WMO

INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE

UNEP

IPCC Fourth Assessment Report

Expert/Government Review of the Second-Order Draft

Chapter 3

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
3-1	A	0	0	0	0	I found the use of units inconsistent and frustrating; they need to be sorted out. Also, I found that the continual switching between units containing GtC and GtCO2 made comparisons difficult. It would be much more convenient for the reader to standardize on one or the other, and put the alternative in brackets if necessary. (Stanley Gordelier, Nuclear Energy Agency of the OECD)	Agreed. All units to be converted to TSU designated unit.
3-2	A	0	0	0	0	Overall, a good summary of the literature since the TAR. It contains a fair assessment of the new endogenous technical change literature (Jonathan Köhler, University of Cambridge)	Noted
3-3	A	0	0	0	0	This Chapter is focused on the very long term although the implicit assumption that climate change mitigation is a very long term problem is becoming increasingly unreliable as evidenced by increasing concerns that the climate system may be near some threshold or tipping point for an abrupt, and possibly catastrophic climate change event. I have elsewhere (other chapters) suggest this be handled by inserting the word "assumed" at various places, but that would be tedious in this Chapter so I propose a footnote on p7. Similarly, although the rhetoric of policy making is in terms of 'emissions reductions' the potential of increased absorption is much greater than even a successful transition to zero emissions (as evident from the figure in my Commentary circulated to LA's by Rutu Dave). The correct concept is net emissions reductions (or net absorption increases) . Again, the insertion of "net" in front of "emissions" at every point in this Chapter would be tedious and I propose a second footnote for page 7. (Peter Read, Massey University)	Rejected. First, comments on the science are properly dealt with by WGI and second, it is clear in the chapter where we are addressing mitigation and where we are addressing sequestration and CCS. Hence, inserting the word 'net' is unnecessary.
3-4	A	0	0	0	0	Please see my Commentary titled "Addressing Potential Abrupt Climate Change" which does not fit into this Excel spreadsheet box. I have accordingly asked Dave Rutu to circulate it to lead authors. It draws attention to a body of peer reviewed and gray literature which appears to have been largely overlooked in the SOD, although it was brought to attention previously in my comments on the FOD and features somewhat in this Chapter I am glad to see. The main point is that the literature mostly treats atmospheric CO2 as a flow pollution problem, to be addressed through a reduction in emissions. However CO2 is not a noxious gas, and therefore atmospheric CO2 is an excess stock problem with several possible answers. It is technologically much easier to extract CO2 from the atmosphere by land use improvements that increase biotic absorption and yield biomass fuels (de-fossilization) than it is do without any fuel other than hydrogen (decarbonisation). Although the best reference is Read and Parshotam (2006) this is still 'gray' and a sufficient basis for the suggested amendments to this Chapter is Read and Lermit	Noted. Will assess Read and Lermit for possible inclusion.

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						(2005) which is already mentioned and Read (2006). (Peter Read, Massey University)	
3-5	A	0	0	0	0	This Chapter is focused on the very long term although the implicit assumption that climate change mitigation is a very long term problem is becoming increasingly unreliable as evidenced by increasing concerns that the climate system may be near some threshold or tipping point for an abrupt, and possibly catastrophic climate change event. I have elsewhere (other chapters) suggest this be handled by inserting the word "assumed" at various places, but that would be tedious in this Chapter so I propose a footnote on p7. Similarly, although the rhetoric of policy making is in terms of 'emissions reductions' the potential of increased absorption is much greater than even a successful transition to zero emissions (as evident from the figure in my Commentary circulated to LA's by Rutu Dave). The correct concept is net emissions reductions (or net absorption increases) . Again, the insertion of "net" in front of "emissions" at every point in this Chapter would be tedious and I propose a second footnote for page 7. (Peter Read, Massey University)	Rejected, same point as addressed in 3-3.
3-6	A	0	0	0	0	Please see my Commentary titled "Addressing Potential Abrupt Climate Change" which does not fit into this Excel spreadsheet box. I have accordingly asked Dave Rutu to circulate it to lead authors. It draws attention to a body of peer reviewed and gray literature which appears to have been largely overlooked in the SOD, although it was brought to attention previously in my comments on the FOD and features somewhat in this Chapter I am glad to see. The main point is that the literature mostly treats atmospheric CO2 as a flow pollution problem, to be addressed through a reduction in emissions. However CO2 is not a noxious gas, and therefore atmospheric CO2 is an excess stock problem with several possible answers. It is technologically much easier to extract CO2 from the atmosphere by land use improvements that increase biotic absorption and yield biomass fuels (de-fossilization) than it is do without any fuel other than hydrogen (decarbonisation). Although the best reference is Read and Parshotam (2006) this is still 'gray' and a sufficient basis for the suggested amendments to this Chapter is Read and Lermit (2005) which is already mentioned and Read (2006). (Peter Read, Massey University)	Rejected , same point as addressed in 3-4.
3-7	A	0	0	0	0	the policy relevance of the chapter needs to be increased. As practical examples were mentioned: -Make description of baseline scenarios less descriptive, but more analytical: policy makers can influence the driving forces.	Accepted, will be addressed in general revision.

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						-current chapter contains wide ranges and "spaghetti diagrams" that are difficult for policy makers to handle. Participants suggested using color bands -policy relevant question: costs of stabilization and how to get there is a main point, but it takes 60 pages to arrive there. Consider shifting text around to keep attention. (Expert Review Meeting Paris, IPCC)	
3-8	A	0	0	0	0	the cost in regard to GDP cost in relation to the 550ppm target? Finally the suggestion was made to make the tables and figures in Chapter 3 more readable. (Expert Review Meeting Paris, IPCC)	Rejected. First, Comment incoherent. Second, agreed.
3-9	A	0	0	0	0	question was raised on whether the table could be broken down into two further categories one below 450ppm and one between 450-550ppm? (Expert Review Meeting Paris, IPCC)	Reject. Comment not clear.
3-10	A	0	0	0	0	It was recommended to include more analysis of the reasons behind the developments and the portfolio of measures up to and in 2100, as resulting from the scenarios/models. Get down to more specifics when decisions in time sequence would need to be taken and emphasize the time slots for the various technologies. (Expert Review Meeting Paris, IPCC)	Rejected. Comment incomprehensible.
3-11	A	0	0	0	0	improving each of the following tables and the combination of them: table 3.5, 3.12, and 3.13 (impacts in terms of avoided damage). It was suggested to add costs and 2 degrees target in Table 3.12 (table is based on material found in Working Group II). (Expert Review Meeting Paris, IPCC)	Noted. Changes subject to inter working group liaison.
3-12	A	0	0	0	0	Notably absent from this chapter (and from other chapters of the WG3 report) is a discussion of the (admittedly limited) ethical literature concerning the global warming issue. Equity issues (pertaining to the distribution of impacts and of emission reduction targets) are raised, but WG3 is silent on the broader and deeper ethical issues. Quite simply, decisions made now and in the coming decades will determined what fraction of species of life on this planet are going to become extinct, and will determine how many millions (or tens of millions, or even hundreds of millions) of people are going to die in the long run (and how many more are to going to suffer adverse but none fatal impacts) as a result of the impacts of unrestrained emissions that we can now foresee (see especially Chapters 4 and 19 of WG2). Ethical issues could be discussion here or in Chapter 2 (they to pertain mostly to the long term, and they should certainly be regarded as a "framing issue), but they should certainly be discussed somewhere. See Brown (2003) and Toon (2003). REFERENCES:	Rejected. Purpose of chapter is to assess the scenario literature not to make ethical judgments about it.

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						Brown, D.A. 2003. 'The importance of expressly examining global warming policy issues through an ethical prism', Glob. Env. Change 13, 229-234. Tonn, B.: 2003, 'An equity first, risk-based framework for managing global climate change', Glob. Env. Change 13, 295-306. (Danny Harvey, University of Toronto)	
3-13	A	0	0	0	0	In spite of some shortcomings (absence of a discussion of the ethical dimensions of global warming, and insufficient treatment of population and growth of GDP/P), this is a very good and informative chapter. Sections 3.1-3.4 provide a lot of useful information that is not found in other chapters. Section 3.4, however, overlaps with the extensive discussion of technology in Chapter 2 – maybe a meticulous intercomparison of the two chapters will reveal ways to shorten the discussion. Section 3.5 strongly overlaps with Chapter 18 of WG2, but the SOD of Chapter 18 had some very serious problems that I do not find in your discussion of these issues. (Danny Harvey, University of Toronto)	Noted. Material in section 3.5 to be reviewed in context of inter WG discussions.
3-14	A	0	0	0	0	I am happy that CO2 emissions are given in terms of mass of C and not of CO2, as this aligns with the practice in WG1 and WG2. However, in chapter 4 and other chapters, emissions are given in mass of CO2. It should be the same in all chapters, and I strongly urge that it be mass of C (as in this chapter). (Danny Harvey, University of Toronto)	Noted. Units to be made consistent.
3-15	A	0	0	0	0	Most of the emission levels in this report are give in terms of tCO2-eq. At many points in this chapter, emission levels are given in tC-eq. These should be converted to tCO2, or the values in tCO2 given as supplemental information, to allow comparison with other information. (Lenny Bernstein, L. S. Bernstein & Associates, L.L.C.)	Noted. Units to be made consistent.
3-16	A	0	0	0	0	A comment on terminology: Carbon storage can occur either through "engineered" storage in for example geological formations and ocean water, or through the biological uptake in growing biomass and soils. In this chapter, it is sometimes unclear which of these two alternatives are actually referred to when the terms "storage" and "sequestration", respectively, are used. One way to improve the text would be to consistently use either "storage" or "sequestration". This would not help to differentiate but it would be less confusing compared to the present text. Another (and better) option would be to use "storage" for engineered storage and "sequestration" for storage through biological uptake. The latter option would ease the differentiation between the two storage strategies. In any case consistency is	Accepted. Terminology to be revised.

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						important within the chapter, but also between this chapter and the other chapters of the report. (Kenneth Möllersten, Swedish Energy Agency)	
3-17	A	0	0	0	0	use CO2 capture and storage (CCS), as used in Special Report; not geological sequestration (term sequestration reserved for biological sequestration) (Bert Metz, IPCC)	Agreed. Terminology to be revised.
3-18	A	0	0	0	0	units should be GtCO2equiv (GtC in brackets), as agreed for whole report (Bert Metz, IPCC)	Agreed. See comment 3-15.
3-19	A	0	0	0	0	Chapter needs to be shortened to meet page allocation and to be more useful to policy users. Recue descriptive parts, focus on analytical material (even strengthen that); large overlaps between 3.3 / 3.4 and 3.5 / 3.6 give also room to cut. (Bert Metz, IPCC)	Accepted. Will reduce size significantly.
3-20	A	0	0	0	0	Many references incomplete (Bert Metz, IPCC)	Accepted.
3-21	A	0	0	0	0	check GWP use, sometimes GWP (Bert Metz, IPCC)	Rejected. Comment incoherent.
3-22	A	0	0	0	0	all references of IPCC reports to be done in standardised way (ippc, xxxx, title, editors, publisher or respective chapter authors (all), year, in …(tittle), editors, publisher, page (Bert Metz, IPCC)	Agreed.
3-23	A	0	0	0	0	Definition of long-term is not clear. There is a distance between policy makers and researchers. (Toshihiko Masui, National Institute for Environmental Studies)	Accepted. Will make definition of long term more clear.
3-24	A	0	0	0	0	As with Chapter 2, 150 pages here on a familiar scenario overview seems much too long. Two key elements stand out: lower World population projections; and failure to show here those scenario studies which assign larger shares to coal due to revised estimates of oil and natural gas reserves (see page 26, lines 32/34). [Some indications of lower expected developing country growth rates and lower carbon intensities are also tentatively given.]Especially in the case of ultimately recoverable conventional oil resources, with natural gas resources further down the time line, it is extremely important for the Fourth Assesment to consider the implications of this most seriously, not simply by assuming larger market shares to coal (with or without CCS) but by highlighting the even greater and more urgent need to harness new renewable energy sources and technologies. (Michael Jefferson, World Renewable Energy Network & Congresses)	Noted.
3-25	A	0	0	0	0	The length of this chapter is its biggest disadvantage. It makes it difficult for the	Accepted.

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						readers to understand and find the purpose of the chapter (Rutu Dave, IPCC WGIII TSU)	
3-26	A	0	0	0	0	For matter of consistency with Chapters 4 - 11, please add also emissions and emision reduction in tCO2 next to tC (Government of European Community / European Commission)	Accepted. Units to be made consistent.
3-27	A	0	0	0	0	One of the major changes compared tot TAR is the strong increase of crude oil prices and other energy prices. The 4th AR should indicate, be it tentatively, what the effect of increased oil prices could be on emissions and on the costs of emission reduction options. (Government of European Community / European Commission)	Noted, literature available for assessment (within IPCC publication timelines) has been reviewed.
3-1	B	0	0	0	0	Throughout the chapter visually complex Figures and Tables are used with little supporting explanation or analysis. The authors need to review each of the figure/tables used to ensure that: abbreviations used are explained; the figure/table is properly formatted (for example Table 3.12 is currently split over 2 pages); the methodology of the figure/table is included; and that the significance of the figure/table is explained. (Government of Australia)	Accepted.
3-2	B	0	0	0	0	Throughout chapter 3 there is a tendency for the authors to focus on providing specific numbers for emissions scenarios, without providing analysis as to what a specific result may mean. The authors should ensure that any specific findings in the chapter are supported by analysis explaining the finding. (Government of Australia)	Accepted.
3-3	B	0	0	0	0	There is an overemphasis on SRES comparisons. -As opposed to concentration on our understanding of, and uncertainty regarding key drivers, the document focuses heavily on comparing recent scenarios to SRES. SRES is perhaps the most visible scenario exercise to date, but the focus of this chapter should be on understanding mitigation and the factors that influence the characteristics of mitigation, not changes in our understanding since SRES was completed. Streamlining the discussion of baseline and mitigation scenarios might allow for reductions in the length of the chapter. U.S. Government (Government of U.S. Department of State)	Accepted. Will be addressed in process of reducing chapter length.
3-4	B	0	0	0	0	The importance of technological change needs to be highlighted. The discussions of baseline scenarios and mitigation scenarios are valuable, but they precede any serious discussion of the role of technological change. Technological change should be discussed and emphasized earlier in the document and should be a larger component of the Executive Summary. Policies to improve technologies are among	Accepted. Discussion with ch2 to move more material on technology.

