, by GAIA Global Alliance for Incinerator Alternatives, 2012.	Noted. References on waste and recycling were added to the final draft.
35458	4					Case studies about materials efficiency policies in Taiwan, Flanders, San Francisco show how they have achieved a successful change of attitude from consumers towards producing less waste and increasing recycling rates. Aggressive standards and incentives for both individuals and businesses in the Flanders region of Belgium, for example, have achieved 73 percent diversion of residential waste form landfill, the highest regional rate in Europe. Likewise, through incentives and extensive public outreach, San Francisco has reduced its waste to landfill by 77 percent—the highest diversion rate in the United States—and is on track to reach 90 percent by 2020. See the case studies in 'On the road to zero waste. Successess and Lessons from Around the World, by GAIA Global Alliance for Incinerator Alternatives, 2012.	Noted. References on waste and recycling were added to the final draft.
29552	4					Examples of SCP and material efficiency in Taiwan, Flanders, San Francisco show how they have achieved a successful change of attitude from consumers towards producing less waste and increasing recycling rates. Aggressive standards and incentives for both individuals and businesses in the Flanders region of Belgium, for example, have achieved 73 percent diversion of residential waste form landfill, the highest regional rate in Europe. Likewise, through incentives and extensive public outreach, San Francisco has reduced its waste to landfill by 77 percent—the highest diversion rate in the United States—and is on track to reach 90 percent by 2020. See the case studies in 'On the road to zero waste. Successess and Lessons from Around the World, by GAIA Global Alliance for Incinerator Alternatives, 2012.	Noted. References on waste and recycling were added to the final draft.
26966	4					Case studies about materials efficiency policies in Taiwan, Flanders, San Francisco show how they have achieved a successful change of attitude from consumers towards producing less waste and increasing recycling rates. Aggressive standards and incentives for both individuals and businesses in the Flanders region of Belgium, for example, have achieved 73 percent diversion of residential waste form landfill, the highest regional rate in Europe. Likewise, through incentives and extensive public outreach, San Francisco has reduced its waste to landfill by 77 percent—the highest diversion rate in the United States—and is on track to reach 90 percent by 2020. See the case studies in 'On the road to zero waste. Successess and Lessons from Around the World, by GAIA Global Alliance for Incinerator Alternatives, 2012.	Noted. References on waste and recycling were added to the final draft.
20579	4					Cut by 25%.	Accepted.
33208	4					With capacity building noted as constituting part of the narrative focus of your chapter, please expand this section, by introducing - as agreed in Vigo - the process of capacity building and limitations or barriers to capacity building. Also, please refer the reader to Chapter 13.10 for discussions of the role of international agreements in capacity building, and to Chapter 15.10.2 for discussions of the capacity to formulate and implement policies (“policy capacity”).	Accepted.
20580	4					Cut by 25%.	Rejected, we have moved the part on burden-sharing in 4.6.
20581	4					Cut by 25%.	By more than that, due to export of burden-sharing to 4.6.

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33219	4					Please liaise with Chapter 6 to arrive at a coherent set of equity principles and include cross-reference to relevant section (see Table 6.3 in section 6.3.6.6)	Accepted.
20582	4					Cut by 25%.	Accepted.
35235	4	0				Discussion on technology transfer is insufficient in this chapter. Thus, it is suggested to add a systematic and coherent discussion on technology transfer to chapter 4, focusing on TT'S impact on sustainable development and equity.	Yes, this is now discussed, and harmonized with other chapters (ch. 3 in particular).
40950	4	0				The framing chapters, particularly Chap 4, and the discussion especially on equity and the linkage to sustainable development considerations in Chap 4, are not fully reflected in the SPM. Furthermore, the discussion in Chap 4 itself, even if it is supposed to be one of the framing chapters, does not get reflected in the discussion in the other core chapters – especially Chap 5, 6, 13, and 16.	An effort is being made in this direction. We certainly push toward it.
32070	4	0				IN THIS WORLD THERE ARE SUFFICIENT RESOURCES FOR EVERYTHING WE NEED BUT NOT ENOUGH FOR EVERYTHING WE COVET Ghandi I THINK IT MAY BE GOOD IDEA SHOW THIS THOUGHT OF GANDHI TO THIS CHAPTER, OR PUT ANY THOUGHT OF ANY HISTORICAL FIGURE RELATED TO EACH CHAPTER	Nice but space is scarce.
32072	4	0				THERE ARE TOO MANY COMMENTS IN PARENTHESIS, THIS CAUSES TO GET "LOST" IN READING	We try to improve the flow.
33211	4	0				Compared to the previous draft, there have been great efforts by the author team to improve its framing role for the report and the team should be congratulated! However, there still remains a gap between the holistic SD concept presented in Chapter 4 and the assessment of more focused effects (often grounded in the three pillars approach) found in subsequent chapters. In an effort to close this gap, we would like to encourage you to connect the discussion of SD concepts in chapter 4 (such as the Genuine Savings approach) more closely with the multi-objective/co-benefit framework we have now established for the AR5 (see also Chapter sections 3.5.3 and 6.6). Also, a recognition of the various indicators and more qualitative arguments used in the sector chapters may be given, without providing the specific detail that is currently envisaged for Table 4.8.1. In addition, you may formulate a research agenda in the 'Gaps in knowledge and data' section, of how this contradiction between the holistic SD concept and the sectoral literature describing environmental, social and economic impacts of different mitigation options may be addressed.	Good suggestions, all accepted (see in particular sections 4,8, 4,9)
33212	4	0				There is an inconsistent usage of the term 'objective' across chapters. Please liaise with the relevant chapters (such as Chapter 3) and clarify what the term 'objective' is intended to describe in the AR5 context (policy objectives, societal objectives etc.). A box in Chapter 4 could possibly explain this in a prominent manner.	We seek consistency, this is in particular clarified in 4.8 when discussing the articulation with sector chapter and their multi-objective framework which is closely related to SD.
33213	4	0				The usage of the terms ethics and equity remains interchangeable and this needs to be corrected.	This is now clarified in 4.2.
33214	4	0				Please include a brief discussion of leapfrogging and its relevance in linking mitigation and sustainable development (with adequate cross-reference to Chapter 3, where the concept should be introduced, and Chapter 14, where regional leapfrogging aspects are discussed).	In Sec. 4.4. we mention the fact that consumers in developing countries tend to replicate the unsustainable consumption patterns of rich countries (indicating the absence of leap frogging) but that they also respond to eco-labeling.

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21628	4	0				This chapter lacks a consistent approach to sustainable development and equity and places greater emphasis and attention on SD than equity, e.g. p.26, l.5; p.28, l.39. "Equity" is subsumed under SD in a lot of cases. Perhaps this is symptomatic of equity being a term still being defined, but suggest that the authors try to address this.	This impression may be due to the climate context. We however consider many aspects of equity (inter, intra-generational, procedural…) and provide a detailed justification of its role and principles.
21629	4	0				Relating to the point above, the authors could be clearer about the relationship between the three dimensions of equity (introduced on p. 4, l.40-47) and the four equity principles that are explained later on in the chapter. Section 4.7.3 on equity and burden sharing should be more central in the chapter.	The relationship is clear as the four principles have to do with intra-generational equity primarily, though they also engage intergenerational and procedural issues. The part on equity in burden-sharing is moved up to 4.6, as it fosters building momentum for mitigation and adaptation policies.
21630	4	0				Overall the chapter is very long, not very well structured and lacks a concise styel. Many sections do not lead on or relate to each other, and appear to have been pasted together without an exploration of the links between them.	The structure of the chapter is largely imposed on the authors. We shorten it, and link the issues in the ES, 4.1 and 4.8.
21631	4	0				This chapter could make links with the Economic, Social and Cultural Rights framework. For example, it could reference work of the UN Special Rapporteurs on the rights to food, water and housing. This relates to comments below on the right to development and environmental justice.	Yes, rights are important in the policy arena, though less prominent in the literature reviewed. We take care of mentioning their importance.
21632	4	0				The term "climate response" is used throughout this chapter when it means "climate policy response" (e.g. p.4, line 5). The term "climate response" usually refers to the physical response of the climate to different perturbations. Please amend the chapter accordingly to avoid confusion.	Accepted. Language checked.
21633	4	0				Can there be some justification at the beginning of this chapter (or Ch.3) as to why Ch.3 focusses on justice and Ch.4 on equity? Some sense of how they are understood as being different? There is otherwise too much overlap in the fundamentals of the equity/justic literature covered between the two chapters.	Accepted, this is explained both in Chapter 3 and in this chapter.
19426	4	0				I recommend reduce Section 4.8 to reduce difference between requested and present size of this chapter.	Accepted.
19733	4	0				"Equity" in this chapter is a little weak, which is the key of success of mitigation.	We strengthen the role of equity.
33987	4	0				It is needed in this document to explain the difference between LU (land use) related emissions and LUC (land use change) related emissions. E.g. the drainage and conversion of peatlands that is needed for growing crops causes greenhouse gas emissions and carbon losses because of 1) oxidation of the drained peat, 2) an increase in (peat and forest) fire frequency (at least in the tropics) and 3) biomass carbon loss in the case that forest is converted. The latter (deforestation) is a one-point emission in time, while emissions resulting from peatland drainage continue over time (will continue until the drainage base is reached or if drainage stops and the peat is being rewetted). Emissions from peatland drainage are not restricted to land use change, but also associated with the ongoing land use itself. In this respect peatlands differ from mineral soils, where the main cause of soil carbon losses is from land use change. Now, in the document the focus is still on the one-point emissions from deforestation, while ongoing peat emissions are disregarded, also in figs and tabs in the text and emissions source strength estimates. Please explain this in the beginning of the chapter, perhaps related to figure 11.2.	Rejected - We have to leave this to the AFOLU Chapter

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19686	4	0				As a response to the authors' request for recommendations on shortening this chapter, I would advise to cut down on section 4.4.1 and keep discussions strictly limited to consumption and climate change / GHG emissions instead of tackling too many broad isssues on consumption vs the environment. The same applies on the production side for section 4. 4.3. Also perhaps drastically reduce section 4.4.4 and keep discussion directly related to anthropogenic emissions and climate change. Again the entire section 4.3 could be reduced by keeping discussions strictly focused on climate change mitigation and interactions with development.	Taken into account. All sections are reduced. Sec. 4.4 has been shortened considerably but in a somewhat different way than suggested by this reviewer. Regarding 4.4.1: I do not agree. Drivers of and trends in resource consumption is discussed briefly as an important context for understanding the following discussion of the relationship between consumption and GHG emissions. It is in line with the 'framing' objective of Ch. 4. Other specific environmental impacts are not discussed. Regarding Sec. 4.4.3.4: The discussion of LCA methods has been shortened and the deleted text has been shared with authors of Annex II (Metrics and Methods). 'Eco-efficiency', 'energy efficiency' and 'problem shifting' are central concepts for understanding GHG emission reduction and its relationship to sustainable development. We do not discuss other specific environmental impacts than GHG emissions. Regarding Sec. 4.4.4. The relationship between consumption (which continues to drive emissions despite increases in CO2 efficiency, see also Ch. 5) and well-being is central to the 'decoupling' theme in Chapter 4 and one that has received increased attention in recent years. There is no literature on the relationship between GHG emissions and well-being.
25310	4	0				The chapter has 655 references, out of which 71 are from the chapter authors only.	We increase the number of references.

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25311	4	0				Out of these 655 references, only 23 are on developing countries (around 3%). This is grossly inadequate. It is suggested that a more balanced approach could be adopted.	What is the basis for this number? We count more than 85 references in the SOD that bear directly on developing countries, and an effort is made in the final draft. Regarding Sec. 4.4, then the literature on carbon accounting and consumption is very scant on developing countries. We have included more references since the FOD. In the TOD, we have incuded more references on the issue of under-consumption.
25312	4	0				A quick check on the total universe of articles in peer-reviewed journals since AR4 (2007) indicates that there are almost 95000 in journals of Science Direct, 3400 in Francis & Taylor, 52000 in Springer, 94000 in Wiley and 16000 in Jastor , totaling to around 290000 articles in all. The chapter has captured almost 0.22% of existing literature. However literature cited from journals other than climate chnage and energy domains are not many in this chapter. Developmental issues and their linakges with energy sector are also captured in many articles in reputed journals. It is suggested that this lack of coverage may be looked into.	If we were only to quote 100,000 articles, that would represent about 6,000 pages, i.e., more than the total AR5 report. We do expand the bibliography. Sec. 4.4 cites a very broad range of journals not only from the energy and climate change domains.
25313	4	0				Out of total 290000 articles mentioned as above, almost 20000 (7%) are on developing countries and issues related to them. It indicates that there is a large enough pool to pick up articles on developing countries to be cited in this chapter.	We increase the attention to developing countries in the chapter and in the references. We have included more references on under-consumption in Sec. 4.4.
41096	4	0				Some places where the chapter might be shortened: 1. Omit Box 4.2.2, without loss of chapter continuity. 2. Introduction of LCA concepts might be consolidated to appear in only on place instead of several (for example, see page 39, Lines 7-20 vs. page 45, Lines 8-44. 3. Page 42, Line 32, states "as elaborated below," Lines 34 - 48, and page 43, Lines 1 - 16. Omit this elaboration without loss of chapter continuity. 4. Omit multiple re-definitions of concepts, where various re-definitions are explicitly stated in historical sequence. For example, for "Sustainable Consumption," a 1994 definition is stated (page 42, Lines 10-14), and then a 2005 definition is stated (page 42, Lines 16-21).	1 accepted; 2 accepted; 3 rejected (this seems relevant); 4 accepted, Regarding Sec. 4.4, the description of LCA concepts has been considerably shortened and consolidated, and there is now only one definition of "Sustainable Consumption". Details on LCA methods can be found in Annex II of the report.

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41097	4	0				Understanding that this chapter represents a shift away from a pure equity focus and attempts to incorporate elements of sustainable development where applicable, the huge chunks of politico-economic theory detract from the focus of the chapter, and often have little relevance to climate change policy and mitigation options. Suggest a more active assessment of the real relevance of each of the additional elements described in this chapter to get at the core pieces that can inform work on climate change. The shift towards the end of the chapter towards the specific discussions on equity as relating to mitigation is jarring and there is not a clear connection made between the previous sections on sustainable development theory writ large and the relationship to a climate change equity discussion. Further, throughout the chapter, there should be a clear distinction between internationally agreed principles (for sustainable development or climate change-- there exist no such principles for equity, as the chapter notes) and their proper context (eg. climate change principles are the ones in the UNFCCC, sustainable development principles are the one in the Rio declarations), rather than incorporating principles (such as those contained in the Brundtland Report) which may be widely used and understood in the literature as well as by some policymakers, as the basis for any of the ongoing policy work. They may well be relevant, but there is a confusion and melding together of different principles from different contexts and with different levels of international standing, which should be clarified.	Accepted - we clarify the provenance of the various referenced principles
41098	4	0				While this chapter presented a huge amount of information, it was little more than a literature review with little independent analysis of what the data means. While this report is intended to be based on peer-reviewed literature, it does not give the reader a sense of what all of this information means. For example, the authors could have used the literature to draw general conclusions that are roughly supported concerning the feasibility of being able to achieve sustainability and equity, or to state that there is no general agreement along these lines.	The question of feasibility is exceedingly hard and can be answered at different levels, from pure technical possibility to feasibility under all political and behavioural constraints. We prefer to list the relevant determinants than give a broad indication of feability that is likely to be of little relevance if purely technical or to be a mere political forecast if it is an all things considered judgment.
40565	4	0				Discussion on equity should be summarized in Chapter 4.	An effort at shortening, and connecting to similar points in Chapter 3, is made.
27487	4	0				A section should be added on the importance of economic growth for achieving sustainable development. Currently, references to economic growth are scattered over various passages of chapter 4, mostly growth being referenced as an influence on other factors/dimensions of sd. However, economic growth, because of its various positive externalities, is key element of sustainable development in its own right. The section should depict, inter alia, the positive effects of growth on employment, the sustainability of public finances (including public services such as health care) and mitigation capabilities.	Yes, this is mentioned in 4.8

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
27488	4	0				Adding the concept of sustainable development certainly enriches the debate. Most importantly, given its broad scope, sd is a tool/ an analytical approach for more fully understanding the various factors at play in the negotiations for an optimal policy response to climate chance. Synergies between climate change and sustainable development policies are to be expected - as chapter four confirms. At the same time, the underlying conflict of interests in climate change politics remains intact, irrespective of the analytical lense that is applied to them. As such, the value added of sd in terms of designing the optimal climate change regime is probably more limited than in terms of fostering understanding for underlying discussion strands. The broad-bush nature of sustainable development, while stimulating in terms of analysis, also renders its operationalisation difficult. Given the limited amount of resources at the disposal of real-life policy makers, pursuing a holistic sustainable development strategy is challenging both in terms of monitoring but even more so in terms of planning and securing desired outcomes. The report should therefore be careful not to project an overly optimistic scenario in terms of the potential contribution of sd for tackling climate change.	Agreed, care has been taken when revising the text.
25066	4	0				Equity is discussed both in Chapter 3 and 4. Those should be consolidated into one section (preferably in Chapter 4, as Chapter 3 is overloaded at this moment).	The division of labor between the two chapters is now explained.
27002	4	1		72		General comments: all the concepts explored in this chapter are well spotted on. Yet this looks more like a literature review, with no clear recommendations, leaving the reader with the question: and then what? Why do draw this to our attention? This is specially the case for "Values and behaviours", "consumption patterns and carbon accounting".	This is supposed to be a critical review of existing literature, not a policy prescritive analysis. We try to highlight the key issues that decision-makers and stakeholders must consider.
20075	4	1				Recent years are shown several attents to improve GHG emission inventories, for instance adding imports and removing eports so as to calculate emissions and emissions per capita in a consumption approach. This has the potential to shed a totally different light on mitigation policies (shift in national targests,adoption of other regulation tools such as a VAT based on carbon footprint of goods...). Chapter 4 is a nice effort to introduce such a consumption approach, but probably unsufficient. Indeed, whatever methods is chosen (a policy based on a production or on a consumption approach) both will impact lifestyles at the end. If the industry is taxed some products will be more expensive, and therefore the purchasing power and its associated lifestyles will be affected. This should be more present in the whole WGIII report : what can we expect in term of future society, in our capacity to fulfill basic and more sophisticiated needs, in the redistribution of revenues, in the buurden sharing ? Which resulting lifestyles in low carbon economies can we reasonably expect ? Here the problem is dealt more in a "sustainable consumption- environmental awareness of consumers" perspective, rather than in a comprehensive view on lifestyles and on the way they are embedded in the society and in the economy. More precisely, the chapter is setting the stage and introduce too theoretically key concepts on the debate about lifestyles and sustainable development / low carbon, but without reflecting recent works which endeavours low carbon lifestyle and societies (see the SPREAD 2050 initiative in UK for instance). But this is true that lifestyles are not well dealt with in the existing literrature on long term scenarios, and AR5 reflects this knowledge gap.	We do not disagree, and section 4.4 discusses these issues. We also note the knowledge gap in 4.9.
20076	4	1				Chapters 4 in general appears theoretical only, and does not present the results of key recent works triying to illustrate or quantify the concept that the chapter introduces. For instance, on the different conceptions of responsibility, or on transition pathways. The consequence is that the link with GHG emission mitigation is quite low. Some developments appear more as a general thinking on sustainable development. Theoretical developments on sustainable development indicators, the CAB approach and all associated equations appear for exemple irrelevant	Rejected - Ch 4 is tasked with a treatment of SD and equity in the context of CC and mitigation, but cannot do so without explication of broader themes and fundamental aspects

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
19178	4	1				Sustainability is impossible. The world changes unexpextedly. To try and "sustain" obsolete ideas, institutions and practise is to ensure obsolescence. Future generaions will not be grateful to be lumbered with attitudes, ideas and actions which are in conflict with what they actually encounter. We should try to move along with changes in the world, not try to stop them.	We agree but sustainability in our chapter is about preserving valuable things like well-being and the environment.
19179	4	1				"Equity" should not be confused with "democracy" It is impossible to please everybody but we must avoid societies where some are more equal than others.	We agree and do not make the confusion.
22927	4	1		72		IPCC- WGIII, Mitigation of Climate Change Chapter 4 Sustainable Development and Equity Review report At the outset, I must congratulate and appreciate the authors of this chapter for their untiring efforts to produce such a comprehensive, rigorous and well written chapter. 1. TSU has specifically asked to indicate where chapter could be shortened, I suggest that Executive Summary which runs through a little more than three pages, may be shortened and compressed to one page only. Although it may be very difficult and challenging to do so. 2. “Executive Summary” by definition is an overview of the salient points of a business plan or proposal does not seem to be an appropriate title for an Assessment Report of IPCC which is an academic and research oriented document. Therefore I suggest that it may be titled as Abstract or Extended Abstract. 3. Authors have discussed issues related to sustainable development, equity, inter and intra generational equity etc at length. I believe that to achieve SD, mechanism to be inbuilt in the policy to reward “good consumer behavior” in or outside the market. Climate policy globally or locally rewards or penalizes good or bad production behavior respectively, which may or may not be shared and passed on to the consumers depending on the dynamics of the market. Assignment of per capita emission rights to nations reduces the unrest amongst developing countries for level playing field and improves possibility of transfer of resources from the North to the South. This possibility of transfer of resources through per capita emission rights has to be used judiciously at the local level as this may reduce disparity globally but may increase it locally until these rights are assigned to individuals particularly to poor and improve their livelihood. The policy objective of SD may be achieved through reducing disparity as it makes environmental goods scarce and provides mitigating capacity to poor also. Therefore policy focus is to be diverted from SD to remove disparity.	We make an effort to reduce the ES (we cannot change its name), and we acknowledge the tensions between tackling disparities and securing SD (see 4.2 and 4.4 in particular).

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
19198	4	1		117		OVERALL COMMENTS: This is a well-organized and packaged chapter. The authors identified the critical issues that needed to be discussed without diverging the writing onto each authors 'favorite' research topic. It is concise and clearly introduces the topics that will be discussed and is well balanced. The discussions read well and I really like the use of examples to present complex ideas instead of relying on academic jargon that no one will read or understand. Most of the sections are quite insightful and definitely introduce the new thinking that is occurring in this area. The introduction of how this chapter moves forward from past IPCC reports was very useful and interesting to read. The material flows logically and there was no material that I saw that should not have been included (I did identify sections to delete that focused on discussions of materials in other chapters or repeated text). The writers did a really good job on deciding what to include, determining what supporting information to include, and developing the storyline throughout the chapter. I really liked most of the introductions to each section and thought that they were well written and introduced the topics really well. The entire chapter is well balanced, provides excellent introductions to the topic, provide the multiple views that need to be considered, and address points that are relevant for a chapter focusing on mitigation to achieve sustainable development and equity. Attention should be paid to when the general global discussions are really relevant for the industrialized world and less relevant for the developing or emerging economy countries. This would not take a lot of work but is important to clarify since the industrialized world has very different ideas about what mitigation and adaptation is and what policy to pursue. These ideas do not work in regions of the world where people are already dependent upon nature capital. The industrialized world is dependent upon fossil capital and generates most of the climate change gases. I think many developing or emerging economy countries do not appreciate being lumped into the same global adaptation or mitigation solutions since their context is very different. Throughout the chapter there are several generalizations being made at the global level when they are more relevant for only the western world. There are several places where the words used should be clarified further. For example, use of terms like 'carbon economy' should really be 'fossil carbon economy'. I have tried to note the places where words need to be changed so they reflect what the conflicts and trade-offs need to really focus on.	noted - (Thank you)
23965	4	1	1	8	41	the introduction to the chapter is very long (8 pages). It is repetitive and especially the review of past reports could be shortened.	Accepted, this is reduced.
19215	4	10	13		29	COMMENT: These are critical points but these are not just national level issues but local/regional where social capital plays out. National governments do not distribute equitably resources at local/regional levels. The national level can be a barrier from what I have observed in Asia and South America.	Agreed: this is the meaning of "at the national and international levels"
41118	4	10	15	10	15	What "recent history" is being refered to here?	Further detail in chapter will not be repeated in this brief introductory synopsis.
29881	4	10	2	10	3	The expression (sacrificing well being) is too negative and thus not consensual. Maybe rephrase "without forced austerity" or other.	Replaced by "hindering"

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
25684	4	10	21	10	24	This part should be deleted completely because the 1.5℃ target is not realistic and even 2℃ target is extremely difficult to attain, as described in (Höhne, 2011, conclusion) and (Rogelj, 2011, abstract). These literatures are listed in the No4 line of this table.	Rejected - these are identified because of their relevance to the current political discussions, and the text is substantiated by WGI text. (See immediately above.)
21636	4	10	21	10	24	This sentence on the strength of action required needs to be consistent with the WGI report and chapter 6, particularly the date of peak emissions.	Agreed - consistency confirmed ("as soon as 2020" is consistent with RCP 2.6 pathways examined by WG1, for instance as presented in fig. 6.25)
29882	4	10	23			It is important to recall that 1.5°C is also a discussed target	Noted - reference to 1.5C included.
29588	4	10	23	10	24	If possible, please give a reference for this statement ? Or add a graph ?	Accepted - reference added.
41119	4	10	27	10	29	This is an important statement. suggest putting this in the exec sum and SPM as well.	Noted.
30832	4	10	33	10	35	There are normative statements on page 10. E.g., "Such a process requires the education and empowerment of diverse actors to participate in system of decision making that are designed and implemented with procedural equity as a deliberate objective." and "A just transition would be helpful to build support needed for the substantial techno-economic, institutional and lifestyle shifts needed to reduce emissions substantially and enable adaptive responses." Consider rewording to be more objectively stated.	TIA - text slightly rephrased. See text in chapter for further discussion. (Recall, this is merely a brief introductory synopsis.)
41120	4	10	42	10	43	Such considerations apply to a wide range of decisions, not just ones on finance and technology	Accepted.
41117	4	10	5	10	12	What about the "just transition" concept? Is this not to be addressed in this chapter? It is highly relevant to the ongoing debates both internationally and in terms of domestic equity concerns (equity within nations)	Accepted - yes, important concept. The term is used here (see 4.1.2.2) but the concept is used throughout.
19214	4	10	5		12	These are all good points but mostly a developed world identification of themes. This should be stated. Good points but they should be tied to equity and how policy should vary. One global policy is not going to work and will be ignored by nations and regions if they do not see applications for their situation.	Accepted - a box has been added in all Chapters including this one relating to specific concerns of poor countries
29814	4	10	24	10	26	Omit sentence beginning: Particularly in a situation....	Rejected - this is a helpful expression of equitable global approach, and drawn from the literature.
29590	4	11	15	13	2	Mathematical format is very poor (see e.g. page 12 line 22: huge vertical misalignment); is LaTeX used to type formulas ?	Problem of compatibility between versions of Word. The equations have disappeared anyway.
19216	4	11	25		40	Good discussion. Might be good to develop a link to natural capital since social resilience hinges on resilient natural capital.	This is done by referring to natural systems and natural stocks.
19217	4	11	30			Suggest that it is not just preserved but also conserved. Preservation has a connotation that something is locked up and kept separate from humans which doesn't work. We have changed our ideas of what makes resilient ecosystems and have found that locked up nature degrades. Preservation is not an option since nature sites in a matrix landscape of human built environment and is already highly altered or converted to a human nature. One needs different tools here.	Preserved replaced by maintained (conserved also means "keep for future use")
29589	4	11	31			Please define "genuine savings" at the first appearance of this term in the Chapter.	Accepted.
19910	4	11	42	13	7	Chapter is rather long. I would delete the box 4.2.1, as too difficult to understand with all formulars	The Box has been re-written, taking into account all the comments received.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
29905	4	11	42			Box 4.2.1 is too technical and too long. It needs to be shortened and simplified, prefrerably without using mathematical expressions.	The Box has been re-written, taking into account all the comments received.
31586	4	11	47	13	7	The "CAB" framework seems to be something unusual, at least under this name. Does it have a specific reference, and is sufficiently widely used to be included in an assessment report ? If not, could you find an alternative name or framework ?	It is indeed widely used, including in this report.
41121	4	11	5	11	10	Given that the Brundtland report was not a negotiated document, it should be made clear that this definition, nor the principles contained in the report constitute anything like accepted definitions or principles of sustainable development. That is a contentious issue, and much of this chapter refers to the language from the Brundtland as if it is gospel, rather than widely cited/used.	Accepted, the formulation says "most quoted" (though the Bruntland approach is hardly controversial).
19679	4	11	25	11	40	There seems to be a slightly incomplete description of weak versus strong sustainability. Weak sustainability also acknowledges some critical ecosystem thresholds and natural stocks, but not as much as strong sustainability. Please also see comment 31 above	Agreed but the simpler formulation is kept for brevity's sake.
19680	4	11	42	13	7	The descriptionof SDIs in Box 4.2.1 could be reduced to discuss broadly the types of sustainable development indicators developed, their pros and cons, as is done in the first two and last paragraphs of Box 4.2.1. There is no need to go into the detail of explaing the CAB approach (and implicitingly giving this more importance although its limitations are increasingly acknowledged)	The Box has been re-written, taking into account all the comments received.
31717	4	11	12	11	13	The affirmation ¨ and that for developing countries, development objectives are for basic needs to be met for all citizens and secured in a sustainable manner ¨ is valid too for developed countries where exist poverty in a per cent of the population, the welfare not reach all population.	Agreed, the restriction to developing countries has been deleted.
24582	4	11	42	13	7	The use of multiple equations integrated within sentences may be confusing to some. Non-mathematical readers may benefit from a 'key' at the end of this box briefly defining each of the equations' symbols in words	Equations have been removed.
41122	4	12	15	12	35	There is an extensive discussion of only one of the techniques - a balance of the approaches is suggested. Only one of the possible valid approaches to defining sustainable development in mathematical terms is presented and discussed here -- that is, the CAB approach. The authors should present a more balanced approach, presenting the PSR approach at least, and possibly others. The strengths and limitations of each should then be noted and discussed.	Accepted.
19218	4	12	16		21	This still ignores that there are thresholds in human and natural systems and both are adapted to boom-and-bust cycles. Systems do not fail in a linear fashion but have thresholds when adaption no longer works – this is what we want to know.	The Box has been re-written, taking into account all the comments received.
19219	4	12	16		38	RECOMMEND DELETE: This is too much of an emphasis on one approach and the detail is too much compared to the rest of the text. It is not clear why this detail is needed or it is not introduced.	The Box has been re-written, taking into account all the comments received.
41123	4	12	20	12	21	Line 20 contains the sentence "The current level is said to be sustainable is (sic) there exists a feasible path that sustains it." This seems like circular logic. Please clarify.	It would be unsustainable if no path sustaining it existed, this is simple but logical. This has been rephrased.
21173	4	12	31			Should be "modeling" instead of "modelling"	There is even a journal called "economic modelling".
29591	4	12	33			Please define "maximin prices" at the first appearance of this term in the Chapter.	This has disappeared when shortening.
21172	4	12	5			Add "the" to the sentence i.e. "Sustainable development is the development…"	This has disappeared when shortening.
29815	4	12	15	13	7	Omit the entire portion dealing with CAB indicators. This is a one sided presentation that pays too much attention to one approach while leaving other approaches unspecified in detail.	The Box has been re-written, taking into account all the comments received.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
19220	4	13	1		7	There needs to be a comment on the assumptions of this World Bank approach and especially what it is most sensitive to. If there is no space for that, I would DELETE IT.	The Box has been re-written, taking into account all the comments received, and space constraints.
19221	4	13	11		12	NOTE: but also taking place in a highly altered environment. I think it is important to recognize that the world is highly altered and we need to determine adaptation in this type of world.	This point is addressed in Working Group II on adaptation.
29593	4	13	13	13	14	"Although SD is a contested concept" : this seemed a rather well accepted concept at the start of the Chapter ?!	Correct, this has been reformulated.
41125	4	13	13	13	19	There are a wide variety of different principles across Conventions, organizations, etc. The authors should consider explaining them and how there are different ways for them to applied.	The choice of principles is linked to the context of the discussion in this sub-section, i.e. SD.
21174	4	13	18			Remove extra space "t ,"	Done.
19222	4	13	28			Stable is a wrong word to use since climates and ecosystems and societies are not stable.	What is at stake is avoiding too great variations, an idea well summarized by the word "stable". This has been reformulated anyway.
19223	4	13	38			What does 'loosened' mean here. I could not follow this.	Reformulated.
19224	4	13	44			ADD: …pollutants 'and therefore human and ecosystem health'	This whole passage has been shortened.
29592	4	13	5	13	7	The sentence/idea behind is not clear : please explain ?	Slightly expanded/reformulated.
41124	4	13	6	13	7	"Weitzman (1976)" and "K.J. Arrow et al., 2010" are cited but are not listed in the list of "References" that begins on page 73. Please add the correct citation.	Done.
27332	4	13	8			There is disagreement between authors on the dialogue between these three concepts, and some argue that vulnerability is a limited concept to reflect the importance of environmental sustainability in researgh (Turner, 2010), while others argue that the use of the resilience to sustainable development discussion depoliticized and naturalized in the neutral ecology perspective (Cannon and Muller-Mahn, 2010). The similarity of other differences in the literature is noted in the text, this is also one that deserves brief mention. (Turner, B.L. Vulnerability and resilience: Coalescing or paralleling approaches for sustainability science? Global Environmental Change, 20 (4): 570-576, 2010.; Cannon, T. and Muller-mahn, D. Vulnerability, resilience and development discourses in context of climate change. Natural Hazards, 55 (3):621-635, 2010.	Interesting suggestion, references added.
29956	4	13	8	13	9	Past efforts for measuring sustainability holistically have taken an accounting approach based on the efficiency dimension of sustainability. However, an accounting approach fails to fully incorporate the resilience dimension of sustainability. An ecological information-based approach is an approach to holistic measurement incorporating both efficiency and resilience dimensions of sustainability (Kharrazi, et al., 2013). Kharrazi, Ali, Elena Rovenskaya, Brian D. Fath, Masaru Yarime, and Steven Kraines, "Quantifying the sustainability of economic resource networks: An ecological information-based approach," Ecological Economics, 90, 177-186 (2013).	Reference has been made to the treatment of resilience in Working Group II.
20538	4	13	9			Literature cited here on vulnerability could be improved to be representative. This can be achieved also through referring to the IPCC SREX report.	Some references added.
24139	4	13	21	13	23	The cement industry in Japan facilitates a sustainable development by integrating recycling of municipal solid wastes with climate change actions. I would suggest to add the reference (MORIMOTO, NGUYEN, CHIHARA, HONDA and YAMAMOTO; Journal of Life Cycle Assessment, Japan, Vol.2 No.4 October 2006 "Proposals for Classification and an Environmental Impact Evaluation Method for Eco-Services: Case study of Municipal Waste Treatment in Cement Production") showing a case study to establish the sustainable society in local community.	Noted. We are not singling out specific cases in Chap. 4