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						the core policy tools that are available for facilitating mitigation. U.S. Government (Government of U.S. Department of State)	
3-5	B	0	0	0	0	The chapter needs significant editorial and proofreading work. There are many typographical errors and word choice errors. Moreover, there is much reduntant text (the same passages in more than one section). Addionally, data presented uses inconsistent units (MTC, PgCO2, MTCO2, 2000US$, US2002$, etc). U.S. Government (Government of U.S. Department of State)	Accepted.
3-6	B	0	0	0	0	The chapter is far too long and has far too much text which simply reitterates the previous conclusions of the SRES Report and the TAR. These sections should be brief, if definitely needed. U.S. Government (Government of U.S. Department of State)	Accepted, chapter to be shortened in revision process.
3-7	B	0	0	0	0	The Chapter 3 discussion of the process of technological change needs to be more consistent with the discussion in Chapter 2. Chapter 2 puts forward a more comprehensive vision of technological change that considers R&D, spillovers, and issues associated with the diffusion of technology. The Chapter 3 discussions of technological change focus on learning-by-doing with less consideration of R&D and limited consideration of spillovers and their implications for policy. The work of Goulder & Mathai should be considered in this chapter. U.S. Government (Government of U.S. Department of State)	Accepted. See comment 3-4B. Will review Goulder & Mathai.
3-8	B	0	0	0	0	Probabilistic Interpretation of Scenarios in the Literature: Does the review of scenarios properly convey the differing perspectives on how to interpret the ranges of scenarios that are currently in the literature? As the chapter discusses, these scenarios were developed for very different purposes and using very different methods. Although it is clearly illuminating and valuable to discuss the scenarios using a statistical perspective (e.g., giving percentile distributions), it is critical that the discussion acknowledge the many limitations associated with interpreting the scenarios literature in a probabilistic fashion like this. Authors should acknowledge these concerns more forcefully. U.S. Government (Government of U.S. Department of State)	Accepted.
3-9	B	0	0	0	0	Most of the emission levels in this report are give in terms of tCO2-eq. At many points in this chapter, emission levels are given in tC-eq. These should be converted to tCO2, or the values in tCO2 given as supplemental information, to allow comparison with other information. U.S. Government (Government of U.S. Department of State)	Accepted. See comment 3-26A.
3-10	B	0	0	0	0	Many of the conclusions in this chapter are supported largely or entirely by	Rejected. Relevant publications met the IPCC

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						references that are listed as in press. This is the last chance experts have to review this chapter, and this approach gives them no way to assess the validity of the authors' characterization of the information or their conclusions. For example, on page 35, lines 12-13, the authors' state: "There also seems to be a consensus in recent non-CO2 GHG baseline scenarios that CH4 and N2O emissions will increase until the end of the century, potentially doubling in some scenarios." The six references supporting that conclusion are all listed as in press. This is a perversion of the review process. Authors should verify that the sources conform to the IPCC guidelines for submission dates. U.S. Government (Government of U.S. Department of State)	guidelines for submission dates.
3-11	B	0	0	0	0	Induced Technological Change: How effectively does the discussion on the forces that shape technological development mesh with the more detailed discussion in Chapter 2? The discussion appears to focus on learning-by-doing and applied R&D without serious consideration of spillovers and their implications for policy. In addition, the work of Goulder & Mathai should be considered in this chapter. U.S. Government (Government of U.S. Department of State)	Accepted. See comment 3-7B.
3-12	B	0	0	0	0	Discussions of Impacts and Adaptation: Section 3.5 discusses a variety of approaches to analysis of mitigation that consider impacts and adaptation, for example, cost-benefit analysis. Implementing these analyses necessarily requires some discussion of impacts and adaptation. However impacts and adaptation are not topics for Working Group III, and are the focus of Working Group II. Two issues are important in this regard. (1) Does the chapter stray further than it needs to into the discussion of these topics? It is important to distinguish between general discussions of impacts and adaptation and potential implications for mitigation, on the one hand, and discussions of integrated analysis of mitigation and these topics in formal, consistent cost-benefit frameworks where the effects on mitigation can be addressed. The latter would seem to be an appropriate area for discussion in this chapter, whereas the former would appear to be more appropriate for Working Group II. (2) Are any discussions of impacts and adaptation consistent with the work coming out of Working Group II? U.S. Government (Government of U.S. Department of State)	Accepted. Section 3.5 to be revised.
3-13	B	0	0	0	0	Comparison to SRES: The review of existing scenarios is extremely useful as is the comparison of these scenarios to SRES. However, it might be valuable if some of the discussion, particularly in the Executive Summary, could focus more on the overall sense of the results rather than whether there have been changes since	Noted. See comment 3-6B.

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						SRES. The readership should be interested not just in changes in the state of knowledge and understanding since SRES, but also the absolute state of these things. This is more a matter of presentation than content. U.S. Government (Government of U.S. Department of State)	
3-14	B	0	0	0	0	Chapter title is misleading. It suggests that the chapter covers conceptual long-terms mitigation issues, which it does. However, the chapter also provides a full discussion of actual long-term mitigation results. The other chapters (outside of the brief and shallow coverage in chapter 11) provide short-term mitigation assessments. This chapter is the only place in the report and across all the IPCC AR4 reports where the long-term mitigation analysis is assessed. It is a crucial piece of the climate change analyses picture in that it provides the mitigation complement to WGI's and WGII's long-term climate change and impacts assessments. The title should be changed to inform readers that this is the place to come for this information. As is, the chapter may be regarded as a framing discussion similar to preceding chapters and overlooked as a result. Suggested alternative: "Mitigation in the long-term context." U.S. Government (Government of U.S. Department of State)	Rejected. Chapter title set by IPCC Plenary.
3-15	B	0	0	0	0	Chapter 3 is too long. U.S. Government (Government of U.S. Department of State)	Accepted.
3-16	B	0	0	0	0	Authors should consider whether it would be feasible and valuable to characterize GDP loss over the whole period. U.S. Government (Government of U.S. Department of State)	Accepted. Will report data where available in the literature.
3-17	B	0	0	0	0	(3) There is a citation problem in Chapter 3 that can be easily fixed: 3.3.4.2 (3.4.3.2) references Chapter 2 sections 2.9.2.1 and 2.9.2.2; 3.4.3.3 references 2.9.2.3. However, there are no sections numbered 2.9.2.1-2.9.2.3. It is recommended that these be 2.8.2.1-2.8.2.3. U.S. Government (Government of U.S. Department of State)	Accepted.
3-18	B	4	0	0	0	The Executive Summary should include more information on possible long-term emissions pathways to achieve stabilisation, than is currently included - as the discussion at section 3.5.3.2 is particularly useful. (Government of Australia)	Accepted.
3-28	A	4	1	7	29	Not covered in the executive summary: reducing earlier versus later, cost saving or lock in effect? (Government of European Community / European Commission)	Accepted. Executive summary to be revised.
3-19	B	4	1	0	0	The role of risk management/hedging should be featured more prominently in the design of chapter 3 and in its Executive Summary. The issues raised in section 3.5	Accepted. Sections to be revised.

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						and 3.6 regarding (a) cost benefit versus cost-effectiveness and (b) risk management/hedging approaches to climate mitigation are fundamental to our understanding of mitigation. These discussions are relegated to the last two sections of the chapter, with little prior mention. Risk management is discussed in Section 3.5 and hedging is discussed in Section 3.6. Reorganization is required. These should be discussed in a single comprehensive discussion of risk management. U.S. Government (Government of U.S. Department of State)	
3-20	B	4	1	0	0	The Executive Summary should begin by highlighting the lessons from recent scenarios and then turn to comparisons with the TAR rather than making the comparisons the centerpiece. U.S. Government (Government of U.S. Department of State)	Accepted.
3-29	A	4	3	7	30	Why is there nothing on carbon prices that are assumed or result from long term emission scenarios? Especially for comparison with the bottom up chapters, this information is of high importance and should be higlighted. What do carbon prices do over the long term. This is additional information over the costs as a function of GDP. (Government of European Community / European Commission)	Noted. Tables 3.16 and 3.17 already provide 2030 carbon price and abatement quantities for direct comparison to bottom-up chapters. Also, a long-term carbon price figure is planned.
3-30	A	4	15	4	19	Possibly add more meaning to the paragraph. Why is the range so large. What do we learn from it? Is the range unchanged because not enough research has been carried out for IPCCs assessement or what is the generic and basic reason for this (Government of European Community / European Commission)	Accepted. Will insert discussion on drivers of uncertainty in range.
3-31	A	4	22	4	23	Were these changes in other drivers an arbitrary choice or a response to observed signals ? (Government of France)	Accepted. Paragraph to be amended to deal with comment 3-21B.
3-21	B	4	22	4	22	Amend to '…lower population projections' (Government of Australia)	Accepted. See 3-31A.
3-32	A	4	25	0	28	Why this chapter refers to the "medium-term" projections although the title is "Long-term issue"? The discussion about the medium term perspectives under the long-term perspectives can be understood. (Toshihiko Masui, National Institute for Environmental Studies)	Noted. Chapter refers to mid term in order to link with ch11.
3-33	A	4	25	4	26	I am a little confused about "economic projections…lower than the highest scenarios … ". If it is lower than the highest, it means they are still in the range of scenarios in TAR. Perhapers it should be "higher than the highest" or "lower than the lowerest", or maybe I did not understand correctly. (REF!)	Accepted. Text to be revised to remove confusion.

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3-34	A	4	25	4	25	Could not the very vague "some" be replaced by a more precise statement ? (Government of France)	Accepted. Text to be revised.
3-35	A	4	30	4	35	What is the problem here? MER or PPP is a methodological problem but what does it tell about the reality? In addition, "the debate" has been in a debate in a small community driven by two experts. Highlighted here might give it more attention it does not deserve. (Government of European Community / European Commission)	Noted.
3-36	A	4	34	4	35	Unnecessarily provocative to say that much of the literature still doesn't use PPP. The counter-argument would be that the new literature that doesn't use the PPP (where warranted) should be disregarded. The point made in the previous sentence is compelling enough. (Government of Environment Canada)	Accepted. Text to be revised.
3-37	A	4	39	4	41	"multigas reduction strategies are substantially lower". This seems indeed to be the agreement, but another issue seems relevant here: several non-CO2 emission reduction options exist in the short term at lower cost compared to CO2. But reducing to very low levels in the long term (e.g. 450 co2eq.) non-CO2 options are no longer available and CO2 is reduced more compared to non-CO2. This is important to show that non-CO2 options can only postpone, not replace CO2 mitigation. (Government of European Community / European Commission)	Noted.
3-22	B	4	39	4	39	Insert "ranges" after "lower'. (Government of Australia)	Accept.
3-38	A	4	40	4	40	Lower costs to achieve emissions reduction on what time scale ? (Government of France)	Reject. Comment does not add anything.
3-39	A	4	43	4	43	Replace "drivers" by "GHG" (Government of France)	Accept.
3-40	A	5	1	5	3	Unclear message. Earlier it is said that multigas is less costly, here it is said that the effect of methane is overestimated. If the use of GWPs is questioned here in the executive summary then only with a full explanation of the problem and possible solutions to it. (Government of European Community / European Commission)	Accept. Text to be revised to make meaning clear.
3-41	A	5	2	5	2	Specify the time scale used in the GWP definition (Government of France)	Noted. Timescale GWP reference to appear in glossary.
3-42	A	5	5	0	6	This first sentence is too technology focused and thus inaccurate. Technology is not the only influence on the costs of stabilization. Suggest add the words at the end of the sentence: "Costs in these scenarios are assessed making simplifying	Accept. Text to be revised following chapter revision.

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						assumptions about consumption patterns and behaviour change." Note that the importance of consumption patterns is identified on p15, but these subtleties are not reflected in the summary statements made on p5.. (Ralph Chapman, Victoria University of Wellington)	
3-43	A	5	5	5	10	Level of target is a policy choice, while baseline and technology portfolio is a modellers choice. Possibly rephrase: "The model estimates of costs depend most in the policy choices of the stabilization target and level as well as on modelling choices of the baseline conditions and the portfolio of technologies included in the model." possibly combine with or refer to page 6 line 28. (Government of European Community / European Commission)	Noted. Changes to text to be considered following revisions to Ch3 text.
3-44	A	5	8	5	8	What is "somewhat"? (Government of European Community / European Commission)	Accepted. Will reword to make clearer.
3-45	A	5	10	5	10	After 'nuclear', insert '(fusion and advanced fission)'. Given the maturity of the world fusion development programme (which is beginning construction of a 500MW fusion device - ITER - in France), the substantial safety and environmental advantages of fusion, and the great abundance of its fuels, fusion should be distinguished from fission, not just included in the 'nuclear' umbrella term. (Ian Cook, United Kingdom Atomic Energy Authority)	Reject. Sentence to be removed as is redundant.
3-46	A	5	10	0	0	“Those could include nuclear (fission and fusion), CCS and BECCS.” (Robert Goldston, Princeton Plasma Physics Laboratory)	Reject. Sentence to be removed as is redundant.
3-47	A	5	10	0	0	Replace "BECCS" with "BECS" [bioenergy with carbon storage is a wider concept than bioenergy linked to CCS - for instance storage of long lived bio-char in soil linked to flash pyrolysis of biomass with liquid biofuels the main product and biochar an otherwise wasted by-product] . (Peter Read, Massey University)	Reject. Sentence deleted.
3-48	A	5	10	5	10	Replace "BECCS" with "BECS" [bioenergy with carbon storage is a wider concept than bioenergy linked to CCS - for instance storage of long lived bio-char in soil linked to flash pyrolysis of biomass with liquid biofuels the main product and biochar an otherwise wasted by-product] . (Peter Read, Massey University)	Reject. Sentence deleted.
3-49	A	5	10	5	10	BECCS is not defined in the abreviations list (Government of France)	Reject. Sentence to be removed as is redundant.
3-50	A	5	10	5	10	Add "renewables, " after "Those could include" to reflect the fact that many low stabilisation scenarios foresee extensive investment strategies towards renewable energy technologies. See, e.g., Figure 7, page 93 in Edenhofer, O, Kemfert, C., Lessmann, K., Grubb M., Koehler J. (2006): Technological Change: Exploring its	Reject. Sentence to be removed as is redundant.

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						Implicaton for the Economics of Stabilisation. Insights from the Innovation Modelling Comparison Project. In: Edenhofer, O., Carlo Carraro, J. Koehler, Michael Grubb (eds): Endogenous Technological Change and the Economics of Atmospheric Stabilisation. The Energy Journal Special Issue. The underlying figure on page 60 does not indicate how much of the biofuels is combined with BECCS and singling out BECCS from biofuels seems odd. To mention renewables in general would correct this imbalance. (Government of Germany)	
3-23	B	5	10	0	0	"Those could include nuclear (fission and fusion), CCS and BECCS." U.S. Government (Government of U.S. Department of State)	Rejected. See comment 3-50A.
3-51	A	5	14	5	14	Reason for this decreasing rate ? (Government of France)	Noted. Need to use clearer wording about continued loss of forest carbon and increased non-co2 emissions associated with continued but slowing land conversion and agricultural intensification. (Steve)
3-24	B	5	20	5	21	What is meant by "structure of supply as moderated by international trade"? Does that include changes in the rate of technological change and increases in productivity in the food and agricultural sector? Recommend that these be mentioned specifically and clearly. U.S. Government (Government of U.S. Department of State)	Noted. Clarification on these items will be considered.
3-52	A	5	23	5	31	After "cost-effectiveness" insert "and is essential in a responding to the threat of abrupt climate change"; after "policy" insert "related to an emissions cap such as under the Kyoto Protocol"; after "dedicated lands" insert "or co-produced with traditional products of the land"; replace "food demand" with "synergies and/or conflicts with food supply" [[[the illustrative calculations that currently support the holistic strategy envisage co-production of sugar with ethanol, timber with bio-energy from timber wastes and extraction of protein from (mainly) energy switchgrass, all based on energy industry investments in future raw material supplies driven by policies that result in a shift from drilling to tilling, from excavating to cultivating.]]] (Peter Read, Massey University)	Noted. Will consider proposed re-wording and necessary changes to supporting discussion in Sec. 3.3. Will need to provide proper support for new conclusions.
3-53	A	5	23	5	31	After "cost-effectiveness" insert "and is essential in a responding to the threat of abrupt climate change"; after "policy" insert "related to an emissions cap such as under the Kyoto Protocol"; after "dedicated lands" insert "or co-produced with traditional products of the land"; replace "food demand" with "synergies and/or	Noted. Will consider proposed re-wording and necessary changes to supporting discussion in Sec. 3.3. Will need to provide proper support for new conclusions.

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						conflicts with food supply" [[[the illustrative calculations that currently support the holistic strategy envisage co-production of sugar with ethanol, timber with bio-energy from timber wastes and extraction of protein from (mainly) energy switchgrass, all based on energy industry investments in future raw material supplies driven by policies that result in a shift from drilling to tilling, from excavating to cultivating.]]] (Peter Read, Massey University)	
3-25	B	5	34	5	37	Second sentence needs to be made clearer. Could perhaps redraft along lines '…with low energy intensity economies in 2000, scenarios of future drastic CO2 reductions are …' (Government of Australia)	Accepted. The sentence will be changed to make it clearer. The current sentence lacks necessary information because some words were dropped during the editing process.
3-54	A	5	35	5	39	The examples of the European countries scenarious need more explanantion as these are not the technologies that currently dominating or seem to dominate in the short term policies. These presumably come from desk top studies. Please add some clarification for instance on the underlying assumptions in terms of policy decision and related timing of these to reach these scenarious (Government of European Community / European Commission)	Accepted
3-26	B	5	35	5	35	"...means like shift to natural…" ...should be "such as a shift to natural..." U.S. Government (Government of U.S. Department of State)	Accepted
3-55	A	5	36	5	37	It seems odd not to mention the USA as a place where large scale CCS deployment could take place. There's a large literature on CCS and I think most of it would indicate that the USA would be a likely place for this technology to deploy. The wording at the bottom of page 80 of chapter 3 includes an additional sentence that mentions many studies of large scale emissions reductions in the USA assume significant penetration of CCS. Please try to work that point into the Executive Summary. (James Dooley, Battelle)	Taken into account. Not only the results from national modeling, but also ones from global modeling could be added
3-56	A	5	37	5	39	Delete "by two to three times their historical levels". This was observed for a single scenario and does not warrant generalisation, see page 80, line 5. (Government of Germany)	Rejected. In the editing process, the words “in one study” are added. The sentence in page 80, line 5 will be changed. All scenarios reviewed so far need two to three times improvement. The sentence could be modified with new review results.
3-57	A	5	44	5	44	Replace observed by assumed to avoid any confusion. (Government of France)	Accept. However will reword to ‘occur’.

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
3-58	A	6	2	0	0	Addition of LBD and ETC is a great addition as it reflects much more how business thinks about things. (Chris Mottershead, BP)	Noted.
3-59	A	6	10	6	10	After 'scenarios.', insert: 'During the period 2050 to 2100, most plausible stabilisation scenarios require rapid movement towards limiting annual carbon emissions to very low levels, whilst economic development continues and energy consumption continues to grow; it is unlikely that this can be accomplished without very strong efforts to develop and deploy the new technologies that can almost completely replace carbon-emitting technologies during the course of this century. Primarily, these technologies are carbon capture and storage, solar (substituted by other renewables where locally appropriate), fusion and advanced nuclear fission.' (Ian Cook, United Kingdom Atomic Energy Authority)	Reject. There is no basis in the literature to choose particular technical solutions.
3-60	A	6	12	0	0	To put the scale of the energy aspect of this problem in perspective, for median scenarios it will be necessary to provide non-CO2-emitting power in the range of 150 EJ/year by 2050, 500 EJ/year by 2100 and over 1000 EJ/year during the next century, while ultimately limiting CO2-emitting power to a small fraction of this level. The total requirement over the period until 2200 is in the range of 100,000 EJ. To address this problem requires large-scale non-CO2-emitting energy resources that, in aggregate, are not limited in their fractional market penetration. New technologies thus need to be developed that can almost fully replace carbon-emitting technologies in the long run. (Robert Goldston, Princeton Plasma Physics Laboratory)	Noted.
3-61	A	6	20	0	0	I am not sure that the use of technology here does not reflect a broader meaning human capital, including both hard and soft technology, institutional knowledge etc. (Chris Mottershead, BP)	Noted.
3-27	B	6	23	6	26	Final sentence is largely a repetition of p5, lines 47-49 (ie last full sentence on p.5) (Government of Australia)	accept. Repetition to be removed.
3-28	B	6	23	6	26	The sentence beginning with "long" is a duplicate of a sentence starting page 5 line 47. U.S. Government (Government of U.S. Department of State)	accept. Repetition to be removed.
3-29	B	6	28	6	32	In an Executive Summary, it would help the reader if this paragraph was not in a style of technical shorthand. Explain what 'baseline choice' means in practice. What does '…economy may not cost any more…' really mean for a policy audience. (Government of Australia)	Accept. Wording to be changed to make meaning clearer.

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
3-30	B	6	30	6	32	This section states: "Literature identifies low-cost technology clusters allowing for endogenous technological learning with uncertainty. This suggests that a decarbonised economy may not cost any more than a carbon-intensive one, if technological learning curves are taken into account. The only other reference is in Chap. 3, page 97, lines 16-19, which states: "Gritsevskyi and Nakicenovic (2000) identified some 53 clusters of least cost technologies allowing for endogenous technological learning with uncertainty. This suggests that a decarbonized economy may not cost any more than a carbon intensive one, if technology learning curves are taken into account." That is the extent of the discussion. This seems very thin. The final sentence of this paragraph should be modified so that it does not suggest that this is a widely held conclusion. Start this sentence: "At least one study has found that…" replacing "This suggests". A caveat should be added to make clear that the majority of studies do not find this to be true. U.S. Government (Government of U.S. Department of State)	Accept. Wording to be changed to make meaning clearer.
3-62	A	6	45	6	46	Comment: 450 ppm CO2 eq for * in "Stabilisation of GHG concentrations at * or lower results in avoidance of key climate impacts" (Donald Pols, Friends of the Earth Netherlands/Milieudefensie)	Reject. Sentence to be deleted. See comment 3-62A
3-63	A	6	45	6	45	Line to be completed (Government of France)	Reject. Sentence to be deleted. See comment 3-62A.
3-31	B	6	45	6	45	It seems improbable that findings of WGII (and WGI) in AR4 will allow WGIII to use a headline statement that a particular atmospheric concentration level will avoid climate change. (Government of Australia)	Reject. Sentence to be deleted. See comment 3-62A.
3-32	B	6	45	6	45	"…concentration at * or lower" needs a number. U.S. Government (Government of U.S. Department of State)	Accept.
3-64	A	6	47	0	0	"from 1900". Even iIf WG2 has indeed defined temperature changes relative to 1990, it would be helpful to know the corresponding change from pre-industrial levels. Table 3.12, for example, very helpfully lists both. Please note the pre-industrial levels in parentheses here. (Harald Winkler, University of Cape Town)	Noted. Addition will be made.
3-65	A	6	47	6	47	Erratum: to change >4 C; 2-4 C; 0-2 C for > 4 ºC; 2-4 ºC; 0-2 ºC (Félix Hernández, Economía y Geografía. Consejo Superior de Investigaciones Científicas (IEG-CSIC))	Accept.
3-33	B	7	1	7	1	WGIII report needs to standardise terminology on theme of 'social costs of carbon'. Glossary uses term 'social unit costs of mitigation'. Need a single, clear term which is well explained to the policy audience and which is used consistently throughout	Noted. Consistency to be ensured.

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						relevant places in WGIII report. (Government of Australia)	
3-66	A	7	9	7	14	I fully agree with the statement that "Large uncertainties persist related to the cost of mitigation…." But are the costs "uncertain", if, as the SPM says, they imply only an 0.03 to 0.1 reduction in an approximately 3.0% GDP growth rate? Such estimates are so low that the word "uncertainty" is not descriptive, and the implied economic risks are tiny. But, in fact, costs may be orders of magnitude higher (as a simple thought experiment demonstrates suggest--see p.12 of my review of FOD), if a carbon-free backstop technology(ies) fails to materialize. (Christopher Green, McGill University)	Accept. Text being revised to properly incorporate uncertainties.
3-67	A	7	13	7	13	The probability is small, not the risk as defined in chapter 2, page 27, line44 (Government of France)	Accept. Wording to be changed.
3-68	A	7	13	7	13	Delete "small". Even if the 'likelihood' of abrupt changes occurring was small, the related 'risk' is still enormous, because of the scale of possible damages involved. It is also misleading to talk about a small risk, when there is considerable uncertainty about the probability of such events occurring. (Government of Germany)	Accept. Wording to be changed.
3-34	B	7	14	7	15	Description of concept of 'risk averse' behaviour needs improvement. Could be expressed as preparedness to take extra measures and possibly bear extra costs to avoid….. (Government of Australia)	Accept. See comment 3-68A.
3-69	A	7	18	7	22	Uncertainties of projections of non-CO2 emission and mitigation are much larger than those of CO2. This point should be described in this paragraph. (Keigo Akimoto, Research Institute of Innovative Technology for the Earth (RITE))	Accept. Text to be added where appropriate.
3-35	B	7	18	7	19	The statement in the Executive Summary concerning the potential cost savings of using a multi-gas model seems to underplay the significance of the cost savings as presented in the body of the text at section 3.3.5.4 and Figure 3.31. These two findings need to be harmonised. (Government of Australia)	Accepted.
3-70	A	7	24	0	0	replace last 4 words with "climate goals that are generally assumed to be long term" and hang from this a footnote to read "Increasing concern that the non-linear dynamical climate system may be nearing a threshold or tipping point for an irreversible and possibly catastrophic abrupt change may lead to the adoption of climate policy goals with a much nearer time horizon than has been generally assumed so far. Maybe that has been because they have until recently seemed	Rejected. Issue for WGI.