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
24219	4	13	21	14	30	The three pillar theory of sustainable development, or triple bottom line approach in another name, identifies social equity, economic efficiency and ecological scale as three mutually reinforcing components of sustainable development. (Dale, 1996 Beyond growth; Daly, 2004, Ecological economics). This theory helps to clarify the relationships between ecological scale and emission cap control, between social equity and emission allocation and between economy efficiency and emission abatement efficiency.(Neumayer,1999,weak versus strong sustainability; Dale, 1996 Beyond growth; Daly, 2004, Ecological economics). Reference: Neumayer,1999,weak versus strong sustainability; Dale, 1996 Beyond growth; Daly, 2004, Ecological economics	Reference included.
19225	4	14	15			Sustainable Development is strongly impacted by choices made at the local/regional level that many governments ignore or assume everyone behaves or responds in the same manner.	Accepted: add "including at local and regional levels" at the end of the sentence in line 17.
41127	4	14	18	14	19	If the phrase "be viewed as resources for the design of" is deleted and the word "inform" added after "can"- this is a more direct way of saying this.	This sentence has been deleted in the final draft.
41128	4	14	20	14	30	While it is explicit in this text box, the authors should explicitly state that was worry about sustainable development long before we started worrying about climate change. Even if the climate was static, the world would still need to think about sustainability.	Agreed, and noted in the revised version as well as in 4.1.
23966	4	14	20	14	30	Since there is a need to shorten the text, FAQ 1 can go. The answer is obvious.	Noted, this FAQ is reformulated so that the second part is less obvious.
41129	4	14	23	14	30	Is there a reference for the statement that "climate change undermines SD"? Also, the temporal/causal chain implied in the statement that addressing climate change is a prerequisite for sustainable development doesn't necessarily bear out in reality-- the two can be (and are) concurrent	See 4.1
24583	4	14	25	14	26	This sentence does not clearly identify what is being threatened or why climate change mitigation is necessary. Suggest reword: 'Though addressing climate change is necessary component of achieving sustainable development, it is only one threat being faced. Other threats include the depletion of...'	The question has been changed, the answer reformulated.
19226	4	14	26			ADD: …pollution hazards ‘on human and environmental health’	Not done, for brevity's sake.
27494	4	14	38	14	39	It should be noted that equity, as it is defined in this chapter, is a very broad concept that encompasses various notions (equality of treatment, outcome equality etc.). As such, it becomes a synonym for "socially optimal". This broadens its appeal but also limits its applicability for decisions when there are conflicting interests (as most interests can claim to act in pursuit of one or the other notion of equity). As such, it has an analytical purpose but only a very limited prescriptive one.	Good remark. We do need to use a broad concept in order to cover the debates and considerations that appear in the field. If we were prescriptive, we would need to specify our favorite notion of equity.
41126	4	14	4	14	4	Sentence starting with conversely needs to be rewritten to remove double negatives.	This has disappeared when shortening.
19227	4	14	40		49	NICE!	Thank you. This has been shortened due to space constraints.
41131	4	14	45	14	48	The sentence starting with "A first argument is..." seems to imply that within the sustainability path described, both present and future generations will ultimately become poor again. The concept needs to be clarified a bit.	This has been shortened due to space constraints.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
41130	4	14	31	18	26	This section does not include a number of issues that are central to the dynamics of the collective effort as it pertains to climate. Though much of the climate literature on “equity” is focused on burden sharing among countries, this is a narrow framing of equity that does not fully or accurately capture key elements of the ‘fairness dynamic as experienced by states in the negotiations. For example: - Equity is not simply an issue that pertains to countries – it pertains to industries that compete with each other, the workers affected in those industries , and even to individuals (in several emerging states, for example, a significant portion of national income that relates to emitting sectors is concentrated in a small portion of the population). This set of dynamics would be addressed in any full discussion of equity, as they impact outcomes in international discussions. - A discussion of equity would also address the fact that “burden sharing” in a climate context may inherently align with other objectives that countries have. This is particularly true regarding the relationship between climate and related objectives, such as energy security and energy diversification. The literature that focuses solely on burden sharing arrangements often misses this insight, but it is an important factor in the negotiation process and in terms of the level of effort countries are willing to undertake. - Another insight implicitly reflected in a good deal of literature pertaining to the climate challenge (and implicitly equity) the degree to which burden sharing is relevant relates in large part to increased cost, in particular to the relative cost of clean technology relative to fossil fuels. The equity issue is dynamic not only because the relative conditions and circumstances of actors (countries, industries, individuals), but also because relative costs are dynamic. This also suggests that there is an important role for policies that are designed to reduce costs of technologies in addition to those that are aimed at reducing emissions in addressing the equity issue.	Comments on equity have been taken into account in the final draft wherever the issue is discussed.
41133	4	15	11	15	11	What is difference between "political" unsustainability and other forms of sustainability?	This has disappeared when shortening.
24584	4	15	15	15	21	Length of this sentence confounds meaning. Suggesting shortening to: 'Meeting the needs of the world's poor by mandating a convergence of living standards to that of the world's richest populations would evidently be unsustainable, with consumption patterns threatening to exceed the regeneration and absorption capacity of the Earth'	Reformulated and shortened in a similar way.
19228	4	15	15		24	COMMENT: Can also increase the efficiency at which poor obtain resources, i.e., technology, and acquire energy, food and water. Poor burning wood is unhealthy and not very efficient. It does not allow sustainable development to happen especially since resource supplies are decreasing today.	Good point but we had to shorten this passage due to space constraints.
24585	4	15	21	15	24	Length of this sentence confounds meaning. Suggesting splitting into two sentences at '… economic injustice. Environmental costs and benefits are often distributed…'	Accepted.
29884	4	15	36	17	32	Justifications of fairness in the negociation is well expressed and justified. Maybe this part could be shortened with focus on the twe latter reasons (legal and effectiveness justifications.	This has been shortened. We keep "moral justification" as it is one determinant of level of commitment of public constituencies.
41134	4	15	36	16	42	The authors should note that the three "justifications" described here are not mutually exclusive.	Accepted.
41135	4	15	40	15	40	Obtain may not be the best term. Do the authors mean "arise"?	Accepted.
41136	4	15	42	15	46	This section lacks citations in the literature, which suggests that the interpretations here are the lead author’s. This is not appropriate.	References added.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
41137	4	15	42	16	31	This passage inaccurately suggests that in the UNFCCC there is a legal link between “equity” and “sustainable development.” Equity is mentioned Article 3 paragraph 1. Sustainable development is explicitly mentioned, or alluded to, in the Preamble, Article 2, Article 3 paragraphs 4 and 5, and Article 4. There is no specific legal link, explicit or implicit, between “equity” and “sustainable development” in the Convention that suggests a legal connection between those concepts that is any greater than the connection between any other two concepts or principles in the UNFCCC.	Noted - We clarify that the point of the referenced text is the legal and effectiveness justification of equity, not the connection between equity and SD.
41138	4	15	44	15	14	The abbreviation UNFCCC first appears. However, it is not cited, and also, at this first appearance, it is not revealed what it stands for. It turns out that in the Reference section, there is a citation (United Nations (1992a)) that does reveal what UNFCCC stands for. Therefore, this citation would best be made on page 15, Line 44,	It appears in the Glossary.
29883	4	15	5	15	14	The importance of equity is emphasized here (maybe too much) but there should be a mention of the UNFCC negociations where it is a key stumbling block.	Noted, we mention that it is a key topic of negotiations at present (in ADP)
41132	4	15	8	15	10	Strong language that sounds policy-prescriptive without any reference/data-- if you've "failed", then what you did is automatically wrong.	This has disappeared when shortening.
26092	4	15	42	16	31	The content of legal justification can be shorten	Rejected - this is relevant to policy makers
41139	4	16	11	16	13	The text correctly notes there is no definition of “equity” under the UNFCCC but proceeds to incorrectly note that the UNFCCC gives the term “practical meaning” by assigning difference obligations according to categories of countries and levels of development. The sentence is unsupported either in the text of the convention, or in any precept of treaty interpretation and should be deleted. What the term “equity” means under the convention is a topic currently under discussion and debate by the Parties to the UNFCCC, including in the negotiations under the Durban Platform. This document should not prejudge the outcome of those discussions by the Parties to the treaty, which are positioned to ascertain the meaning of treaty terms.	This has disappeared when shortening.
41140	4	16	14	16	14	Not all of the above para are "legal statements"-- the interpretation of this language is still very much open and debated.	Formulation adjusted.
41141	4	16	14	16	24	This sentence should specify that one commenter has asserted that these specific legal statements are further buttressed by a body of soft law and norms. The meaning of the terms of the UNFCCC are to be interpreted in accordance with Customary International Law for treaty interpretation, generally reflected in the Vienna Convention on the Law of Treaties. Terms in a treaty are to be interpreted “in good faith in accordance with the ordinary meaning to be given to the terms of the treaty in their context and in light of its object and purpose.” Vienna Convention Article 31(1). Taken into account, together with context, can include “any relevant rules of international law applicable to relations between the Parties.” Article 31(3)(c). It is not settled law that “international law” in Article 31(3)(c) includes so-called soft law instruments. Nor is it settled that “international law” in that article, whether law or soft-law, includes developments after a treaty has been concluded. Therefore, it is incorrect to assume that Declarations and or U.N. General Assembly resolutions have significant bearing on interpreting the terms of the UNFCCC.	The formulation has been modified to avoid this possible interpretation.
21175	4	16	18			Add "be" to the sentence i.e. "it would be unsustainable…"	Corrected.
21176	4	16	22			Should it be "racial, social and economical…"	Rejected (economical has become unusual in this sense).
41142	4	16	22	16	24	There is a big difference between domestic obligation and internationally agreed rights and principles with a common interpretation-- this should be clarified.	Noted but space constraints limit the possibility to develop these issues.
21177	4	16	25			Change to "despite of the…"	This has disappeared when shortening.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
41143	4	16	25	16	25	"legal justification" by whom?	See references
41144	4	16	25	16	31	These issues have also been addressed in UNFCCC decision text (1/CP.16)-- should note that the exact language used in both the UNFCCC and HRC is that "climate change can have a range of direct and indirect impacts on the effective enjoyment of human rights" and not the highly prescriptive language noted here.	Accepted - We clarify to ensure no misattribution
41145	4	16	25	16	31	This paragraph should note that the “further legal justification” are potential justifications offered by commentators in the literature. The potential interplay between international environmental law and human rights law, and/or the potential interplay between environmental changes and human rights law is unsettled in the law (as noted on line 30). The sentence on lines 25-28 should also acknowledge the unsettled nature of law in this area.	Accepted.
24586	4	16	32	17	40	The explanation for the 'effectiveness justification' is longer than the other two burden sharing principles, with p17 lines 9-32 in particular going into more detail than a brief explanation requires. Suggest that this passage (and p17 lines 9-32 in particular) could be shortened/deleted if necessary to shorten the chapter length	Accepted.
21178	4	16	40			Might need to be revised as "duties that are obtained between…. also are obtained between…"	Accepted
26093	4	16	32	18	28	The content of effectivness justification revised and be shorten	Accepted.
19229	4	17	1		32	GOOD MATERIALS – like it.	Thank you
29594	4	17	14	17	15	The sentence/idea behind is not clear : please explain ?	This has been reformulated while shortening.
21179	4	17	34			Should the term be "common problem" or "common's problem"	commons is correct
19230	4	17	36		40	COMMENT: Yes but part of the problem is changing behavior to consume less fossil materials and products they produce and not just mitigation. Is there a reason why in most of the text, the distinction between fossil and renewable is not mentioned since this is the key change that has to occur??	What is at stake is rather the volume of emissions. We seek to avoid confusion about fossil and renewable energy, though this distinction is not central in this chapter.
41146	4	17	37	17	37	Does "developed countries" here and in other places in the document refer to Annex 1 Parties or another conception of development? If merely A1, then there are no "principles under discussion" since there is no agreement on what constitutes an equitable solution if so many capable countries considered developed by a range of socio-economic metrics are free-riding	When we cite UNFCCC we use Annex I and when we cite literature we cite as used in the literature.
29595	4	17	45	17	50	The sentence/idea behind is not clear : please explain ?	Noted, but the sentence seems clear.
29885	4	18				Shis figuer (links between SD, equity, and climate policy) does not bring content nor advice for policy. It could be skipped entirely.	This figure has been redone.
19231	4	18	1		9	GOOD MATERIALS	Thank you
19232	4	18	10		21	DELETE: material is too detailed compared to the rest of the chapter. Also the individual situation (line 16) varies a lot. Brazilians consume less energy because of their geographic location in a region where warmer temperatures allow them to consume less energy compared to the Scandinavian countries where it is colder. Therefore Scandinavian countries derive more co-benefits.	Accepted.
34302	4	18	12			Please change the cross-reference to 3.7.1.2. Many other cross-references to chapter 3 sections also need to be changed as the structure of chapter 3 changed before the SOD publication.	Accepted
29596	4	18	21			Where is Equation 3.9.1 ??	This reference has disappeared when shortening.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
41147	4	18	25			A critically important factor omitted from this figure is economic self interest. Economic self interest mitigates very strongly against the three boxes at the bottom of the figure (sharing equity, intergenerational equity, intragenerational equity). This factor of economic self interest is mentioned at varous locations in the text, yet it does not appear in the figure and therefore greatly limits the conceptual value of the figure: - Page 26, Lines 6-7: "...short-term narrow individual interests conflict with the longer term social interests..." - Page 21, Lines 5-6: "...fiscal conservatives who oppose aid, libertarians who oppose both humanitatian and environmental interventions..." - Page 23, Lines 18-20: "...those that wield the greatest authority either consider it against their self interest to facilitate rapid progress toward a global low carbon economy or insist that every solution must be aligned to increase their authority and material gains." - Page 24, Lines 4-6: "...the impossibility of disconnecting sustainability and climate change governance from existing trends in global capitalism and political economy."	Figure has been reworked.
41148	4	18	25			Why no arrow from CC to dev goals? Isn't this whole chapter about mainstreaming into SD more broadly? Why aren't there arrows from inter and intra generational eq to climate reponse? Doesn't the "needed for" arrow also go both ways?	Figure has been reworked
41149	4	18	28	18	29	It is unclear from the text whether the determinants of sustainability and equity are the same. While they have many similarities, the two concepts are quite different and overlapping but it might be helpful to make more explicit what the primary determinants of each are.	Good point, we have clarified but without making a separate discussion because there is so much overlap.
21180	4	18	35			Should be "fulfill"	Accepted.
21181	4	18	36			Remove extra space "3.1)"	Accepted.
29816	4	18				Omit box. It privileges one particular approach in economics while many competing perspectives are ignored.This isn particular privileges a particular form of neo-classical economics	The box has been reworked. The initial version covered all approaches, the SOD version focused on one approach because the comments requested that, now we are back to something simillar (but shorter) to the first version….
19234	4	19	13		45	COMMENT: Really good explanation. Nice!	Thank you
23967	4	19	17	19	22	Since there is a need to shorten the text, lines 17-22 can go. It is not helpful to say how the discussion could have been structured instead; moreover, the reader gains little from these short remarks and very limited references to other angles like 'human nature (Wilson 1978)'.	Accepted - Text revised.
41152	4	19	19	19	22	It is unclear why "leadership" falls into this category. It would seem to be very important, especially in efforts to change behaviors. While interventions might be difficult for political leadership, especially at the national level, strong leadership, especially at the civil society level seems to be something equally important and something targeted interventions could promote.	Rejected - We have deliberately left the question of leadership to highlight it has also been considered a driver of SD, particularly in organisational studies.
41150	4	19	2	19	3	It seems that whether something is a driver or a barrier is contextually based, no? How useful is this categorization?	Rejected - We maintain the categorization since this was originally provided to us by the IPCC secretariat.
21637	4	19	23	19	29	Agnolucci et al. provides an example of the application of Kaya by the energy community. It was developed strictly to examine factors behind GHG emissions rather than environmental impacts in general. However ImPACT is a useful extension of IPAT that bridges the two identities, taking into account the energy intensity of consumption, and thus the carbon intensity fo energy to decompose IPAT further. See York et al. (2003), Ecological Economics, 46, 351-365.	Rejected - The text has been revised and we have excluded the discussion on the Kaya identity in the chapter.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
41151	4	19	4	19	12	It's surprising that "political considerations" did not rise to the top for determinations. Perhaps these fall into political economy, but it would seem with the highly political nature of the climate change negotiations, that these considerations would have a huge influence on sustainability, especially how "societies can balance the economic, social and economic pillars of SD."	Noted - the reviewer's is correct; we understand politics as a sub-category within governance and political economy.
19233	4	19	4		12	NOTE: It is important to address how altered nature is and whether approaching a threshold of degradation. It is easier to make choices when less altered and degraded nature.	Rejected - We understand the reviewer's comment but we do not see how this can be incorporated into the suggested paragraph.
41153	4	19	46	20	4	This box is not particularly helpful, or really any different from the main text. As this section is already pretty long and dense, the authors should consider either refining or removing.	Noted - Box has been removed.
27495	4	19	46	20	4	The text does not fit with the question.	Noted - Text has been removed.
24587	4	19	48	19	50	Further definition of the Kaya identity is required. Although it is in proximity to some explanation on p19 line 23-30, it should be treated as a discrete FAQ and therefore the reader does not have enough context to understand the Kaya identity when reading the FAQ only.	Taken into account - The correspondent text has now been deleted as part of the chapter's re-structuring.
21182	4	19	7			Sentence "gains to be had from…" needs to be corrected for grammer	editorial
26216	4	2	29	2	29	Choice of accounting method could be deleted	This is shortened but not deleted because of important policy implications.
26215	4	2	7	2	7	4.1.2 The narrative focus and key messages of this chapter could be shortened to 4.1.2 Narrative focus and key messages	Accepted.
41156	4	20	23	20	23	Where were "promises" made? Any reference for this besides a UN doc that is perhaps more academic?	In case the concern being expressed is that the term "promise" has an undesired legal connotation, the term "anticipated" has been substituted. Alternatively, if a narrow focus on particular targets (e.g., 0.7% ODA) is acceptable, references could be added (e.g., to DAC Journal v4, no3).
24588	4	20	27	20	27	The meaning of 'graft' and 'patronage' may be unclear to general readers. Suggest a brief definition in parentheses within this sentence	Editorial - deemed not necessary, as these are conventional terms used as per their standard definitions.
21183	4	20	28			Should the word be "identity"	Noted - amended.
27496	4	20	30			Achieving the level of bioenergy deployment does not require co- processing of biomass with coal or natural gas with CCS. It seems to be doubtful to emphasize this technology in the report, especially when regarding the massive negative impacts like biodiversity loss in connection with large-scale monocultures, land-grabbing and deforestation.	Rejected - This comment does not relate to our chapter.
41157	4	20	45	20	46	Plenty of developing countries had significant emissions in 1990-- this should be clarified to reflect that historic emissions refers to emissions when the climate impact/science was unknown.	The issue of knowledge and causal responsibility is dealt with in detail in Ch 3 and sec 4.6.2. The distribution of historic is treated in Ch 6.
41154	4	20	5	21	24	The history of the legacy is discussion in 4.3.1 important. But the authors could summarize the history and more quickly establish the link to GHGs.	Section has been shortened in context of overall shortening of chapter.
19235	4	20	5		32	COMMENT: Good discussion and well summarized. NICE!!	Thank you.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
41155	4	20	6	20	21	It almost seems that there is a mixing of two kinds of development that could make this confusing, especially in relation to sustainable development and equity. While they both fit under the general definition of "development", it can be argued that people have a different sense of development when related to the developing world, than to the developed world. This paragraph seems to be very much focused on development aid, and not the general development of society. In terms of climate change, the "legacy of development" could also refer to the fact that over the last 100 years different countries have developed at different paces and thus produced differing amounts of GHGs. It might be helpful here to explicitly state that this section is looking at the legacy of development aid, and not development in general.	Helpful point. We have sought to clarify by retitling "The legacy of Development Relations"
29887	4	21	14	21	23	The meaning of the paragraph is not clear. The refusal of some to accept any solidarity in principle but only realpolitic does exist. But it should be clear that this point of view contradicts UNFCCC Climate Change Convention.	Reference to consistency with UNFCCC added.
41159	4	21	14	21	23	The rest of this section uses development with regards to international development aid, and whether it is effective, while this paragraph deals with the other aspect of development (i.e., the relative level of). This is a bit confusing as these are two very different issues and both has significant implications for sustainability and equity. It might be helpful to make this distinction more clear.	Edited so as to clarify link between preceeding text and this para.
41160	4	21	15	21	16	CBDR RC is not the only "legacy of development" enshrined in the UNFCCC	Sentence no longer appers in text.
41161	4	21	16	21	16	The text cites (UNFCCC, 1992), but no such citation is listed in the References. Instead, what is listed in the References is "United Nations (1992a)".	Editorial - corrected
41162	4	21	18	21	18	Does "agreement" here mean "treaty"? There are plenty of agreements the have been reached in Copenhagen, Cancun, Durban, and Doha, for instance.	This term is intentionally used, to encompass the range of such agreements.
29597	4	21	20	21	21	"decisions on the mechanisms for reducing greenhouse gases and questions of development should be better negotiated separately" : Why ?	Text edited and clarified.
41163	4	21	22	21	22	This is an incredibly subjective statement. The authors should revise to read something like: "there may be skepticism on the part of poorer countries to separate these two issues"	Sentence no longer appears in text.
29886	4	21	3	21	13	This part is interesting for policy, but there should be more clarity that both libertarian and radical environmentalism are extreme minority points of views, in most countries. For example, begin by (line4) "the evidence can be interpreted as support for extreme views such as..."	These are not intended to be highlighted "extreme views", but rather a cross-section of perspectives.
19236	4	21	3		39	COMMENT: Good discussion and well summarized. NICE!!	Thank you
41164	4	21	33	21	37	"response measures" is a loaded term in the UNFCCC with very specific meaning. The authors should consider using "measures responding to climate change" or something like that	Accepted - Text revised.
19237	4	21	42			COMMENT: especially societies that are decoupled from nature and the biophysical system (most industrialized countries)	Accepted - Text revised.
41158	4	21	9	21	9	"rich nations": this term is used interchangeably with "developed"-- neither are clearly defined categories. The authors should maintain consistency as well as a clearer definition for the purposes of this report.	Noted. The term rich nations is vague because these issues have to do with broad categories rather than a precise set of countries.
29888	4	21	25	24	6	Most of this section is rather erudite, but the message is blurred and contradictory. "Everything is complex, everything is contradictory… " Not very useful for policy choices. A list of some key controversies could be enough.	Rejected - The IPCC needs to review the literature on this selected determinant. The reviewer does not provide specific examples to explain the problem
19238	4	22	1		31	COMMENT: Good discussion and flows well. Also well written.	Noted.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
29599	4	22	16			Navigation within AR5 : please give a Ref where we can find Fig. 13.1, as it seems very far !!	Taken into account - The editorial process of the WG3 Report will make all cross-chapters links more explicit in the correspondent chapters.
21184	4	22	25			Should be "critical" instead of "criticals"	Accepted - Text revised.
41165	4	22	31	22	31	Suggest adding the following text to acknowledge the increasing use of collaborative governance in the Unites States to address contentious environmental issues: "Collaborative governance is a paradigm being employed by the federal government in the United States to address a range of contentious policy disputes using a range of consultation processes, including dispute resolution by neutral parties (Harter)."	Accepted - Text revised. We have included the suggested type of governance and correspondent reference.
24589	4	22	42	22	43	The language used may not be accessible for all readers. Suggest deleting 'cognate' as it is superfluous, and replace 'cacophony' with multitude	Accepted - Text revised.
19239	4	22	42		50	COMMENT: Right on target – top down can inform on the science and issues but not how to decide how to make the trade offs (this has to be local or regional). Unfortunately national governments are top down decision makers.	Noted.
41166	4	22	43	22	45	What does "corresponding progress" mean in this context? From what to what?	Accepted - The text has been revised and the statement has been removed for the sake of argumentative clarity.
41167	4	22	45	22	47	The UNFCCC does not necessarily imply a top-down approach as it does not contain specific goals for emissions reductions- only the KP does.	Accepted - Text revised.
21080	4	22	46	22	47	Participation literature also suggests to develop contextual models in which collaborative learning and opening space for negotiation is stimulated to overcome differences between the scientific UNFCCC design and views of local nature-dependent stakeholders. References: Pierce Colfer, C. (2011). Marginalized forest peoples' perceptions of the legitimacy of governance: An exploration. World Development. doi:10.1016/j.worlddev.2011.04.012. Pickerill, J. (2009). finding common ground? Spaces of dialogue and the negotiation of indigenous interests in environmental campaigns in Australia. Geoforum, 40, 66-79. Giller, K., Leeuwis, C., Andersson, J., Andriess, W., Brouwer, A., Frost, P., et al. (2008). Competing claims on natural resources: What role for science? Ecology and Society, 13(2). Retrieved from http://www.ecologyandsociety.org/vol13/iss2/art34/. Robinson, L., & Berkes, F. (2011). Multi-level participation for building adaptive capacity: Formal agency-community interactions in northern Kenya. Global Environmental Change, 21(4), 1185-1194.	Accepted - Text revised and references included.
41168	4	22	48	22	50	It is not the case that all bottom up approaches have been "vehemently opposed" or "further marginalize vulnerable"-- that is not a statement backed up by fact, merely a policy conjecture. The authors should revise the text accordingly.	Accepted - Text revised.
29598	4	22	5			Spelling : a "." is missing after 2005b)	Accepted - Text revised.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
41169	4	23	1	23	50	There is a lost opportunity here to discuss in more detail the voluntary vs. non-voluntary options, as these play a huge role in ongoing climate change negotiations. One lines 33-35 it is indicated that market oriented approaches can be a good tool but have drawbacks, but there is never a good discussion of how the different options fit into sustainable development and equity.While this is a sensitive issue, there always needs to be a connection from the text directly back to its relative importance to sustainable development and equity, and what the potential ramifications are for choosing one option over the other.	Rejected - We think that voluntary and non-voluntary options are discussed in detail in Chapter 15. Additionally, we think that the reviewer's suggested paragraphs do make the necessary connections with CC mitigation, SD and equity by placing emphasis on authority, vested interests and political economy, and how the latter influence progress toward effective and inclusive climate policy.
29600	4	23	15			For me, "the agency of others" makes no sense. Perhaps change the word "agency" in a more appropriate one .. ?	Accepted - Text revised. We changed agency for action.
19241	4	23	19			ADD: …a global low ‘fossil’ carbon; …achieving low ‘fossil’ carbon transition.	Rejected - We consider the term "low carbon economy" a rather established term in the related literature (see e.g. Brown and Corbera, 2003; Urban and Nordensvard, 2013)
41170	4	23	2	23	4	The UNFCCC has had several high-level engagements on equity considerations-- not true to say this is not/has not been taking place.	Accepted - The correspondent text has been deleted.
41171	4	23	22	23	24	This line notes that "...the prevailing organization of the global economy around free market capitalism has provided the context for the sorts of governance practices of climate change that have dominated to date." It may be useful here or in the following paragraph to discuss to what extent, if any, there is increasing recognition of the need to "internalize" the externalities of climate change in the dominant governance practices. The economic notion of externalities does address the problem of the commons and is the basis for a great deal of public policy. The authors should consider inserting an additional paragraph on this, with some analysis of why arguments related to externalities and free rider issues have by and large failed to move the free market system to recognition of climate change as a market failure that needs to be corrected.	Accepted - The reviewer makes a good point. However, we have not inserted additional material because some of his suggestions are already covered in the following paragraph, where we discuss the potential and limitations of carbon pricing mechanisms.
21185	4	23	24			Should be "sub-national"	Rejected - The line suggested does not match with the comment.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
27003	4	23	26	23	40	While Chapter 13 never saw a market that it didn't like, this Chapter seems to lean the other way. The discussion would benefit from more balance and coherence with chapter 13. It could include accomplishments under the Kyoto Protocol, such as the creation of emission trading schemes, Clean Development Mechanism, institutions in developing countries, and relevance to European emission reductions, some of the safeguards set up under the UNFCCC through the accounting, verification, compliance rules, before nuancing it with its shortcomings. The following text includes some suggested additions: The Kyoto Protocol created flexible market-based mechanisms to aid in reducing GHG emissions. UNFCCC. (1998). Kyoto Protocol to the United Nations Framework Convention on Climate Change, http://unfccc.int/resource/docs/convkp/kpeng.pdf. First, the CDM allows for certified emission reductions (CERs) achieved in developing countries to be counted toward emission reduction commitments of developed countries. Second, Joint Implementation (JI) is a mechanism for creating and transferring of emission reduction units from projects in Annex I Parties. JI requires that emissions reductions be additional and that acquiring of units be supplemental to domestic action. Finally, the COP was given the power to define rules related to the "verification, reporting and accountability for emissions trading." The Marrakesh Accords provide for a set of rules on the verification, reporting, accounting, compliance and eligibility criteria for emissions trading. UNFCCC (2001). The Marrakesh Accords. FCCC/CP/2001/13/Add.1. Decision 2/CP.7. http://unfccc.int/resource/docs/cop7/13a01.pdf. Parties with commitments, including many European countries, can sell their extra emissions units to countries with emission levels that are over their targets as long as trading is supplemental to domestic action.	Accepted - Text has been revised to include the positive outcomes delivered by carbon pricing mechanisms, with subsequent referencing to chapter 13.
41172	4	23	26	24	6	There is a good distinction between "government" and "governance" laid out on page 21, lines 29-30 where "governance" is being used here to refer to activities of advocacy, information campaigns, proposals for negotiation and other actions by non-government actors to propose policy on climate change. Just the same, the use of the term "governance" seems highly specialized here and is a bit confusing in the text section to which this comment refers. Use of "advocacy," "social movements," "lobbying" and related terms might be clearer.	Rejected - We do not understand what the reviewer is implying. We use the terms he suggests only when required or indicated by the correspondent cited references.
24590	4	23	31	23	32	Specific projects mentioned as examples should include the country they are being implemented in: Carbon Disclosure Project and the Renewable Energy and Energy Efficiency Partnership	Rejected - We do not see the value of extending the text by including the companies or countries involved in these initiatiatives.
19242	4	23	33			ADD: …a global low 'fossil' carbon; …achieving low 'fossil' carbon transition.	Rejected - Please see comment 317 above.
41173	4	23	36	23	36	The text uses the term "CDM" but does not reveal what this stands for. Instead, later, on page 33, Lines 18-19, this is revealed. The revelation should be introduced when CDM first appears in the text (on page 23).	Accepted - text revised.
19240	4	23	5			COMMENT: It is important to realize that decarbonisation is a common goal but society will not decarbonizes itself since all products – even humans are 18% C – include carbon molecules. Society would have to invent a new molecule to decarbonizes or move away from the carbon molecule. The focus should be on renewable C and avoid fossil C that depletes the C capital. Renewable carbon does not deplete because it renews itself. Fossil C – despite suggestions for high reserves – is continuously being depleted and the question is when will it run out. Renewable C doesn't deplete reserves.	Noted - We understand the reviewer comment, but please refer to comments 324 and 317 above.
27004	4	23	6	23	7	Other factors to include are: governance (inneffective institutions) and lack of carbon price	Accepted - text revised. The issue of carbon pricing, however, is dealt elsewhere in this section. See comment 319.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
29636	4	23	8		16	Asymetry of authorities as a barrier to mitigation options is particularly obvious in the case of informal recycling sector. While dozen thousands of urban poverty task force provides a sustainable development solution in terms of climate change mitigation, they remain one of the most vulnerables and marginalized groups, often threatened and displaced by powerful multinationals willing to recycle the same materials as informal sector, therefore literally fighting for access to it.	Noted.
19243	4	24	1		3	COMMENT: This is only applicable to the developed world since developing world is still not consuming much C to tax. It doesn't mean they may not move up to becoming higher C consumers but this doesn't seem likely in the near future.	Noted - We have deleted the reference to taxation.
29601	4	24	25	24	26	If possible, please give a reference for this statement ? Or add a graph ? (age pyramid ?)	Though it would be interesting, there is not space to add a graph and it is not of central importance to this chapter.
41174	4	24	3	24	3	The authors should consider adding some text after the sentence ending in "such transitions" to state: Due to litigation and how it can thwart implementation of government regulations, the need for perceived control needs to be balanced against the buy-in of actors in the post-agreement implementation phase that approaches such as collaborative governance can foster.	Have noted the importance of actors beyond the state, and need for buy-in via procedurally just approaches.
19244	4	24	35		48	COMMENT: Gender is a significant issue here with whether females are involved or not involved in SD.	Noted. Reference made to adverse affects of gender inequity
41175	4	24	7	25	12	There is no discussion in this section of projected or potential changes in disease vectors due to climate change. This is relevant to population and demography because it relates to morbidity. Emerging links between climate change and disease vectors is fairly widely discussed in certain public health circles. It would be useful to at least note what the current evidence base is for this discussion.	This has been noted in second para of this section.
41176	4	24	8	24	47	The authors should consider summarizing most of this portion of 4.3.3. The more important part begins in the paragraph beginning on line 48.	Sections have been shorted in the context of the overall shortening of the chapter.
19151	4	24	7	25	12	This section should be highlighted. I worked in Tanzania and Thailand from 1968 to 1972. Thailand, by promoting family planning managed to reduce their population growth rate considerably, whereas Tanzania did not and theper-capita GDP growth rate in these countries refect this. as line 35 stresses "Low development is widely understood to contribute to hich population growth ---" This is why investment in key development needs, such as expanding rural opportunities should include family planning and rural clinics etc.	Noted. This is why this section has been included.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
24128	4	24				Policy makers and practitioners around the world have emphasised how difficult it is to develop the waste management sector and how fundamental inclusive planning process is to raise standards in solid waste management. One country that has taken this road is Brazil where there are many initiatives throughout the country, at both national, state- and city-levels, that attempts to implement a participatory and inclusive approach to SWM. This has been framed under different institutional arrangements with varying degrees of formalization. At national level, an Inter-ministerial Committee for Social Inclusion of Waste Pickers with relevant ministries from the federal government and participation of the waste pickers´ national movement –MNCR was created in 2003 with the task of devising and coordinating policies for integration of informal recyclers. There are also many provincial states and municipalities throughout the country with Waste and Citizenship Forums - a multistakeholder channel whose focus is to eradicate open dumps, eradicate child labour, as well as integrate waste pickers. In some cities inclusivity issues in SW are debated at environmental committees. This whole process has led to a great degree of integration of waste pickers in SWM in the country furthering the association of waste with citizenship. Source: Dias, Sonia M. 2011. The Municipal Waste and Citizenship Forum: A Platform for Social Inclusion and Participation. WIEGO Policy Brief (Urban Policies) No. 5.	The comment does not relate to the page and line identified
27005	4	25	13	27	2	Figure 4.3.1: none of the content of the figures (hedonism, stimulation, unversalism, benevolence, conformity and tradition) is explained in the text. It is not clear what the theory of change is here: how to move from one type to the other. Not sure the figure add.	Accepted - The figure and much of the accompanying text has been deleted.
41178	4	25	13	25	35	There is a missed opportunity here in this section to also talk a bit more about religion and other belief systems that might influence people to be less than willing to accept scientific findings. This subsection seems to be predicated on the assumption that people will believe science if they just understand it, or perverse incentives are removed. However a larger number of folks do not believe in climate change because it conflicts with other strongly held beliefs, or because it requires sharp changes in behavior. The latter you might be able to convince to change their thinking and behavior, but it can be harder to be convinced about the first group. Also, it might be interesting to add a section talking about people as non-rational actors. Often it is assumed that people will do the rational thing if it is just explained to them, but this is clearly not true, and getting people to change their behaviors requires more than just information provision.	Noted. Regarding the first point, then this subsection is limited to 1 page, which prevents comprehensive coverage of the role of religion and other belief systems in influencing behaviour. Instead, a statement has been added that "Such beliefs may be rooted in cultural, religious and other belief systems, which may sometimes conflict with scientific understandings of climate change". Regarding the second point, then the issue of non-rationality is discussed in Chapter 2.
41179	4	25	14	25	16	The opening sentence of Section 4.3.4 states that "Climate change uncertainties...and the scale of the problem are often used to justify limited action, insofar as they led to personal and collective discounting of the problem...." This is confusing, as it is not clear why a large scale problem would be discounted collectively or individually. If the issue is that the problem is overwhelming, that possibly merits a clearer statement, in a separate sentence.	Accepted - Text has been deleted.
20539	4	25	2			Again here, references to vulnerability can be added by referring to the IPCC SREX report	Noted - Reference has been included.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
21081	4	25	26	25	35	An important paper on values is recently published: Wolf, J., Allice, I., & Bell, T. (2013). Values, climate change, and implications from adaptation: Evidence from two communities in Labrador, Canada. Global Environmental Change 23, 548-562. The text mentions value conflicts but conflict reslution theory is lacking in this section. According to Fisher and Ury (Fisher, R., & Ury, W. (1991). Getting to Yes: Negotiating agreement without giving in. New York, NY: Penguin Books.) value conflicts need to be transferred into interests. This can be done when there are no differences in reality between stakeholders. With large differences between realities, for instance with indigenous peoples vs. organizations, value conflicts need to be adressed following the model of Nudler (Nudler, O. (1993). In search of a theory of conflict resolution: Taking a new look at world view analysis. Institute for Conflict Analysis and Resolution Newsletter, 5, 1-5.) by answering five questions: what is real (ontology), how is the real detected (epistemology), what of reality is important (axiology), how is reality organized (logic) and how should we act to reality (ethic).	Taken into account. A sentence has been added citing Wolf et al. 2013. The topic of conflict resolution falls outside the scope of this subsection.
24591	4	25	3	25	3	Specify what section(s) of the Working Group II report are relevant	Accepted - Appropriate cross-referencing has been included.
41177	4	25	8	25	12	The authors should consider adding concrete examples of the U.S. military stated concerns about migration becoming a security threat based on climate change. They also could cite to widespread equity concerns following Hurricane Katrina on the poor people in Lousiana who didn't have the means to evacuate.	Noted.
19245	4	25	9		12	COMMENT: Is this really supported by data? Migration from Africa to Europe, US, Scandinavian countries is and has been large – especially every time there is civil conflict which appears to be frequent. There are also the attempts by all these countries to control immigration today – this is a hot topic.	Noted.
30276	4	25	14	27	2	The issue of valuesand behaviors is very important, but what is proposed seems to be limited to inidviduos and promoting ecological awareness and pro-SD for Achieving behavioral change. The valuesand behaviors include different levels of government and especially to businesses where there is scarcely such awareness. I propose that values and behavior of companies, governments, organizations and inidviduos and general mechanism or instrument to drive better awareness and deep processes and performance against the threats of climate change.	Accepted - The text has been revised. And section 4.4 has a discussion of the role of values in sustainable consumption. Mechanisms and instruments are discussed in the policy chapters of the report.
19247	4	26	17			COMMENT: the comment about changing human values is really an issue with industrial countries (except for the Scandinavian countries) and can explain their high rank in the HDI.	Rejected - The comment is not completely clear. The reviewer's propositon that changing human values can explain a high HDI value of industrialised countries is over simplistic and is not supported by reference to literature. Neither is it clear why changing human values is only an issue in industrialised countries.
23521	4	26	21	26	21	Given the problems of crowding out related to "incentivising" behaviour change I wonder whether another word, e.g. "encouraging" might have broader appeal here?	Accepted - The wording has been changed.
41180	4	26	21	26	22	It is not clear to me that incentivizing behavioral change in the short term requires a change in values. A change in prices, relative costs, understanding of disease causes, and other factors not related to values per se have been showed to cause behavior change. Please clarify.	Accepted - The text has been revised.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
19246	4	26	6			NOTE: Many indigenous communities do not focus on the individual but the group and individuals do not own property – most of the property is held in common with some individual allotments that do not amount to much.	Accepted - The text has been revised to end with "...indigenous communities are in particular known to focus on 'collective' versus 'individual' interests and values".
29637	4	27	25		37	Human capital knowledge related to informal recycling sector, operates as public awareness campaigners, when their need to go door to door educating citizens about source-segregation of waste as a key component of their inclusive systems. Despite not knowing of climage change impacts, they are providing a very sucessfull education scheme that could be complement by climate change understanding, therefore impacting in the whole community. Since 2009, wastepickers united under Global Alliance organizational framework, has understand for the first time their value and contribution to climate change mitigation through an education campaign supported by the Global Alliance for Incineration Alternatives. See more at http://globalrec.org/global-campaigns/	Accepted - References regarding the informal recycling sector have been included.
41181	4	27	3	28	36	Much of the social capital theory is not immediately relevant and can probably be taken out or at least condensed	Rejected - We think that this section provides already a succinct definition of human and social capital, whilst relating them to the social and economic pillars of SD.
21082	4	27	33	27	34	The barriers are between traditional ecological knowledge and scientific knowledge may not be overcome with education when there are worldview differences. In this case collaborative learning is a better option (Orcherton, D. (2012). Raising the bar: Recognizing the intricacies of cultural and ecological knowledge (CEK) in natural resource management. BC Journal of Ecosystems and Management, 12(3). Neves-Graca, K. (2006). Politics of environmentalism and ecological knowledge at the intersection of global and local processes. Journal of Ecological Anthropology, 10(1), 19-33.)	Noted - Text has been removed, but similar references have been included in other parts of the section.
19248	4	27	33		37	COMMENT: This ignores indigenous communities who have intergenerational knowledge of climate change but their approach is not packaged in the western world educational structure and framework. Nature is not a negotiable trade-off for them.	Accepted - Text revised.
41182	4	27	38	28	4	It is not clear that this paragraph belongs in the section on Human and Social Capital. Rather, it might be better placed and more effective in Section on 4.3.4, on Values and Behaviors. The link between types of knowledge, the weight placed on each type in different cultures and the link to values would strengthen Section 4.3.4.	Noted - The correspondent text has now been removed.
19249	4	27	39		46	COMMENT: Exactly – maybe package other statements with a transition so the flow or threads can be followed by the reader.	Noted.
41183	4	27	41	27	44	This sentence might read more clearly if changed as follows: "It is important to distinguish between formally acquired scientific knowledge on climate change, traditional knowledge on climate-related issues and values and THE EFFECT OF values, beliefs, preferences and perceptions on determining the relative validity of both types of knowledge TO DIFFERENT AUDIENCES, as well as FOR DETERMINING THE MEANING AND RELEVANCE OF PERSONAL ENGAGEMENT. " Overall, however, this seems a bit of a run-on sentence and might be better split in two.	Accepted - The text has been revised accordingly.
41184	4	27	47	27	48	Is there anyone who is saying that what has been reached so far is "inequitable"? This sure seems like a subjective policy call	Accepted - Text revised.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
27006	4	28	13	28	36	What is overal purpose, recommendationand conclusion here?	Accepted - The text has been revised to make it clearer that we are presenting key literature exploring the relationship between social capital and SD issues, which reveals both synergies and trade-offs.
29638	4	28	24		30	To have more information on the relationship between social capital, sustainable development, equity and climate change mitigation, there are extensive literature associated to informal recycling sector, as they provided livelihood to urban poverty communities, while mitigating climate change and offer sustainable solutions to waste management in their cities. See more Chintan report Cooling Agents (http://www.chintan-india.org/publications_research_reports.htm)	Accepted - Suggested references have been included.
41186	4	28	31	28	31	The authors should consider inserting a paragraph break (that is, a new paragraph) at the sentence starting "However, social capital can also be sustained...." This sentence introduces a new topic to the section.	Accepted - Text revised.
19251	4	28	42			COMMENT: Aren't most of the national labs carrying out the research in the industrialized world?? Private firms are involved but they are refining existing technologies and not really developing new technology which is a national lab role.	Noted - While national labs do engage in research, private firms also invest heavily in R&D. In fact, in most industrialzied counries, the private sector is responsible for 60-75% of the national R&D investments.
41187	4	28	48	28	48	Fundamental objectives is different from meeting "all needs" -- the latter is true, unclear whether there is enough data to indicate the former.	Noted - We are not talking about all needs. In the examples we use in the following sentences (i.e., access to adequate energy and nutrition), about which we think most people would agree on, are fundamental to equitable and sustainable development. These areas - energy and agriculture - also have a clear relationship to the climate issue.
41185	4	28	5	28	36	In the section on human and social capital, the discussion focused solely on sustainability and neglected equity. It might be helpful to add some discussion of how different forms of capital influence equity.	Accepted - Text has been improved in this regard.
19250	4	28	5		36	GOOD MATERIAL. Really like it.	Noted.
23522	4	28	6	28	6	Is Bourdieu referred to here (not Bordeaux)?	Noted - The correspondent text has been deleted.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
30275	4	28	21	28	36	In this issue of human and social capital, forget the concept of empowerment and its role in human security: Human Security Now: Protecting and Empowering People. "Human Security Now" is a report published by the Commission on Human Security That Identifies the new challenges to security That are present in a globally integrated world. Rather than focusing only on the security state, effective Security measures must now take into consideration the security of the Individual in a Manner That Protects his or her "vital freedoms." The report details several ways to advance the security of people, treats including protecting people in violent conflict, empowering people on the move, protecting people in post-conflict Situations, and aiding Those dealing with economic insecurity, Among Others. The center of this paradigm, is the reduction of vulnerability and insecurity. Therefore, the nodal topic in human security is collective risk reduction and sharing, through analysis, decisions, and actions to reduce prevention, causes and circumstances of insecurity and vulnerability. Thus, refers to the reduction of risks and dangers that affect people. In the human security paradigm, it seeks to empowerment as strategies that enable people to develop their ability to manage assets and resources of all kinds to overcome and resist and if possible be resilient to difficult situations. Empowerment implies a "bottom up". It aims to develop the capacities of individuals and communities to make informed decisions and act for themselves. By empowering people, not only allows them to develop their full potential, but also enables them to find ways to share and seek their own solutions to ensure human safety and that of others. Protection and empowerment are mutually reinforcing and can not be made in isolation, both strategies are needed in situations of human insecurity, although the way they acquire and the proportion that are used vary greatly depending on the circumstances.	Noted. Questions related to human security are dealt in dept in the IPCC Working Group 2 Report.
29639	4	28	37			With regard to solid waste management, technology and specially high-tech-centralized technology are driver for privatization and increase asymmetry between actors, particularly undermining the informal recycling sector. See Wael Fahmi (2010), “Cairo Contested Garbage” and the rights of Zabaleens to access waste and the city and De Maria, Schindler, Pandit (2012) “Delhi Waste Conflict”.	Rejected - While we agree in principe, due to limitation of space, we are unable to add more discussion on other technologies. We already have had to limit the discussion on major mitigation options (e.g., CCS, nuclear, geoengineering) that have all kinds of complex social and political issues associated with them.
21186	4	29	10			Should be "succinct" instead of "succint"	Noted - Text revised.
19253	4	29	10		24	GOOD MATERIAL.	Noted.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
19254	4	29	25		35	COMMENT: Agriculture also suffers from climate and soil constraints which decrease productivity. These constraints cannot be overcome with another green revolution. Also it is difficult to mitigate these constraints since climates and legacy soil health control this.	Noted - It is true that climate change will affect agriculture and that technology cannot provide a silver bullet for agriculture to address the challenges of growing food requirements and climate change. There are many agricultural practices and technologies that are consistent with sustainable development and also allow for climate mitigation. But implementing these technologies will require careful policies - and this is what we wanted to note in this sub-section rather than have a wider discussion on agriculture, which is beyond the scope of this sub-section (see Chapter 11 of AR5).
29602	4	29	26			Spelling : "(See Chapter 15)." is not a sentence.	Noted - Text revised.
41188	4	29	3	29	8	Food and food security are not solely or mostly about technology-- why are they in this section?	Noted - We are highlighting the food/nutrition challenge relating to SD. This challenge also is related to climate change in the sense that climate change may exacerbate this challenge. While technology cannot by itself address this challenge, it will certainly play a role. Furthermore, technology may also play a role in mitigating GHG emissions from agriculture, in which case it would be helpful if it can also help address the SD challenges relating to agriculture.
26176	4	29	39	29	45	A good comment.	Noted.
19252	4	29	5			ADD: …(FAO, 2012) and spend most of the family income on food which does not leave much money to pursue SD opportunities.	Noted - Our intention here is to emphasize lack fo access to food as a key issue for SD, not why low-income families may not pursue SD opportunities. In any case, there are many factors that determine whether low-income families may puruse or not pursue SD oppprtunities, of which income is an important, but not the only one.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
27007	4	29	8	29	9	Need to add economical goals. We need to connect the dots and be cconsistent with overarching thesis about sustainable development being drive by both economical, social and environmental considerations.	Noted - We are focusing here specifically on social and environmental issues that are not taken into account by traditional formal economy. This is also highlighted by the former sentence "Achieving the objectives of equitable SD demands the fulfilment of such basic and other developmental needs" (e.g. food security and change of unhealthy traditional biomass cookstoves).
41189	4	30	11	30	25	Enabling environments for tech transfer should also be addressed in this section, not just IP issues. VERY IMPORTANTLY, this section should include discussion of the need for IP protection as a key type of incentive for innovation. The authors need to talk about the importance of IP for technology transfer and development - the benefits of IP. This section of the chapter will be very unbalanced if the positive need for IPR protection is not presented. Reference can be made here to lines 11-17 of Chapter 13, as well as to Chapter 3, Section 10.	Noted - There is some emerging literature that is suggesting a more complex relationship between IP protection and innovation. See, for example, M. Boldrin and D.K. Levine, "The Case Against Patents,"J. Econ. Perspectives, 27(1): 3-22 (2013); P. Moser, “Patents and Innovation: Evidence from Economic History," J. Econ. Perspectives, 27(1): 23-44 (2013).
29603	4	30	21	30	23	Why ? Please explain.	Accepted - This part has been re-written to make it clearer.
22444	4	30	21	30	25	As described in Chapter 3 (3.10.6), "some technologies are in the public domain; they are not patented or their patents have expired" and "some analysts also have pointed out that in some sectors of climate technology, particularly renewable energy such as wind and solar technology have easily available substitutes and sufficient competition, such that patents on these technologies do not make them costly or prevent their spread". On the other hand, absense of IP protection may results in obstacles to technology transfer. Because of these, this sentence should be deleted or thus revised.	Accepted - While it is true that some analysts suggest that there are some techologies that not costly because they are in public domain or not patented, there are other analysts who suggest that IP rights can pose a barrier to TT. There also are other issues relating to patents and innovation. Therefore, we have re-written these sentences to present these perspectives more clearly.
41190	4	30	26	32	15	A lot of this could be shortened since very little of the theory is related to mitigation and/or climate equity concerns. The authors should edit this section to make it more precise.	Accepted - Text revised.
41191	4	30	27	30	28	The statement "Countries' level of endowment with renewable and/or non-renewable resources...determines their environmental and economic performance." is not accurate. Historically, management of resources is definitely a stronger determinant of prosperity than underlying or starting natural resource endowment. The contrasting examples of Switzerland, with a relatively scanty natural resource endowment, and Nigeria, with a huge endowment, helps to illustrate our point.	Accepted - The text has been changed to avoid misinterpretations.
19255	4	30	27		40	ADD: ..and the amount of civil conflict that occurs (e.g., Paul Coulier)	Accepted - Text revised and reference included.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
19256	4	30	27		50	GOOD MATERIALS. Really like.	Noted.
24592	4	30	41	30	43	The wording of the sentence 'It has been argued that we are currently witnessing a shift in the world's historical trend toward declining the use of natural resource per unit of economic output, particularly due to reductions in research efficiency in the Asia-Pacific region over the last decade (Schandl and West, 2010)' is unclear. One would think that a 'declining' use of natural resources would imply an 'increase' in the efficiency of resource use. Alternatively, vice-versa, that an 'increasing' historical trend in the use of natural resources per unit of economic output due to a 'reduction in resource efficiency.	Accepted - The correspondent paragraph has been removed.
41192	4	30	41	30	43	It is not clear why "reductions in resource efficiency in the Asia-Pacific region over the last decade" would lead to a decline in the use of natural resource inputs per unit of economic output. It's clear that resource efficiency means getting more output out of a fixed number of inputs. Does the author mean that higher consumption in Asia-Pacific region leads to lower resource efficiency? This statement is confusing and needs to be clarified.	Accepted - The correspondent paragraph has been removed.
21187	4	30	6			Change to "fulfillment"	The comment is not placed for the right page/line.
29640	4	30	8		10	The perspective of informal economy sector such as the recycling sector should be take into account for stakeholders assessment. Brazil, Dias (2011) « Recycling in Belo Horizonte, Brazil – An Overview of Inclusive Programming », UNHABITAT (2010) Solid Waste Management in the World's Cities.	Rejected - These comments are not relevant to our section, which focuses on technology in the context of energy and climate technologies, rather than the braoder implication sof technology development and diffusion.
24129	4	30				Technology can be a driver for privatization and increases asymmetry between actors as discussed in these two Works: Scheinberg, Anne. 2012. Informal Sector Integration and High Performance Recycling: Evidence from 20 Cities. WIEGO Working Paper (Urban Policies) No. 23. DIAS, S. M. Waste and Development Perspectives from the Ground. Facts Reports, v. 1, p. 1-5, 2012.	Rejected - These comments are not relevant to our section, which focuses on technology in the context of energy and climate technologies, rather than the braoder implication sof technology development and diffusion.
30834	4	31	13	31	16	Is this in reference to all resource-rich countries, including industrialized resource rich countries? The text could use some clarity around this point.	Accepted - This has now been clarified.
19257	4	31	13		31	GOOD MATERIALS. Really like.	Noted.
29604	4	31	43			Why ? Please explain.	Accepted - This has been now clarified.
30833	4	31	8	31	11	How could these factors explain whether oil resources result in a key developmental “curse” or a “blessing”? This sentence is not clear.	Noted - This text has now been removed.
22544	4	31	40	31	40	The figure (Rights panel) is highly confusing and misleading - especially the statement "Biogenic emissions from hydropower are not included" - as far as I can understand it is in fact included - the figure should be at least edited or taken out - see comments on figure 7.9	This comment does not belong to this chapter

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
41195	4	32	17	32	22	It's strange to talk about the financial system as a stand-alone entity. Also , the text doesn't separate private finance from public finance – there tends to be very different incentives depending on what component of the finance world you are talking about. This needs to either be accounted for or this section needs to be cut.	Noted - Chapter 16 reviews the different types of finance and investment mechanisms and options. This chapter is a framing chapter - in view of the trend to leverage private financing/investment with public finance, especially through the use of ODA and climate funds, a systemic approach is taken here to raise some of the tensions that are addressed.
41196	4	32	23	32	31	This paragraph makes sweeping statements that, while largely true, need to be caveated heavily. There are many businesses and actors in the "financial system" that take into account sustainable development concerns and have a "triple bottom line". This is becoming more and more common. For private financial intermediaries, certainly profit is one of the goals. But it is not always the only goal. This needs to be accounted for.	Acknowledgement of (limited) private sector attention to "sustainable investment" is now included, but as it is still a marginal force within private capital, it is not stressed.
41197	4	32	32	32	37	It is not correct to state that the financial system as a whole is insensitive to declining marginal utility of income. The financial system is not synonymous with a purely unregulated market approach. The needs to be fixed in the text.	This statement has been modified to focus on private financial markets.
41198	4	32	38	32	38	The paragraph is fine, but again need to not call it the "financial system". Author should revise to say that pure market economics value shorter time horizons.	This text has been shortened and caveated.
19258	4	32	38		46	GOOD MATERIALS.	Thank you
41199	4	32	48	32	49	"The recent period of rapid financialization of the global economy " – this needs a citation. Otherwise it comes across as the author's opinion.	Noted - This sentence has to be read with the rest of the para where citations are listed at the end.
41193	4	32	16	34	21	This whole section comes across as academic theory and is not very relevant from a scientific, technical or policy perspective.	As a framing chapter this section reviews the literature that addresses systemic issues as they apply to SD and the climate challenge. By focusing on systemic issues, rather than the specifics of individual funds or mechanisms (as discussed more in Ch 16), it is not unexpected that some readers will find the section general or academic, but we do not consider this a problem to be corrected.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
41194	4	32	16	34	21	The author needs to separate economic theory from the real world of finance, and recognize that financial systems – both public and private – take into account social and environmental concerns all the time. Financial systems are also regulated and influenced by laws and social norms that help to shape it in this direction. Section needs to be heavily revised or cut. It's unclear what the utility of this section is.	Noted - A careful reading of this section actually addresses the issues raised in this comment - see para 2 of the section. The literature reveals that there are systemic limits to self-enlightenment of the market, and acknowledges the role of laws and norms but recognizes their limitations.
41202	4	33	12	33	13	This sentence carries little meaning in this context. What is the innovative financing they are referring to? Suggest removing: "Establishing better mechanisms for leveraging private sector finance through innovative financing can help (EGTT, 2008)	Noted - The term "innovative finance" has become more common parlance, and is discussed in Ch 16 (as now referenced in text) in more detail than can be provided in this section.
41203	4	33	15	33	21	Points about the Adaptation Fund may be true, but there are other reasons the Fund has had problems, such as poor fiduciary standards of developing countries mean they struggle to get direct access to the fund, and lack of absorptive capacity. This should be accounted for as well.	Discussion of the UNFCCC funds and mechanisms has been deleted as this is addressed in Chapter 13 and 16.
41204	4	33	17	33	23	This is a useful paragraph, but the wording needs to be revised to reflect the evidence. The authors should consider editing as follows: "Even mechanisms that are specifically designed and implemented for the purpose of generating SD benefits have faced difficulty. Consider the the Kyoto Protocol's Clean Development Mechanism (CDM), which SOME HAVE ARGUED HAS LIMITED value in financing additional emission reductions in developing countries. THERE IS SOME EVIDENCE THAT CDM PROJECTS HAVE concentrated on particular technologies and HAVE BEEN UNEVENLY DISTRIBUTED, showing a significant bias towards emerging economies, and PLAYING A LIMITED ROLE IN AFRICA. (Boyd et al., 2009; UNEP/Risø Centre on Energy, 2011). (See Chapter 13.)"	Discussion of the UNFCCC funds and mechanisms has been deleted as this is addressed in Chapter 13 and 16.
19260	4	33	17		25	IMPORTANT POINT: Forest certification is the same situation. Most certified forests are in the developed countries and not the emerging or developing economy countries that were being targeted by certification.	Noted.
29605	4	33	18			Spelling : "the the Kyoto" : remove a "the".	Editorial
23121	4	33	18	33	25	Replace "Consider…Jover 2012" by "The contributions of CDM projects to SD have been assessed frequently. Sutter and Parreno (2007)and Corbera and Jover (2012) assess small samples of projects, while Policy and Operations Evaluation Board (2008) looks at the entire Dutch project pipeline. A significant meta-analysis of the early CDM literature was done by Olsen (2007). The research agrees that a significant share of CDM projects provides only limited SD benefits.". References: Olsen, K. (2007): The clean development mechanism's contribution to sustainable development: a review of the literature, in: Climatic Change, 84, p. 59-73. Policy and Operations Evaluation Board, Ministry of Foreign Affairs (2008): Clean and sustainable? An evaluation of the contribution of the Clean Development Mechanism to sustainable development in host countries, IOB evaluations no. 310, The Hague; Sutter, C.; Parreño, J.C. (2007): Does the current Clean Development Mechanism (CDM) deliver its sustainable development claim? An analysis of officially registered CDM projects. In: Climatic Change, Vol. 84, pages 75-90. Reason: Corbera and Jover assess a minuscule project sample and are not representative of the rich literature on CDM and sustainable development.	Discussion of the UNFCCC funds and mechanisms has been deleted as this is addressed in Chapter 13 and 16.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
27498	4	33	18	33	25	Negative assessment of KP/CDM here is not consistent with positive assessment of KP/CDM in TS, p. 55, lines 33-35.	Discussion of the UNFCCC funds and mechanisms has been deleted as this is addressed in Chapter 13 and 16.
29606	4	33	22			Spelling : "(See Chapter 13)." is not a sentence.	Editorial
27499	4	33	22	33	25	To contribute meaningful to the development goals was not the main objective of the CDM. It was designed to support sustainable development and to reduce emissions. We suggest deleting this sentence.	Discussion of the UNFCCC funds and mechanisms has been deleted as this is addressed in Chapter 13 and 16.
41205	4	33	23	33	25	Strike this sentence as the CDM was not meant to necessarily improve energy access or lead to the industrialization of power. If the authors want to make a point that the SD benefits of the CDM have been limited, they need to rephrase the statement.	Discussion of the UNFCCC funds and mechanisms has been deleted as this is addressed in Chapter 13 and 16.
27500	4	33	26	33	35	It is recommended to delete this para. It can be read like scapegoating developed countries not to provide adequate financial resources for the needs of developing countries. The given view is also too partial. The reasons for missing actions to pursue a sustainable development in these countries is not only a lack of finance but also administrative and technological constraints, e.g. rudimentary tax and fiscal systems, low competitiveness. This should be added, when the para is not deleted.	Rejected. These are factual statements and the section deals with finance specifically. Barriers more generally are treated throughout the reprot, including each sectoral chapter.
41206	4	33	30	33	32	The authors need to explain “arguments of effectiveness”	Explained in section 4.2 and 4.7 as indicated.
24593	4	33	36	34	21	Detailed examples of international finance mechanisms would fit better within Chapter 15. Suggest shorten/delete if the chapter needs to be reduced.	Discussion of the UNFCCC funds and mechanisms has been deleted as this is addressed in Chapter 13 and 16.
41207	4	33	36	33	49	The discussion of loss and damage is misleading-- the decision in Doha was to develop the institutional arrangements for L&D, though it is unclear what those arrangements might be, and it is far from agreed that this will involve any finance considerations whatsoever. Also, this section makes no mention of fast start finance, which is a significant piece of UNFCCC finance outcomes.	Discussion of the UNFCCC funds and mechanisms has been deleted as this is addressed in Chapter 13 and 16.
41208	4	33	36	33	49	The authors should strike the entire reference to loss & damage in the finance section. It doesn’t belong in this section. If it must be retained, it should be reworded so it is in line with the actual decision and does not prejudge decisions in Warsaw. Once “further increase finance” is removed, it is clear that it no longer really fits in this paragraph. The institutional arrangements could be the Adaptation Committee, which is not a funding committee, it could be Nairobi Work Program, which is about knowledge and information, etc. The rest of the paragraph is about funding mechanisms. In any case, if retained the text should read: "At COP-18 in 2012, a decision to ESTABLISH institutional arrangementS to address loss and damage ASSOCIATED WITH THE ADVERSE EFFECTS OF CLIMATE CHANGE IN developing countries was adopted."	Discussion of the UNFCCC funds and mechanisms has been deleted as this is addressed in Chapter 13 and 16.
41209	4	33	36	34	14	The authors should strongly consider deleting this whole paragraph. This section demonstrates a good deeal of ignorance about finance, and, specifically, finance under the UNFCCC. The authors list funds, but leave off the GEF. Then they talk about the GEF, but say it supports mitigation and adaptation, which isn’t true. They also mischaracterize the support coming from the LDCF and SCCF. It either needs to be entirely rewritten (and researched) or stricken.	Discussion of the UNFCCC funds and mechanisms has been deleted as this is addressed in Chapter 13 and 16.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
27501	4	33	36	34	14	The presentation of UNFCCC financial architecture not totally consistent with the presentation in ch. 13, p. 56, lines 33-45 (e.g. here in line 36: "three funds", in ch. 13, p. 56, lines 35/36: "four primary vehicles").	Discussion of the UNFCCC funds and mechanisms has been deleted as this is addressed in Chapter 13 and 16.
41200	4	33	4	33	16	This paragraph needs work. Yes, developing countries are constrained by lower capacity to mobilize private capital, but this is a general statement and should not only apply to private capital “toward SD objectives, and for adaptation and mitigation of GHG emissions in particular”. The last phrase should be stricken.	Rejected - This is a section framing the key issues on finance and investment; the para refers to challnegs of mobilising private sector capital for SD and climate.
41201	4	33	4	33	16	The laundry list of barriers to mobilizing private capital needs a reference.	Reference added to further discussion in chapter 16.
19259	4	33	4		16	GOOD MATERIALS.	Thank you
27502	4	33	48	33	49	It is recommended to delete "which is expected to further increase the financing required". The decision to develop an institutional arrangement is not a political decision to increase financial support.	Discussion of the UNFCCC funds and mechanisms has been deleted as this is addressed in Chapter 13 and 16.
27497	4	33	5			According to the actual discussions on Sustainable Development Goals, the term "SD objectives" should be avoided in the whole text, as it is not defined and could be misleading.	Rejected. This is standard english usage, not a legal term.
19261	4	34	1		14	IMPORTANT QUESTION: There are a lot of data given but the question is what the efficacy of each project is and how was it evaluated (e.g., the criteria and indicators used)? How does this help with mitigation efforts??	Discussion of the UNFCCC funds and mechanisms has been deleted as this is addressed in Chapter 13 and 16.
21188	4	34	18			Repetition of word "the the"	Editorial – copyedit to be completed prior to publication
19262	4	34	23		44	COMMENT: This introduction is extremely well written.	Noted. Thanks.
23523	4	34	45	34	46	It would be important to introduce this section by referring to the distinction between absolute and relative decoupling of consumptio/growthn and emissions	Taken into account. Text has been added to clarify this distinction.
29607	4	34	48			Please add a graph, if possible ?	Rejected on account of space contraints and the framing character of chapter 4.
35399	4	34				One important impact of consumerism is waste, which has a high societal cost. So, the impact of consumerism is exacerbated by this being a wasteful consumerism; that is, increased consumption of products that are single-use and cannot be reused or recycled. A good example may be food: we have strongly fall into processed food culture -a core characteristic of consumerism, that implies much more waste generation given the usually big amount packaging that it's involved in processed food. Likewise, the increase of specific products that can be easily recyclable show how strategic it is to tackle consumerism and materials efficiency by specific products: the consumption of refreshments in cans has increased a 65% in Spain, for example.	Noted. References on waste have been added.
35453	4	34				One important impact of consumerism is waste, which has a high societal cost. So, the impact of consumerism is exacerbated by this being a wasteful consumerism; that is, increased consumption of products that are single-use and cannot be reused or recycled. A good example may be food: we have strongly fall into processed food culture -a core characteristic of consumerism, that implies much more waste generation given the usually big amount packaging that it's involved in processed food. Likewise, the increase of specific products that can be easily recyclable show how strategic it is to tackle consumerism and materials efficiency by specific products: the consumption of refreshments in cans has increased a 665% in Spain, for example.	Noted. References on waste have been added.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
29547	4	34				Consumerism is indeed a root cause of climate change - this can be seen also in one of its greatest impacts - waste. That is to say that the impacts of consumerism are made worse by that consumerism of single-use products or anything that cannot be reused or recycled. One strategic entry point to tackle consumerism is to follow principles of zero waste - give priority to initiatives that reduce the production and consumption of any products that cannot be recycled or reused.	Noted. References on waste have been added.
26961	4	34				One important impact of consumerism is waste, which has a high societal cost. So, the impact of consumerism is exacerbated by this being a wasteful consumerism; that is, increased consumption of products that are single-use and cannot be reused or recycled. A good example may be food: we have strongly fall into processed food culture -a core characteristic of consumerism, that implies much more waste generation given the usually big amount packaging that it's involved in processed food. Likewise, the increase of specific products that can be easily recyclable show how strategic it is to tackle consumerism and materials efficiency by specific products: the consumption of refreshments in cans has increased a 665% in Spain, for example.	Noted. References on waste have been added.
19263	4	35	1		2	COMMENT: This is difficult to digest since it is a probably biased perspective that is really a developed countries view and not developing countries. This is good text and just needs to be have a context better developed?	Taken into account. The text has been revised.
19264	4	35	14		25	DELETE?? – This text is for the poor people who live in the industrialized countries but not really in developing countries.	The comment is not clear. The text concerns high- consumption life-styles, which are typical of the developed countries, although they also have poor populations with low levels of consumption, and which are adopted by the wealthy and middle classes of the developing countries (where these classes exist).
29002	4	35	16	35	16	Incomplete reference.	Editorial – copyedit to be completed prior to publication. The reference is Assadourian (2010).
41210	4	35	25	36	25	The authors should consider frontloading concrete examples of mega drivers, such as auto use and the more widespread use of air conditioning by the emerging middle class of India. The latter is a major driver of GHGs linked to major demographic shifts.	Noted. A reference on space conditioning in India has been added.
19265	4	35	26		46	MOVE right after 1st paragraph starting line 7. Start the sentence of with The spread of consumerism …. Remove Furthermore, Thought should be given to the flow of text so it clearly transitions between the topics being discussed. Text between lines 26-35 are really good and should be introduced earlier??	Taken into account. Editorial comment.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
21638	4	35	30	35	30	Although useful, equating LCA to consumption emissiosn is misleading to the a reader. The estimation of consumption emissions at the aggregation level (country) used in this chapter uses very different methods to an LCA. LCA techniques are useful for individual products (usually cradle to grave) whereas the estimates of a product's footprint developed using a consumption approach (i.e. an MRIO model) do not include the transportation, use or disposal of that product. These sources are treated separately, e.g. part of household private transport and in the case of disposal, not particularly well in an IO model. An LCA, on the other hand, does allocate cradle-to-grave emissions to a product. Although I can see how it may be useful to describe consumption-based emissions to LCA is useful conceptually, in practice, they are very different methodologies and are not quite comparable. This can lead to significant confusion in policy makers when the results from each approach can be very different with different boundaries.	Noted. In the final draft no reference is made to LCA when not appropriate or when potentially misleading.
35237	4	35	32	35	34	Hong Kong SAR is not a sovereign state. Therefore, it should not be listed as an Asian country here. It is recommended to replace Hong Kong SAR with an Asian or African country in this sentence.	Taken into account. We have deleted the explicit reference to Hong Kong.
21639	4	35	36	35	39	The allocation of consumption emissions to countries using an MRIO or similar is reliant upon economic data including expenditure data. Given that in such a model all expenditure is linked to CO2, is it not an artefact of the modelling methodology that there is a link between expenditure and CO2? The significance of this relationship over and above the fact that CO2 and expenditure are modelled with a linear multiplier needs to be examined before this strong correlation is reported as such.	Noted. The methodological issues involved in IO-based models are discussed in Annex II.
21640	4	35	39	35	43	Comparing households' expenditure and carbon footprint using IO model outputs is limited bythe linear multiplier between expenditure and CO2. Simply by the methods used, higher expenditure will of course lead to higher emission. Can additional literature be found to support this relationship that doesn't have the inherent limitations of the IO approach?	Noted. The methodological issues involved in IO-based models are discussed in Annex II.
21642	4	36	10	36	10	Can an explanation be included as to what "investments" are included in this statement and how they are responsible for GHG emissions? 18% of global GHG due to "investments" is a significant amount and needs more explanation to make it relevant to policy makers.	Noted. The sentence has been deleted.
19266	4	36	10		12	COMMENT: These data are relevant for the industrialized countries but deforestation or land-use conversion is the more important problem causing GHG emissions in the emerging economic countries.	Noted. It is now explicitly stated that this refers to the global scale and the following sentence outlines main differences between rich and poor countries. Deforestation and land use change are not normally considered as consumption categories but as activites related to production or resource extraction.
21643	4	36	23	36	27	The outliers - presumably the US, Hong Kong and Luxembourg - are worthy of greater explanation in the text as to why their emissions are so high. Is this a fluke of their economic SU tables etc., or is something else happening there? This could help inform emission reduction policy, as without them it appears that high-income countries per capita CO2 emissions do stablise beyond $15 per cap.	Noted. The figure has been deleted.
41211	4	36	23			This figure indicates that no de-coupling is occurring currently between wealth and CO2 footprint. Inf act the U.S. economy grew by 2.2% last year while energy CO2 emissions decreased by almost 4%(!) - a clear and continued decoupling of economic growth and emissions. The figure and related text should be revised to reflect this fact adn potential in other regions of the world.	Noted. The figure has been deleted.
21641	4	36	6	36	7	Reference needed to support the line "70-80% of all life-cycle impacts".	Noted. The sentence has been deleted.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
35401	4	36	9		13	Household emissions should take into account the kind of waste that it is produced and how it is handled, whether the waste it is recycled or disposed of in landfill or incinerators. Recycling would show a much greater emission reductions than landfills or incinerator options ; source separation of organic waste to composting could show even greater results. For example, those containers that can be reused have 50-60% less climate impact that those that are single-use. Source: IFEU - Institute for Energy and Environmental Research: Life cycle assessment of refillable glass and PET bottles for mineral water and soft drinks. IFEU, 2008. Therefore, this dimension should be another category integrated in the overall picture of household emissions.	Noted. References on waste management have been added.
35455	4	36	9		13	Household emissions should take into account the kind of waste that it is poduced and how it is handled, whether the waste it is recycled or disposed of in landfill or incinerators. Recycling would show a much greater emission reductions than landfills or incinerator options ; source separation of organic waste to composting could show even greater results. For example, those containers that can be reused have 50-60% less climate impact that those that are sngle-use. Source: IFEU - Institute for Energy and Environmental Research: Life cycle assessment of refillable glass and PET bottles for mineral water and soft drinks. IFEU, 2008. Therefore, this dimension should be another ctaegory integrated in the overall picture of household emissions.	Noted. References on waste management have been added.
29549	4	36	9		13	Household carbon footprint should take note of the kind of waste that it is produced, whether the waste it is recycled or disposed of in landfill or incinerators. Recycling would show a much greater emission reductions than landfills or incinerator options ; source separation of organic waste to composting could show even greater results. For example, those containers that can be reused have 50-60% less climate impact that those that are sngle-use. Source: IFEU - Institute for Energy and Environmental Research: Life cycle assessment of refillable glass and PET bottles for mineral water and soft drinks. IFEU, 2008. Therefore, this dimension should be another ctaegory integrated in the overall picture of household emissions.	Noted. References on waste management have been added.
26963	4	36	9		13	Household emissions should take into account the kind of waste that it is poduced and how it is handled, whether the waste it is recycled or disposed of in landfill or incinerators. Recycling would show a much greater emission reductions than landfills or incinerator options ; source separation of organic waste to composting could show even greater results. For example, those containers that can be reused have 50-60% less climate impact that those that are sngle-use. Source: IFEU - Institute for Energy and Environmental Research: Life cycle assessment of refillable glass and PET bottles for mineral water and soft drinks. IFEU, 2008. Therefore, this dimension should be another ctaegory integrated in the overall picture of household emissions.	Noted. References on waste management have been added.
19267	4	37				Interesting figure. I would define what is meant by Territorial emissions since it can have different interpretations. This could be defined in the figure legend.	The figure has been deleted due to space constraints. Territorial emissions has been defined elsewhere in Chapter 4 as well as in Chapter 5.
29608	4	37	14			Navigation within AR5 : please give a Ref/hint where we can find "Annex II"	Editorial – copyedit to be completed prior to publication.
41212	4	37	14	37	14	The text states, "see Annex II." Where is Annex II to be found?	Editorial – copyedit to be completed prior to publication.
29609	4	37	24			On the contrary, "energy systems" is not so clear in §4.3.	Noted. Sentence has been revised.
29610	4	37	27			Footnote 5 : please define "GTP" and "GWP100" metrics, at the first appearance of these terms in the Chapter.	Noted. The footnote and the statement it referst o have been deleted.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
27008	4	37	6	41	17	What are the recommendations?	Noted. The text has been sharpened. The purpose of chapter 4 is not to make policy recommendations but to frame discussions in later chapters.
27009	4	37	7	37	32	Goes back and forth between discussing carbon footprinting generally and product carbon footprinting. Need to be more specific since there are various boundaries for carbon footprinting assessments.	Noted. The text has been revised and clarified. Reference has been made to the Methodology Annex II where these differences are explained in more detail.
27011	4	37	7	41	17	It is important in this section to reference the standards you are referring. Referencing other documents with mentions of these standards is not useful to readers and difficult to follow. These references also appear to be out of date.	Noted. The discussion of specific standards has been deleted due to space constraints.
19270	4	38		39		COMMENT: This is a really good section!	Noted. Thanks.
27010	4	38	1	38	8	We do not agree that there are several international carbon footprinting standards. For corporate level accounting, there is the GHG Protocol Corporate Standard and ISO 14064. Although, ISO 14064 and any other standard or program available, are all based on the GHG Protocol Corporate Standard. The EU standard for organizational accounting, which is in a road test phase, is actually a product category level assessment and is not an international standard. At the Product level, there is currently the UK PAS 2050 standard and the GHG Protocol Product Life Cycle Accounting and Reporting Standard. The EU product standard (which addresses multiple impacts), currently being roadtested, is another regional standard. The GHG Protocol Standard is the only internationally accepted GHG product standard. The ISO 14067 Standard that was under development for the last 4 years is being released as technical guidance and therefore will not be a standard. There is ISO 14040 which is an international product standard but looks at multiple impacts and does not provide specific guidance on GHGs. For corporate value chain accounting, the only international standard is GHG Protocol Corporate Value(Scope 3) Standard.	Noted. The discussion of specific standards has been deleted due to space constraints. The PAS 2050, although of national origin, is applied in several countries.
30835	4	38	24	38	24	The word 'study' is missing from the sentence.	Accepted. Corrected.
30836	4	38	24	38	26	Indicating why Canadian and American investors care about companies' GHG emissions disclosures would be informative and useful for the reader. This is particularly important as it also provides insight on the next statement explaining how accounting based measures indicate a positive correlation between financial performance and GHG emissions, while market based performance measures suggest the opposite trend.	Noted. We found that reporting on the possible reasons underlying these observations and differences would take up too much space so the reader is referred to the cited articles for further information.
29003	4	38	24	38	24	Word missing (study?)	Accepted. Corrected.
19269	4	38	31		41	COMMENT: I noticed that this is covered later in the chapter in the detail needed but this is the first time the reader sees it. Most C footprints are not including the entire life chain from the resource growth or extraction, its conversion, its distribution, etc. Most industries will not provide this information anyway as it is considered to be proprietary information.	Noted. The reader is referred to the Methodology Annex II for detailed information on different carbon footprint methodologies, including Life Cycle Assessment (LCA) and environmentally-extended input-output (EIO) models, and their strengths and weaknesses.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
21644	4	38	42	39	32	There needs to be clearer distinction made between the methods used to estimate the consumption-based emissions of a country and the LCA emissions of a product. The two methods are discussed here as if they can serve the same purpose which isn't the case. I suggest describing input/output approaches to illustrate the methods for a nation's consumption emissions and LCA/LCA-EIO for product-based assessments, and making it clear that different methodologies are necessary depending on the purpose of the assessment. Equal space needs to be attributed within the text to the discussion of uncertainties involved in both types of methodology. The discussion in Annex II will help with this but it doesn't discuss the uncertainty associated with the methods.	Noted. The reader is referred to the Methodology Annex II for detailed information on different carbon footprint methodologies. We have made Annex II authors as well as the WG3 TSU aware of the strong interest in these methods among reviewers so as to make sure that they are adequately explained in Annex II.
19268	4	38	8		12	NOTE: Not sure that this really works based on my experience with certification. It works for a small group of people but you really need to influence the general public.	Noted. There is actually evidence, especially from Europe, that certification and labeling can be effective means to influence the general public.
29777	4	38	24	38	25	Incomplete sentence	Accepted. The word "study" has been added to the sentence.
27012	4	39	1	39	1	The claim that most methods only address CO2 is incorrect based on our knolwedge. All the standards we are aware of for GHG accounting cover the 6 main GHGs. Also, the reference provided here only discusses product footprinting and should not be used to make a claim about most GHG accounting methods.	Accepted. The text has been revised.
21189	4	39	10			Change to "labeling"	Editorial – copyedit to be completed prior to publication. It is page 38, not 39.
29612	4	39	17	39	18	"consumer responsability" : only if customer well informed.	Noted. The comment is not clear. The term "consumer responsbility" in this sentence is not meant in a normative sense.
35400	4	39	2		6	Household carbon footprint calculations should take into account the consumption-based emissions, which in its turn should include the emissions involved in the end-use disposal or recycling of products. Depending on whether a consumption pattern recycles or not, the carbon footprint of the household may change significantly. Wastes management upstream strategies keep wastes that cannot be recycled or composted from being generated in the first place and thereby offer much larger potential for GHG abatement through the reduction of emissions associated with raw material acquisition, manufacturing, and transportation. These approaches include options related to waste reduction, reutilisation, and recycling. References: US EPA, Solid Waste Management and Greenhouse Gases: A Lifecycle Assessment of Emissions and Sink. 3rd Edition, 2006; Morris, J., “Recycling versus incineration: an energy conservation analysis”, Journal of Hazardous Materials 47 (1996), 277-293; D. Hogg, A Changing Climate for Energy from Waste? Eunomia Research & Consulting for Friends of the Earth, 2006; Tellus Institute, Assessment of Materials Management Options for the Massachusetts Solid Waste Master Plan, Review submitted to the Massachusetts Department of Environmental Protection, 2008.	Noted. Reference has been made in several places to the role of waste management and recycling in reducing GHG reductions.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
35454	4	39	2		6	Household carbon footprint calculations should take into account the consumption-based emissions, which in its turn should include the emissions involved in the end-use disposal or recycling of products. Depending on whether a consumption pattern recycles or not, the carbon footprint of the household may change significantly. Wastes management upstream strategies keep wastes that cannot be recycled or composted from being generated in the first place and thereby offer much larger potential for GHG abatement through the reduction of emissions associated with raw material acquisition, manufacturing, and transportation. These approaches include options related to waste reduction, reutilisation, and recycling. References: US EPA, Solid Waste Management and Greenhouse Gases: A Lifecycle Assessment of Emissions and Sink. 3rd Edition, 2006; Morris, J., “Recycling versus incineration: an energy conservation analysis”, Journal of Hazardous Materials 47 (1996), 277-293; D. Hogg, A Changing Climate for Energy from Waste? Eunomia Research & Consulting for Friends of the Earth, 2006; Tellus Institute, Assessment of Materials Management Options for the Massachusetts Solid Waste Master Plan, Review submitted to the Massachusetts Department of Environmental Protection, 2008.	Noted. Reference has been made in several places to the role of waste management and recycling in reducing GHG reductions.
29548	4	39	2		6	It should be noted that household consumption with higher generation of waste will have a larger carbon footprint that those households with more reuse and recyclign rates. Consumption-based emissions should consider the life-cycle of products consumed including the post-consumption stage of products. That should reflect the difference between disposing or not those products. Wastes management upstream strategies keep wastes that cannot be recycled or composted from being generated in the first place and thereby offer much larger potential for GHG abatement through the reduction of emissions associated with raw material acquisition, manufacturing, and transportation. These approaches include options related to waste reduction, reutilisation, and recycling. References: US EPA, Solid Waste Management and Greenhouse Gases: A Lifecycle Assessment of Emissions and Sink. 3rd Edition, 2006; Morris, J., “Recycling versus incineration: an energy conservation analysis”, Journal of Hazardous Materials 47 (1996), 277-293; D. Hogg, A Changing Climate for Energy from Waste? Eunomia Research & Consulting for Friends of the Earth, 2006; Tellus Institute, Assessment of Materials Management Options for the Massachusetts Solid Waste Master Plan, Review submitted to the Massachusetts Department of Environmental Protection, 2008.	Noted. Reference has been made in several places to the role of waste management and recycling in reducing GHG reductions.
26962	4	39	2		6	Household carbon footprint calculations should take into account the consumption-based emissions, which in its turn should include the emissions involved in the end-use disposal or recycling of products. Depending on whether a consumption pattern recycles or not, the carbon footprint of the household may change significantly. Wastes management upstream strategies keep wastes that cannot be recycled or composted from being generated in the first place and thereby offer much larger potential for GHG abatement through the reduction of emissions associated with raw material acquisition, manufacturing, and transportation. These approaches include options related to waste reduction, reutilisation, and recycling. References: US EPA, Solid Waste Management and Greenhouse Gases: A Lifecycle Assessment of Emissions and Sink. 3rd Edition, 2006; Morris, J., “Recycling versus incineration: an energy conservation analysis”, Journal of Hazardous Materials 47 (1996), 277-293; D. Hogg, A Changing Climate for Energy from Waste? Eunomia Research & Consulting for Friends of the Earth, 2006; Tellus Institute, Assessment of Materials Management Options for the Massachusetts Solid Waste Master Plan, Review submitted to the Massachusetts Department of Environmental Protection, 2008.	Noted. Reference has been made in several places to the role of waste management and recycling in reducing GHG reductions.
29613	4	39	26			"responsability assigned to consumers" : only if customers well informed.	Noted. The comment is not clear. The term "consumer responsbility" in this sentence is not meant in a normative sense.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
21646	4	39	28	39	32	The description of carbon leakage in this sentence is not clear. Consumption in one country will have a GHG impact. Whether this is over and above the impact it would have had had it been produced domestically is dependent on whether the country has an equivalent, enforced GHG reduction strategy. It would be useful to expand here to discuss how carbon accounting measures can affect markets.	Noted. The text has been clarified - the issue of carbon leakage in relation to GHG accounting approaches is discussed in sec. 4.4.2.4. Space considerations prevented a discussion of how carbon accounting measures can affect markets.
24428	4	39	41	39	42	You can also refer to the most updated following paper on this issue; T. Homma, K. Akimoto, T. Tomoda, Quantitative evaluation of time-series GHG emissions by sector and region using consumption-based accounting, Energy Policy, Vol.51 pp.816-827, December 2012.	Rejected. The two references already cited (Peters and Hertwich 2008; Bows and Barrett 2011) provide sufficient backing for the quite straightforward notion that the difference between consumption- and production-based emissions is given by emissions embodied in trade.
25587	4	39	42			Please add the following literature. T. Homma, K. Akimoto and T. Tomoda, Quantitative evaluation of time-series GHG emissions by sector and region using consumption-based accounting, Energy Policy 51, 816-827 (2012).	Rejected. The two references already cited (Peters and Hertwich 2008; Bows and Barrett 2011) provide sufficient backing for the quite straightforward notion that the difference between consumption- and production-based emissions is given by emissions embodied in trade.
29611	4	39	7			Please define "LCA" shortcut at the first appearance of this term in the Chapter.	Editorial – copyedit to be completed prior to publication.
21645	4	39	7	39	7	It's not correct to say that most emisssions accounting methods use a LCA approach unless it is stated under what circumstances. LCA is often used to assess products but this is just one small area of emissions accounting's application.	Accepted. This has been clarified throughout section 4.4.
20184	4	4		7		The analysis on technology (Section 3.6) should be summarily reflected ihere.	Accepted, point added.
32615	4	4		57		This comment mostly pertains to sections 4.5 and 4.6 but is perhaps of wider interest. It is an interesting and strong chapter. One possible addition is to consider an aspect of development as improvements in the 'First domain' of getting closer to best practice frontiers - eg. Subsidy removal, institutional strengthening, tackling local environmentl damage, etc - and Sustainable Development as being development targeted at ensuring the evolution of the 'best practice frontier' (3rd domain processes) in directions that are consistent with sustainability constraints, and hnece involve more strategically productive innovations, rather than simply continuing on a default but sub-optimal 'business as usual' direction. The final text of our book 'Planetary Economics: Energy, Climate and the Three Domains of Sustainable Development' (Grubb et al, 2013) aims to draw these links between the three domain processes and sustainable development, most directly in Chapter 10, and may be a useful point of reference.	TIA in 4.2 when the relevance of efficiency and equity to sustainability is discussed. (and reference added)
32616	4	4		6		One observation useful to draw out in the Exec Summary is the impication that the 'business as usual' development trajectory is generally not optimal - it risks storing up a number of problems that then have to be addressed at greater cost	Good point which is mentioned in this chapter but it is developed mostly to other chapters.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
33649	4	4	11	4	13	We prefer a bullit list here.	Rejected.
26222	4	4	13	4	14	4.7.3 Equity and burden-sharing in the context of international cooperation on climate change could be shortened to 4.7.3 Equity and burden-sharing	Rejected. This title is more explicit.
29578	4	4	13			Please define "co-evolution" at the first appearance of this term in the Chapter.	The term is self-evident, meaning "joint evolution".
33650	4	4	13	4	16	We like to introduce both types of sustainability a bit by inserting a short sentence: "Two concepts of sustainability are in use."	This has been deleted to shorten ES.
19199	4	4	13		15	Good definition of types of sustainability	This has been deleted to shorten ES.
25067	4	4	13	4	14	The sentence 'There are two sustainability, one is weak while the other one is strong' is rather a new concept. I checked these words in glossary and could not find them. If these are found in other chapters, definition should be in glossary. Please check.	This is not new, it is a standard distinction, though some disagreements exist about their exact interpretation.
26223	4	4	15	4	15	4.7.3.1 Equity principles pertinent to burden-sharing in an international climate regime could be shortened to 4.7.3.1 International climate regime	editorial
19200	4	4	15			Stable is a bad word to use since climates are really not stable, they are just as dynamic as social and environmental systems but do not follow the same cycles. Stable should be replaced with ‘climate systems that vary within their historical range’. Natural capital needs to remain resilient and not be pushed over a threshold that can cause system alteration and loss of lands productive capacity. Stable suggests that there is a loss of resilience – they do not equate to one another.	This has been deleted to shorten ES.
21634	4	4	16	4	17	Sentence beginning "Ensuring SD…" - Incomplete sentence.	This has been deleted to shorten ES.
27340	4	4	16	4	17	The sentence is confusing, since no justification is given as to why sustainable develoment does not constitute a socially optimal pathway.	This has been deleted to shorten ES.
41099	4	4	16	4	17	The text states: "Ensuring SD is less ambitious but more consensual than seeking a socially optimal pathway. [4.2]" It is not clear where the support for this claim appears in section 4.2.	This has been deleted to shorten ES.
41100	4	4	16	4	17	The last sentence here needs clarification: ambitious and consentual in what ways and for whom? as compared to what? what constitutes a social optimal pathway?	This has been deleted to shorten ES.
27489	4	4	16	4	17	Strike out last phrase of 2nd paragraph ("Ensuring sd is…"). This statement is highly conditional on the definition applied. It is, moreover, not straightforward for the casual reader.	This has been deleted to shorten ES.
26224	4	4	17	4	17	4.8 Implications for subsequent chapters could be shortened to 4.8 Implications	Rejected - Section titles can no longer be changed.
26225	4	4	19	4	19	4.8.2 Three levels of analysis of sustainability consequences of climate policy options could be shortened to 4.8.2 Sustainability consequences of climate policy options	Rejected - this would be less clear.
33648	4	4	2	4	7	This sentence is very long, we propose to split it to read: "Since the First Assessment Report, the IPCC has considered the relations between climate change on the one hand, and sustainable development (SD) and equity on the other with a progressively expanding scope. The issues now include: ... .", and we prefer to have a bullit list here.	This has been shortened.
26226	4	4	20	4	20	4.8.3 Sustainability and equity issues in sectoral chapters . could be shortened to 4.8.3 Sustainability and equity Mechanisms	It is now "in subsequent chapters"
29579	4	4	20			"high agreement, medium evidence" : where is this scale defined ? Please give a reference to this vocabulary.	See Uncertainty Guidance Document
23519	4	4	21	4	24	Whether or not there are trade-offs between emission reduction and sustainable devleopment goals depends on how sustainability development goals are defined. I thus wonder whether it is better to formulate this as a possibility, rather than a given, e.g. "there might be trade offs between climate responses and broader sustainable development goals".	This has been rephrased to include synergies. All of this is substantiated in the chapter and in sector chapters.
19201	4	4	21			Same comment on ‘stable’. We do not want stable climates but where it varies within its normal range for a particular system.	This has been deleted to shorten ES.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
19202	4	4	21		47	Really good summaries – excellent points being made. I really like the Executive Summary – it is to the point but really say a lot. This summary includes insights on how this should be done differently and does not follow traditional approaches of the past.	noted - (Thank you)
32071	4	4	32		34	DELETE, THE COMMENT DOES NOT SEEM TO ADD VALUE TO THE PARAGRAPH	Rejected. This comment probably refers to another part of the chapter.
35236	4	4	34	4	39	In this paragraph, the viewpoint that “developing countries, as newcomers, should take responsibility for the global unsustainable development in the future” is incorrect. In the context of globalization, the emission-intensive lifestyle of developed countries has demonstration effects on developing countries. Arguments such as “achieving global sustainable development and equity requires collective efforts at global level” and “developed countries should take the lead in the transition of lifestyle” should be added in this paragraph.	This is a misinterpretation. But the sentence has been deleted to shorten the ES.
27490	4	4	34	4	39	Please, elaborate what other development options are there. You just say what developing countries should not do, but do not offer an alternative.	Please see sectoral chapters for alternative technological paths
26217	4	4	4	4	4	4.5.1 Development pathways: definition and examples could be shortened to 4.5.1Definition and examples	Accepted.
29576	4	4	4			Please define "co-benefit" at the first appearance of this term in the Chapter.	Rejected - see glossary
41101	4	4	40	4	41	The statement “compelling arguments have been put forward that equity, in its multiple dimensions, be embraced as a fundamental component of sustainable development” makes a normative judgment about the of arguments presented in the literature, rather than making a neutral statement about what is in the literature. This type of statement becomes particularly problematic when “equity” and “sustainable development” as presented in the UNFCCC are linked later in the draft chapter (see page 8 lines 26-28) in a manner that inaccurately suggests a legal link between them in the UNFCCC.	TIA - the sentence has been replaced by a neutral formulation.
41102	4	4	42	4	42	what are "climate change relations"? Please clarify.	Yes, reformulated.
26218	4	4	6	4	6	4.5.3 Strategies towards sustainable development paths could be shortened to 4.5.3 Strategies	This subsection has been deleted.
29577	4	4	6			Please define "procedural equity" at the first appearance of this term in the Chapter; you could e.g. insert the () of page 14 line 35 as a hint	Accepted, and done in 4.1
26219	4	4	7	4	7	4.5.4 Indicators of sustainability for development paths could be shortened to 4.5.4 Indicators of sustainability	This subsection has been deleted.
26220	4	4	8	4	8	4.5.5 Transition between development paths: Frameworks for analysis could be shortened to 4.5.5 Frameworks for analysis	The section has been restructured.
26221	4	4	9	4	9	4.6 Mitigative capacity and mitigation, and links to adaptive capacity and adaptation could be shortened to 4.6 Mitigative capacity and adaptive capacity	Rejected, section titles can no longer be changed.
27491	4	4		7		This ES reads very nicely, but seems more like storytelling than a summary of concise assessment results. It would add to the comprehensibility if the key results/messages were presented in bold in the first sentence of each paragraph. There is no need to present the uncertainty languages in bold instead. The storyline of the chapter is not clear by reading just the ES.	TIA via shortening and focusing on the key points.
19678	4	4	13	4	16	The definition of strong and weak sustainability are not entirely correct. Weak sustainability allows for generous substitution between man-made and natural-capital whilst also acknowledging there are some critical thresholds to ecosystems and critical natural capital that need to be preserved and not substituted for. Strong substitutability allows for only very limited substition between man-made and natural capital and argue that most ecosystems and natural capital needs to be preserved. The difference between the two concepts is not unlimited versus no substitution (i.e. the extremes), but rather different degrees of substitution (high versus low) in addition to attaching high or low importance to aggregate capital stocks, but also different interpretations of sustainability (with traditional economists favouring weak sustainability and ecologists or natural scientists advocating strong sustainability resulting in inconsistent views of sustainability - see for example Ayres R, van den Berrgh J, Gowdy J (2001) Strong versus weak sustainability, Environmental Ethics 23(2):155-168	This has been deleted to shorten ES.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
19273	4	40				COMMENT: This is a really good way to focus the discussion and to make the reader refocus their thinking.	Noted. Thanks.
21647	4	40	1	40	43	This section is too detailed in terms of relevance to the chapter. Suggest to be shortened.	Rejected. The debate on producer vs. consumer responisbility for emissions is central to equity considerations in climate policy and hence for Ch4. From this perspective, devoting one page on the question how these two approaches differ doesn't seem exaggerated.
31707	4	40	15		16	This section should be drafted to make it clearer that this is opinion of a certain group of commentators. Or state “it is argued by xxx “	Accepted. The sentence has been changed to "Hence, some authors (e.g. Peters and Hertwich, 2008; Bows and Barrett, 2010) argue that this approach gives a fairer illustration of responsibility for current emissions.
21190	4	40	16			Change to "modeled"	Editorial – copyedit to be completed prior to publication.
25685	4	40	2	40	7	This part should be deleted completely because market-based mechanism such as emission trading has several problems. Volatility of emission permit prices affects volatility of product prices as evidenced by fluctuating price developments in the EU-ETS. Therefore, the market-based policy tools of cap-and-trade cannot provide credible incentives for the technological change, as described in (Montgomery, 2005, abstract) and (Baldursson, 2009, page29). In addition, CO2 leakage caused by the implementation of the ETS happened actually through transfer of industry from one country to others. Market mechanisms at least under Kyoto-like international scheme, where the condition of all countries' meaningful participation is not met, do not work well, as shown in (Rosendahl, 2011, abstract), (Aichele, 2012, page336), and (Peters, 2011, page1). These literatures are listed in the No9 line of this table.	Rejected. This section does not deliver any judgment on market-based mechanisms, such as emissions trading. It only compares under which circumstances consumption- and production-based policies differ.
19271	4	40	21		33	NICE!!	Noted. Thanks.
29614	4	40	26	40	28	Why ? Please explain.	Accepted. The sentence has been rephrased to "That is, if some goods or services were not consumed in a given country, global emissions would not necessarily decrease by the same amount of emissions generated for their production, as this country’s trade partners would adjust their consumption – as well as production – patterns in response to price changes resulting from its changed demand profile."