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						infeasible. However, prima facie this is no longer the case although further research is needed to fully substantiate the claims made (on the basis of illustrative calculations) for a recently proposed holistic strategy that focuses on modifying the carbon cycle through biosphere management, rather than on simply reducing emissions (see Chapter 2 Section 2.3.4). Meantime this Chapter uses the concept of long term climate policy goals with a maintained proviso that it could be overtaken by imminent abrupt climate change requiring an urgent response." (Peter Read, Massey University)	
3-71	A	7	24	7	24	replace last 4 words with "climate goals that are generally assumed to be long term" and hang from this a footnote to read "Increasing concern that the non-linear dynamical climate system may be nearing a threshold or tipping point for an irreversible and possibly catastrophic abrupt change may lead to the adoption of climate policy goals with a much nearer time horizon than has been generally assumed so far. Maybe that has been because they have until recently seemed infeasible. However, prima facie this is no longer the case although further research is needed to fully substantiate the claims made (on the basis of illustrative calculations) for a recently proposed holistic strategy that focuses on modifying the carbon cycle through biosphere management, rather than on simply reducing emissions (see Chapter 2 Section 2.3.4). Meantime this Chapter uses the concept of long term climate policy goals with a maintained proviso that it could be overtaken by imminent abrupt climate change requiring an urgent response." (Peter Read, Massey University)	Comment repeated.
3-72	A	7	28	7	28	Nevertheless would be more approriate than hence (Government of France)	Rejected. Existing word is appropriate meaning.
3-73	A	7	31	0	0	From section 3.1 title hang a footnote "Throughout this Chapter "emissions" should be taken to mean net emissions i.e. emissions minus absorption, and "emissions reductions" to mean emissions reductions plus absorption increases, unless the context indicates otherwise. It may be noted that, although this is correct from the scientific perspective of this Chapter, it is not correct from a policy perspective, with emissions reductions generally more easily accounted for than increases in absorption (see Chapter 13)". (Peter Read, Massey University)	Rejected. It is not possible to generalize that in this chapter emissions should be taken to mean net emissions.
3-74	A	7	31	7	31	From section 3.1 title hang a footnote "Throughout this Chapter "emissions" should be taken to mean net emissions i.e. emissions minus absorption, and "emissions reductions" to mean emissions reductions plus absorption increases, unless the context indicates otherwise. It may be noted that, although this is correct from the	Same as 3-73

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						scientific perspective of this Chapter, it is not correct from a policy perspective, with emissions reductions generally more easily accounted for than increases in absorption (see Chapter 13)". (Peter Read, Massey University)	
3-75	A	7	41	7	46	As A1 A2 B1 B2 are used without explanation (unless I have missed it) later in the text, maybe a brief couple of sentences are needed, e.g. inserted after "2000" in line 42 "These 500 scenarios were placed in four main groups, A1,A2…etc etc.." (Peter Read, Massey University)	Accepted. Text changed to "The SRES scenarios were representative of some 500 emissions scenarios in the literature, grouped as A1, A2, B1 and B2, at the time of their publication in 2000."
3-76	A	7	41	7	46	As A1 A2 B1 B2 are used without explanation (unless I have missed it) later in the text, maybe a brief couple of sentences are needed, e.g. inserted after "2000" in line 42 "These 500 scenarios were placed in four main groups, A1,A2…etc etc.." (Peter Read, Massey University)	Same as 3-75
3-36	B	7	43	7	45	"Of special relevance is how representative SRES ranges… are of the newer scenarios…" This is an example of a line of reasoning that is not necessary and simply adds to the length of the chapter. The well regarded SRES report stands on its own and need not be critiqued here. U.S. Government (Government of U.S. Department of State)	Rejected. The reference here is made to the relevance of projections of driving forces of the scenarios rather than scenarios themselves.
3-77	A	8	3	0	0	add "baseline" before "scenario assumptions" (this does not refer to mitigation scenarios) (Bert Metz, IPCC)	Accepted. "baseline" added before "scenario assumptions"
3-78	A	8	20	8	30	This paragraph is a summary of the chapter; does not belong here; integrate in executive summary (Bert Metz, IPCC)	Accepted. Paragraph deleted and text integrated in executive summary.
3-79	A	8	28	8	29	Meaning of "explore" unclear: Lines 15-18 on p4 seem to mean that the upper and lower bounds of the range have not changed much. Does 'explore' mean that efforts to devise scenarios that fall outside the SRES range [presumably fall below to be of interest] have been fruitless? This is not the case if the holistic strategy is taken into account. Suggest adding to end of sentence (after "trajectories") "although recent work suggests that the lower bound may be lowered through biosphere management that stimulates greatly increased absorption linked to terrestrial storage of the absorbed carbon (Read and Parshotam, 2006)". (Peter Read, Massey University)	Rejected. Paragraph deleted apropos 3-78 and text integrated in executive summary.
3-80	A	8	28	8	29	Meaning of "explore" unclear: Lines 15-18 on p4 seem to mean that the upper and lower bounds of the range have not changed much. Does 'explore' mean that efforts to devise scenarios that fall outside the SRES range [presumably fall below to be of	Rejected. Paragraph deleted apropos 3-78 and text integrated in executive summary.

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						interest] have been fruitless? This is not the case if the holistic strategy is taken into account. Suggest adding to end of sentence (after "trajectories") "although recent work suggests that the lower bound may be lowered through biosphere management that stimulates greatly increased absorption linked to terrestrial storage of the absorbed carbon (Read and Parshotam, 2006)". (Peter Read, Massey University)	
3-37	B	8	34	16	34	This section could be summarized much more concisely for the purpose of this chapter. Much of the discussion would be better in the baselines and emissions sections. U.S. Government (Government of U.S. Department of State)	Accepted. Text shortened.
3-81	A	10	1	0	0	more descriptive figure for scenario development (NOIM UDDIN, Macquarie University, Sydney)	Rejected. This figure is sourced from SRES and adequately illustrates the heterogeneity in scenario development.
3-82	A	10	20	0	0	add "e.g. Read and Lermit, 2005, Read, 2006, Read and Parshotam, 2006." (Peter Read, Massey University)	Rejected. Full references are not provided.
3-83	A	10	20	10	20	add "e.g. Read and Lermit, 2005, Read, 2006, Read and Parshotam, 2006." (Peter Read, Massey University)	Same as 3-82
3-84	A	10	24	11	12	Add other global scenario literature, such as MEA, GEO, Agric Assessment (nowhere else mentioned) (Bert Metz, IPCC)	Accepted. Added reference to MEA and GEO.
3-85	A	11	18	0	0	Please add: ' ... associated with the emission reduction but often do not quantify the benefits of reduced impacts from climate change.' (Manfred Treber, Germanwatch)	Accepted: in a slightly modified version "… but rarely the benefits of reduced impacts from avoided climate change".
3-86	A	11	25	12	1	Box 13.3 on UK CCL. No mention is made of one outstanding and innovative feature of the UK CCL and CCAs - that they were announced in advance. Since the Cambridge Econometrics report on the CCL concludes, with strong econometric evidence, that the announcement effect was substantial and long-term, it is certainly worth a mention, if not a paragraph in the main text. The result is important in that it shows how the costs of policies may be greatly reduced, or their effectiveness increased by advanced planning and consultation. These are major issues for climate policies and for governments seeking to encourage industries to reduce emissions and keep costs to industries as low as possible.The effect is an information effect, perhaps best included in section 13.2.1.7 (Government of UK)	**THIS COMMENT BELONGS TO CHAPTER 13 AND IT APPEARS IN CH 13 COMMENTS TOO.**
3-38	B	12	11	12	14	Note that under UNFCCC national communications a different approach is used to represent measures and emissions projections: 'with/without measures'. Authors	Rejected: UNFCCC communications are not about the future and thus need not be

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						need to explain why in a scenarios context the approach selected is taken; and do not be categorical ('can no longer be considered') (Government of Australia)	metioned here. Accepted: Language is now changed to be less categorical.
3-87	A	12	42	13	33	Section 3.1.3 and section 3.1.5 cover the same issues; merge these two sections; now too fragmented; make reference to ch 12 in the merge section, where appropriate (Bert Metz, IPCC)	Accepted, text revised by saying "both developing countries and developed countries"
3-39	B	13	4	13	6	In the discussion of technological lock-in, the authors should also include a sentence noting that lock-in can also impact upon developed countries (although this may have less of an impact upon short-term emissions than lock-in in developing countries). (Government of Australia)	Accepted, change to "energy elasticity of GDP"
3-88	A	13	8	13	11	Overly technical: commerical energy demand/GDP elasticity not a common concept (Government of Environment Canada)	Noted, text revised together with next comment
3-89	A	13	13	0	25	The paragraph is written as if decentralised patterns necessarily is better from a climate perspective than a centralised. There seems to be little research evidence of that and that there is other aspects that is much more important. (Government of Sweden)	Accepted, text revised
3-90	A	13	15	3	25	These four sentences mix three quite separate issues: the size distribution of cities; choice of technology; rural /urban spatial distribution of population. There is also the implicit suggestion that a less concentrated distribution of population would be equivalent to a less carbon (energy)-intensive. However, for the same level of per capita income, large cities are more energy-efficient than small ones, so the idea that a strategy geared toward rural development would have positive effects on CO2 emissions is highly questionable. I would suggest replacing the first three sentences with the following text: "The spatial distribution of of the population and economic activities is still not settled, opening the possibility of adopting integrated urban, regional, and transportation planning, thereby avoiding urban sprawl and facilitating more efficient transportation and energy systems. The large amount of agricultural and water resources available in many developing countries could be tapped through the use of modern biotechnology and hydroelectric power generation, thus allowing them to bypass a number of emissions-intensive technologies." The final sentence of the paragraph should simply be deleted. (Kenneth Ruffing, Non-affliated)	Accepted. Text revised.
3-91	A	13	30	13	33	This is a very important point - given the emphasis in many chapters on	Rejected, in this session long term scenario

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						'technology', which although given a broad definition, for many policymakers may not capture infrastructure or system factors. The sentence could be reinforced by an additional reference from a briefing to policymakers, by the Tyndall Centre research collaboration: "To have the requisite impact in 2050 [on emissions], it is necessary to start directing investment towards low carbon technologies in the immediate and short term from now to 2010, and to persist with such low carbon investments thereafter." Reference: Executive Summary from Kohler, J. et. al., 2005. New Lessons for Technology Policy and Climate Change, Investment for Innovation: a briefing document for policymakers, Tyndall Briefing Note No. 13, Tyndall Centre for Climate Change Research, UK. Available from, URL: www.tyndall.ac.uk. (also in comment to Ch1, page 20, line 40) (Kirsty Hamilton, Chatham House; UK Business Council for Sustainable Energy)	was reviewed and the key factors are discussed. It is hard to change the discussion on the scenarios reviewed.
3-92	A	13	35	15	15	There is good reason to expect divergence, looking only at climate impacts, because ythose can be severe, and are regional in nature.Impacts will be a strong influence on economic development. It is well known that impacts can have effects of over 100% of GDP for small states, and possibly economic regions of large nations eg New Orleans post 2005. The main factors will be extreme events, and the pervasive shortage of good quality water in some regions. (Andrew Dlugolecki, University of East Anglia)	Noted. Different way for convergence is already presented by scenarios. Because of no specific reference provided, it is hard to be reflected here because here is talking about reviewing of long-term scenarios.
3-93	A	13	36	14	37	In my previous comments I suggested to mention club convergence. According to "New growth theory" there are possibilities for multiple steady states. As a result, different countries would convert to different per capita income. It may have major implications for carbon emission dynamics. I strongly recommend to update this section refering to these results. (Alexander Golub, Environmental Defense)	Accepted, text revised
3-94	A	13	40	13	41	Needs fuller explanation (Government of Environment Canada)	Noted, text revised.
3-95	A	13	41	0	0	What is "capital deepening"? (Bert Metz, IPCC)	Noted.
3-96	A	13	43	14	37	This section is very difficult to read and understand and does not bring out clearly what the main points are; reformulate (Bert Metz, IPCC)	Noted, text revised.
3-40	B	13	48	14	4	Need a clear, crisp statement for policy audience on what the authors mean by term 'convergence', meaning is only implicit in current draft and not easy to grasp. (Government of Australia)	Noted. Text will be revised.
3-97	A	14	25	14	30	The term "social inertia" should be touched upon which has been used in the	Rejected. Restriction on number of pages does