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
19272	4	40	35			COMMENT: Need to define 'territorial' since people can have several definitions. I assume this is national boundaries?	Accepted. The sentence has been changed to "It is for this reason that Jakob and Marschinski (2013) argue that a more detailed understanding of the underlying determinants of emissions is needed than what is currently provided by either territorial or consumption-based accounts, in order to guide policies that will effectively reduce global emissions in a fragmented climate policy regime."
41213	4	40	45	41	8	The answer provided, while correct, does not match the question asked. The question is a subjective question while the answer is factual. The question should be reworded to make them consistent.	Accepted. The question has been rephrased to "How can we properly account for all emissions related to consumption activities, even if these emissions occur in other countries?"
35402	4	41				What kind of consumption has the greatest environmental impact? A criteria that should be included here is the idea that consumption of products that cannot be reused or recycled; or consumption of throw-away products, wil definitely have a greater impact than consumption of other products that can be reinserted into nature, industry or society via material efficiency strategies. It would be important to add that about a third of food for human consumption is wasted globally (FAO & Interpack, 2011, Save Food, Global Food loses and food waste), and add that in developing countries 40% of food waste happen after harvest and during processing whereas in industrialised countries over 40% food wastage occurs at retail and consumer level (European Commission http://ec.europa.eu/food/food/sustainability/indez_en.htm	Taken into account. There are now several references to waste and waste management in sec. 4.4.
35456	4	41				What kind of consumption has the greatest enviornmental impact? A criteria that should be included here is the idea that consumption of products that cannot be reused or recycled; or consumption of throw-away products, wil defintely have a greater impact than consumption of other products that can be reinserted into nature, industry or society via material efficiency strategies. It would be important to add that about a third of food for human consumption is wasted globallly (FAO & Interpack, 2011, Save Food, Global Food loses and food waste), and add that in developping countries 40% of food waste happen after harvest and during processing whereas in industrialised countries over 40% food wastage occurs at retail and consumer level (European Commission http://ec.europa.eu/food/food/sustainability/indez_en.htm	Taken into account. There are now several references to waste and waste management in sec. 4.4.
29550	4	41				What kind of consumption has the greatest enviornmental impact? Hopefully the answer to this question would include the idea that consumption of products that cannot be reused or recycled; or consumption of throw-away products, will definetely have a greater impact than consumption of other products that can be reinserted into nature, industry or society via material efficiency strategies.	Taken into account. There are now several references to waste and waste management in sec. 4.4.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
26964	4	41				What kind of consumption has the greatest enviornmental impact? A criteria that should be included here is the idea that consumption of products that cannot be reused or recycled; or consumption of throw-away products, wil defintely have a greater impact than consumption of other products that can be reinserted into nature, industry or society via material efficiency strategies. It would be important to add that about a third of food for human consumption is wasted globallly (FAO & Interpack, 2011, Save Food, Global Food loses and food waste), and add that in developping countries 40% of food waste happen after harvest and during processing whereas in industrialised countries over 40% food wastage occurs at retail and consumer level (European Commission http://ec.europa.eu/food/food/sustainability/indez_en.htm	Taken into account. There are now several references to waste and waste management in sec. 4.4. although space limitations prevented a discussio of food waste per se.
41214	4	41	12	41	13	The full sentence in the middle is a very broad statement with questionable causal direction. The authors should conside revising.	Accepted. The sentence has been revised.
41215	4	41	13	41	16	Under FAQ 4.4, claims are made about the sizes of shares of global GHG emissions, with no literature citations provided to support these claims. Please support these claims with appropriate citations. Also, where does generation of electric power fit in this scheme?	Noted. Only one figure is mentioned now, taken from sec. 4.4.1.3 which also provides a citation (Hertwixh and Peters 2009). FAQs don't usually include citations.
41216	4	41	14	41	15	Is the sentence "research has shown that food accounts for the largest share of consumption-based GHG emissions" universally true, or this is a global average? This is confusing, as it seems that what activity has the largest impact varies by region of the world. This sentence needs to be made clearer.	Accepted. This been made clear by starting the sentence with "At the global scale, .." indicating that it is a global average.
19274	4	41	14			NOTE: I would include resources such as forest extraction or deforestation as consumption. Since this can account for 30% of the emissions, my first reaction is that food is not the largest GHG emitter. Others may have the same reaction that I have and may define consumption like what I am doing.	Noted. Forest extraction or deforestation are not normally considered categories of consumption but activities carried out as part of productive activities (e.g. food or timber production) and hence should in principle be included in the accounting of consumption emissions.
41217	4	41	17	41	17	The discussion of "mobility" needs to be better coupled with land use and zoning impacts of automobile-based development. This might already be addressed in the Transport chapter, and if so can be cross referenced.	Accepted. Cross reference has been added to Chapter 8 (Transport) in sec. 4.4.1.3 from which this FAQ si derived.
21648	4	41	6	41	8	The consumption-based relationship with GDP needs to be more robustly defended against criticism that the relationship between consumption CO2 and total expenditure is not simply caused by the methods used in input-output modelling.	Taken into account. There is not space in a FAQ to explain this, but the issue has been addressed mainly in Annex II (Methodology) to the report.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
41218	4	41	18	46	9	This section takes a very narrow view of SCP and only looks at it in the form of programs that are specifically called SCP. This is not in keeping with the language or the original intent of WSSD in 2002 when it called for "actions at all levels set our below....'Encourage and promote the development of a 10-year framework of programs in support of regional and national initiatives to accelerate the shift forwards sustainable consumption and production to promote social and economic development within the carrying capacity of ecosystems by addressing and , when appropriate, delinking economic growth and environmental degradation through improving efficiency and sustainability in the use of resources and production processes and reducing resource degradation pollution and waste. …" This is repeated in the quote from Rio +20 which states "support for regional and national is necessary"	Taken into account. Due to space constraints, the review of SCP-related initiatives has been condensed into a couple of sentences and emphasis placed on the research literature on sustainable consumption, lifestyle and production (4.4.3.2 - 4.4.3.4).
41219	4	41	18	46	9	These regional and national initiatives need not be labeled SCP and in most case they are not. Even the work on this topic by the OECD is often considered under the topic of decoupling and includes efforts on the Japanese inspired 3R initiative "reduce, reuse and recycle" and more recently the OECD "sustainable manufacturing metrics toolkit". Many of the international efforts are based in the joint UNEP UNIDO program on clean production and most are still called that. Clean production efforts are also supported by a number of bilateral donors including Japan, Switzerland and the US. In the US we are strongly supportive of efforts to foster the objectives of scp but we don't call it scp. An example of the US government commitment to it is Executive Order 13514 issued by President Obama on Oct 2009. It sets sustainability goals for federal agencies and focuses their improvement in the environmental energy and economic performance. The Executive Order required Federal agencies to submit a 2020 greenhouse gas pollution reduction target within 90 days, and to increase energy efficiency, reduce fleet petroleum consumption, conserve water, reduce waste, support sustainable communities, and leverage Federal purchasing power to promote environmentally-responsible products and technologies. The US Department of Commerce also has a sustainable manufacturing initiative and the USDA has a Life Cycle Assessment initiative which includes a Life Cycle Assessment Digital Data Commons project www.lcacommons.gov which includes links teo many articles n the international journal of LCA. In the area of sustainable consumption we utilize range of approaches from regulatory to voluntary approaches including CAFÉ standards for vehicle manufacturing and estimated mileage labeling on all vehicles sold in the US to government approved certification schemes for the use of the term "organic" in food manufacturing to the voluntary sustainable related certification schemes including for example buildings, lumber and seafood.	Taken into account. Due to space constraints, the review of SCP-related initiatives has been condensed into a couple of sentences and emphasis placed on the research literature on sustainable consumption, lifestyle and production (4.4.3.2 - 4.4.3.4).
41220	4	41	18	46	9	The report also totally overlooks the robust engagement in the issue of sustainability by the private sector. There are a host of initiatives that are having a significant impact on the sustainability practices of the private sector and which address the issues encompassed in the concepts of SCP. These include groups such as the Global Reporting Initiative, the efforts of CERES, the UNEP Finance Initiative, and the Business council for Sustainable Development.	Taken into account. Will mention this category of initatives too.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
41221	4	41	18	46	9	In education and research there is a significant effort to include sustainability concepts in a variety of education programs from MBA business programs to engineering programs and there is significant research in many different facets of SCP as revealed by the US National Academies of Science focus on Sustainability http://sites.nationalacademies.org/PGA/sustainability/index.htm	Taken into account. Due to space constraints, the review of SCP-related initiatives has been condensed into a couple of sentences and emphasis placed on the research literature on sustainable consumption, lifestyle and production (4.4.3.2 - 4.4.3.4) and in finalising these sections literature published by the US PNAS has been reviewed as appropriate and in light of space constraints.
41222	4	41	18	46	9	The authors need to go back to WSSD section 3 paras 14 – 23 to really get a look at what governments envisioned in what “development of a 10-year framework of programs in support of regional and national initiatives” would entail. They won’t find it is focused on a narrow set of policy directive labeled SCP, they will find a robust set of efforts across the board that they have totally overlooked in their analysis.	Taken into account. Due to space constraints, the review of SCP-related initiatives has been condensed into a couple of sentences and emphasis placed on the research literature on sustainable consumption, lifestyle and production (sections 4.4.3.2 - 4.4.3.4.). The text on the initiatives now reads "A great variety of public and private SCP policies and initiatives have developed alongside the UN-led initiatives (see Ch. 10.11.3), as has a large body of research that we report on below."