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						Chapter 2. (Shunsuke Mori, Tokyo University of Science)	not allow for additional references.
3-98	A	14	35	14	37	Some up-to-date references should be given! Some examples are H. Daly (Beyond Growth, Beacon Press, Boston, 253 pages, 1996) and T. Princen (Confronting Consumption, MIT Press, 383 pages, 2002; and The Logic of Sufficiency, MIT Press, 401 pages, 2005). (Danny Harvey, University of Toronto)	Accepted. Text will be revised.
3-99	A	14	40	0	0	I reiterate an earlier comment. I do not understand why this comment was ignored. The text is misleading. It says the SRES assumptions on GLOBAL convergence match the empirical evidence on REGIONAL convergence. This is true. However, the SRES assumptions on GLOBAL convergence do NOT match the empirical evidence on GLOBAL convergence. The text is misleading and should be reformulated. (Richard Tol, Economic and Social Research Institute)	Accepted, text revised
3-100	A	15	7	15	7	Income ratio needs better explanation (Government of Environment Canada)	Accepted, text revised
3-41	B	15	10	15	10	TFP' not explained. (Government of Australia)	Accepted, text revised
3-101	A	15	28	15	28	Please add "waste" to list including forestry, agriculture, etc.... (,)	Accepted, text revised.
3-102	A	16	15	17	34	there is a very weak link of this whole section with scenarios; it is mainly a duplication now of the discussion on institutional issues in chapters 2 and 12; suggest to shorten; make clearer connection to scenarios (how is this quantified?) and make proper references to ch 12 and 2 (Bert Metz, IPCC)	Accepted, text revised
3-103	A	16	20	16	45	Some contents are repeated twice in these two paragraph, for example, in line 20-21 "Recent research has included ...", and again in line 35-36, "recent development research has included studies … ". How about rearranging these two paragraph to avoid the repeat. (REF!)	Accepted
3-48	B	17	0	45	0	Section 3.2: Most of this section provides useful information regarding differences between pre- and post-SRES scenarios. However, it would be even more value-added, if the assumptions/projections of the SRES (and post-SRES scenarios) regarding emissions drivers (population, GDP growth rates, changes in carbon and energy intensities) for the early 2000s were compared with the latest available data (since most of these scenarios were based on data from the 1990s). This would be	Noted – This is done in Sec. 3.2.1.3

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						useful information for policy analysts and policy makers in gauging the relevance and credibility of the scenarios. U.S. Government (Government of U.S. Department of State)	
3-104	A	17	28	0	0	The word "like" is often used when "such as" would be better. Do a global search of "like" and change to "such as" when that is what is meant. (Danny Harvey, University of Toronto)	Accepted, text revised by saying "both developing countries and developed countries"
3-105	A	17	36	45	15	throughout this section, in comparing with SRES, systematically only 4 of the 6 SRES markers/representative scenarios are shown; should be full range (Bert Metz, IPCC)	
3-106	A	17	36	45	15	in this section emphasis is too much on describing full range of scenarios in literature (spaghetti graphs); better to limit that and focus more on analysing significant trends; this means that selections are made from the total database, making it possible to illustrate changes (Bert Metz, IPCC)	
3-42	B	17	38	45	15	Section 3.2: The authors need to address the criticisms that have been made of the SRES in a more open and transparent manner. At present many of the criticisms tend to be obscured or down played in this section, especially when it comes to questions of population and economic growth projections. A more transparent method to deal with these criticisms would be for the authors to take a "twin-track" approach where they present both the SRES scenarios and the criticisms of those scenarios as valid differences of opinion. For instance at page 24 line 23, the authors state that a team of SRES researchers responded to criticisms of the use of MER-based projections, implying that the debate is over, which is clearly not the case. The authors should redraft this section to give a more balanced view of the criticisms of the SRES. The authors need to avoid giving the impression that the validity of the AR4 rests on readers agreeing with the authors' views on MER/PPP. This does not, however, prevent the authors from defending their views on MER/PPP. (Government of Australia)	
3-43	B	17	38	45	15	Section 3.2: One of the key messages that should be drawn out in this section is that, while there are those who argue that technical criticisms of the SRES are valid, as yet no meaningful scenarios have been produced that fall outside the range of the SRES (page 25 lines 41-48 does this well and these should be made more prominent). What matters to policy-makers is stabilisation of concentrations relative to the base-year. The SRES scenarios do not underpin the stabilisation scenarios but simply provide some context for the possible costs of meeting	

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						particular stabilisation targets. The authors should avoid suggesting that the SRES (or indeed any particular emissions scenarios) are central to the main discussions of the WG3 report. (Government of Australia)	
3-44	B	17	38	31	7	Section 3.2.1: While the authors of Chapter 3 are careful not to ascribe probabilities to the scenarios, the 'vertical bars' shown on some graphs imply that probabilities have been assigned. Readers will be likely to assume that the median scenario represents the central case and that the 5th, 25th, 75th and 95th percentiles of the distribution provide an indication of the probability that the outcome will be different than the central case. They will do this because understanding the central case and probability range is critical for policy makers. Removing the 'vertical bars' which give the range of distributions may stop the information that they show from being misinterpreted, but it will not address the fundamental requirement of policy makers for a probability range. (Government of Australia)	Reject – The use of the percentiles is to show the distribution of the scenarios. It is not meant to used to assign probabilities to the scenarios
3-45	B	17	38	31	7	Section 3.2.1: The process of reviewing literature and presenting the findings is flawed when it comes to determining baseline scenarios. Each scenario as presented in the literature is given an equal weight, regardless of how well or otherwise the scenario was constructed. The range of scenarios is then taken to represent the possible range of outcomes. This implies a zero probability of outcomes outside the range, which may not be the case. The authors need to explain this for readers. (Government of Australia)	Rejected – A discrete probability analysis of the baseline scenarios has not been condcuted in the literatute or in this assesmemt. Will make this clearer.
3-46	B	17	38	31	7	Section 3.2.1: The literature in this section is largely self referencing -- consequently the individual scenarios do not represent individual observations. If there are problems with the assumptions behind one scenario, then these problems will be repeated in all subsequent scenarios that 'feed' from it. The whole process then becomes self-reinforcing. These problems need to be acknowledged by the authors in the report but it should be noted that very few meaningful baseline scenarios have been produced outside the SRES range. (Government of Australia)	Rejected – It is not the purpose of this assesment to analyze the all the specific assumption for the scenarios. Scenarios whuch are in the literature are assessed and reported.
3-107	A	17	43	0	0	I'm happy to see the Kaya identity mentioned (as I had strongly recommended doing so in my comments on the ZOD). However, I think that it would be useful to write out the equation (with the units of each term written underneath each term in the equation). (Danny Harvey, University of Toronto)	Accepted – will add equation.

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3-47	B	17	43	17	43	IPAT' not explained (Government of Australia)	Accepted – will add explanation.
3-108	A	18	4	0	0	You now added a footnote saying that quality varies. This is incomplete. A frank statement would be that you know that quality control was poor and known errors were not removed from the database. (Richard Tol, Economic and Social Research Institute)	Accepted – Clarified the footnote.
3-49	B	18	8	22	35	Section 3.2.1.1: Many of the scenarios presented in the literature are based on out-of-date information. United Nations world population projections, for example, have been revised down significantly in recent years, and most of the scenarios presented do not take account of this. The Report notes this, but downplays the impact, by stating "this does not imply that previous population assumptions are no longer useful". Figure 3.3 is used to support this assertion. Yet figure 3.3 clearly shows a significant downward adjustment to population assumptions in post-TAR scenarios. This surely raises significant concerns about the use of TAR and pre-TAR scenarios in the overall analysis and this needs to be addressed by the authors. The section also omits any discussion of the sensitivity of emissions scenarios to changes in population projections. (Government of Australia)	Need to consider diffeent focus on pre and post TAR
3-50	B	19	1	20	0	The demographic projections are characterized as having shifted since the TAR, but the only significant shifts appear to be in the tails. The suggestion on page 19/line 30 that projections have shifted downward would appear to be overstated based on this simple statistical picture. U.S. Government (Government of U.S. Department of State)	Taken ino account – Figure does show a change in the 75th percentile but will clarify the text language.
3-51	B	19	4	0	0	Fig3.2 – This figure is too complicated. The figure is too complicated – further, the figure is based off of SRES B2 as though it were an important mean, and moreover, the figure doesn't seem to add much useful information to chapter three. U.S. Government (Government of U.S. Department of State)	Rejected – Figure is useful to compare SRES B2, which is used in impacts assesments, to newere literature.
3-109	A	19	9	0	0	What are "demographic institutions", and why are IIASA (a research institution) and the UN (a club of nations) so called? (Richard Tol, Economic and Social Research Institute)	Accepted – text chnaged.
3-110	A	20	4	20	4	It seems "Figure 3.2" should be "Figure 3.3". (REF!)	Rejected – Figure is numbered correctly.
3-52	B	20	16	0	0	Figure 3.3 The demographic projections are characterized as having shifted since the TAR, but the only significant shifts appear to be in the tails. The suggestion on page 19/line 30 that projections have shifted downward would appear to be	See number 3-50.

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						overstated based on this simple statistical picture. U.S. Government (Government of U.S. Department of State)	
3-53	B	20	23	20	34	This paragraph is an example of too much emphasis on SRES which merely lenghthens the text. U.S. Government (Government of U.S. Department of State)	Accepted – will change emphasis.
3-111	A	20	34	0	0	As one of the authors of Fisher et al., I do not think that the projections in that paper are at all consistent with SRES. In fact, the paper is very explicit about having to use improbably parameter values to reproduce SRES. (Richard Tol, Economic and Social Research Institute)	Need to check with Brian O'Neil
3-112	A	21	1	0	0	Box 1: make sure box is together on 1 page (Bert Metz, IPCC)	Accepted – will be taken of in the final draft.
3-113	A	21	1	24	6	A shortcoming of the scenarios is that they ignore impacts as an influence on economic development, yet it is well known that impacts can have effects of over 100% of GDP for small states, and possibly economic regions of large nations eg New Orleans post 2005. Ignoring extreme events, and the pervasive shortage of good quality water in some regions, means that this exercise is unrealistic , and should be clearly labelled as such for policymakers.This issue is discussed in section 3.5.2, but there is no real literature that goes into detail at a practical level on impacts and the feedback into the economy. (Andrew Dlugolecki, University of East Anglia)	Noted. Could be commented upon up front (introduction)
3-54	B	21	1	22	4	Section 3.2.1.2: The section also points to deficiencies in the calculation. These are overstated. A report on the Human Development Report by the 'Friends of the Chair' to the 2001 United Nations Statistical Commission (UNSC) noted: "…[there are] two important shortcomings of PPP conversion use that require a response. The first is the question of quality of the measurement instruments of the basic data, the data collection and the calculation of PPPs. The second is the question of coverage for the countries of the world. We acknowledge...that these are both important issues but they are not in our view of sufficient weight to justify the use of US dollar exchange rate conversion rather than PPP conversion …the quality issue [of PPP data] cannot justify switching from the PPP estimate to a US dollar exchange rate, which can be more than three times smaller for least developed countries. Given such large differences between the two measures, using the wrong measure because it is more accurate does not satisfy a 'fitness-for-purpose' criterion." (Government of Australia)	Rejected: We have only a very cautious statement and points out that the effects are likely to be small. See no reason to change text.
3-55	B	21	1	22	4	Section 3.2.1.2: The different effects of using PPP will have different impacts on the projection of emissions, and may offset each other to a certain extent.	Rejected. Refer to p.25, l.46. We say "on the basis of

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						However, it is not credible to state that because of the potential for offset that "PPP based values instead of MER based values in scenarios ... would only mildly change results". While this may be the case for the very few models where both PPP and MER based estimates have been derived, it may not be the case at all for the 'MER only' models that form the vast bulk of the literature scenarios. This should be recognised by the authors. (Government of Australia)	these scenarios". Also the end of the quote reads: … in terms of physical parameters".
3-56	B	21	1	22	4	Section 3.2.1.2: The 1993 System of National Accounts, which is a joint UN, IMF, OECD, EC and World Bank publications, states "When the objective is to compare the volumes of goods or services produced or consumed per head, data in national currencies must be converted into a common currency by means of purchasing power parities and not exchange rates. It is well known that, in general, neither market nor fixed exchange rates reflect the relative internal purchasing powers of different currencies. When exchange rates are used to convert GDP, or other statistics, into a common currency the prices at which goods and services in high-income countries are valued tend to be higher than in low-income countries, thus exaggerating the differences in real incomes between them. Exchange rate converted data must not, therefore, be interpreted as measures of the relative volumes of goods and services concerned. (para 1.38)". (Government of Australia)	Noted. No concrete proposal put forward. We could include SNA statement in section on economic projections (3.2.1.2). Of less relevance when it comes to emission projections.
3-57	B	21	1	22	4	Section 3.2.1.2: It should also be recognized that part of the 'problem' with the calculation of PPPs relates to national accounts data, which of course affects MER comparisons as well. Because it has now been accepted by statisticians (and generally by economists), that PPPs are a far superior mechanism for comparing countries than MERs, a revamped International Comparison Program is now underway to develop a high quality set of global PPPs for 2005. This work is well underway, and it is expected that preliminary global results will be published sometime during 2007. It is not necessary to have a 'time series' of PPPs in order to use them for economic projections. All that is required is a contemporary set of PPPs so that appropriate comparisons of countries at the current point in time can be made. (Government of Australia)	Noted. Not right though that we don't need PPP in the future (e.g. in order to define degree of convergence)
3-58	B	21	1	22	4	Section 3.2.1.2: In addition, an independent evaluation, commissioned by the UN Statistical Commission in 1998, concluded that there is no alternative to PPP data for cross-country economic comparisons. Both the IMF and World Bank strongly support the use of PPPs for comparing economise, and both organisation's official	Noted. (But, again, it depends on for what purpose. For instance, comparing impacts on global markets clearly requires MER.)