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32474	4	414				The page numbers refer to the pages of the pdf document (and do not coincide with the page numbers as printed in the bottom right of the document. Life Cycle Assessment (LCA) is standardused by ISO with that name. Therefore, it should never be referred to as Life Cycle Analysis. Furthermore, once defined, it can be referred to simply as "LCA". Many important works of Brandão et al. (e.g. 2013) and Levasseur are missing, which are particular relevant to chapters 8 and 11. These are: -Brandão M, Levasseur A, Kirschbaum M, Cowie A, Weidema B, Jørgensen SV, Hauschild M, Chomkhamsri K, Pennington D (2013) Key issues and options in accounting for carbon sequestration and temporary storage in life cycle assessment and carbon footprinting. The International Journal of Life Cycle Assessment 18 (1) 230-240. DOI: 10.1007/s11367-012-0451-6. http://link.springer.com/article/10.1007%2Fs11367-012-0451-6 -Levasseur A, Lesage P, Margni M, Brandão M, Samson R (2012) Assessing temporary carbon sequestration and storage projects through land use, land-use change and forestry: comparison of dynamic life cycle assessment with ton-year approaches. Climatic Change. DOI: 10.1007/s10584-012-0473-x. http://www.springerlink.com/content/b3251u56v728m870/?MUD=MP13. -Levasseur A, Brandão M, Lesage P, Margni M, Pennington D, Clift R, Samson S (2012) Valuing temporary carbon storage. Nature Climate Change 2, 6–8. doi:10.1038/nclimate1335. http://www.nature.com/nclimate/journal/v2/n1/full/nclimate1335.html. -Brandão M, Mila i Canals L, Clift R (2011) Soil Organic Carbon changes in the cultivation of energy crops: implications for GHG balances and soil quality for use in LCA. Biomass & Bioenergy35 (6). 2323–2336. Special issue: Modelling Environmental, Economic and Social Aspects in the Assessment of Biofuels. http://www.sciencedirect.com/science/article/pii/S0961953409002402 -Brandão M, Clift R, Mila I Canals L, Basson L (2010) A Life-Cycle Approach to Characterising Environmental and Economic Impacts of Multifunctional Land-Use Systems: An Integrated Assessment in the UK. Sustainability 2(12): 3747-3776. Special issue: Life Cycle Sustainability Assessment. http://www.mdpi.com/2071-1050/2/12/3747/pdf -Mueller-Wenk R and Brandão M (2010) Climatic impact of land use in LCA - carbon transfers between vegetation/soil and air. The International Journal of Life Cycle Assessment 15(2) 172-182. http://www.springerlink.com/content/02628184t2q98051/fulltext.pdf -Brandão M (2012) Food, Feed, Fuel, Timber or Carbon Sink? Towards Sustainable Land Use: a consequential life cycle approach. Springer. 125pp. -Brandão M (2012) Food, Feed, Fuel, Timber or Carbon Sink? Towards Sustainable Land Use: a consequential life cycle approach. PhD thesis. Centre for Environmental Strategy (Division of Civil, Chemical and Environmental Engineering), Faculty of Engineering and Physical Sciences, University of Surrey, UK. 246 pp. Appendices 541 pp. -Mulligan D, Edwards R, Marelli L, Scarlat N, Brandão M, Monforti-Ferrario F (2010) The effects of increased demand for biofuel feedstocks on the world agricultural markets and areas. Luxembourg: Publications Office of the European Union. ISBN 978-92-79-16220-6. http://publications.jrc.ec.europa.eu/repository/bitstream/111111111/16193/1/en24464_iluc%20workshop.pdf -Brandão M, Levasseur A (2011) Assessing temporary carbon storage in life cycle assessment and carbon footprinting: outcomes of an expert workshop. Joint Research Centre, European Commission, Ispra, Italy	Editorial - copyedit to be completed prior to publication (regarding first sentence). The references are mainly relevant to Chapter 8 and 11.

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32475	4	416				The page numbers refer to the pages of the pdf document (and do not coincide with the page numbers as printed in the bottom right of the document. Life Cycle Assessment (LCA) is standardused by ISO with that name. Therefore, it should never be referred to as Life Cycle Analysis. Furthermore, once defined, it can be referred to simply as "LCA". Many important works of Brandão et al. (e.g. 2013) and Levasseur are missing, which are particular relevant to chapters 8 and 11. These are: -Brandão M, Levasseur A, Kirschbaum M, Cowie A, Weidema B, Jørgensen SV, Hauschild M, Chomkhamsri K, Pennington D (2013) Key issues and options in accounting for carbon sequestration and temporary storage in life cycle assessment and carbon footprinting. The International Journal of Life Cycle Assessment 18 (1) 230-240. DOI: 10.1007/s11367-012-0451-6. http://link.springer.com/article/10.1007%2Fs11367-012-0451-6 -Levasseur A, Lesage P, Margni M, Brandão M, Samson R (2012) Assessing temporary carbon sequestration and storage projects through land use, land-use change and forestry: comparison of dynamic life cycle assessment with ton-year approaches. Climatic Change. DOI: 10.1007/s10584-012-0473-x. http://www.springerlink.com/content/b3251u56v728m870/?MUD=MP13. -Levasseur A, Brandão M, Lesage P, Margni M, Pennington D, Clift R, Samson S (2012) Valuing temporary carbon storage. Nature Climate Change 2, 6–8. doi:10.1038/nclimate1335. http://www.nature.com/nclimate/journal/v2/n1/full/nclimate1335.html. -Brandão M, Mila i Canals L, Clift R (2011) Soil Organic Carbon changes in the cultivation of energy crops: implications for GHG balances and soil quality for use in LCA. Biomass & Bioenergy35 (6). 2323–2336. Special issue: Modelling Environmental, Economic and Social Aspects in the Assessment of Biofuels. http://www.sciencedirect.com/science/article/pii/S0961953409002402 -Brandão M, Clift R, Mila I Canals L, Basson L (2010) A Life-Cycle Approach to Characterising Environmental and Economic Impacts of Multifunctional Land-Use Systems: An Integrated Assessment in the UK. Sustainability 2(12): 3747-3776. Special issue: Life Cycle Sustainability Assessment. http://www.mdpi.com/2071-1050/2/12/3747/pdf -Mueller-Wenk R and Brandão M (2010) Climatic impact of land use in LCA - carbon transfers between vegetation/soil and air. The International Journal of Life Cycle Assessment 15(2) 172-182. http://www.springerlink.com/content/02628184t2q98051/fulltext.pdf -Brandão M (2012) Food, Feed, Fuel, Timber or Carbon Sink? Towards Sustainable Land Use: a consequential life cycle approach. Springer. 125pp. -Brandão M (2012) Food, Feed, Fuel, Timber or Carbon Sink? Towards Sustainable Land Use: a consequential life cycle approach. PhD thesis. Centre for Environmental Strategy (Division of Civil, Chemical and Environmental Engineering), Faculty of Engineering and Physical Sciences, University of Surrey, UK. 246 pp. Appendices 541 pp. -Mulligan D, Edwards R, Marelli L, Scarlat N, Brandão M, Monforti-Ferrario F (2010) The effects of increased demand for biofuel feedstocks on the world agricultural markets and areas. Luxembourg: Publications Office of the European Union. ISBN 978-92-79-16220-6. http://publications.jrc.ec.europa.eu/repository/bitstream/111111111/16193/1/en24464_iluc%20workshop.pdf -Brandão M, Levasseur A (2011) Assessing temporary carbon storage in life cycle assessment and carbon footprinting: outcomes of an expert workshop. Joint Research Centre, European Commission, Ispra, Italy	Editorial - copyedit to be completed prior to publication (regarding first sentence). The references are mainly relevant to Chapter 8 and 11.

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32476	4	418				The page numbers refer to the pages of the pdf document (and do not coincide with the page numbers as printed in the bottom right of the document. Life Cycle Assessment (LCA) is standardused by ISO with that name. Therefore, it should never be referred to as Life Cycle Analysis. Furthermore, once defined, it can be referred to simply as "LCA". Many important works of Brandão et al. (e.g. 2013) and Levasseur are missing, which are particular relevant to chapters 8 and 11. These are: -Brandão M, Levasseur A, Kirschbaum M, Cowie A, Weidema B, Jørgensen SV, Hauschild M, Chomkhamsri K, Pennington D (2013) Key issues and options in accounting for carbon sequestration and temporary storage in life cycle assessment and carbon footprinting. The International Journal of Life Cycle Assessment 18 (1) 230-240. DOI: 10.1007/s11367-012-0451-6. http://link.springer.com/article/10.1007%2Fs11367-012-0451-6 -Levasseur A, Lesage P, Margni M, Brandão M, Samson R (2012) Assessing temporary carbon sequestration and storage projects through land use, land-use change and forestry: comparison of dynamic life cycle assessment with ton-year approaches. Climatic Change. DOI: 10.1007/s10584-012-0473-x. http://www.springerlink.com/content/b3251u56v728m870/?MUD=MP13. -Levasseur A, Brandão M, Lesage P, Margni M, Pennington D, Clift R, Samson S (2012) Valuing temporary carbon storage. Nature Climate Change 2, 6–8. doi:10.1038/nclimate1335. http://www.nature.com/nclimate/journal/v2/n1/full/nclimate1335.html. -Brandão M, Mila i Canals L, Clift R (2011) Soil Organic Carbon changes in the cultivation of energy crops: implications for GHG balances and soil quality for use in LCA. Biomass & Bioenergy35 (6). 2323–2336. Special issue: Modelling Environmental, Economic and Social Aspects in the Assessment of Biofuels. http://www.sciencedirect.com/science/article/pii/S0961953409002402 -Brandão M, Clift R, Mila I Canals L, Basson L (2010) A Life-Cycle Approach to Characterising Environmental and Economic Impacts of Multifunctional Land-Use Systems: An Integrated Assessment in the UK. Sustainability 2(12): 3747-3776. Special issue: Life Cycle Sustainability Assessment. http://www.mdpi.com/2071-1050/2/12/3747/pdf -Mueller-Wenk R and Brandão M (2010) Climatic impact of land use in LCA - carbon transfers between vegetation/soil and air. The International Journal of Life Cycle Assessment 15(2) 172-182. http://www.springerlink.com/content/02628184t2q98051/fulltext.pdf -Brandão M (2012) Food, Feed, Fuel, Timber or Carbon Sink? Towards Sustainable Land Use: a consequential life cycle approach. Springer. 125pp. -Brandão M (2012) Food, Feed, Fuel, Timber or Carbon Sink? Towards Sustainable Land Use: a consequential life cycle approach. PhD thesis. Centre for Environmental Strategy (Division of Civil, Chemical and Environmental Engineering), Faculty of Engineering and Physical Sciences, University of Surrey, UK. 246 pp. Appendices 541 pp. -Mulligan D, Edwards R, Marelli L, Scarlat N, Brandão M, Monforti-Ferrario F (2010) The effects of increased demand for biofuel feedstocks on the world agricultural markets and areas. Luxembourg: Publications Office of the European Union. ISBN 978-92-79-16220-6. http://publications.jrc.ec.europa.eu/repository/bitstream/111111111/16193/1/en24464_iluc%20workshop.pdf -Brandão M, Levasseur A (2011) Assessing temporary carbon storage in life cycle assessment and carbon footprinting: outcomes of an expert workshop. Joint Research Centre, European Commission, Ispra, Italy	Editorial - copyedit to be completed prior to publication (regarding first sentence). The references are mainly relevant to Chapter 8 and 11.
23524	4	42	26	42	42	Would be useful here to acknowledge sociological conceptions of practice that highlight the embeddedness of practices in social norms, institutions, discourses, infrastructures etc. (e.g. Southerton, D., Warde, A. & Hand, M., 2004. The limited autonomy of the consumer: Implications for sustainable consumption. In Southerton, D., Chappels, H. & Van Vliet, B. eds. Sustainable consumption: The implications of changing infrastructures of provision. Cheltenham: Edward Elgar, 32-47; Warde, A., 2005. Consumption and theories of practice. Journal of Consumer Culture, 5 (2), 131-153; Shove, E., Pantzar, M. & Watson, M., 2012. The dynamics of social practice. Everyday life and how it changes London: Sage).	Taken into account.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
19275	4	42	4		28	COMMENT: This is a really good introduction, is a well balanced, and addresses the key points without ignoring or not explaining the uncertainties. Most of the chapter has been written where there is an excellent introduction of the topic and a balanced summarization of the materials that is relevant for the reader to know.	Noted. Thanks.
32477	4	421				The page numbers refer to the pages of the pdf document (and do not coincide with the page numbers as printed in the bottom right of the document. Life Cycle Assessment (LCA) is standardused by ISO with that name. Therefore, it should never be referred to as Life Cycle Analysis. Furthermore, once defined, it can be referred to simply as "LCA". Many important works of Brandão et al. (e.g. 2013) and Levasseur are missing, which are particular relevant to chapters 8 and 11. These are: -Brandão M, Levasseur A, Kirschbaum M, Cowie A, Weidema B, Jørgensen SV, Hauschild M, Chomkhamsri K, Pennington D (2013) Key issues and options in accounting for carbon sequestration and temporary storage in life cycle assessment and carbon footprinting. The International Journal of Life Cycle Assessment 18 (1) 230-240. DOI: 10.1007/s11367-012-0451-6. http://link.springer.com/article/10.1007%2Fs11367-012-0451-6 -Levasseur A, Lesage P, Margni M, Brandão M, Samson R (2012) Assessing temporary carbon sequestration and storage projects through land use, land-use change and forestry: comparison of dynamic life cycle assessment with ton-year approaches. Climatic Change. DOI: 10.1007/s10584-012-0473-x. http://www.springerlink.com/content/b3251u56v728m870/?MUD=MP13. -Levasseur A, Brandão M, Lesage P, Margni M, Pennington D, Clift R, Samson S (2012) Valuing temporary carbon storage. Nature Climate Change 2, 6–8. doi:10.1038/nclimate1335. http://www.nature.com/nclimate/journal/v2/n1/full/nclimate1335.html. -Brandão M, Mila i Canals L, Clift R (2011) Soil Organic Carbon changes in the cultivation of energy crops: implications for GHG balances and soil quality for use in LCA. Biomass & Bioenergy35 (6). 2323–2336. Special issue: Modelling Environmental, Economic and Social Aspects in the Assessment of Biofuels. http://www.sciencedirect.com/science/article/pii/S0961953409002402 -Brandão M, Clift R, Mila I Canals L, Basson L (2010) A Life-Cycle Approach to Characterising Environmental and Economic Impacts of Multifunctional Land-Use Systems: An Integrated Assessment in the UK. Sustainability 2(12): 3747-3776. Special issue: Life Cycle Sustainability Assessment. http://www.mdpi.com/2071-1050/2/12/3747/pdf -Mueller-Wenk R and Brandão M (2010) Climatic impact of land use in LCA - carbon transfers between vegetation/soil and air. The International Journal of Life Cycle Assessment 15(2) 172-182. http://www.springerlink.com/content/02628184t2q98051/fulltext.pdf -Brandão M (2012) Food, Feed, Fuel, Timber or Carbon Sink? Towards Sustainable Land Use: a consequential life cycle approach. Springer. 125pp. -Brandão M (2012) Food, Feed, Fuel, Timber or Carbon Sink? Towards Sustainable Land Use: a consequential life cycle approach. PhD thesis. Centre for Environmental Strategy (Division of Civil, Chemical and Environmental Engineering), Faculty of Engineering and Physical Sciences, University of Surrey, UK. 246 pp. Appendices 541 pp. -Mulligan D, Edwards R, Marelli L, Scarlat N, Brandão M, Monforti-Ferrario F (2010) The effects of increased demand for biofuel feedstocks on the world agricultural markets and areas. Luxembourg: Publications Office of the European Union. ISBN 978-92-79-16220-6. http://publications.jrc.ec.europa.eu/repository/bitstream/111111111/16193/1/en24464_iluc%20workshop.pdf -Brandão M, Levasseur A (2011) Assessing temporary carbon storage in life cycle assessment and carbon footprinting: outcomes of an expert workshop. Joint Research Centre, European Commission, Ispra, Italy	Editorial - copyedit to be completed prior to publication (regarding first sentence). The references are mainly relevant to Chapter 8 and 11.

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32478	4	423				The page numbers refer to the pages of the pdf document (and do not coincide with the page numbers as printed in the bottom right of the document. Life Cycle Assessment (LCA) is standardused by ISO with that name. Therefore, it should never be referred to as Life Cycle Analysis. Furthermore, once defined, it can be referred to simply as "LCA". Many important works of Brandão et al. (e.g. 2013) and Levasseur are missing, which are particular relevant to chapters 8 and 11. These are: -Brandão M, Levasseur A, Kirschbaum M, Cowie A, Weidema B, Jørgensen SV, Hauschild M, Chomkhamsri K, Pennington D (2013) Key issues and options in accounting for carbon sequestration and temporary storage in life cycle assessment and carbon footprinting. The International Journal of Life Cycle Assessment 18 (1) 230-240. DOI: 10.1007/s11367-012-0451-6. http://link.springer.com/article/10.1007%2Fs11367-012-0451-6 -Levasseur A, Lesage P, Margni M, Brandão M, Samson R (2012) Assessing temporary carbon sequestration and storage projects through land use, land-use change and forestry: comparison of dynamic life cycle assessment with ton-year approaches. Climatic Change. DOI: 10.1007/s10584-012-0473-x. http://www.springerlink.com/content/b3251u56v728m870/?MUD=MP13. -Levasseur A, Brandão M, Lesage P, Margni M, Pennington D, Clift R, Samson S (2012) Valuing temporary carbon storage. Nature Climate Change 2, 6–8. doi:10.1038/nclimate1335. http://www.nature.com/nclimate/journal/v2/n1/full/nclimate1335.html. -Brandão M, Mila i Canals L, Clift R (2011) Soil Organic Carbon changes in the cultivation of energy crops: implications for GHG balances and soil quality for use in LCA. Biomass & Bioenergy35 (6). 2323–2336. Special issue: Modelling Environmental, Economic and Social Aspects in the Assessment of Biofuels. http://www.sciencedirect.com/science/article/pii/S0961953409002402 -Brandão M, Clift R, Mila I Canals L, Basson L (2010) A Life-Cycle Approach to Characterising Environmental and Economic Impacts of Multifunctional Land-Use Systems: An Integrated Assessment in the UK. Sustainability 2(12): 3747-3776. Special issue: Life Cycle Sustainability Assessment. http://www.mdpi.com/2071-1050/2/12/3747/pdf -Mueller-Wenk R and Brandão M (2010) Climatic impact of land use in LCA - carbon transfers between vegetation/soil and air. The International Journal of Life Cycle Assessment 15(2) 172-182. http://www.springerlink.com/content/02628184t2q98051/fulltext.pdf -Brandão M (2012) Food, Feed, Fuel, Timber or Carbon Sink? Towards Sustainable Land Use: a consequential life cycle approach. Springer. 125pp. -Brandão M (2012) Food, Feed, Fuel, Timber or Carbon Sink? Towards Sustainable Land Use: a consequential life cycle approach. PhD thesis. Centre for Environmental Strategy (Division of Civil, Chemical and Environmental Engineering), Faculty of Engineering and Physical Sciences, University of Surrey, UK. 246 pp. Appendices 541 pp. -Mulligan D, Edwards R, Marelli L, Scarlat N, Brandão M, Monforti-Ferrario F (2010) The effects of increased demand for biofuel feedstocks on the world agricultural markets and areas. Luxembourg: Publications Office of the European Union. ISBN 978-92-79-16220-6. http://publications.jrc.ec.europa.eu/repository/bitstream/111111111/16193/1/en24464_iluc%20workshop.pdf -Brandão M, Levasseur A (2011) Assessing temporary carbon storage in life cycle assessment and carbon footprinting: outcomes of an expert workshop. Joint Research Centre, European Commission, Ispra, Italy	Editorial - copyedit to be completed prior to publication (regarding first sentence). The references are mainly relevant to Chapter 8 and 11.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
32479	4	425				The page numbers refer to the pages of the pdf document (and do not coincide with the page numbers as printed in the bottom right of the document. Life Cycle Assessment (LCA) is standardused by ISO with that name. Therefore, it should never be referred to as Life Cycle Analysis. Furthermore, once defined, it can be referred to simply as "LCA". Many important works of Brandão et al. (e.g. 2013) and Levasseur are missing, which are particular relevant to chapters 8 and 11. These are: -Brandão M, Levasseur A, Kirschbaum M, Cowie A, Weidema B, Jørgensen SV, Hauschild M, Chomkhamsri K, Pennington D (2013) Key issues and options in accounting for carbon sequestration and temporary storage in life cycle assessment and carbon footprinting. The International Journal of Life Cycle Assessment 18 (1) 230-240. DOI: 10.1007/s11367-012-0451-6. http://link.springer.com/article/10.1007%2Fs11367-012-0451-6 -Levasseur A, Lesage P, Margni M, Brandão M, Samson R (2012) Assessing temporary carbon sequestration and storage projects through land use, land-use change and forestry: comparison of dynamic life cycle assessment with ton-year approaches. Climatic Change. DOI: 10.1007/s10584-012-0473-x. http://www.springerlink.com/content/b3251u56v728m870/?MUD=MP13. -Levasseur A, Brandão M, Lesage P, Margni M, Pennington D, Clift R, Samson S (2012) Valuing temporary carbon storage. Nature Climate Change 2, 6–8. doi:10.1038/nclimate1335. http://www.nature.com/nclimate/journal/v2/n1/full/nclimate1335.html. -Brandão M, Mila i Canals L, Clift R (2011) Soil Organic Carbon changes in the cultivation of energy crops: implications for GHG balances and soil quality for use in LCA. Biomass & Bioenergy35 (6). 2323–2336. Special issue: Modelling Environmental, Economic and Social Aspects in the Assessment of Biofuels. http://www.sciencedirect.com/science/article/pii/S0961953409002402 -Brandão M, Clift R, Mila I Canals L, Basson L (2010) A Life-Cycle Approach to Characterising Environmental and Economic Impacts of Multifunctional Land-Use Systems: An Integrated Assessment in the UK. Sustainability 2(12): 3747-3776. Special issue: Life Cycle Sustainability Assessment. http://www.mdpi.com/2071-1050/2/12/3747/pdf -Mueller-Wenk R and Brandão M (2010) Climatic impact of land use in LCA - carbon transfers between vegetation/soil and air. The International Journal of Life Cycle Assessment 15(2) 172-182. http://www.springerlink.com/content/02628184t2q98051/fulltext.pdf -Brandão M (2012) Food, Feed, Fuel, Timber or Carbon Sink? Towards Sustainable Land Use: a consequential life cycle approach. Springer. 125pp. -Brandão M (2012) Food, Feed, Fuel, Timber or Carbon Sink? Towards Sustainable Land Use: a consequential life cycle approach. PhD thesis. Centre for Environmental Strategy (Division of Civil, Chemical and Environmental Engineering), Faculty of Engineering and Physical Sciences, University of Surrey, UK. 246 pp. Appendices 541 pp. -Mulligan D, Edwards R, Marelli L, Scarlat N, Brandão M, Monforti-Ferrario F (2010) The effects of increased demand for biofuel feedstocks on the world agricultural markets and areas. Luxembourg: Publications Office of the European Union. ISBN 978-92-79-16220-6. http://publications.jrc.ec.europa.eu/repository/bitstream/111111111/16193/1/en24464_iluc%20workshop.pdf -Brandão M, Levasseur A (2011) Assessing temporary carbon storage in life cycle assessment and carbon footprinting: outcomes of an expert workshop. Joint Research Centre, European Commission, Ispra, Italy	Editorial - copyedit to be completed prior to publication (regarding first sentence). The references are mainly relevant to Chapter 8 and 11.
21649	4	43	18	44	31	This section discusses eco-labelling in the interests of the environment but does not deal with consumer concer over social issues (e.g. fair trade).	Noted. The social impacts of consumption, while a possible co-benefit of eco-labeling, is not the focus of Sec. 4.4 due to the need to focus on climate mitigation. The issue is partly addressed in section 4.4.3.3. on sustainable production.
19276	4	43	18		27	COMMENT: Good write up, really nice.	Noted. Thanks.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
41223	4	43	2	43	4	The following statement appears:"The effect of advertising on spending is concentrated on luxury goods ...while it is nonexistent in the field of basic necessities (food and clothes)." If so, why do MacDonalds (food) and Old Navy (clothes) spend so much on advertising? The statement should be reconsidered or clarified.	Noted. The sentence has been changed to "According to this study, the effect of advertising on spending is concentrated on luxury goods (household appliances and supplies and automobiles) while it is nonexistent in the field of basic necessities (food and clothes), while Druckman and Jackson (2010) found that in the UK, expenditures on food and clothes clearly exceeded 'necessary' levels."
20519	4	43	2	43	2	The statement that "The effect of advertising.....is nonexistent in the field of basic necessities (clothes and food)" is, in my judgement, incorrect. First, the role of advertising in the clothing and food retail industries cannot be passed off as negligible in Western consumerist societies: evidence for this lies in the marketing budgets of major companies who carry out systematic research to justify the effectiveness of their advertising expenditures. Second, the classification of clothes and food as basic necessities is crude in this context. In Western societies, purchase of clothing, in particular, extends beyond provision of basic necessities. See for example, Table 1 in Druckman and Jackson (2010), which shows that whereas UK household weekly expenditure of £15.55* is required to meet the basic necessities of clothing, UK average household on clothing is £23.12 – nearly 50% higher than 'necessary'. In the case of food, advertising can at least be partially blamed for current obesity levels. * Estimated from the 'Minimum Income Standards' (Bradshaw et al, 2008). References Bradshaw, J., S. Middleton, A. Davis, N. Oldfield, N. Smith, L. Cusworth and J. Williams (2008). A minimum income standard for Britain: what people think. York, UK, Joseph Rowntree Foundation. Druckman, A. and T. Jackson (2010). "The bare necessities: how much household carbon do we really need?" Ecological Economics 69(9): 1794–1804.	Noted. The sentence has been changed to "According to this study, the effect of advertising on spending is concentrated on luxury goods (household appliances and supplies and automobiles) while it is nonexistent in the field of basic necessities (food and clothes), while Druckman and Jackson (2010) found that in the UK, expenditures on food and clothes clearly exceeded 'necessary' levels."
19279	4	44	16		32	COMMENT: Good insights on tools.	Noted. Thanks.
41224	4	44	20	44	21	Climate friendly claims section should also mention what is widely called "greenwashing"- which includes using industry-backed standards that are not always subject to monitoring and verification.	Noted. Space limitations prevent us from addressing this topic in detail.
29004	4	44	25	44	25	Incomplete reference (Maslow).	Noted.
19278	4	44	33		45	COMMENT: Excellent discussion of the trade-offs that need to be made.	Noted. Thanks.
29005	4	44	42	44	45	An authoritative reference regarding discussions of eco-efficiency is: Huppes, G. and M. Ishikawa. 2005. Editor's introduction: Why eco-efficiency? Journal of Industrial Ecology 9(4): 2-5. DOI: 10.1162/108819805775248052	Noted. We agree that it is an authoritative reference, but it doesn't really address what is discussed in these lines so we don't think it would be appropriate to put it in as a reference for these lines.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
21650	4	44	5	44	23	Upham et al. (2011) discusses use of eco labels by consumers and its utility as a behavioural change tool (http://dx.doi.org/10.1016/j.jclepro.2010.05.014)	Noted. The study is based on 3 focus groups in one country and hence does not represent a strong base.
19277	4	44	5		23	COMMENT: Good write up, really nice.	Noted. Thanks.
20710	4	44	32	46	9	This would be a good place to have a detailed discussion of the implications of location of production (sustainable or otherwise) and the full implications of 'embedded' emissions and data thereon.	Noted. This was not possible due to space considerations.
21192	4	45	15	45	19	Change to "labeled"	Editorial – copyedit to be completed prior to publication.
35405	4	45	18		32	Regarding a life cycle approach to evaluate 'sustainable production', it should be considered the advantages of products that can be reused or recycled in comparison to products that are of single-use. Single-use products are wasteful products with high environmental impact. For example, those containers that can be reused have 50-60% less climate impact that those that are single-use. Source: IFEU - Institute for Energy and Environmental Research: Life cycle assessment of refillable glass and PET bottles for mineral water and soft drinks. IFEU, 2008.	Identical to 519.
35459	4	45	18		32	Regarding a life cycle approach to evaluate 'sustainable production', it should be considered the advantages of products that can be reused or recycled in comparison to products that are of single-use. Single-use products are wasteful products with high environmental impact. For example, those containers that can be reused have 50-60% less climate impact that those that are sngle-use. Source: IFEU - Institute for Energy and Environmental Research: Life cycle assessment of refillable glass and PET bottles for mineral water and soft drinks. IFEU, 2008.	Identical to 519.
29553	4	45	18		32	Regarding a life cycle approach to evaluate 'sustainable production', it should be considered the advantages of products that can be reused or recycled in comparison to products that are of single-use. Single-use products are wasteful products with high environmental impact. For example, those containers that can be reused have 50-60% less climate impact that those that are sngle-use. Source: IFEU - Institute for Energy and Environmental Research: Life cycle assessment of refillable glass and PET bottles for mineral water and soft drinks. IFEU, 2008.	Identical to 519.
26967	4	45	18		32	Regarding a life cycle approach to evaluate 'sustainable production', it should be considered the advantages of products that can be reused or recycled in comparison to products that are of single-use. Single-use products are wasteful products with high environmental impact. For example, those containers that can be reused have 50-60% less climate impact that those that are sngle-use. Source: IFEU - Institute for Energy and Environmental Research: Life cycle assessment of refillable glass and PET bottles for mineral water and soft drinks. IFEU, 2008.	Noted. References on waste and recycling have been added. Specifically, p. 45 line 26-27 has been be changed into: "Improvement potentials along product chains can be large, in particular when companies shift from selling only products to delivering product-service systems, often increasing the number of uses of the individual product (Manzini and Vezzoli, 2003)."
21193	4	45	20			Change to "skeptical"	Editorial – copyedit to be completed prior to publication.
21194	4	45	23			Change to "labeling"	Editorial – copyedit to be completed prior to publication.
21195	4	45	29			Change to "eco-labeled"	Editorial – copyedit to be completed prior to publication.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
29007	4	45	29	45	32	Industrial symbiosis should be defined in the glossary. One leading definition is "traditionally separate industries in a collective approach to competitive advantage involving physical exchange of materials, energy, water, and by-products. The keys to industrial symbiosis are collaboration and the synergistic possibilities offered by geographic proximity." (from Chertow, M. R. 2000. Industrial Symbiosis: Literature and Taxonomy. Annual Review of Energy and the Environment 25(1): 313-337.)	Noted.
21651	4	45	8	45	32	This section is too detailed in terms of relevance to the chapter. Suggest it is shortened.	Taken into account. We do not find that the section is too long, but we have shortened it slightly as part of the generic effort to shorten Chapter 4. We have reduced detailed coverage of LCA and shared this information with the relevant author of Annex II. Another reviewer (item 528) found it pertinent to retain some discussion of LCA in Section 4.4 and we have agreed to that.
41225	4	45	8	45	15	LCA's are an important concept to highlight in this chapter. When cutting down the length of the document the authors should spare this section. Second, the authors should reference use of LCAs by numerous regulatory agencies, for example the EPA and DOE in the U.S.	Noted. We have condensed the description of LCA in section 4.4 and refer the reader to Annex II for more details on methodology. We do not find it necessary to mention the wide use of LCA by government agencies or other organisations, but simpy observe that "With its focus on the provided function and its broad coverage of environmental impacts, LCA is frequently used for evaluation of the eco-efficiency of products or production activities."
21191	4	45	9	45	12	Change to "labeling"	Editorial – copyedit to be completed prior to publication.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
32480	4	455		456		The page numbers refer to the pages of the pdf document (and do not coincide with the page numbers as printed in the bottom right of the document. Life Cycle Assessment (LCA) is standardused by ISO with that name. Therefore, it should never be referred to as Life Cycle Analysis. Furthermore, once defined, it can be referred to simply as "LCA". Many important works of Brandão et al. (e.g. 2013) and Levasseur are missing, which are particular relevant to chapters 8 and 11. These are: -Brandão M, Levasseur A, Kirschbaum M, Cowie A, Weidema B, Jørgensen SV, Hauschild M, Chomkhamsri K, Pennington D (2013) Key issues and options in accounting for carbon sequestration and temporary storage in life cycle assessment and carbon footprinting. The International Journal of Life Cycle Assessment 18 (1) 230-240. DOI: 10.1007/s11367-012-0451-6. http://link.springer.com/article/10.1007%2Fs11367-012-0451-6 -Levasseur A, Lesage P, Margni M, Brandão M, Samson R (2012) Assessing temporary carbon sequestration and storage projects through land use, land-use change and forestry: comparison of dynamic life cycle assessment with ton-year approaches. Climatic Change. DOI: 10.1007/s10584-012-0473-x. http://www.springerlink.com/content/b3251u56v728m870/?MUD=MP13. -Levasseur A, Brandão M, Lesage P, Margni M, Pennington D, Clift R, Samson S (2012) Valuing temporary carbon storage. Nature Climate Change 2, 6–8. doi:10.1038/nclimate1335. http://www.nature.com/nclimate/journal/v2/n1/full/nclimate1335.html. -Brandão M, Mila i Canals L, Clift R (2011) Soil Organic Carbon changes in the cultivation of energy crops: implications for GHG balances and soil quality for use in LCA. Biomass & Bioenergy35 (6). 2323–2336. Special issue: Modelling Environmental, Economic and Social Aspects in the Assessment of Biofuels. http://www.sciencedirect.com/science/article/pii/S0961953409002402 -Brandão M, Clift R, Mila I Canals L, Basson L (2010) A Life-Cycle Approach to Characterising Environmental and Economic Impacts of Multifunctional Land-Use Systems: An Integrated Assessment in the UK. Sustainability 2(12): 3747-3776. Special issue: Life Cycle Sustainability Assessment. http://www.mdpi.com/2071-1050/2/12/3747/pdf -Mueller-Wenk R and Brandão M (2010) Climatic impact of land use in LCA - carbon transfers between vegetation/soil and air. The International Journal of Life Cycle Assessment 15(2) 172-182. http://www.springerlink.com/content/02628184t2q98051/fulltext.pdf -Brandão M (2012) Food, Feed, Fuel, Timber or Carbon Sink? Towards Sustainable Land Use: a consequential life cycle approach. Springer. 125pp. -Brandão M (2012) Food, Feed, Fuel, Timber or Carbon Sink? Towards Sustainable Land Use: a consequential life cycle approach. PhD thesis. Centre for Environmental Strategy (Division of Civil, Chemical and Environmental Engineering), Faculty of Engineering and Physical Sciences, University of Surrey, UK. 246 pp. Appendices 541 pp. -Mulligan D, Edwards R, Marelli L, Scarlat N, Brandão M, Monforti-Ferrario F (2010) The effects of increased demand for biofuel feedstocks on the world agricultural markets and areas. Luxembourg: Publications Office of the European Union. ISBN 978-92-79-16220-6. http://publications.jrc.ec.europa.eu/repository/bitstream/111111111/16193/1/en24464_iluc%20workshop.pdf -Brandão M, Levasseur A (2011) Assessing temporary carbon storage in life cycle assessment and carbon footprinting: outcomes of an expert workshop. Joint Research Centre, European Commission, Ispra, Italy	Editorial - copyedit to be completed prior to publication (regarding first sentence). The references are mainly relevant to Chapter 8 and 11.
19280	4	46	11		27	NOTE: This is a really good discussion even though I would suggest that this is totally not relevant for indigenous peoples where culture & traditions are more important than making money (so this may be a western world view)	Noted. It would have been useful with some references to support this view of indigenous people.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
41227	4	46	29	46	30	This sentence is a key to the equity discussion. Essentially it indicates that equity is not an absolute concept, but a relative one (at least in people's perceptions). The authors should better integrate this idea into the chapter, especially in terms of behavior change and the legacy of development. This also has relevance to the discussion on page 47 line 19-20 about de-coupling growth and well-being. The de-coupling is a two fold problem. First the de-coupling has to occur, and then it has to be accurately measured.	Equity is a matter of comparisons, but this does not mean that the concept is just a matter of perception, relativity, subjectivity, as there is philosophical and economic analysis of the various facets of the concepts, as explained in chapters 3 and 4. Given the role of this report as an assessment of the literature, we highlight the various approaches.
27333	4	46	10	46	16	Until now, there has no widely recognised monetary measure that sums up the stock of natural, human and physical assets in nations. Economistas usually settle instead for GDP. But that is a measure of income, not wealth. It values a flow of goods and services, not a stock of assets. Accordingly, when dealing with the question of whether it is relevant to discuss whether human well-being or hapiness can be decoupled from consumption or growth, it could be worth discussing a new report that has been broadly commented since the latest IPCC report: The Inclusive Wealth Report (IWR), overseen by Sir Partha Dasgupta from Cambridge University. The report presents a new metric known as inclusive wealth index (IWI) for evaluating progress in human well-being. The first IWR 2012 focuses on Natural capital and presents the Inclusive Wealth for 20 countries over a period of 19 years. Preliminary results suggest that most countries have positive Inclusive wealth rate changes (a non-declining productive base) but also show declining rates of natural capital calling into question the sustainability of the productive base. Even if the IWR have some clear limitations - its estimates are illustrative, not definittive, and many of the calculations are inevitably crude, just as the first guesstimates of GDP were crude over 70 years ago - we believe the IWR should be mentioned in Chapter 4. This, because the Inclusive Wealth Index (IWI) is a novel approach that strives to inject green accounting into the assessment of a country's capital assets and move beyond the environmental shortfalls of the indicators. This change of perspective stresses its fundamental impact on long-term economic and social sustainability.	Noted. We did not include this new report in the chapter.
41226	4	46	10	47	28	Section 4.4.4 could be removed since it is less relevant than other sections	Rejected. The comment does not explain why this section is less relevant than other sections. There is a large literature on this topic which we find relevant to sustainable development in the context of climate change, in terms of the implications of human well-being of reducing consumption as one among several alternative or complementary climate responses.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
22545	4	46	26	46	29	" ,such as hydropower, .." The sentence is to categorical. It is stated that Hydropower do not reduce water use and may increase water demand. How hydro increase water demand is not described in the referred text. The only refference I can find regarding water consumption in hydro is given in Table 7.4. The Sataye reference points to the SRREN, Ch 9. In fig 9.14 there is an indication that hydro uses water (through evaporation) - however it is stated that the values for hydro is based on very few studies and are not representative - i.e the values given are wrong - this is also reflected in the SRREN ch 5 box 5.2. Table 7.4 do not refelct these caveats and therefore creates a too firm and not substantiated statement - (there is resesearch ongoing i.e. by The International Hydropower Association, EDF and Statkraft (Norway)) - also it could be mentioned that hydro increase water availability through the use of reservoirs, as is said in ch 7 (this draft) page 36 line 29-30. increased water availability comes at a price i.e. net eveporation and thus some water loss from the specific catchment.	Rejected. Comment refers to wrong page/line number and is not relevant to Chapter 4.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
32481	4	461				The page numbers refer to the pages of the pdf document (and do not coincide with the page numbers as printed in the bottom right of the document. Life Cycle Assessment (LCA) is standardused by ISO with that name. Therefore, it should never be referred to as Life Cycle Analysis. Furthermore, once defined, it can be referred to simply as "LCA". Many important works of Brandão et al. (e.g. 2013) and Levasseur are missing, which are particular relevant to chapters 8 and 11. These are: -Brandão M, Levasseur A, Kirschbaum M, Cowie A, Weidema B, Jørgensen SV, Hauschild M, Chomkhamsri K, Pennington D (2013) Key issues and options in accounting for carbon sequestration and temporary storage in life cycle assessment and carbon footprinting. The International Journal of Life Cycle Assessment 18 (1) 230-240. DOI: 10.1007/s11367-012-0451-6. http://link.springer.com/article/10.1007%2Fs11367-012-0451-6 -Levasseur A, Lesage P, Margni M, Brandão M, Samson R (2012) Assessing temporary carbon sequestration and storage projects through land use, land-use change and forestry: comparison of dynamic life cycle assessment with ton-year approaches. Climatic Change. DOI: 10.1007/s10584-012-0473-x. http://www.springerlink.com/content/b3251u56v728m870/?MUD=MP13. -Levasseur A, Brandão M, Lesage P, Margni M, Pennington D, Clift R, Samson S (2012) Valuing temporary carbon storage. Nature Climate Change 2, 6–8. doi:10.1038/nclimate1335. http://www.nature.com/nclimate/journal/v2/n1/full/nclimate1335.html. -Brandão M, Mila i Canals L, Clift R (2011) Soil Organic Carbon changes in the cultivation of energy crops: implications for GHG balances and soil quality for use in LCA. Biomass & Bioenergy35 (6). 2323–2336. Special issue: Modelling Environmental, Economic and Social Aspects in the Assessment of Biofuels. http://www.sciencedirect.com/science/article/pii/S0961953409002402 -Brandão M, Clift R, Mila I Canals L, Basson L (2010) A Life-Cycle Approach to Characterising Environmental and Economic Impacts of Multifunctional Land-Use Systems: An Integrated Assessment in the UK. Sustainability 2(12): 3747-3776. Special issue: Life Cycle Sustainability Assessment. http://www.mdpi.com/2071-1050/2/12/3747/pdf -Mueller-Wenk R and Brandão M (2010) Climatic impact of land use in LCA - carbon transfers between vegetation/soil and air. The International Journal of Life Cycle Assessment 15(2) 172-182. http://www.springerlink.com/content/02628184t2q98051/fulltext.pdf -Brandão M (2012) Food, Feed, Fuel, Timber or Carbon Sink? Towards Sustainable Land Use: a consequential life cycle approach. Springer. 125pp. -Brandão M (2012) Food, Feed, Fuel, Timber or Carbon Sink? Towards Sustainable Land Use: a consequential life cycle approach. PhD thesis. Centre for Environmental Strategy (Division of Civil, Chemical and Environmental Engineering), Faculty of Engineering and Physical Sciences, University of Surrey, UK. 246 pp. Appendices 541 pp. -Mulligan D, Edwards R, Marelli L, Scarlat N, Brandão M, Monforti-Ferrario F (2010) The effects of increased demand for biofuel feedstocks on the world agricultural markets and areas. Luxembourg: Publications Office of the European Union. ISBN 978-92-79-16220-6. http://publications.jrc.ec.europa.eu/repository/bitstream/111111111/16193/1/en24464_iluc%20workshop.pdf -Brandão M, Levasseur A (2011) Assessing temporary carbon storage in life cycle assessment and carbon footprinting: outcomes of an expert workshop. Joint Research Centre, European Commission, Ispra, Italy	Editorial - copyedit to be completed prior to publication (regarding first sentence). The references are mainly relevant to Chapter 8 and 11.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
32482	4	463				The page numbers refer to the pages of the pdf document (and do not coincide with the page numbers as printed in the bottom right of the document. Life Cycle Assessment (LCA) is standardused by ISO with that name. Therefore, it should never be referred to as Life Cycle Analysis. Furthermore, once defined, it can be referred to simply as "LCA". Many important works of Brandão et al. (e.g. 2013) and Levasseur are missing, which are particular relevant to chapters 8 and 11. These are: -Brandão M, Levasseur A, Kirschbaum M, Cowie A, Weidema B, Jørgensen SV, Hauschild M, Chomkhamsri K, Pennington D (2013) Key issues and options in accounting for carbon sequestration and temporary storage in life cycle assessment and carbon footprinting. The International Journal of Life Cycle Assessment 18 (1) 230-240. DOI: 10.1007/s11367-012-0451-6. http://link.springer.com/article/10.1007%2Fs11367-012-0451-6 -Levasseur A, Lesage P, Margni M, Brandão M, Samson R (2012) Assessing temporary carbon sequestration and storage projects through land use, land-use change and forestry: comparison of dynamic life cycle assessment with ton-year approaches. Climatic Change. DOI: 10.1007/s10584-012-0473-x. http://www.springerlink.com/content/b3251u56v728m870/?MUD=MP13. -Levasseur A, Brandão M, Lesage P, Margni M, Pennington D, Clift R, Samson S (2012) Valuing temporary carbon storage. Nature Climate Change 2, 6–8. doi:10.1038/nclimate1335. http://www.nature.com/nclimate/journal/v2/n1/full/nclimate1335.html. -Brandão M, Mila i Canals L, Clift R (2011) Soil Organic Carbon changes in the cultivation of energy crops: implications for GHG balances and soil quality for use in LCA. Biomass & Bioenergy35 (6). 2323–2336. Special issue: Modelling Environmental, Economic and Social Aspects in the Assessment of Biofuels. http://www.sciencedirect.com/science/article/pii/S0961953409002402 -Brandão M, Clift R, Mila I Canals L, Basson L (2010) A Life-Cycle Approach to Characterising Environmental and Economic Impacts of Multifunctional Land-Use Systems: An Integrated Assessment in the UK. Sustainability 2(12): 3747-3776. Special issue: Life Cycle Sustainability Assessment. http://www.mdpi.com/2071-1050/2/12/3747/pdf -Mueller-Wenk R and Brandão M (2010) Climatic impact of land use in LCA - carbon transfers between vegetation/soil and air. The International Journal of Life Cycle Assessment 15(2) 172-182. http://www.springerlink.com/content/02628184t2q98051/fulltext.pdf -Brandão M (2012) Food, Feed, Fuel, Timber or Carbon Sink? Towards Sustainable Land Use: a consequential life cycle approach. Springer. 125pp. -Brandão M (2012) Food, Feed, Fuel, Timber or Carbon Sink? Towards Sustainable Land Use: a consequential life cycle approach. PhD thesis. Centre for Environmental Strategy (Division of Civil, Chemical and Environmental Engineering), Faculty of Engineering and Physical Sciences, University of Surrey, UK. 246 pp. Appendices 541 pp. -Mulligan D, Edwards R, Marelli L, Scarlat N, Brandão M, Monforti-Ferrario F (2010) The effects of increased demand for biofuel feedstocks on the world agricultural markets and areas. Luxembourg: Publications Office of the European Union. ISBN 978-92-79-16220-6. http://publications.jrc.ec.europa.eu/repository/bitstream/111111111/16193/1/en24464_iluc%20workshop.pdf -Brandão M, Levasseur A (2011) Assessing temporary carbon storage in life cycle assessment and carbon footprinting: outcomes of an expert workshop. Joint Research Centre, European Commission, Ispra, Italy	Editorial - copyedit to be completed prior to publication (regarding first sentence). The references are mainly relevant to Chapter 8 and 11.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
32483	4	467		468		The page numbers refer to the pages of the pdf document (and do not coincide with the page numbers as printed in the bottom right of the document. Life Cycle Assessment (LCA) is standardused by ISO with that name. Therefore, it should never be referred to as Life Cycle Analysis. Furthermore, once defined, it can be referred to simply as "LCA". Many important works of Brandão et al. (e.g. 2013) and Levasseur are missing, which are particular relevant to chapters 8 and 11. These are: -Brandão M, Levasseur A, Kirschbaum M, Cowie A, Weidema B, Jørgensen SV, Hauschild M, Chomkhamsri K, Pennington D (2013) Key issues and options in accounting for carbon sequestration and temporary storage in life cycle assessment and carbon footprinting. The International Journal of Life Cycle Assessment 18 (1) 230-240. DOI: 10.1007/s11367-012-0451-6. http://link.springer.com/article/10.1007%2Fs11367-012-0451-6 -Levasseur A, Lesage P, Margni M, Brandão M, Samson R (2012) Assessing temporary carbon sequestration and storage projects through land use, land-use change and forestry: comparison of dynamic life cycle assessment with ton-year approaches. Climatic Change. DOI: 10.1007/s10584-012-0473-x. http://www.springerlink.com/content/b3251u56v728m870/?MUD=MP13. -Levasseur A, Brandão M, Lesage P, Margni M, Pennington D, Clift R, Samson S (2012) Valuing temporary carbon storage. Nature Climate Change 2, 6–8. doi:10.1038/nclimate1335. http://www.nature.com/nclimate/journal/v2/n1/full/nclimate1335.html. -Brandão M, Mila i Canals L, Clift R (2011) Soil Organic Carbon changes in the cultivation of energy crops: implications for GHG balances and soil quality for use in LCA. Biomass & Bioenergy35 (6). 2323–2336. Special issue: Modelling Environmental, Economic and Social Aspects in the Assessment of Biofuels. http://www.sciencedirect.com/science/article/pii/S0961953409002402 -Brandão M, Clift R, Mila I Canals L, Basson L (2010) A Life-Cycle Approach to Characterising Environmental and Economic Impacts of Multifunctional Land-Use Systems: An Integrated Assessment in the UK. Sustainability 2(12): 3747-3776. Special issue: Life Cycle Sustainability Assessment. http://www.mdpi.com/2071-1050/2/12/3747/pdf -Mueller-Wenk R and Brandão M (2010) Climatic impact of land use in LCA - carbon transfers between vegetation/soil and air. The International Journal of Life Cycle Assessment 15(2) 172-182. http://www.springerlink.com/content/02628184t2q98051/fulltext.pdf -Brandão M (2012) Food, Feed, Fuel, Timber or Carbon Sink? Towards Sustainable Land Use: a consequential life cycle approach. Springer. 125pp. -Brandão M (2012) Food, Feed, Fuel, Timber or Carbon Sink? Towards Sustainable Land Use: a consequential life cycle approach. PhD thesis. Centre for Environmental Strategy (Division of Civil, Chemical and Environmental Engineering), Faculty of Engineering and Physical Sciences, University of Surrey, UK. 246 pp. Appendices 541 pp. -Mulligan D, Edwards R, Marelli L, Scarlat N, Brandão M, Monforti-Ferrario F (2010) The effects of increased demand for biofuel feedstocks on the world agricultural markets and areas. Luxembourg: Publications Office of the European Union. ISBN 978-92-79-16220-6. http://publications.jrc.ec.europa.eu/repository/bitstream/111111111/16193/1/en24464_iluc%20workshop.pdf -Brandão M, Levasseur A (2011) Assessing temporary carbon storage in life cycle assessment and carbon footprinting: outcomes of an expert workshop. Joint Research Centre, European Commission, Ispra, Italy	Editorial - copyedit to be completed prior to publication (regarding first sentence). The references are mainly relevant to Chapter 8 and 11.
19281	4	47	38		40	COMMENTS: Good insights provided.	Noted -- Thank you
29615	4	47	41			Footnote 10 : please expain why you then use the term "pathways" at line 29 & 30 as titles, if you prefer "path" ?!	Accepted -- Name harmonized across the Chapter
41228	4	47	29	56	16	The discussion of pathways is quite vague and needs to be reduced in length. 4.5.5 (p. 53) is the most relevant of the subsections.	Noted -- Discussion on pathways made crisper

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
32484	4	475				The page numbers refer to the pages of the pdf document (and do not coincide with the page numbers as printed in the bottom right of the document. Life Cycle Assessment (LCA) is standardused by ISO with that name. Therefore, it should never be referred to as Life Cycle Analysis. Furthermore, once defined, it can be referred to simply as "LCA". Many important works of Brandão et al. (e.g. 2013) and Levasseur are missing, which are particular relevant to chapters 8 and 11. These are: -Brandão M, Levasseur A, Kirschbaum M, Cowie A, Weidema B, Jørgensen SV, Hauschild M, Chomkhamsri K, Pennington D (2013) Key issues and options in accounting for carbon sequestration and temporary storage in life cycle assessment and carbon footprinting. The International Journal of Life Cycle Assessment 18 (1) 230-240. DOI: 10.1007/s11367-012-0451-6. http://link.springer.com/article/10.1007%2Fs11367-012-0451-6 -Levasseur A, Lesage P, Margni M, Brandão M, Samson R (2012) Assessing temporary carbon sequestration and storage projects through land use, land-use change and forestry: comparison of dynamic life cycle assessment with ton-year approaches. Climatic Change. DOI: 10.1007/s10584-012-0473-x. http://www.springerlink.com/content/b3251u56v728m870/?MUD=MP13. -Levasseur A, Brandão M, Lesage P, Margni M, Pennington D, Clift R, Samson S (2012) Valuing temporary carbon storage. Nature Climate Change 2, 6–8. doi:10.1038/nclimate1335. http://www.nature.com/nclimate/journal/v2/n1/full/nclimate1335.html. -Brandão M, Mila i Canals L, Clift R (2011) Soil Organic Carbon changes in the cultivation of energy crops: implications for GHG balances and soil quality for use in LCA. Biomass & Bioenergy35 (6). 2323–2336. Special issue: Modelling Environmental, Economic and Social Aspects in the Assessment of Biofuels. http://www.sciencedirect.com/science/article/pii/S0961953409002402 -Brandão M, Clift R, Mila I Canals L, Basson L (2010) A Life-Cycle Approach to Characterising Environmental and Economic Impacts of Multifunctional Land-Use Systems: An Integrated Assessment in the UK. Sustainability 2(12): 3747-3776. Special issue: Life Cycle Sustainability Assessment. http://www.mdpi.com/2071-1050/2/12/3747/pdf -Mueller-Wenk R and Brandão M (2010) Climatic impact of land use in LCA - carbon transfers between vegetation/soil and air. The International Journal of Life Cycle Assessment 15(2) 172-182. http://www.springerlink.com/content/02628184t2q98051/fulltext.pdf -Brandão M (2012) Food, Feed, Fuel, Timber or Carbon Sink? Towards Sustainable Land Use: a consequential life cycle approach. Springer. 125pp. -Brandão M (2012) Food, Feed, Fuel, Timber or Carbon Sink? Towards Sustainable Land Use: a consequential life cycle approach. PhD thesis. Centre for Environmental Strategy (Division of Civil, Chemical and Environmental Engineering), Faculty of Engineering and Physical Sciences, University of Surrey, UK. 246 pp. Appendices 541 pp. -Mulligan D, Edwards R, Marelli L, Scarlat N, Brandão M, Monforti-Ferrario F (2010) The effects of increased demand for biofuel feedstocks on the world agricultural markets and areas. Luxembourg: Publications Office of the European Union. ISBN 978-92-79-16220-6. http://publications.jrc.ec.europa.eu/repository/bitstream/111111111/16193/1/en24464_iluc%20workshop.pdf -Brandão M, Levasseur A (2011) Assessing temporary carbon storage in life cycle assessment and carbon footprinting: outcomes of an expert workshop. Joint Research Centre, European Commission, Ispra, Italy	Editorial - copyedit to be completed prior to publication (regarding first sentence). The references are mainly relevant to Chapter 8 and 11.
41229	4	48	29	49	18	It would seem that an important citation that is not made for Box 4.5.1 is the book by Robert Ayers and Edward Ayers entitled "Crossing the Energy Divide: Moving from Fossil Fuel Dependence to a Clean-Enegy Future," published by Prentice Hall in 2010.	Reference included.
19282	4	48	31		41	COMMENT: Excellent building on past reports to identify how our thinking has changed or what is new.	Noted -- Thank you
29616	4	48	42			Footnote 11 : please define "EKC" at the first appearance of this term in the Chapter.	Noted -- Reference to Environmental Kuznets Curve hypothesis (EKC) deleted from footnote

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
32485	4	484		486		The page numbers refer to the pages of the pdf document (and do not coincide with the page numbers as printed in the bottom right of the document. Life Cycle Assessment (LCA) is standardused by ISO with that name. Therefore, it should never be referred to as Life Cycle Analysis. Furthermore, once defined, it can be referred to simply as "LCA". Many important works of Brandão et al. (e.g. 2013) and Levasseur are missing, which are particular relevant to chapters 8 and 11. These are: -Brandão M, Levasseur A, Kirschbaum M, Cowie A, Weidema B, Jørgensen SV, Hauschild M, Chomkhamsri K, Pennington D (2013) Key issues and options in accounting for carbon sequestration and temporary storage in life cycle assessment and carbon footprinting. The International Journal of Life Cycle Assessment 18 (1) 230-240. DOI: 10.1007/s11367-012-0451-6. http://link.springer.com/article/10.1007%2Fs11367-012-0451-6 -Levasseur A, Lesage P, Margni M, Brandão M, Samson R (2012) Assessing temporary carbon sequestration and storage projects through land use, land-use change and forestry: comparison of dynamic life cycle assessment with ton-year approaches. Climatic Change. DOI: 10.1007/s10584-012-0473-x. http://www.springerlink.com/content/b3251u56v728m870/?MUD=MP13. -Levasseur A, Brandão M, Lesage P, Margni M, Pennington D, Clift R, Samson S (2012) Valuing temporary carbon storage. Nature Climate Change 2, 6–8. doi:10.1038/nclimate1335. http://www.nature.com/nclimate/journal/v2/n1/full/nclimate1335.html. -Brandão M, Mila i Canals L, Clift R (2011) Soil Organic Carbon changes in the cultivation of energy crops: implications for GHG balances and soil quality for use in LCA. Biomass & Bioenergy35 (6). 2323–2336. Special issue: Modelling Environmental, Economic and Social Aspects in the Assessment of Biofuels. http://www.sciencedirect.com/science/article/pii/S0961953409002402 -Brandão M, Clift R, Mila I Canals L, Basson L (2010) A Life-Cycle Approach to Characterising Environmental and Economic Impacts of Multifunctional Land-Use Systems: An Integrated Assessment in the UK. Sustainability 2(12): 3747-3776. Special issue: Life Cycle Sustainability Assessment. http://www.mdpi.com/2071-1050/2/12/3747/pdf -Mueller-Wenk R and Brandão M (2010) Climatic impact of land use in LCA - carbon transfers between vegetation/soil and air. The International Journal of Life Cycle Assessment 15(2) 172-182. http://www.springerlink.com/content/02628184t2q98051/fulltext.pdf -Brandão M (2012) Food, Feed, Fuel, Timber or Carbon Sink? Towards Sustainable Land Use: a consequential life cycle approach. Springer. 125pp. -Brandão M (2012) Food, Feed, Fuel, Timber or Carbon Sink? Towards Sustainable Land Use: a consequential life cycle approach. PhD thesis. Centre for Environmental Strategy (Division of Civil, Chemical and Environmental Engineering), Faculty of Engineering and Physical Sciences, University of Surrey, UK. 246 pp. Appendices 541 pp. -Mulligan D, Edwards R, Marelli L, Scarlat N, Brandão M, Monforti-Ferrario F (2010) The effects of increased demand for biofuel feedstocks on the world agricultural markets and areas. Luxembourg: Publications Office of the European Union. ISBN 978-92-79-16220-6. http://publications.jrc.ec.europa.eu/repository/bitstream/111111111/16193/1/en24464_iluc%20workshop.pdf -Brandão M, Levasseur A (2011) Assessing temporary carbon storage in life cycle assessment and carbon footprinting: outcomes of an expert workshop. Joint Research Centre, European Commission, Ispra, Italy	Editorial - copyedit to be completed prior to publication (regarding first sentence). The references are mainly relevant to Chapter 8 and 11.