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						forecasts of future economic activity are constructed on a PPP basis. From the perspective of baseline scenarios, it is particularly important that PPPs be used in three areas (see below). (Government of Australia)	
3-59	B	21	1	22	4	Section 3.2.1.2: Importance of using PPP: First, to underpin any 'convergence' assumptions -- put simply, all things being equal a lower rate of growth is generally required for low income countries to converge with high income countries using PPPs than using MERs. Second, to weight together economic growth in different countries to obtain a global average -- on a PPP basis, low income countries will generally have a higher weight than on an MER basis. Third, to understand differences in 'energy intensity' across countries at different stages of economic development -- on a PPP basis low income countries will have a lower use of energy per (common) unit of output than on an MER basis. (Government of Australia)	Noted. But what to do about it? Should we include a paragraph with recommendations for PPP? While keeping the conclusion that for emissions it doesn't matter!
3-60	B	21	1	22	4	Section 3.2.1.2: Chapter 3 makes an observation that "the question of whether PPP or MER should be employed in economic scenarios ... seems to be fully open". While there may be some conjecture about this point in the climate change literature, there is no debate on this issue within the statistical community. References are provided below; these should be reviewed by the authors and incorporated into the discussion of PPP/MER. (Government of Australia)	Which references? Accepted: Rephrase "…seems to be fully open" to "PPP is recommended for making economic projections in most cases. Exceptions are when impacts on world markets are the focus".
3-61	B	21	14	21	16	We suggest the insertion of 'real' in front of growth rates. Rationale: The reader will not be clear about what growth rates are being used, real or nominal. U.S. Government (Government of U.S. Department of State)	Accepted.
3-114	A	21	17	22	4	The discussion on PPP verus MER is unclear, which is better for scenario analysis? What advantage or problem to use them? It is recommanded to add more text to show the difference to use PPP and MER in scenario analysis. (Government of China Meteorological Administration)	Rejected. Text is already too long. Although see 3-60
3-62	B	21	17	24	7	It's not clear from the discussion how pre-TAR, TAR, and SRES are related. A larger point is that there needs to be some explanation of these and other models and how the models fit together chronologically and conceptually. Don't assume the reader knows. A separate Box explaining all this (pre-TAR, TAR, post-TAR, SRES, EMF, IMCP, etc.) would be useful. (The discussion on page 19 is inadequate.) U.S. Government (Government of U.S. Department of State)	Accepted. Box on pre-, post-TAR and SRES should be included (on page 19?)

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3-63	B	21	19	21	20	The authors observe that either a market exchange rate (MER) in a fixed year are used or a purchasing power parity index. It is not a purchasing power parity index but rather, like the market exchange rate, it is the purchasing power parity (PPP) rate for a fixed year. Rationale: For an apples to apples comparison it is misleading to suggest that the two alternatives are between MER for a fixed year and a PPP index. Researchers use either MER for a fixed year or PPP for a fixed year to convert to a common currency. U.S. Government (Government of U.S. Department of State)	Accepted. Change text accordingly.
3-64	B	21	21	22	0	Box 3.1. The authors give the misleading impression that PPP rates have to be calculated for every year and thus require large amounts of data. It depends on the purpose at hand. If the purpose is, as is the case in the economic growth scenarios, to express real activity across countries and over time in a single currency, only one year's PPP rate, as is the case with MER, is required. See above. Also the authors mention that there is no single method or price index favored for converting GDPs to a common currency 'resulting in different sets of PPP rates'. Clearly it is not because of the favored method or price index that has resulted in different sets of PPP rates. It is recommended that the quoted text be deleted. Rationale: The authors intentionally or unintentionally are appearing to suggest that the use of PPP rates is a time consuming process which inhibits their use. It is more complicated than that. First, many researchers were not aware of the problems associated with the use of MER and second, it has been the case in the past, that even a single year PPP rates were not available for many countries. The situation is being rectified as additional countries are being brought into the more current rounds of price data collection. In addition Castles and Henderson's critiques have made researchers become more aware of the problems associated with using MERs. U.S. Government (Government of U.S. Department of State)	Rejected. Our text states that differences are likely to be small. Perhaps modify text on the issue of multi-year PPP?
3-65	B	21	21	0	0	Box 3.1 The discussion of the distinction between MER and PPP could benefit from an example of relative price differences that would show how future growth trends would appear different when measured differently. U.S. Government (Government of U.S. Department of State)	Rejected. Hangs on the convergence assumption. Examples are given in the literature, e.g. Holtsmark and Alfsen
3-115	A	22	1	0	0	Box 1: what is the dotted line? In the figure? References missing (Bert Metz, IPCC)	Partially accepted: The dotted line is PPP/MER=1, and could be deleted. Source of the figure is given in the text (although this is not the primary source)..
3-66	B	22	1	22	4	Figure 3.4: The fact that scenarios expressed in PPPs are relatively rare does not in	Rejected. Do not see how this relates to figure

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						itself make the use of scenarios based on MERs an appropriate thing to do. (Government of Australia)	3-4.
3-67	B	22	1	22	4	Figure 3.4: Any divergences in PPPs derived by updating the most recently available PPPs on the basis of price indexes are likely to be minor compared with the significant errors that could be introduced through the inappropriate use of MERs. This should be articulated by the authors. (Government of Australia)	Noted . Cf 3-64.
3-116	A	22	6	24	6	The discussion is a little confusing in Section 3.2.1.3, in that, having introduced the Kaya identity earlier, I was expecting to see a discussion of GDP per capita – and indeed, this is what Figures 3.5 and 3.6 show according to the Y-axis labels, but the captions and the discussion in the text refer to growth of GDP, not growth of GDP per capita. I think that the discussion and the numbers do pertain to growth rates of GDP/P and not of GDP, so please consistently refer to GDP/P. Second, it would be helpful to tell the reader what the historical rate of growth of GDP/P has been and how it has changed over time. The following is lifted from the introduction to Harvey (2006) and could be used here: "World average GDP/P, based on estimates of gross world product in terms of constant (2003) dollars as given Mastny et al. (2005), grew at the following rates: 2.8%/yr from 1950-1970, 1.9%/yr from 1970-1980, and 1.6%/yr from 1980-2004. Thus, over the long term there has been a steady decline in the rate of growth of GDP/P, although during the four-year period 2000-2004 the growth of GDP/P accelerated to 2.3%/yr due to a burst of growth of GDP in China and India (on the order of 6-9%/yr) that is not sustainable." REFERENCE: Harvey, L.D.D. 2006. A Handbook on Low-Energy Buildings and District Energy Systems: Fundamentals, Techniques, and Examples. James & James, London, 701 pages. Original Reference: Mastny, L. et al. (2005) Vital Signs 2005: The Trends that are Shaping our Future, Worldwatch Institute, Washington, 139 pages. (Danny Harvey, University of Toronto)	Accepted: Make sure references are to GDP per capita. Consider to include text on historical growth rates (MER based!) in connection with figure 3.5
3-68	B	22	7	24	6	Section 3.2.1.3: A concern is that the 'earlier' scenarios have not been calibrated to the actual economic growth that has occurred since they were produced. Many of these scenarios have projections of economic activity for 2005 that are quite different to the actual situation. This could have quite significant implications for longer-term projections. Even small errors in the 'jumping off' point can cause	Rejected: Historical mismatch is not necessarily a problem for long term scenarios. It may be temporary, and it depends in any case on the purpose of the scenario, ref. Discussions in section 3.1.x

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						large errors in projections of activity in 100 years time. Again, this casts doubt about the usefulness of using TAR and pre-TAR scenarios in the analysis. Chapter 3 sort of acknowledges this point by noting that the median scenario for GDP per capita post-TAR is substantially below the TAR and pre-TAR median; however it also states that upper and lower bounds have essentially remained unchanged, "mainly due to a small group of particularly very high growth scenarios". One wonders about the quality of these scenarios or the likelihood that they would occur, but readers will take them to have some degree of plausibility. (Government of Australia)	
3-117	A	22	10	22	12	is this lower median of growth rates meaningful? Is this modelers estimate of the likelihood? Or just an artefact of subjective choices of modelers or copying certain SRES scenarios for convenience? If it is meaningful, then it would have implications for the assessment of the usefulness of SRES scenarios. However, that conclusion is not drawn. Actually, why compare post-TAR with TAR and pre-TAR. Should be post-TAR (selected studies) versus SRES (because the evaluation is to find out if SRES is still applicable) In addition, figure 3.6 shows that current growth rate assumptions are not systematically lower than SRES, This needs more analysis. (Bert Metz, IPCC)	Noted: DO not understand the comment. (I though we were to assess the literature, not making new analysis??)
3-69	B	22	21	22	0	Box 3.1, Figure 3.4. The authors need to be explicit about what is being portrayed. The left y-axis and columns represent regional real GDP per person expressed in MER and PPP terms. The right y-axis and line graph portrays the ratio of PPP based real GDP to MER based real GDP or the ratio of MER to the PPP rate. Rationale: To avoid confusion and misinterpretation the authors may want to be more explicit. U.S. Government (Government of U.S. Department of State)	Noted: This is clearly stated in the caption?
3-118	A	23	17	0	0	"reported" should be " assumed" (in scenarios it is always assumptions) (Bert Metz, IPCC)	Rejected. One can report from a scenario analysis.
3-70	B	24	3	24	0	Figure 3.6. Some of the sources cited are missing in the references to Chapter 3. These are World Bank 2004, US.DOE. 2004a, and IEA 2002. Could it be World Bank 2005, DOE 2005, IEA 2004 which are provided in the references? Rationale: Missing references. U.S. Government (Government of U.S. Department of State)	Accepted: Missing references should be included.
3-119	A	24	8	26	0	Extensive further discussion of this issue summarised at http://johnquiggin.com/index.php/archives/2006/03/31/diewert-on-quiggin-castles-	Rejected: Blogs are not part of the grey literature. But, perhaps submissions to the

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						and-henderson/. Diewert presents a formal model and a summary critical of the IPCC approach. Quiggin responds, arguing that any bias asociated with the use of MER rates is likely to be small and may be in either direction (John Quiggin, University of Queensland)	Stern Committee? In any case - Support our text.
3-71	B	24	10	24	11	The use of non-peer reviewed literature is acceptable under the IPCC's rules for the preparation of IPCC reports. At no other place in the AR4 is it footnoted that a specific reference has not been peer-reviewed. This footnote should be deleted, or alternatively every other non-peer reviewed source cited in the AR4 should be similarly footnoted. (Government of Australia)	Accepted. Delete footnote
3-72	B	24	11	24	15	The authors may want to include DOE 2005 (International Energy Outlook 2005), which is already in the references to Chapter 3, as another one of the shorter term scenarios that use PPP based projections. The DOE has a more recent version of its publication available (International Energy Outlook 2006). This, like its predecessor version, also uses PPP based economic growth projections. Rationale: To provide a more complete and up-to-date list of PPP based economic growth scenarios. U.S. Government (Government of U.S. Department of State)	Accepted
3-120	A	24	12	0	0	insert " economic" before "projections" (Bert Metz, IPCC)	Accepted
3-121	A	24	21	0	0	insert "the criticism is that" (to make clear this is not what the authors conclude from the literature) (Bert Metz, IPCC)	Accepted
3-122	A	25	4	0	0	You missed the recent paper of Dixon and Rimmer in Energy & Environment. (Richard Tol, Economic and Social Research Institute)	Accepted. Should get paper
3-73	B	25	8	25	10	This sentence suggests that PPPs are of relevance only to the informal sector. This is not right. PPPs differ from MERs because of the presence non-traded goods and services in economies. (For traded goods and services, PPPs will be equivalent to MERs.) Even the most advanced economies have significant non-tradeable sectors, particularly in services. And many goods that are ostensibly 'tradeable' have significant non-tradeable components in their final price, such as taxes, domestic transport margins and domestic retail margins. This is the reason why a can of coke costs a different amount in Sydney than it does in New York at MERs, even though the can of coke could be considered to be a typical 'traded' good. (Government of Australia)	Accepted. Rewrite sentence
3-123	A	25	12	25	13	Needlessly provocative--debate not fully open. There is general agreement that	Accepted. Change sentence.