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32486	4	488				The page numbers refer to the pages of the pdf document (and do not coincide with the page numbers as printed in the bottom right of the document. Life Cycle Assessment (LCA) is standardused by ISO with that name. Therefore, it should never be referred to as Life Cycle Analysis. Furthermore, once defined, it can be referred to simply as "LCA". Many important works of Brandão et al. (e.g. 2013) and Levasseur are missing, which are particular relevant to chapters 8 and 11. These are: -Brandão M, Levasseur A, Kirschbaum M, Cowie A, Weidema B, Jørgensen SV, Hauschild M, Chomkhamsri K, Pennington D (2013) Key issues and options in accounting for carbon sequestration and temporary storage in life cycle assessment and carbon footprinting. The International Journal of Life Cycle Assessment 18 (1) 230-240. DOI: 10.1007/s11367-012-0451-6. http://link.springer.com/article/10.1007%2Fs11367-012-0451-6 -Levasseur A, Lesage P, Margni M, Brandão M, Samson R (2012) Assessing temporary carbon sequestration and storage projects through land use, land-use change and forestry: comparison of dynamic life cycle assessment with ton-year approaches. Climatic Change. DOI: 10.1007/s10584-012-0473-x. http://www.springerlink.com/content/b3251u56v728m870/?MUD=MP13. -Levasseur A, Brandão M, Lesage P, Margni M, Pennington D, Clift R, Samson S (2012) Valuing temporary carbon storage. Nature Climate Change 2, 6–8. doi:10.1038/nclimate1335. http://www.nature.com/nclimate/journal/v2/n1/full/nclimate1335.html. -Brandão M, Mila i Canals L, Clift R (2011) Soil Organic Carbon changes in the cultivation of energy crops: implications for GHG balances and soil quality for use in LCA. Biomass & Bioenergy35 (6). 2323–2336. Special issue: Modelling Environmental, Economic and Social Aspects in the Assessment of Biofuels. http://www.sciencedirect.com/science/article/pii/S0961953409002402 -Brandão M, Clift R, Mila I Canals L, Basson L (2010) A Life-Cycle Approach to Characterising Environmental and Economic Impacts of Multifunctional Land-Use Systems: An Integrated Assessment in the UK. Sustainability 2(12): 3747-3776. Special issue: Life Cycle Sustainability Assessment. http://www.mdpi.com/2071-1050/2/12/3747/pdf -Mueller-Wenk R and Brandão M (2010) Climatic impact of land use in LCA - carbon transfers between vegetation/soil and air. The International Journal of Life Cycle Assessment 15(2) 172-182. http://www.springerlink.com/content/02628184t2q98051/fulltext.pdf -Brandão M (2012) Food, Feed, Fuel, Timber or Carbon Sink? Towards Sustainable Land Use: a consequential life cycle approach. Springer. 125pp. -Brandão M (2012) Food, Feed, Fuel, Timber or Carbon Sink? Towards Sustainable Land Use: a consequential life cycle approach. PhD thesis. Centre for Environmental Strategy (Division of Civil, Chemical and Environmental Engineering), Faculty of Engineering and Physical Sciences, University of Surrey, UK. 246 pp. Appendices 541 pp. -Mulligan D, Edwards R, Marelli L, Scarlat N, Brandão M, Monforti-Ferrario F (2010) The effects of increased demand for biofuel feedstocks on the world agricultural markets and areas. Luxembourg: Publications Office of the European Union. ISBN 978-92-79-16220-6. http://publications.jrc.ec.europa.eu/repository/bitstream/111111111/16193/1/en24464_iluc%20workshop.pdf -Brandão M, Levasseur A (2011) Assessing temporary carbon storage in life cycle assessment and carbon footprinting: outcomes of an expert workshop. Joint Research Centre, European Commission, Ispra, Italy	Editorial - copyedit to be completed prior to publication (regarding first sentence). The references are mainly relevant to Chapter 8 and 11.
19283	4	49	15		18	NOTE: …“low ‘fossil’ carbon economy”…. “low ‘fossil’ carbon society”… The word fossil has to be included in these discussions because that is what we are talking about. See my earlier comment on this. Society will not move away from a carbon economy since nothing can replace C today. The form of carbon needs to change.	Rejected -- "Low Carbon Economy" is the way this strand of the literature defines itself
21652	4	49	19	50	25	This section should explain how it is relevant to the subject of the chapter and the realisation of SD/equity.	Accepted -- Link to sections in subsequent chapters talking about lock-ins added
19284	4	49	20		29	COMMENT: Excellent introduction and a good use of examples to explain statements.	Noted -- Thank you

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
21083	4	49	7	49	14	The local development path is abscent. From the literature it is evident that there are local ambitions/interests in terms of development. Corbera, E., Kosoy, N., & Matinez Tuna, M. (2007). Equity implications of marketing ecosystem services in protected areas and rural communities: Case studies from Meso America. Global Environmental Change, 17, 365-380. Larson, A. (2011). Forest tenure in the age of climate change: Lessons for REDD+. Global Environmental Change, 21, 540-549.	Noted -- Issue of local development paths taken into account in box, but w/other references more relevant to the point.
33209	4	49	15	49	18	Please provide a link to Chapter 6, section 6.6.2.6, for a slightly more extended discussion of the Low-Carbon Society pathways.	Accepted -- Link to relevant section in Chapter 6 provided
35406	4	49				Investment in incinerators is an example of a path dependency and lock-in of an industry barrier that will prevent material efficiency strategies for a long period of time, as incinerator usually take up contracts for 30-40 years to compensate the heavy initial investments needed. This example should be included in this section for the widespread and increasingly important presence of this industry in developing countries where there is a risk to reproduce the problems of overcapacity faced in developed countries. In the case of incinerators, the generalised lock-in has created a situation of incineration overcapacity -more capacity to burn than waste is or will be available-, with at least 80% of MSW being recyclable. Reference: Altair, 2013, Characterisation of households residual fraction in Gipuzkoa, Spain. Building incineration capacity to burn more than 20% of the waste available is locking in waste prevention and recycling policies in the future. A recent study proves how this lock-in effect in place such as Denmark, Sweden, Germany or Holland is threatening recycling and encouraging the shipment of waste that otherwise could be treated locally with less environmental cost. Reference: Jofra M., Ventosa I., 2013 "Incineration overcapacity and waste shipping in Europe: the end of the proximity principle?". This concern has also been reported in Greater Manchester, at the time of a thorough revision of the waste management system to foster material efficiency strategies. Reference: Uyarra, E. & Gee, S., 2012. Transforming urban waste into sustainable material and energy usage: the case of Greater Manchester (UK). Journal of Cleaner Production, pp.1–10. Available at: http://linkinghub.elsevier.com/retrieve/pii/S0959652612006403 [Accessed January 30, 2013].	Noted -- Example not added for lack of space
35460	4	49				Investment in incinerators is an example of a path dependency and lock-in of an industry barrier that will prevent material efficiency strategies for a long period of time, as incinerator ususally take up contracts for 30-40 years to compensate the heavy initial investments needed. This example should be included in this section for the widespread and increasingly important presence of this industry in developing countries where there is a risk to reproduce the problems of overcapacity faced in developed countries. In the case of incinerators, the generalised lock-in has created a situation of incineration overcapacity -more capacity to burn than waste is or will be available-, with at least 80% of MSW being recyclable. Reference: Altair, 2013, Characterisation of households residual fraction in Gipuzkoa, Spain. Building incineration capacity to burn more than 20% of the waste available is locking in waste prevention and recycling policies in the future. A recent study proves how this lock-in effect in place ssuch as Denmark, Sweden, Germany or Holland is threatening recycling and encouraging the shipment of waste that otherwise could be treated locally with less environmental cost. Reference: Jofra M., Ventosa I., 2013 "Incineration overcapacity and waste shipping in Europe: the end of the proximity principle?". This concern has also been reported in Greater Manchester, at the time of a thorough revision of the waste management system to foster material efficiency strategies. Reference: Uyarra, E. & Gee, S., 2012. Transforming urban waste into sustainable material and energy usage: the case of Greater Manchester (UK). Journal of Cleaner Production, pp.1–10. Available at: http://linkinghub.elsevier.com/retrieve/pii/S0959652612006403 [Accessed January 30, 2013].	Noted -- Example not added for lack of space

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
29554	4	49				The incinerator industry offers a clear example of a path dependency and lock-in as it will be a barrier for materia efficiency strategies and SCP for a long period of time, as incinerator usually take up contracts for 30-40 years to compensate the heavy initial investments needed. This example should be included in this section. In fact, in the case of incinerators, the generalised lock-in has created a situation of incineration overcapacity -more capacity to burn than waste is or will be available-, with at least 80% of MSW being recyclable. Reference: Altair, 2013, Characterisation of households residual fraction in Gipuzkoa, Spain. Building incineration capacity to burn more than 20% of the waste available is locking in waste prevention and recycling policies in the future. A recent study proves how this lock-in effect in place ssuch as Denmark, Sweden, Germany or Holland is threatening recycling and encouraging the shipment of waste that otherwise could be treated locally with less environmental cost. Reference: Jofra M., Ventosa I., 2013 "Incineration overcapacity and waste shipping in Europe: the end of the proximity principle?".	Noted -- Example not added for lack of space
26968	4	49				Investment in incinerators is an example of a path dependency and lock-in of an industry barrier that will prevent material efficiency strategies for a long period of time, as incinerator ususally take up contracts for 30-40 years to compensate the heavy initial investments needed. This example should be included in this section for the widespread and increasingly important presence of this industry in developing countries where there is a risk to reproduce the problems of overcapacity faced in developed countries. In the case of incinerators, the generalised lock-in has created a situation of incineration overcapacity -more capacity to burn than waste is or will be available-, with at least 80% of MSW being recyclable. Reference: Altair, 2013, Characterisation of households residual fraction in Gipuzkoa, Spain. Building incineration capacity to burn more than 20% of the waste available is locking in waste prevention and recycling policies in the future. A recent study proves how this lock-in effect in place ssuch as Denmark, Sweden, Germany or Holland is threatening recycling and encouraging the shipment of waste that otherwise could be treated locally with less environmental cost. Reference: Jofra M., Ventosa I., 2013 "Incineration overcapacity and waste shipping in Europe: the end of the proximity principle?". This concern has also been reported in Greater Manchester, at the time of a thorough revision of the waste management system to foster material efficiency strategies. Reference: Uyarra, E. & Gee, S., 2012. Transforming urban waste into sustainable material and energy usage: the case of Greater Manchester (UK). Journal of Cleaner Production, pp.1–10. Available at: http://linkinghub.elsevier.com/retrieve/pii/S0959652612006403 [Accessed January 30, 2013].	Noted -- Example not added for lack of space

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
32487	4	493		494		The page numbers refer to the pages of the pdf document (and do not coincide with the page numbers as printed in the bottom right of the document. Life Cycle Assessment (LCA) is standardused by ISO with that name. Therefore, it should never be referred to as Life Cycle Analysis. Furthermore, once defined, it can be referred to simply as "LCA". Many important works of Brandão et al. (e.g. 2013) and Levasseur are missing, which are particular relevant to chapters 8 and 11. These are: -Brandão M, Levasseur A, Kirschbaum M, Cowie A, Weidema B, Jørgensen SV, Hauschild M, Chomkhamsri K, Pennington D (2013) Key issues and options in accounting for carbon sequestration and temporary storage in life cycle assessment and carbon footprinting. The International Journal of Life Cycle Assessment 18 (1) 230-240. DOI: 10.1007/s11367-012-0451-6. http://link.springer.com/article/10.1007%2Fs11367-012-0451-6 -Levasseur A, Lesage P, Margni M, Brandão M, Samson R (2012) Assessing temporary carbon sequestration and storage projects through land use, land-use change and forestry: comparison of dynamic life cycle assessment with ton-year approaches. Climatic Change. DOI: 10.1007/s10584-012-0473-x. http://www.springerlink.com/content/b3251u56v728m870/?MUD=MP13. -Levasseur A, Brandão M, Lesage P, Margni M, Pennington D, Clift R, Samson S (2012) Valuing temporary carbon storage. Nature Climate Change 2, 6–8. doi:10.1038/nclimate1335. http://www.nature.com/nclimate/journal/v2/n1/full/nclimate1335.html. -Brandão M, Mila i Canals L, Clift R (2011) Soil Organic Carbon changes in the cultivation of energy crops: implications for GHG balances and soil quality for use in LCA. Biomass & Bioenergy35 (6). 2323–2336. Special issue: Modelling Environmental, Economic and Social Aspects in the Assessment of Biofuels. http://www.sciencedirect.com/science/article/pii/S0961953409002402 -Brandão M, Clift R, Mila I Canals L, Basson L (2010) A Life-Cycle Approach to Characterising Environmental and Economic Impacts of Multifunctional Land-Use Systems: An Integrated Assessment in the UK. Sustainability 2(12): 3747-3776. Special issue: Life Cycle Sustainability Assessment. http://www.mdpi.com/2071-1050/2/12/3747/pdf -Mueller-Wenk R and Brandão M (2010) Climatic impact of land use in LCA - carbon transfers between vegetation/soil and air. The International Journal of Life Cycle Assessment 15(2) 172-182. http://www.springerlink.com/content/02628184t2q98051/fulltext.pdf -Brandão M (2012) Food, Feed, Fuel, Timber or Carbon Sink? Towards Sustainable Land Use: a consequential life cycle approach. Springer. 125pp. -Brandão M (2012) Food, Feed, Fuel, Timber or Carbon Sink? Towards Sustainable Land Use: a consequential life cycle approach. PhD thesis. Centre for Environmental Strategy (Division of Civil, Chemical and Environmental Engineering), Faculty of Engineering and Physical Sciences, University of Surrey, UK. 246 pp. Appendices 541 pp. -Mulligan D, Edwards R, Marelli L, Scarlat N, Brandão M, Monforti-Ferrario F (2010) The effects of increased demand for biofuel feedstocks on the world agricultural markets and areas. Luxembourg: Publications Office of the European Union. ISBN 978-92-79-16220-6. http://publications.jrc.ec.europa.eu/repository/bitstream/111111111/16193/1/en24464_iluc%20workshop.pdf -Brandão M, Levasseur A (2011) Assessing temporary carbon storage in life cycle assessment and carbon footprinting: outcomes of an expert workshop. Joint Research Centre, European Commission, Ispra, Italy	Editorial - copyedit to be completed prior to publication (regarding first sentence). The references are mainly relevant to Chapter 8 and 11.
19204	4	5	14		20	Good points and good summary of what will be looked at in chapter.	noted - (Thank you)
19203	4	5	2			Edit recommend: …problem. Thus an effective….	This has disappeared when shortening.
29580	4	5	25			No "H/M/L agreement, H/M/L evidence" level for §4.3 ?	Accepted.
41106	4	5	26	5	37	This paragraph and much of the underlying text can be cut to shorten the chapter. It's not clear how this heavy theory is relevant to the climate change discussions except in the sense that climate policy can/should be a part of sustainable development considerations.	This is shortened but mostly kept because it is directly relevant to development path issues that surround climate policy.
27492	4	5	26	6	39	These are important points and should be reflected in the SPM.	Noted

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
21635	4	5	32	5	37	The framing of behaviours is based on a narrow field of literature. The role of practices and infrastructure lock-in are currently omitted. See for example, Southerton 2012 for further detail on the significance of practices in shaping behaviour.	This is mentioned in relation to 4,5, where the various sorts of lock-ins (in particular infrastructure) are discussed. The discussion has been improved. The structural influences on behaviour is discussed in several places.
41107	4	5	32	5	32	Typo ". . . is mediated by a many factors . . ."	Corrected.
21161	4	5	33			Should the term be "Intra-generational"	Accepted.
41108	4	5	46	5	47	Why are there quotation marks and attribution on this text when there are no quotes nor attribution/references in the rest of the executive summary. It's suggested that the authors use consistent style.	Accepted and corrected.
41104	4	5	6	5	10	Throughout document "equitable burden sharing" seems to be used interchangeably with "equity." Consistency of terminology should be maintained, and an equivalence between those terms should not be assumed.	Rejected, they are clearly not treated as equivalent (see 4,2).
41103	4	5	6	5	7	It is not necessarily true that "small set of core equity principles that are well-grounded in moral philosophy serve as the basis for most discussions of equitable burden-sharing in a climate regime" since those discussions reflect a range of views-- not all of them principles-based, not all of them about burden-sharing. This should be reflected.	TIA, the formulation no longer refers to moral philosophy.
27341	4	5	9	5	9	The term "right to sustainable development" should be replaced by "right to development", as accorded in Principle 3 of the 1992 Rio Declaration on Environment and Development and Paragraph 8 of the outcome document of the United Conference on Sustainable Development (Rio+20).	Accepted (this is indeed in conformity with the text in the chapter).
41105	4	5	9	5	9	The authors should use language about equal access to SD - text from Rio	See previous comment.
19285	4	50	24			Remove extra space after …1997);	Accepted -- Done
29955	4	50	8	50	17	The phenomena of lock-in can be understood to be induced through a certain mechenism of increasing returns. Sources of increasing returns would include economies of scale, economies of scope, effect of learning, and failures in coordination. In particular, the fourth mechanism, coordination failures, results when strong complementarities among parts of a system exist. In a large-scale, complex system, the existence of this condition among different individual decisions gives rise to a variety of stable outcomes, and the energy and transportation sectors, which involve a large number of users and extensive infrastructure development, fall under coordination failures feedback system. This emphasis points to the systemic character of technologies that reinforces interdependence among different parts, thereby, making a transition from one state to another extremely difficult. There are possibilities of escaping from the state of lock-in. For example, a recent attempt by the Tokyo Metropolitan Government to replace diesel vehicles by low-emission vehicles illustrates the potential of escaping a state of technological lock-in by coordinating the behaviors and expectations of relevant actors, including vehicle producers, vehicle users, and infrastructure providers (Yarime, 2009). Yarime, Masaru, "Public Coordination for Escaping from Technological Lock-in: Its Possibilities and Limits in Replacing Diesel Vehicles with Compressed Natural Gas Vehicles in Tokyo," Journal of Cleaner Production, 17 (14), 1281-1288 (2009).	Accepted -- Lock ins by coordination failures included

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
26893	4	50				Another example of lock-in is the construction of incineration overcapacity -more capacity to burn than waste is or will be available-, with at least 80% of MSW being recyclable (ref: Altair, 2013, Characterisation of households residual fraction in Gipuzkoa, Spain) building incineration capacity to burn more than 20% of the waste available is locking in waste prevention and recycling polciies i the future. A recent study proves how this lock-in effect in place ssuch as Denmark, Sweden, Germany or Holland is threatening recycling and encouraging the shipment of waste that otherwise could be treated locally with less environmental cost. Ref: Jofra M., Ventosa I., 2013 "Incineration overcapacity and waste shipping in Europe: the end of the proximity principle?"	Noted -- Example not added for lack of space
29641	4	50	26			One of the most powerful examples with regard empowerment of informal recycling sector, can be found in Pune, India, Chikarmane (2012) “Integrating Waste Pickers into Municipal Solid Waste Management in Pune, India” as well as Belo Horizonte, Brazil , Dias (2011) « Integrating Informal Workers into Selective Waste Collection: The Case of Belo Horizonte », and Bogota, Colombia, Parra F, Fernandez L. (2013) “Constructing an Inclusive Model for Public Waste Management Based on the Legal Empowerment of Colombia’s Waste Picking Community”.	Noted -- Reference not relevant to section
41230	4	50	26	51	40	In section 4.5.3, an opportunity was missed to look beyond technologies in terms of our path forward. While technology has the potential for significantly helping toward sustainable development, it is incorrect to think of sustainable development and especially equity being a technology problem. Many of the issues are sustainability and equity are social issues and are relatively independent of technology. For example, even if many of these technologies are invented, who is to say they will lead to sustainability as opposed to great consumption. While much of the non-technology issues are covered in the rest of the section, it's a little bit misleading to have a subsection entitled "strategies towards sustainable development paths" that really only touched on the potential impacts of technology, and that did not touch on the potential negative impacts of technology for sustainability (i.e., technology can also allow us to consume resources at a greater rate) and equity (i.e., technology is likely to accrue to the wealthy countries first)	Noted -- Section 4.5.3 does not focus solely on technology, but it has been revised
19287	4	51	37		40	COMMENT: Have problems with the use of a low-carbon development or low-carbon society. It should instead be more explicit - low ‘fossil’ carbon development	Rejected -- "Low Carbon Economy" is the way this strand of the literature defines itself
19288	4	51	46			ADD: …gases emissions ‘at small to larger scales, e.g., local to national	Rejected -- Point that development path are at multiple scale made in 4.5.1
19286	4	51	8		12	COMMENT: This is a one paragraph sentence, is too long and needs to be broken up into 2 sentences such as: …process. It requires strong….	Accepted -- Paragraph revised

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
24130	4	51				There are a number of papers that discuss empowerment of the informal recycling as a key to sustainable development: Dias, Sonia M. 2011. Integrating Informal Workers into Selective Waste Collection: The Case of Belo Horizonte, Brazil. WIEGO Policy Brief (Urban Policies) No. 4. Dias, Sonia M. 2011. "Recognition of Waste Picking as a Profession in Brazil and Its Impacts." In GIZ, Recovering Resources, Creating Opportunities: Integrating the Informal Sector Into Solid Waste Management. Eschborn: Deutsche Gesellschaft fur Internationale Zusammenarbeit. Dias, Sonia M. 2010. Overview of the Legal Framework for Social Inclusion in Solid Waste Management in Brazil. Cambridge, Massachusetts, USA: WIEGO. Available at http://wiego.org/sites/wiego.org/files/publications/files/Dias_BN8_.pdf. Dias, S.M & F.C.G Alves. 2008. "Integration of the Informal Recycling Sector in Solid Waste Management in Brazil." Study Prepared For GIZ's Sector Project "Promotion Of Concepts For Pro-Poor And Environmentally Friendly Closed-Loop Approaches In Solid Waste Management." Available at www.GIZ.de. Dias, Sonia M. 2000. "Integrating Waste Pickers for Sustainable Recycling." Paper delivered at the Manila Meeting of the Collaborative Working Group (CWG) on Planning for Sustainable and Integrated Solid Waste Management, Manila, Philippines. Available at www.cwgnet.net. Dias, Sonia M. and H.S. Andrade. 1998. "Street Scavengers: Partners in the Selective Collection of Inorganic Materials in Belo Horizonte City." International Directory of Solid Waste Management 1998/9. The ISWA Yearbook. London: James & James. Fernandez, Lucia. 2007. "De hurgadores a clasificadores organizados. Analisis politico institucional del trabajo com La basura em Montevideo." In: Schamber, Pablo. Suárez, Francisco. Valdes, Eduardo (org). Recicloscopio: miradas sobre recuperadores urbanos de residuos de América Latina. Buenos Aires: Prometeo Libros; Los Polvirines: Univ. Nacional de General Sarmiento; Lanus: Univ. Nacional de Lanus. Scheinberg, Anne, and Justine Anschütz. 2007. "Slim pickin's: Supporting Waste Pickers in the Ecological Modernisation of Urban Waste Management Systems." International Journal of Technology Management and Sustainable Development, Vol. 5, No. 3, pp 257-270. Chikarmane, Poornima. Integrating Waste Pickers into Municipal Solid Waste Management in Pune, India. WIEG Dias, Sonia M. 2011. Overview of the Legal Framework for Inclusion of Informal Recyclers in Solid Waste Management in Brazil. WIEGO Policy Brief (Urban Policies) No. 6. O Policy Brief (Urban Policies) No. 8 Scheinberg, Anne. 2012. Informal Sector Integration and High Performance Recycling: Evidence from 20 Cities. WIEGO Working Paper (Urban Policies) No. 23. Schamber, Pablo J. 2012. Proceso de integración de los cartoneros de la Ciudad Autónoma de Buenos Aires. Del reconocimiento a la gestión de Centros Verdes y la recolección selectiva. Español (Waste Picker Integration Process of the Autonomous City of Buenos Aires. From Recognition to Green Management Centres and Selectiv	Rejected.
29617	4	52				Please explain better this Fig., if possible.	Noted -- Figure deleted
19290	4	52	11		20	COMMENT: Good packaging	Noted -- Thank you
19289	4	52	3			ADD: …the society, how it impacts those not involved with it, … One needs to address what are its externalities.	Rejected -- not relevant to the case
19291	4	52	31		35	QUALIFY: This statement assumes that all conditions remain the same which is hard to do, e.g., climates change and there are regional variances in its impacts.	Accepted -- Statement deleted
41232	4	53	1			This figure is a bit confusing. The area under the curve to the right of the current level, also represent a risk of unsustainability? Please review and clarify.	Noted -- Figure deleted
41233	4	53	1			Label clearly what is represented by the vertical axis and what is represented by the horizontal axis.	Noted -- Figure deleted

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
41231	4	53	13	53	14	As written, th statement is not accurate: "public policies alone cannot trigger changes in pathways..." The authors need to add the phrase after pathways "at sufficient scale" at a minimum to make this accurate. For example, at smaller scales policies ranging from smart growth (e.g., higher density), transit oriented development (U.S. Government and various U.S. States) and energy efficiency standards for automobiles and commercial and residential products (U.S. DOE) have changed the trajectory of pathways to some degree.	Noted -- Statement accurately represents Sathaye et al. 2007; But qualification of statement added to make it clearer.
21653	4	53	23	56	16	This section needs to explicitly incorporate greater relevance for the realisation of SD and equity.	Rejected -- Key argument of Chapter 4 is about transitioning to sustainable development paths
29618	4	53	36			Spelling : "The" should be written as "the".	Accepted -- Revised
29619	4	53	37			Footnote 12 : if have the feeling that a word is missing there, no ? "is being [vanishing] over time" perhaps ?	Accepted -- Revised
19292	4	54	10		28	COMMENT: Really nice paragraph	Noted -- Thank you
41234	4	54	18	54	28	The examples given (implementation of municipal sewer systems, horse-powered vehicles to cars, sailing ships to steam ships) are, of course, very dated. Adding contemporary examples would be beneficial. How about the transition from coal to natural gas in the U.S. as the result of new fracking and horizontal drilling technology? What about the rise of PV in Germany? How about the focus on improving building energy efficiency?	Accepted - revised.
21196	4	54	20			Change to "modeling"	Accepted -- Revised
29620	4	54	3			Spelling : odd number of) and ")see 4.5.2" should be written ") see 4.5.2"	Accepted -- Revised
19683	4	54	38	56	16	I think it is also important to highlight the problem of smooth transition or adjustment typically linked to neoclassical growth models. Smoothness of adjustment is a property of neoclassical optimal growth models, where adjustment always occurs smoothly - see Rezai A., Taylor L, Mechler R (2013) Ecological macroeconomics: an application to climate change, Ecological Economics 85: 69-76	NOTED: REFERENCE TO BE EXPLORED
19681	4	54	40	54	41	It would be advisable to cite other static economic models in addition to general equilibrium models otherwise the reader may reduce the economic modelling literature to one type of modelling approach (i.e. CGE). For example one could mention environmental input-output models and computable general equilibrium models (the latter uses the former but imposes a set of economic equilibrium constraints on input-output data imbalances)	Accepted -- Revised
19293	4	55	16		31	COMMENT: Really nice write up	Noted -- Thank you
29621	4	55	19			Please add an explanatory footnote to explain "Keynesian" ?	Accepted -- Keynesian defined
21197	4	55	38			Change to "modeling"	Accepted -- Revised
19684	4	55	32	55	43	The advantage of using simulation climate mitigation models as opposed to optimisation models when it comes to dynamics and capturing transition or adjustment paths have also been discussed in detail in Scrieciu, S., Rezai, A. and R. Mechler (2012) “On the Economic Foundations of Green Growth Discourses: The Case of Climate Change Mitigation and Macroeconomic Dynamics in Economic Modelling”, WIREs Energy Environ. doi: 10.1002/wene.57	NOTED: REFERENCE TO BE EXPLORED
19682	4	55	6	55	7	This statement is not quite true: most of the economic modelling literature on climate mitigation relies not only on Solow-growth type of models, but also on Ramsey-type of growth models such as the much cited RICE and DICE models (where savings and consumption decisions are endogenised to maximise an intertemporat utility function)	Accepted -- Statement revised
27013	4	56		56		Needs to explain and add legend regarding the color coding	Figure deleted
19296	4	56				COMMENT: This is a good section and important to include	Thank you
19294	4	56				COMMENT: Good figure to conceptually represent the ideas.	Thank you

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
27334	4	56	19			Given the relevance of the three topics in the chapter, convergence could be developed in a few paragraphs, accompanied by more elements of the broad literature that deals with this dialogue, highlighting not only the synergies between mitigation and adaptation's capacity, as well as the trade-offs between mitigation, adaptation ans sustainable development. Below are some suggestion of items that can add to the discussion (though focusing on adaptation, they also make the link with this mitigation and sustainable development. (Howden et al. Adapting agriculture to climate change. Proceedings of the natural Academy of Sciences of the United States of America, 104 (50):19691-19696, 2007. Doi: 10.1073/pnas.0701890104; Parry, Martin. Climate Change is a development issue, and only sustainable development can confront the challenge. Climate and Development Climate and Development, 1:5-9, 2009; Parry, Lowe and Hanson. Overshoot, adapt and recover. Nature, 458(7242):1102-1103, 2009; Pielke et al. Climate change 2007: Lifting the taboo on adaptation. Nature, 445 (7128): 597-598, 2007.	Have strengthened links to SD, and included those references appropriate to this section.
29622	4	56	24			Spelling : "similar(" should be written as "similar (".	Editorial
19295	4	56	24			ADD space between …similar (Yohe….	Editorial
21198	4	56	6			Change to "modeling"	Editorial
19685	4	56	15	56	16	I would argue that it would be worth and relevant mentioning a couple of studies within this emerging field. Some examples of incorporating short-term processes into the analysis of growth in the long run within a simulation framework are that of Rezai A., Taylor L, Mechler R (2013) Ecological macroeconomics: an application to climate change, Ecological Economics 85: 69-76; and Barker, T. and S. Scrieciu (2010) “Modelling Low Stabilization with E3MG: Towards a ‘New Economics’ Approach to Simulating Energy-Environment-Economy System Dynamics”, The Energy Journal 31(special issue 1 “The Economics of Low Stabilization”): 137-164	NOTED: REFERENCE TO BE EXPLORED
29642	4	56	16			The mitigation capacity from the informal recycling sector (wastepicker's communities) can be found at Colling Agents (Chintan, 2009) where a total of 962,133 TCO2 emmissions is reduced per year, through the informal recycling activities in New Delhi, India. According to Mumbai wastepicker's biogas workers, processing 5 metric tonnes a day reduces 1726 MT of CO2 daily, and costs less than 400 000 U$D including operating costs. Its important to consider that in the case of wastepicker's worldwide, its not just about mitigation but also urban poverty aliviation and increase of human capital. Therefore the combination of three factors makes it a very unique and important solution to be considered and supported.	This is a good example of mitigation activity with strong intersections with SD objectives. Has been used as an example in other sections, but not here in this section as an illustration of mitigative capacity"
19298	4	57	23			DELETE WORDS: ..introduce issues of equity…	Editorial
19299	4	57	27		31	EDIT: Too long of a sentence. Recommend: ..climate policy. The sustainability ideal is directly akin… management listed ‘in Subsec. 2.3.2.3 and Sec. 2.6, ….	Editorial
19297	4	57	3			MISSPELLING: Similarly is misspelled	Editorial
19300	4	57	40		42	EDIT: …regions ‘experience’ unequal degrees of climate risk and ‘its uncertainties’.	Editorial
19301	4	58				This whole page needs a lot of EDITS	editorial
21199	4	58	1			Change to "address"	Editorial
19303	4	58	10		13	EDITS: …Tol (1999). An advantage… Line 11 – weights – what is this? Line 12 – degree of priority to.. What is being said here? This is not clear.	Editorial
27014	4	58	14	58	23	A bit repetitive. The beginning of this section may fit earlier in this chapter.	Rejected. We have to respect the outline.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
19304	4	58	14		20	DELETE: Would recommend deleting both paragraphs since including summaries of other chapters is distracting when it is more than a reference to a chapter. Paragraph 4 (lines 34-40) is too long and awkward to read. Other summaries of other chapters should also be deleted since this is not a summary or final chapter of this report. This discussion for a non-expert is hard to follow, it uses jargon that can be interpreted in several ways by the reader.	Rejected. These are not summaries but links to the previous framing chapters, and they have been requested in the outline.
19306	4	58	24		33	COMMENT: This comes across as a very human centric viewpoint while natural capital has to be also included since other organisms are also dependent upon natural capital.	Non-human beings are indeed mentioned.
29623	4	58	29	58	33	Why so many "if" … ? Would it be possible to give some hint towards answers to those "if" ? For example, perhpas some studies do exist concerning the psychological effects of isolation in jails ? Or why astronauts should need to cultivate plants in order to be still connected to Nature, if they make a Mars-long space journey ?	These are rhetorical "ifs". But putting numbers on these values remains very hard.
21200	4	58	3			Change to "Similarly"	Accepted.
19302	4	58	3		7	EDIT: awkward, and too long of a sentence Line 6 – it is not clear what weights means. Is it weighted criteria?	Slightly reformulated to make it clearer.
19305	4	58	34		40	DELETE: Would recommend deleting both paragraphs since including summaries of other chapters is distracting when it is more than a reference to a chapter. Paragraph 4 (lines 34-40) is too long and awkward to read. Other summaries of other chapters should also be deleted since this is not a summary or final chapter of this report. This discussion for a non-expert is hard to follow, it uses jargon that can be interpreted in several ways by the reader.	See above.
19307	4	58	43		47	EDITS: Too long sentence Recommend: …sharing. It will first highlight the general equity principles typically invoked in discussions of equitable burden-sharing. It will end with a review of several categories of …as options to allocate burdens …	editorial
21201	4	58	5			Change to "moreover"	editorial
31258	4	58	41			Do not, preferrably, restrict the development issue to the issue of the burden sharing of the emission-quotas, because this would be too restricted as compared to the scope of the remaining of the Chapter 4.	As discussed in great length throughout the chapter, there are many elements of equity relevant to climate change and development. This section deliberately focuses on equity in burden-sharing.
24594	4	58	41	64	29	This is very valuable material. It does an excellent job of succinctly summarising and ordering this body of research. Suggest that it is important to keep when shortening the chapter.	Noted - thank you
24595	4	58	41	64	29	The emphasis on 'burden sharing' in this section, whilst accurate vernacular, frames the issue as one of all cost rather than cost and benefit. Suggest using “mitigation action” or some other phrase that is more balanced.	Will note the limitation in the terminology, but keep it, as it is standard usage in the academic literature.
19308	4	59				DELETE: All of this is already mentioned in the text and does not add to the discussion. It could also replace part of the text? If this is kept, it needs considerable editing from lines 11-12.	Rejected - the FAQ is by design a recapitulation of key information in chapter

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
41235	4	59	14	59	22	This conflates “equitable burden-sharing” with “equity” and asserts that the UNFCCC “clearly invokes the vision of equitable burden sharing.” What the term “equity” means under the convention is a topic currently under discussion and debate by the Parties to the UNFCCC, including in the negotiations under the Durban Platform. This document should not prejudge the outcome of those discussions by the Parties to the treaty, which are positioned to ascertain the meaning of treaty terms.	Taken into account - have ensured language is consistent with UNFCCC, which states (Art 3.1) "The Parties should protect the climate system ... on the basis of equity and in accordance with their common but differentiated responsibilities and respective capabilities." and Art 4.2 "the need for equitable and appropriate contributions by each of these Parties to the global effort regarding that objective".
41236	4	59	16	59	22	The remainder of this paragraph advocates for a particular interpretation of terms, linking “equity” with “equitable burden sharing” and “equitable burden sharing” with the Annex I and non-Annex I structure of the convention. This is one possible interpretation of the convention, but it is not the only one, and there is nothing in the UNFCCC text itself that draws this link. It advocates for this position without citations to any literature. This paragraph should be deleted, and this introductory section could begin with a sentence noting the lack of explicit meaning for “equity” or differentiated responsibilities and capabilities, and proceed with the paragraphs from line 23 on page 59 to line 3 on page 60. While not perfect, these paragraphs at least have the benefit of presenting a more neutral recounting of the issues identified and advocated for in the literature, rather than advocating for particular position.	TIA - First para is necessary, to situate this discussion in UNFCCC. The existing UNFCCC allocation of obligations is presented (not "advocated") here because they are relevant to the discussion of burden-sharing, as the allocation of obligations is inextricably linked (and perhaps synonymous) with burden-sharing. Will ensure that the existing UNFCCC allocation of oblgations is presented in a manner that is fully consistent with UNFCCC, and clarified as providing information, while not being the final word or prejudging the ADP decisions.
19309	4	59	16		20	EDITS: …countries based primarily on their per… ..consisting of the wealthier developed…	editorial
29624	4	59	19	59	21	Please mention explicitly which countries are you talking about / or give a reference ?	Rejected - there is not room to reproduce Annexes. Will try to more fully describe.
19310	4	59	29			EDIT: this is confusing and reference doesn’t seem to be in the right place??	editorial
29625	4	59	35			Spelling : "nogiciating" should be written as "negociating".	editorial
19311	4	59	36		40	DELETE: doesn’t add to text discussions	moved to beginning and shortened

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
24429	4	59	36	60	3	This section needs to bridge Chapter3 and Chapter6 with regard to burden sharing. Chapter6, specifically Table 6.3, includes "Potential" as well as "Responsibility" , "Capability" and "Equality" as an equity principle. There are number of studies that focus on "Potential" for burden sharing, so one section should be added to cover "potential" related issues, although I think "potential" is not good wording. This section also needs to keep an eye on the discussion in the section 13.4. When doing so, authors need to keep in mind the following points made in the section 13.3.3 (Section13 page20 line16-20); "it is not sufficient to consider only plausible and widely accepted equity criteria for the redistribution of the gains from cooperation (Ringius et al., 2002), because if the distribution of net burdens (or sharing of net benefits) violates the fundamental interests of some parties, those parties may not participate, despite the distribution satisfying others' equity criteria. Thus this literature suggests that issues of equitable burden sharing and transfer need to be addressed at the same time (e.g. (Sandler, 2010))."	TIA - It aims to bridge Ch 3 and Ch 6, and also Ch 13. Please note that "potential" has been recast in Ch 6. Please note also the discussion of interests.
27335	4	59	14	59	26	It is widely known that the consensus-based decision-making used by the UNFCCC stifles progress and contributes to negotiating deadlocks, which ultimately hurts poor countries more than rich countries. In this respect, it could be worth citing the work by Heike Schroeder et al (2012) on Equity and state representations in climate negotiations (Schroeder is, precisely, one of the authors of this draft Chapter). The study - published lats year in the journal Nature Climate Change - shows that delegations from some countries taking part have increased in size over the years, while others have decreased, limiting poor countries negotiating power and making their participation less effective. (UNU-IHDP and UNEP, 2012. Inclusive Wealth Report, 2012. Measuring progress toward sustainability, Cambridge: Cambridge University Press.; Schroeder, H., Boykoff, M. and Spiers, L. 2012. Equity ans state representations in climate negotiations. nature Climate Change 2, 834-836. Doi: 10.1038/nclimate1742. Published on line 18 November 2012). Tough dealing with equity, the number of case studies cited does not accurately reflect the significance and impact of the BRICS, with a marked towards China (19 mentions) and India (11 mentions). On the other end, Brazil, South Africa and especially Russia are seldom mentioned, with 7, 6 and 1 citation, respectively. Regarding the cited References, there is a clear tendency to citing academic works produced by Northern Hemisphere authors and published by Northern Hemisphere editors. In the case of Brazil, on of the exceptions isthe work by De Barcellos et al (2011), about food purchasing attitudes in that country (De Barcellos, MD, A. Krystallis, M.S. de Melo Saab, J.O. Kügler, and K.G. Grunert. 2011. Investigating the gap between citizens sustainability attitudes and food purchasing behaviour: empirical evidence from Brazilian pork consumers. International Journal of Consumer Studies 35, 391-402. Doi: 10.1111/j.1470-6431.2010.00978.x). While this is understandable and just reflects the current flow of science and research production in the world, which is mainly written in English, it would be desirable to see a more geographically diverse source of academic research, especially in a chapter like this, dealing with equity.	The reference to Schroeder et al 2012 has been adeed.The authors have made an effort to cite more sources from the global south.
21162	4	6	1			Should the term be "common problem" or "common's problem"	Commons is correct.
29582	4	6	15	6	16	Please define "consumption-based" and "production-based" at the first appearance of these terms in the Chapter.	This is developed in 4.4.
29880	4	6	19	6	30	This development is key to the discussion, and welcome in the AR5.	Noted - (Thank you)
41109	4	6	19	6	30	Much of this can be shortened-- it isn't directly relevant to the climate discussions, confuses the issues to some extent and detracts from the focused and coherent aspects of the chapter.	Rejected. This is relevant to SD strategy and therefore to climate policy.
21163	4	6	21			Change to "transition towards…"	Rejected - is correct
19206	4	6	22		30	Great points, excellent writing – well articulated and effectively catches the reader's attention	Noted - (Thank you)

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
23964	4	6	29	6	30	the line is unclear. It should read "due to the negative effects of large inequality on the fairness of social arrangements as perceived by lower income groups and on these groups' trust in fellow citizens' and those in positions of power."	Reformulated (trying to keep it short).
29581	4	6	3			Format : "(high agreement, robust evidence)" should be in bold if you want consticency	Accepted, consistency checked.
21164	4	6	31			Remove "a" so that the sentence is "by many factors…"	Done.
29529	4	6	31			Increasing returns are treated in a cursory fashion, with no mention of the possibility of very different emissions scenarios haing comparable costs, and no mention of negative net costs associated with increasing returns in certain cases.	We don't disagree, but this is not exactly the context to mention these issues (they are developed elsewhere in the report).
19207	4	6	31		36	Great points, excellent writing – well articulated and effectively catches the reader's attention	Noted - (Thank you)
29583	4	6	33			Format : "(high agreement, robust evidence)" should be in bold if you want consticency	Accepted, consistency checked.
21165	4	6	36			Change to "on the ability of individuals…"	This has been shortened.
29530	4	6	37			Increasing returns and path dependence are unjustly minimized in importance. Need to reference and show results from Gritsevskyi, Andrii, and Nebojsa Nakicenovic. 2000. "Modeling uncertainty of induced technological change." Energy Policy. vol. 28, no. 13. November. pp. 907-921. which shows large variations in emissions from different scenarios with comparable costs, because of increasing returns.	On the contrary, they are mentioned in 4.5 (and this is reflected in the ES).
21166	4	6	39			Should be "society's current systems…. are in many ways..."	Accepted.
21167	4	6	47			Remove extra space between "Third, they…"	Done.
41110	4	6	47	6	47	The last paragraph of the Executive Summary begins by stating, "This chapter has focused on..." But since the Executive Summary is placed at the beginning of the chapter, not the end, the pharse should be revised to "This chapter focuses on..."	Accepted.
19208	4	6	47		49	Great points, excellent writing – well articulated and effectively catches the reader's attention	Noted - (Thank you)
21168	4	6	49			Provide a full stop "…1987)."	Accepted.
23520	4	6	7	6	8	re decoupling of material resource consumption and emissions - it would be crucial here to distinguish between relative and absolute decoupling (e.g. Jackson, T., 2011. Prosperity without growth: Economics for a finite planet London: Routledge, chapter 5).	Accepted, the distinction has been introduced. These concepts are explictly addressed in the final draft (in the introduction to sec. 4.4. and later on).
19205	4	6	7		12	Great points, excellent writing – well articulated and effectively catches the reader's attention	Noted - (Thank you)
31715	4	6	19	6	21	Please, is necessary to explain the affirmation ¨ The second type of decoupling – of human well-being from economic 19 growth – is a more controversial and novel concept than the first, at least in the context of climate 20 change mitigation¨.	This is explained indeed in the two following sentences.
41237	4	60	10	60	16	The text on these lines again advocates for a particular interpretation of the convention without citation to any literature and without noting that this is just one potential interpretation rather than any agreed interpretation. It makes the error of separating the phrase "common but differentiated responsibilities and respective capabilities" and links "common but differentiated responsibilities" specifically, and only, to statement in the preamble about historic emissions. This paragraph should end at line 11 by noting that responsibility is part of a principle of the convention in Article 3(1) "common but differentiated responsibilities and historic capabilities." The remainder of the paragraph should be deleted, as there is nothing in the UNFCCC that indicates the author's proposed interpretation is the proper interpretation. Then, the text can pick up with the paragraph currently beginning on line 17, which is a more neutral description of positions advocated in the literature.	TIA -citations have been added. Also, have clarified what is drawn from literature vs UNFCCC directly, and have added a reference to "respective capabilties" (in discussion of "capacity")
27015	4	60	13	60	13	It strucks us the recommendation here only looks at the past. At this stage could we also call for: "need responsibility for controbuting to the solution:"	TIA - alternative meaning of responsibility acknowledged.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
41238	4	60	17	61	33	This section is a good example of a relatively neutral presentation of the positions taken by various commentators in the literature without resorting to the authors of this chapter advocating for a particular position. This type of approach provides helpful background of the arguments on various sides of the issue, from various viewpoints, without incorrectly asserting or implying that one set of those arguments is correct or most widely accepted.	Noted - thank you
19312	4	60	17		42	EDITS & CLARIFICATION: This entire paragraph could be shortened and made tighter?? Line 20-24 – this is confusing. Is GHG being called a common resource?? If it is, the use seems wrong. What resource is being talked about? This is one sentence that is too long and needs to be broken into 3?	Editorial
21202	4	60	35			Should the term be "negotiating" instead of "nogitiating"	Editorial
19313	4	60	37		41	COMMENT: Good discussion here	Noted - thank you
32405	4	60	19	60	20	Please be more precise and add "anthropogenic" to CC, in order to clearly distinguish anthropogenic climate change from mostly changes in atmospheric GHG concentration from natural climate change, e.g., by orbital forcings, solar irradiance changes and volcanic eruptions etc.	Rejected - not necessary to add "anthropogenic" to every occurrence in AR5 where it is technical a correct adjective
19314	4	61	1		4	COMMENT: This is an accounting nightmare which will deter it being used.	TIA - will note the need for further data and analysis
41239	4	61	11	61	29	The concept of “an equal right to emit” is a highly contentious issue amongst Parties to the UNFCCC. This section does a very good job of describing the arguments made in the literature in a neutral fashion.	Noted - thank you
20575	4	61	12	61	12	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	Citation included
19911	4	61	18	61	18	I would try to avoid old literature here, and delete : Grübler and Fujii, 1991; Smith, 1991; Neumayer, 2000; In stead I would focus on the recent MATCH effort as this is a comparison studies with many models and reseachers involved, describing the best available knownledge in the field of quantifying countries' contribution to climate change. These MATCH studies are i.e. den Elzen et al. 2005; Hohne et al., 2011, i.e. den Elzen MGJ, Fuglestvedt JS, Höhne N, et al. (2005a) Analysing countries' contribution to climate change: Scientific uncertainties and methodological choices. Environmental Science Policy 8:614-636.; Höhne N, Blum H, Fuglestvedt J, et al. (2011) Contributions of individual countries' emissions to climate change and their uncertainty. Climatic Change 106:359-391.	Citation included, but older citations retained to underscore the continuity of approaches over time.
19317	4	61	29			Line 29 – include past emissions even when they are no longer…	Editorial
19318	4	61	32		33	Lines 32-33 - …atmosphere predominantly by oceans causing ocean acidification today. Ocean acidification is a serious ….problem today (See AR%...	Editorial
19315	4	61	5		8	EDIT: This is a one sentence paragraph. Typical to not have only a one sentence paragraph unless you are a newspaper writer.	Editorial

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
19316	4	61	9		26	EDITS: Lines 11-15 - …various rationales and approaches to determine how far in the past to include historical emissions. One rationale suggested that …earliest date to evaluate past emissions since this is when the First IPCC Assessment Report was written and developed a global scheme to curb emissions (Posner… Lines 16-17 - …climate change was suspected of being a global environmental problem, …emissions were identifiable… Lines 17-22 – Too long of a sentence Line 23 – replace damage is still caused to 'still exists today' Lines 22-24 – awkward sentence Lines 24-25 - ..knowledge. The latter group argues …as early as the availability….	Editorial
32406	4	61	33	61	33	Please add references to WGI Ch03 Section 3.8 as well.	Accepted
19319	4	62	1		5	EDIT: Too long of a sentence, needs to be broken into 2 sentences. Line 5 – extra period after investments	Editorial
41240	4	62	11	62	12	The authors should make this a stronger statement to provide a citation for the common understanding of "equality" in international law mentioned here.	Editorial - the expression is deemed to be sufficiently strong.
19321	4	62	23		25	COMMENT: Half of the world is dependent upon burning wood for energy and don't have a choice to move from using fossil fuels.	TIA - good point. Use of unsustainably harvested wood fuel noted.
21654	4	62	31	62	39	The Right to Development is crucial to the relationship between SD and equity but it is given very little attention on the chapter. I would argue that the point should come earlier and given greater exploration, including for instance, discussion of the Vienna Convention.	TIA - has been elaborated.
19912	4	62	40	64	29	Improve cross-reference to Section 6.3.6.6 (in particular Table 6.3, which also includes a framework how to categorise the different effort-sharing and resource sharing methods for allocating the future emission reductions	Accepted -have cross referenced and drawn links
19322	4	62	40		48	COMMENT: Good paragraph	Noted - thank you
19320	4	62	6		8	EDITS: cost-effectiveness. It can be distinguished from burden-sharing per se in that it determines the normative ground for each country that adjusts how much each should pay to achieve these reductions.	Editorial
32407	4	62	43	62	43	As commented in the FOD review, it is not feasible from a WGI standpoint to talk about "sharing" the "global carbon budget".	Rejected - this has become a standard usage, analogous to sharing any commons. Will provide explanation at first use of term.
29626	4	63	12			Spelling : is Annex I" similar to "Annex 1" ?	Editorial
19913	4	63	14	63	14	Give reference for SN Dialogue	Reference added.
29627	4	63	15			Please explain what you mean by "continuous index" … ?	Editorial - clarified
19324	4	63	17		48	This should be reduced to match the length of the effort sharing approach; it has several editorial issues also and the use of too long one sentences Lines 22-23 - ..Jamieson, 2001). This approach is premised…all individuals. It allocates… Lines 24-29 – too long of a sentence Line 27 – should this be population density (what aspect of population is being discussed)?	Editorial
19325	4	63	32			Line 32 - …from 'grandfathered' emissions. QUERY – will others understand what grandfathered means?? It may not be intuitive.	Editorial
19326	4	63	37			Line 37 - ..questionable. The….	Editorial
19327	4	63	40		46	EDITS: This is too long of a sentence.	Editorial

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
22516	4	63	44			Please, add after the word "…threshold." the following sentence: "Ekholm et al. (2010) compared two effort sharing rules ("Triptych" and "Multistage") and their cost implications between countries of different developmental states. They found that under these rules the least developed countries have negative or low costs and more developed countries have higher costs." Ref.: EKHOLM, T., SOIMAKALLIO, S., MOLTMANN, S., HÖHNE, N., SYRI, S., SAVOLAINEN, I. 2010. Effort sharing in ambitious, global climate change mitigation scenarios. Energy Policy 38(4):1797-1810.	Have referenced the relevant approaches. Will leave quantification to Ch 6.
24596	4	63	47	64	7	“Extending the concept of equal per capita rights” gives the impression that the ‘equal cumulative per capita emissions rights” family genuinely allocates equal rights; given the use of ‘reference years’ for population is this rarely guaranteed. Suggest some formulation that acknowledges this.	Editorial - this is already mentioned above.
19328	4	63	47		48	This is not clear to the reader.	Editorial
19323	4	63	5		9	EDIT: This is too long of a sentence, it needs to be broken up.	Editorial
19330	4	64	22		29	EDITS: This is too long of a sentence. Line 29 – what does solely mean?	Editorial
19331	4	64	32		37	COMMENT: Good introduction	noted - thank you
19329	4	64	4		7	EDITS: This is too long and has too many ideas merged into one sentence.	Editorial
19332	4	64	43		46	EDITS: This is one sentence and needs to be broken up.	Accepted.
19914	4	64	6	64	6	Delete den Elzen et al. 2005, or rephrase the text, as this study tries not to quantify a climate debt, but only accounts for historical responsibility in the allocation of future emission reductions (effort-sharing)	accepted - reference removed
19915	4	64	6	64	6	I would refer to the carbon budget literature here, as these studies do account for carbon debt.	See beginning of paragraph.
40566	4	64	8	64	29	Regarding effort-sharing approaches, all options (e.g., cost-benefit analysis) which appear on table 6.3 should be described in this part.	Some have been added, but note that this is not intended to be an exhaustive survey.
21203	4	64	9			Should the term be "potential"	editorial
23968	4	64	31	65	5	Sec 4.8.1 seems redundant. Why equity and sustainability matter has already been said MANY times in this chapter.	Shortened into a brief introduction.
19333	4	65	1		5	EDITS: This is too long and has too many ideas embedded in it.	editorial
19334	4	65	10		45	COMMENT: This is a really nice summary	noted - thank you
24140	4	65	47	66	3	Please inform the draft to be revised by the authors when completed.	Accepted.
23969	4	65	6	65	48	Sec 4.8.2 also seems repetitive.	This is indeed repetitive, but the aim is to extract the relevant insights for subsequent chapters.
34301	4	66	12			Please delete 'tradeoffs' since Table 6.5 discusses co-benefits and risks of individual mitigation options but does not analyse the trade-off between different types of risks.	Trade-offs deleted.
19335	4	66	17		35	COMMENT: Nice summary, especially the use of examples works really well.	This has been eliminated due to space constraint.
41241	4	66	21	66	22	It is not really appropriate to say some gaps more important than others. also "sustainable development goals" are not yet established, so not true to say these issues will be considered.	This has been eliminated due to space constraint.
27016	4	66	7	66	9	Need to include link between adaptation as mentioned earlier in the chapter - otherwise, this would contradict what said earlier.	Rejected - in this table, the link to adaptation options is not presented

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
19152	4	67		70		Equity. Enhancing existing products should also be mentioned. A sustainable product's demand can expand! Economics. Traditional biomass energy is very competitive with other forms of energy. This should be expanded as well as the 'modern' use of biomass energy. Social - poverty alleviation. People, especially rural people can grow and expand the use of biomass for all purposes. This should assist with poverty alleviation. Access and affordability. By expanding biomass use through improved production methods, trade and end-use efficiency, should enhance rural income and enable more people to pay for electricity. It is no good supplying electricity to people if they cannot afford it. Health. Improved stoves and drier biomass should reduce IAP. Some of the main causes of Outsid AP are wild fires and pollution from vehicles and power stations etc. I don't know how wild fires can be stopped except by improved management of resources and the extraction and use of dead biomass. Environmental. It is more beneficial not only to capture carbon in plants but also to use the captured carbon sustainably. Economic: new technologies. Should also promote improved 'old' technologies.	The table has been streamlined, and now only points to chapter sections.
19336	4	67				10 Industry ..CONFUSING: ..may be targeted for poor more – what is this saying and is a word missing?	The table has been streamlined, and now only points to chapter sections.
41242	4	67	1			The authors should conside removing this table-- it doesn't add to the understanding of the issue and summarizes issues inappropriately and problematically	The table has been revised.
34303	4	67	1	71	1	While it seems that the fully annotated table might be a good basis for completing the text in section 4.8.3, the table is hard to read and uses a lot of space. A table listing the indicators might already give a good overview of sustainability discussions throughout the report while better complementing the qualitative synthesis of Table 6.5.	Accepted.
21204	4	68				Should the term be "targeted" instead of "targetted", "involvement" instead of "involvment", "efficiency" instead of "efficieny" or "efficiecny", "recycling" instead of "recyling" or "recicling", "dependency" instead of "dependancy", "opportunity" instead of "opportinity", "yield" instead of "yeild" and "mention" instead of "mentiona"	The table has been streamlined, and now only points to chapter sections.
19337	4	68				10.4 …SPELLING – recycling is misspelled in Poverty alleviation Education and learning 10.4 ..away from use-and-throw to sharing.	The table has been streamlined, and now only points to chapter sections.
29628	4	69				Please repeat the header of the table on each new page for improved lisibility	The table has been streamlined, and now only points to chapter sections.
19338	4	69				Health 7.9 ..and may thus yield… yield misspelled Water, soils… 10.4 …efficiency mispelled	The table has been streamlined, and now only points to chapter sections.
19209	4	7		10		4.1 Introduction reads really well. I really liked it.	Noted - (Thank you)
29584	4	7	1			Format : "(high agreement, medium evidence)" should be in bold if you want consticency	Accepted, consistency checked.
29585	4	7	2			Format : "(high agreement, robust evidence)" should be in bold if you want consticency	Accepted, consistency checked.
29586	4	7	27	7	28	Would you have by chance a reference for these Articles : where do we find them in the AR5 ?	Identified by UNFCCC Article number.
29587	4	7	37			Please define "procedural equity" at the first appearance of this term in the Chapter; see p 4 Line 6	Clarified by context.
21169	4	7	4			Add comma i.e. "in other parts of the world, large…"	Accepted.
21170	4	7	42	7	43	Will it be better change sentence as "relevant for short-term and long-term durations"	Slightly reformulated.
41111	4	7	5	7	7	Does "risk" in this context refer to financial risk or climate risk? Does "sustainability" here refer to economic sustainability or environmental? clarify.	All sorts of risk. This has been reformulated.
31716	4	7	9	9	7	This point is very large is necessary to cut, because is only how is written in the precedent Ars, with one page is sufficient	TIA - shortened, but only modestly, as has been deemed a useful contextulization by several reviewers

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
29345	4	7	9	9	7	This section may be cut out.	TIA - shortened, but only modestly, as has been deemed a useful contextulization by several reviewers
19339	4	70				Distribution (Within countries… under National ….(particularly low-income) countries are progressive ..under Finance …deployment of low-fossil-carbon technologies ADD fossil	The table has been streamlined, and now only points to chapter sections.
19340	4	70				Procedural equity…. Space between 16.5 Procedural ..recent developments on a national level,…	The table has been streamlined, and now only points to chapter sections.
19341	4	71				Under Local pollution and global emissions rearrange words – but not analyzed in detail	The table has been streamlined, and now only points to chapter sections.
26505	4	71		71		The statement made at Page 71 (Map of sustainable development and equity issues within AR5 WGIII) in relation to Chapter 10 _National policies that “Employment effects are not analysed extensively. We believe that there is little that can be said with certainty on the general relationship between employment and climate policy “ is not consistent with findings from Chapter 7, Chapter 9 and Chapter 10 which extensively demosntrate that climate change mitigation can be a driver for employment creation, under certain conditions. We suggest reviewing this statement in line with the above-mentioned chapters. With high certainty it can be said that more research and evidence on social and employment effects are needed, notably in developing countries.	The table has been streamlined, and now only points to chapter sections.
20185	4	72				The analysis on technology indicates gaps in knowledge (p. 29, line 12, page 30, lines 24-25) that should be mentioned here.	Accepted. A new bullet point is added.
27018	4	72		72		Is one of the recommendations a call for a redefinition of "growth"?	This would be prescriptive. But a better understanding of well-being, and of the potential role of various attitudes/values is called for, both of which may indeed lead to move away from a view of growth as economic growth.
19342	4	72				4.9 Gaps …COMMENT: Good summary of key points	Thank you
41243	4	72	7	72	11	Both of these are highly controversial points in the UNFCCC and it is very difficult to assess them in a non-policy prescriptive way.	We only note that knowledge about such issues is limited, this observation itself is not policy prescriptive. The first item has been reformulated to avoid ambiguity in this respect.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
27017	4	72	9	72	9	This is not totally accurante, the GEF, World Bank and other finanical Institutions have set up some methodologies and made effort to evaluate funding necessary. What is really needed is harmonizing them. Indeed, despite the challenges, some financial institutions monitor and evaluate their projects/investments to measure impact and results and understand if funds are well spent. To harmonize GHG accounting and reporting efforts, a working group of multilateral development banks and international financial institutions produced the “International Financial Institution Framework for a Harmonised Approach to Greenhouse Gas Accounting.” Most work to date is focused on project-level financing. Institutions are beginning to look at how to account for impacts of policy level financing. More intensive work in this particular area by encouraging the collaboration of relevant organizations is yet required. reference includes: Asian Development Bank et al. (Nov. 2012) “International Financial Institution Framework for a Harmonised Approach to Greenhouse Gas Accounting” ; Ballesteros, Athena et al. (2010). “Power, Responsibility and Accountability: Re-Thinking the Legitimacy of Institutions for Climate Finance.” WRI: Washington, DC. http://pdf.wri.org/power_responsibility_accountability.pdf	This is incorporated in the new formulation of this bullet point.
19153	4	72				Gaps in knowledge. Good inventory information by country and districts with in the country of biomass stock and annual sustainable supply. The propuer resource use can be planned	Valuable point but it probably belongs to another chapter (AFOLU?). We cannot ground this on the material of our chapter.
24578	4	8	14	8	17	The length of this sentence confounds meaning. Suggest splitting into two sentences with a full stop after 'ethical matter;'	Accepted.
19210	4	8	14		19	COMMENT: This is recognized but there is no framework that has been developed to do this still today. This is why this is such an important topic since there needs to be a move beyond articulating a problem to what to do about it.	Noted - this is intended only as an expression of problem. Please see 4.6.1, Ch 6, and Ch 13, and note that it is not the IPCC's role to decide "what to do about it."
24579	4	8	23	8	30	The length and flow of this passage is confusing. Suggest reword to: 'The AR4 focused more strongly than previous assessments on the distributional implications of climate policies. It highlighted some key oversights of conventional climate policy analysis that is narrowly based on traditional utilitarian or cost-benefit frameworks. These oversights included the neglect of critical equity issues including human rights implications and moral imperatives; neglect of the distribution of costs and benefits of a given set of policies; and further distributional inequities that arise when these policies are implemented in a world where the poor have limited scope to influence policy.'	Revision made accordingly (essentially accepted).
24580	4	8	32	8	35	The length and flow of this sentence is confusing. Suggest split into two sentences: '…compared with the rich. The poor have higher risk aversion and lower access to assets and financial mechanisms that buffer against shocks.'	Accepted.
41112	4	8	35	8	35	Beyond a brief mention on p. 8, this entire chapter has no significant discussion of how the use of private and public insurance can address equity issues. Do other IPCC chapters contain more analysis of the issue?	Yes, see Ch 16.
21171	4	8	5	8	6	Sentence might need to be rephrased - repetition of words "mitigation measures and measures should not…"	Corrected.
41244	4	88	26	88	26	Full cite for appendix (p. 88) for citation on p. 22, above: Philip J. Harter, Collaboration: The Future of Governance, Journal of Dispute Resolution, 411, footnote 56 (2009)_.	Could not find the target of this remark.
19211	4	9	1		7	NOTE: The policy framework that exists in developed countries probably not work in developing countries since they are making very different trade-offs. These trade-offs vary based on which natural resources (fossil and renewable) they have, what are the competitive choices, and what is the survival mode.	Accepted - a box will be added as in the other chapters relating to specific concerns of poor countries

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
41115	4	9	11	9	12	The text states: "It examines these links with the aim of drawing policy-relevant conclusions..." State here explicitly what these policy relevant conclusions are (1...2...3...) and where justifications for them can be found in the chapter (and throghout WG3 and AR5, more broadly). A table on this might be useful.	TIA - the conclusions are described in detail immediately after (4.1.1.1-3).
24581	4	9	16	9	16	Suggest replace 'severely' with significantly as it is repetitive in this sentence	TIA- "serious" has replaced "severe"
19212	4	9	20		22	COMMENT: Adaptation has to consider also reintroducing the idea presented earlier of nature capital vs fossil material capital. Developing countries are more impacted disproportionately compared to developed countries since they supply resources and then are impacted by developing country drivers of climate change.	See sections 4.3.7 an 4.6.1
27493	4	9	32	9	37	Very good point!	Noted - (Thank you)
41116	4	9	35	9	37	The text states: "...the...strategies society needs are those that recognize climate change shares it root causes with other dimensions of the global sustainability crisis, and that without addressing these root causes, robust solutions may not be accessible." What are these root causes? Although it is not stated here, the root causes are (1) the explosion of the human population over the past 150 years, and (2) the aspiration and movement of billions of new humans to achieve higher living standards. Perhaps these two root causes should be clearly and concisely articulated here (it realized that a diffuse section on population appears beginning on page 24). What are the robust solutions mentioned in the text excerpt above? Where, explicitly, are they to be found in AR5?	Please see 4.3 for (a key) set of drivers of (un)sustainable development
41113	4	9	4	9	7	This entire paragraph is unnecessary and does not help policy makers. The authors should consider deleting it.	Accepted.
19213	4	9	42		48	This is good discussion but this is a major problem of industrialized countries and less relevant for developing countries.	Less relevant, but not irrelevant. Also, this is not a matter of countries alone, but individuals as well.
41114	4	9	6	9	7	The text states: "...this Fifth Assessment Report (AR5) elaborates futher on key dimensions and expands the treatment in important directions." State here explicitly what these important directions are (1...2....3...) and add references to areas/oer chapters of AR5 where these points are developed further.	Please see section immediately following.
32404	4	9	15	9	16	Please provide a more specific reference to WGI/WGII AR5.	Done later in the sentence.