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						PPP should be used where appropriate. In some cases, the necessary PPP data is not available, or the model is insensitive to the choice of exchange rates. This does not mean that the debate is fully open, however. (Government of Environment Canada)	
3-124	A	25	15	0	0	Nordhaus (forthcoming) did say no such thing. He says that growth projections should be made in national currencies; exchange rates play no role. (Richard Tol, Economic and Social Research Institute)	Accepted? Change sentence
3-125	A	25	26	25	48	Concerning PPP, Purchasing Power Parities, it is claimed in the chapter 3, p. 25 line 26-48 that it is not likely that the choice of exchange rate will have a substantial effect. This statement is not backed by findings. On the contrary it is a fact that there is uncertainty about the impact of using MER versus PPP. It is also a fact that there is a data problem if PPP is used, most surveys are based on MER. However, there is no doubt that PPP would be a better option, and MER underestimates the purchasing power in especially poorer countries, thereby GDP growth and CO2-emissions are overestimated. These facts are referenced on page 21 box 3.1. and p. 24 line 10 to p. 25 line 26. The use of MER is likely to distort the distribution of global emissions and will distort the cost impact of the mitigation effort. Though facts of how big this distortionary impact is, cannot be found, it might be significant. This uncertainty and potential impact ought to be presented in a fair way in chapter 3. Therefore p. 25 line 26-48 ought to be deleted or rearticulated in order for the statement to be consistent with what is already written on page 21, box 3.1. and on page 24, line 10 to page 25 line 26. (Helle Juhler-Kristoffersen, Confederation of Danish Industries)	Rejected. Should differentiate between effects on GDO and effect on energy, emissions and other physical parameters.
3-126	A	25	28	0	0	I presume the word "as" bfore "likely" should not be there; if it was meant to stay, it would be a very weak rejection of the claim that PPP gives different emission levels and would be inconsitent with the sentence on page 25, lines 45-48 (Bert Metz, IPCC)	Accepted
3-127	A	25	28	25	33	This is speculative and not appropriate for an assessment report. (Government of Environment Canada)	Rejected.
3-74	B	25	28	25	33	This paragraph is difficult to follow. Emission projections will be directly related to economic activity projections. So if the choice of metric -- PPP or MER -- is relevant for exchange rate projections, then surely it also relevant for emission projection. Furthermore, the share of the non-tradeable section of an economy will be very different in PPP based scenarios compared to MER based scenarios, particularly for low income economies. These economies will have substantially larger non-tradeable sectors on a PPP basis than on an MER basis.	Rejected

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						(Government of Australia)	
3-128	A	25	29	0	0	emission projections for carbon dioxide; for sulphur, the effect is substantial (Tol, forthcoming). (Richard Tol, Economic and Social Research Institute)	Rejected. Is the paper available? Should it be included?
3-129	A	25	35	26	3	The analysis in this section is not thoriugh enough to draw clear conclusions about the validity of SRES emission projections. That is the reason in the SPM we have a very vague statement. This would therefore not put to rest the debate. I suggest to do an in-depth study of the Manne/Ricjels and McKibben papers in order to trace the reasons for getting different emission results and then to write that up in a way that would allow to to settle the issue. Of course that depends on the precise findings, but at least the attempt should be made, so that we can strengthen the SPM statement. (Bert Metz, IPCC)	Rejected (and sorry about the SPM). We report on findings in the literature.
3-130	A	25	48	0	0	Note that Tol (forthcoming) shows that PPP or MER does make a difference for climate change impacts. (Richard Tol, Economic and Social Research Institute)	Accepted – paper cited.
3-131	A	26	5	0	0	Having introduced the Kaya identity earlier, and then discussed population projections in Section 3.2.1.1, rates of growth of GDP/P in Section 3.2.1.2 (and hopefully having added the historical data that I provided in an earlier comment), and now in this section indicating that the 90 percent range of rates of reduction in energy intensity is 0.5%/yr to 1.9%/yr, it would be very enlightening to the reader to show a simple diagram that illustrates the impact on global primary energy demand of different combinations of these first three factors in the Kaya identity. I have already published such a figure (as Figure 1.8 of Harvey 2006), so you can readily use it. I have also proposed this figure to Chapter 2, and I will be pleased if Chapter 2 or Chapter 3 uses it. (Danny Harvey, University of Toronto)	Accepted? Have anybody seen the figure?? (Changed to not accepted)
3-132	A	26	7	26	17	Why a comparison between pre-SRES and post-SRES? ; The idea is to analyse whether SRES assumptions stil hold; then a comparison between SRES and post-TAR literature would be the most appropriate. Even, if the idea is to find out if there are different insights in energy use in new baseline scenarios, it is not sufficient to use the full database. Rather, studies would then have to be selected that have made an independent assessment of energy use and studies that copy SRES or TAR assumptions would have to be left out. This gives a more analytical basis for making statements about the validity of SRES. (Bert Metz, IPCC)	Rejected. We have based the methodology on *numbers of scenarios.* To identify independent studies is clearly very demanding (too much so).

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
3-75	B	26	13	26	15	This text confuses energy use with the energy sector. As written it implies that emissions from the transportation and buildings sectors could be ignored, which is clearly not the case. Change "the energy and industry sectors." to "energy use and non-energy industrial emissions." Energy use covers all sectors and makes the statement correct. Change "the energy and industry sectors" to "energy and non-energy industrial emissions". U.S. Government (Government of U.S. Department of State)	Accepted. This is on page 58.
3-133	A	26	14	26	15	What does that say? It could very well be an artifact of the collection of studies looked at (see also comment on the basis for comparison) (Bert Metz, IPCC)	Noted. It is a weakness (which perhaps should be more fully discussed up front in the introduction to the chapter. But we cannot fundamentally know how the scenarios are motivated.
3-76	B	26	15	0	0	Change "30" to "20". U.S. Government (Government of U.S. Department of State)	Rejected – can't find text, comment mislabeled.
3-134	A	26	16	26	17	this sentence is misleading, because it suggests the conclusions could be very different; but in the section on population it is said that other factors compensate for lower population in the studies available and that means there are not lower emissions; suggest to delete or modify (Bert Metz, IPCC)	Don't understand this one
3-135	A	26	24	26	25	A change by 183% is not a change by a "factor" of 183%. (Danny Harvey, University of Toronto)	Accepted. Delete "factor"
3-77	B	26	24	26	27	This section states: "Literature identifies low-cost technology clusters allowing for endogenous technological learning with uncertainty. This suggests that a decarbonised economy may not cost any more than a carbon-intensive one, if technological learning curves are taken into account." These two sentences are repeated word-for-word in the Chap. 3 Summary, page 6, lines 30-32. The only other reference is in Chap. 3, page 97, lines 16-19, which states: "Gritsevskyi and Nakicenovic (2000) identified some 53 clusters of least cost technologies allowing for endogenous technological learning with uncertainty. This suggests that a decarbonized economy may not cost any more than a carbon intensive one, if technology learning curves are taken into account." That is the extent of the discussion. This seems very thin. As the weight of the discussion/models points to GDP losses, the emphasis in the TS on this one study seems odd. Suggest revising to: "While models generally show a cost associated with decarbonisation, one study in the literature identifies low-cost technology clusters that allow for endogenous technological learning with uncertainty. This study suggests that a decarbonised	Accepted: However, The Gritsevskyi and Nakicenovic study does not refer to GDP losses but rather to the discounted energy systems cost. Thus, in principle it is indeed possible that there are GDP differences across scenarios, but this was not modeled in this partcular study. The following text should go into the chaper: "Gritsevskyi and Nakicenovic (2000) identified some 53 clusters of least cost technologies allowing for endogenous technological learning with uncertainty. This suggests that at lest in one study a decarbonized energy sysem may not cost any more than a carbon intensive one, if technology learning curves are taken into

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						economy may not cost any more than a carbon-intensive one, if technological learning curves are taken into account." This section states: "Literature identifies low-cost technology clusters allowing for endogenous technological learning with uncertainty. This suggests that a decarbonised economy may not cost any more than a carbon-intensive one, if technological learning curves are taken into account." These two sentences are repeated word-for-word in the Chap. 3 Summary, page 6, lines 30-32. The only other reference is in Chap. 3, page 97, lines 16-19, which states: "Gritsevskyi and Nakicenovic (2000) identified some 53 clusters of least cost technologies allowing for endogenous technological learning with uncertainty. This suggests that a decarbonized economy may not cost any more than a carbon intensive one, if technology learning curves are taken into account." That is the extent of the discussion. This seems very thin. The final sentence of this paragraph should be modified so that it does not suggest that this is a widely held conclusion. Start this sentence: "At least one study has found that…" replacing "This suggests". A caveat should be added to make clear that the majority of studies do not find this to be true. U.S. Government (Government of U.S. Department of State)	account. This particular study did not assess the impacts on the overral economy and how high the GDP losses might be across the scenario."
3-136	A	26	32	26	34	In an earlier draft there was a reference to high oil price effects. This is something that came up also very stronly at the Pris review meeting. It would be very desirable to include a discussion on the effect of high oil pries. I know not many (may be none at all) of the global long-term models may have done this. But then try to use information from shorter term analyses (eg WEO 2006, that will be made available to authors by the end of September) to discuss the possible impact. We cannot be silent on this issue. (Bert Metz, IPCC)	Without literature, we can only note the issue.
3-137	A	27	23	0	0	More up-to-date references are Matthews et al. (2003), Brovkin et al. (2006), and Betts et al. (2006), all discussed in WG1, Chapter 2, Section 2.5.3. (Danny Harvey, University of Toronto)	Accept. Will review and implement what is appropriate.
3-138	A	28	7	28	10	There is a large uncertainty in the emission estimates for all sources, so there is a large uncertainty in the percentage from any given source. See WG1, Chapter 7, Section 7.4. (Danny Harvey, University of Toronto)	Noted. Re-word text to attribute to USEPA source at beginning of sentence.
3-139	A	28	15	28	19	I think it is necessary to say something about the weight of land use in the carbon cycle (Félix Hernández, Economía y Geografía. Consejo Superior de Investigaciones Científicas (IEG-CSIC))	Noted. Appropriate text will be drafted with co-authors.

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
3-140	A	28	27	0	0	Delete the first "growth" (Danny Harvey, University of Toronto)	Accept.
3-141	A	28	29	0	0	Replace "kcal" with "MJ" (metric units should be used everywhere) (Danny Harvey, University of Toronto)	Accept.
3-142	A	28	37	28	49	Please indicate how much additional cropland would be required, and compare with total present area of cropland. (Danny Harvey, University of Toronto)	Accept. Compute.
3-143	A	28	45	0	46	after " reflect " delete redundant and confusing "the" in line 45. After "investment" add "and policy-driven private investment" (Peter Read, Massey University)	1st sentence – Accept. 2nd – Will craft appropriate change after consulting co-authors.
3-144	A	28	45	28	46	after " reflect " delete redundant and confusing "the" in line 45. After "investment" add "and policy-driven private investment" (Peter Read, Massey University)	1st sentence – Accept. 2nd – Will craft appropriate change after consulting co-authors.
3-145	A	29	5	29	20	Land use change causes GHG emission not only carbon but CH4 and NOX. Although this chapter focuses on carbon emissions, non-carbon GHG emissions caused by land use changes should be mentioned at least in the footnote, even if these are touched upon in 3.3.5.5. (Shunsuke Mori, Tokyo University of Science)	Reject. The chapter has non-co2 discussions related to land-use on page 35-36 and general non-co2 discussions in sections 3.2.2.3 and 3.3.5.4.
3-146	A	29	10	0	0	(Danny Harvey, University of Toronto)	Reject. No comment listed, only name.
3-78	B	29	12	29	13	Give examples of C3 and C4 crops. U.S. Government (Government of U.S. Department of State)	Accepted.
3-147	A	30	20	30	25	Are the numbers and scenarios presented here all consistent with Chapter 8? Also in relation to the biofuel potential? Currently they do not seem to be inconsistent, but an additional check and consistency improves the report enormously. In addition, please add ranges. (Government of European Community / European Commission)	Need to check consistency with ch8 and ch9 on cropland, forestland, and biofuels. Will consider suggestion to include ranges.
3-148	A	31	6	31	18	Why a comparison between TAR/pre-TAR and post-TAR? ; The idea is to analyse whether SRES assumptions stil hold; then a comparison between SRES and post-TAR literature would be the most appropriate. Even, if the idea is to find out if there are different insights in emission levels in new baseline scenarios, it is not sufficient to use the full database. Rather, studies would then have to be selected that have made an independent assessment of emissions+K4 and studies that copy SRES or TAR assumptions would have to be left out. This gives a more analytical basis for making statements about the validity of SRES. In addition, this text belongs in 3.2.2.1, because it is about energy/ industry emissions. (Bert Metz, IPCC)	Noted. Page and line numbers seem to be incorrect since the text on the page and line numbers listed by reviewer do not include a pre-TAR and post-TAR discussion. Will advance comment to other Sec 3.2 authors where comment is applicable. Referred to co-authors where the comment could apply.

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
3-149	A	31	7	0	0	Can anything more be said about the effect of higher oil prices? Please try (Bert Metz, IPCC)	Noted. Will consult co-authors and develop appropriate text.
3-79	B	31	11	31	19	The wide range of 2100 CO2 emissions in scenarios is attributed to the uncertainties surrounding the main driving forces including population growth, economic development, energy production and use, etc. Different model structures may also contribute to the large range in future emissions. U.S. Government (Government of U.S. Department of State)	Accepted – need to add
3-150	A	31	15	31	18	Please give the 50th percentile in numbers directly in the text. (Government of European Community / European Commission)	Rejected – Emissions from steel manuf. included in energy supply
3-151	A	31	23	0	0	among industry related emissions the production of cement manufactures is mentioned, what about steel production, which is not very low? Idem p37, in table 3.2. (Jacques Rilling, CSTB Building Research Center)	Accepted – Need to re-write
3-152	A	32	6	32	13	This is another example of a lack of thorough analysis. To get a good picture studies have to be selected that have lower population studies and then these have to be analysed on other assumptions. Only then a true picture of the effect of population assumptions can emerge. (Bert Metz, IPCC)	Accepted. Sentence clarified to mean post TAR.
3-153	A	32	12	32	13	This sentence seems to be contradicted by figure 3.11 that does not show higher C/E values then the TAR/pre-TAR literature (Bert Metz, IPCC)	Accepted. Sentence clarified to mean post TAR.
3-154	A	32	15	32	22	Same problem with comparison: compare SRES with post-TAR and be selective which studies are being used for this purpose (Bert Metz, IPCC)	Accepted.
3-155	A	33	11	0	0	3.10 should be 3.12 (Bert Metz, IPCC)	Accepted.
3-156	A	33	11	33	11	It seems "Figure 3.10" should be "Figure 3.12". (REF!)	Accepted.
3-157	A	33	11	33	0	Change to: In Figure 3.12 (left panel).... (Government of Germany)	Accepted – will be re-written.
3-158	A	33	17	33	26	I find this segment to be confusing and unclear. It should be rewritten. (Danny Harvey, University of Toronto)	Accepted – will be re-written.
3-159	A	33	17	33	19	Sentence difficult to understand. Do you mean: "The figure shows that the range of emissions from different models participating in the EMF-21 study is somewhat smaller than that of SRES"?? (Bert Metz, IPCC)	Accepted – will be re-written.

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
3-160	A	33	25	33	26	"confirming" is not the right word. Perhaps "replicating". (Danny Harvey, University of Toronto)	Accepted – will be re-written.
3-161	A	33	28	33	32	This conclusion cannot be drawn based on current analysis. See remarks above about the inadequate comparison. In addition, global (CO2) emissions and regional emissions need to be considered searately. It should also be made clear that this secton is only about energy/industry CO2. (Bert Metz, IPCC)	Accepted – added captions.
3-162	A	33	35	33	39	Caption needs to refer to left and right parts of figure. (Danny Harvey, University of Toronto)	Accepted – need to add
3-163	A	35	9	0	0	figure 3.13: is this CO2 only or CO2 equivalent? Remark about IMAGE 2.3 seems to suggest it is a mixture; that would be confusing; CO2 only makes sense. Graphics could be improved by using shaded area fro SRES range (Bert Metz, IPCC)	Accepted. Will net out IMAGE 2.3 forestry non-co2 emissions to make the scenario consistent with the others. Add a footnote noting that forestry generates non-co2 emissions as well, noting magnitude for 2020, 2050, 2100. Noted (shading suggestion). Experiment with shading. However, shading may not support the remark in text (p. 34)
3-80	B	35	9	0	0	Fig3.13 - Hard to read. U.S. Government (Government of U.S. Department of State)	Accepted. Will consider alternatives for improving readability.
3-164	A	35	12	0	0	Insert "agricultural" before "CH4" (Danny Harvey, University of Toronto)	Accepted
3-165	A	35	12	35	15	this paragraph and table 3.1 should be in 3.2.2.3 (and title of 3.2.3.2 to include CO2) (Bert Metz, IPCC)	Rejected. Discussed with Section 3.2 authors and authors agree that the discussion is appropriate where it is given that agriculture is responsible for the vast majority of non-co2 emissions are Section 3.2.2.3 does not discuss non-co2 emissions scenarios for individual sectors.
3-81	B	36	1	36	5	The authors should consider whether Table 3.1 is necessary - it seems to go into a level of detail on the agricultural sector that is not replicated in Chapter 3, for the other sectors. (Government of Australia)	Rejected. Discussed with chapter authors and determined to be appropriate since consistent with land's overall portrayal within chapter.

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
3-82	B	36	1	0	0	Table3.1 – unfinished. Is the table missing entries for the GTEM model? Clarify that the data are unavailable in the later years. U.S. Government (Government of U.S. Department of State)	Accepted.
3-166	A	36	4	0	0	Table 3.1: A reference is needed for each scenario listed. (Danny Harvey, University of Toronto)	Accepted.
3-167	A	36	5	36	12	Is there no modeling study that incorporates any iof these effects? (Bert Metz, IPCC)	Noted. Yes there are models—add note about climate and co2 fertilization in IAMs.
3-168	A	36	14	0	0	What does "other" refer to? (Bert Metz, IPCC)	Accepted. Need to specfy.
3-169	A	36	16	0	0	Insert ",in particular," after "sequestration" and delete the dash. (Danny Harvey, University of Toronto)	Noted. Need to re-write. Not convinced the reviewer's suggestion is the answer though.
3-170	A	36	19	0	20	yes indeed (Peter Read, Massey University)	Accepted. Clarify that referring to model integration/iteration.
3-171	A	36	19	36	20	yes indeed (Peter Read, Massey University)	Accepted. Clarify that referring to model integration/iteration.
3-172	A	36	29	0	0	The EMF multigas work is now all in press in the Energy Journal. (Richard Tol, Economic and Social Research Institute)	Noted.
3-173	A	37	6	37	0	Table 3.2. Not clear why there are numbers under each entry in the "sector" column. Need to explain or delete. (Jean Bogner, Landfills +, Inc)	Accepted – will indicate that these are totals and convert to CO_2 eq.
3-174	A	37	6	0	0	Presumably 100-year time horizons are used in calculating MtCe, but this should be specified. (Danny Harvey, University of Toronto)	Noted. All CO2 equivilents are 100-yr.
3-175	A	37	6	37	8	de la Chesnaye, et al., 2006, list all of the emissions from use of ODS substitutes in the industrial sector. However, the largest contributor to these emissions is use of these materials in air conditioning and refrigeration, most of which occurs in the building sector, with small amounts in the industrial and transport sector. It is beyond the scope of Chapter 3 to make this separation, but Table 3.2 should be footnoted to indicate that F-gas emissions from Substitution of ODS is the total for all sectors. If this explanation is not added, there will be a large, unexplained discrepancy between the values presented for ODS substitutes in Table 3.2 and those presented in Table 7.3 B. (Lenny Bernstein, L. S. Bernstein & Associates, L.L.C.)	Accepted – will add footnote.
3-176	A	37	6	0	0	table 3.2: these data differ from the emisison data in chapter 1; needs to be reconciled (Bert Metz, IPCC)	Accepted – will coordinate with Chap 1

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
3-83	B	37	6	37	8	de la Chesnaye, et al., 2006, list all of the emissions from use of ODS substitutes in the industrial sector. However, the largest contributor to these emissions is use of these materials in air conditioning and refrigeration, most of which occurs in the building sector, with small amounts in the industrial and transport sector. It is beyond the scope of Chapter 3 to make this separation, but Table 3.2 should be footnoted to indicate that F-gas emissions from Substitution of ODS is the total for all sectors. If this explanation is not added, there will be a large, unexplained discrepancy between the values presented for ODS substitutes in Table 3.2 and those presented in Table 7.3 B. U.S. Government (Government of U.S. Department of State)	See 3-175.
3-177	A	37	7	37	0	Table 3.2. For consistency, would recommend replacing this table with summary numbers from the sectoral chapters...these are "estimated numbers for 2000" and may differ from numbers in sectoral chapters. Also, organizing this table according to sectoral chapters is recommended. (Jean Bogner, Landfills +, Inc)	Rejected. This table is based on latest. Peer-reviewed literature on GHG estimates.
3-84	B	37	30	37	30	Is this reference to WG II, Chapter 20, or WG III, Chapter 12? U.S. Government (Government of U.S. Department of State)	Rejected. No line 30 on this page.
3-178	A	38	5	38	9	numbers are already in graph; text can be deleted (Bert Metz, IPCC)	Accepted – deleted text.
3-179	A	39	1	39	4	I would say that is not really different; it is all a matter of assumptions, wether you start from a story line or not; no need to emphasise (Bert Metz, IPCC)	Taken into account and modified text.
3-180	A	39	14	0	0	"wider than" (Bert Metz, IPCC)	Accepted.
3-181	A	39	15	39	18	numbers are already in graph; text can be deleted (Bert Metz, IPCC)	Accepted – text deleted.
3-182	A	39	18	39	22	why no comment on much higher EMF emissions? (Bert Metz, IPCC)	Taken into account.
3-183	A	39	32	39	34	numbers are already in graph; text can be deleted (Bert Metz, IPCC)	Accepted.
3-184	A	39	47	0	0	Replace “historically” with a statement of the time interval over which this is true (presumably 1850-1970). I would regard the period since 1970 as part of the “history”. (Danny Harvey, University of Toronto)	Accepted – deleted “historically”
3-185	A	41	10	41	15	How about adding the effect or influence of Nox in this paragraph. The authors introduced the effect or influence when introducing other gases, for example, in	Rejected – not needed.

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						page 39,, line 45, "Sulfur emissions are relevant … as they contribute to the formation of aerosols, which affect ...". So maybe the authors can also give some introduction what NOx will affect. (REF!)	
3-85	B	43	3	0	0	Table 3.3: Provide units for emissions of black and organic carbon. U.S. Government (Government of U.S. Department of State)	Accepted – added.
3-186	A	43	27	0	0	figure 3.17: needs improvement by bringing different studies together in one graph (Bert Metz, IPCC)	Taken into account. Will attempt to combine.
3-187	A	45	22	45	22	"over the next century", which century dis the authors want to mention? Maybe it should be this century. (REF!)	Accepted, 21st century
3-188	A	45	24	45	25	"this section" should be 'section 3.3.5"; "section 3.3.5" should be "3.3.6" (Bert Metz, IPCC)	Move to before 'section 3.3.5
3-189	A	45	29	45	49	Under Article 2 of the UNFCCC, we are not free to just choose any point we want in the cause-effect chain as the subject of a climate-related target. Article 2 quite clearly says that the concentrations of GHGs are what are to be stabilized, and what is to be avoided is not dangerous climatic change (DCC), but dangerous anthropogenic interference (DAI) in the climate system. The difference between the two is quite significant, as explained in Harvey (2006). DAI is an increase in GHG concentrations that have a non-negligible possibility of provoking a change in climate that in turn has non-negligible possibility of provoking unacceptable impacts, where DCC is a change in climate itself that has risk of provoking unacceptable impacts. To make avoidance of DCC a climate-policy target, one must know what the correct climate sensitivity is, but this is unknown, so any effort to determine what is needed to avoid DCC has to make some assumption about climate sensitivity and so conveys a false sense of certainty. To assess what is needed to avoid DAI, one merely needs to have some plausible upper limit (at some specified estimated percentile) to the climate sensitivity. Yes, it is true that selecting a climate-policy target earlier in the cause effect change increases the uncertainty in the impacts (as stated in lines 37), but it is this very uncertainty that creates a sense of danger, and it is danger that is to be avoided. This discussion should therefore be revised to include this points and a reference to Harvey (2006). Harvey, L.D.D. 2006. Dangerous Anthropogenic Interference, Dangerous Climatic Change, and Harmful Climatic Change: Non-Trivial Distinctions with Significant Policy Implications. Climatic Change (accepted).	Rejected, the text does not state that one is free to choose any point of the cause-impact chain for the target, but described implications for the implications (e.g., uncertainty of impacts) of defining the targets at different metrics. The Harvey (2006) can not be added as the AR4-TOR requires papers to be already in press since September 15, 2006.

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						(Danny Harvey, University of Toronto)	
3-86	B	45	29	45	30	First sentence seems internally contradictory - by definition a baseline scenario is not a mitigation scenario. In line 30, what does phrase 'scenario analysis' refer to (mitigation or baseline?). (Government of Australia)	Accepted, text modified to clarify baseline-mitigation scenario difference.
3-87	B	45	33	45	33	Mitigation studies' presumably refers to long-term mitigation scenarios - since short-term studies have limited connection to stabilisation. (Government of Australia)	Accepted, added "long-term"
3-88	B	45	35	45	38	Penultimate sentence in para: (a) is hard to understand; (b) no evidentiary basis is provided for the 2 conclusions (certainty of effective measures and uncertainty of climate change impacts). (Government of Australia)	Noted, changed text to reflect that the text does not refer to effectiveness of measures or climate change impacts in general, BUT that selecting a temperature target has the advantage to providing a more direct first-order LINKAGE to potential impacts.
3-89	B	45	40	45	40	Logic of para has become quite confusing by this point. The para starts out with a focus upon UNFCCC concentration stabilisation objective. But ends up confusingly indicating that a long-term climate target is undermined by not knowing with any certainty how much emissions must be reduced. Not clear how these confusing points support the conclusion at p7, lines 25 - 29 of the Executive Summary. (Government of Australia)	Rejected, text is consistent with the executive summary, which also emphasis long-term uncertainties. The (probabilistic) literature on climate sensitivity clearly illustrates that how much emissions reduction would be needed is subject to large uncertainties.
3-190	A	45	42	45	49	The concept of CO2 equivalent concentrations needs to be discussed here as well (is used elsewhere in chapter) (Bert Metz, IPCC)	Accepted, The concept of CO2-eq. should be discussed in 3.3.3 (together with GWPs).
3-191	A	45	48	0	0	If this sentence is kept (in spite of my previous comment), then after "level" add "so one must choose some upper limit for climate sensitivity and some degree of risk aversion, as explained in Harvey (2006)". (Danny Harvey, University of Toronto)	Rejected, as noted by WG1-TS, an upper limit of climate sensitivity can not be assessed given present uncertainties.
3-192	A	45	49	0	0	If this sentence is kept, then after "impacts" add "but cannot be implemented in practice because the climate sensitivity is unknown". (Danny Harvey, University of Toronto)	Accepted, text changed to reflect difficulty for implementation due to climate sensitivity uncertainty.
3-193	A	46	0	0	0	Comment: it would be good to make an explicit reference to impacts data from WGII, as it is really the impacts we are trying to avoid, not the intermediate steps of temperatures, concentions/forcings, emissions, etc.. (Chris Mottershead, BP)	Noted, for references to impacts see section 3.5

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
3-194	A	46	2	46	11	You are citing approaches that do not do what is called for under Article 2 of the UNFCCC. Article 2 calls for avoiding dangerous anthropogenic interference, which depends on the combination of probability distribution functions for climate sensitivity and for the temperature threshold beyond which unacceptable impacts occur. This gives the probability of unacceptable impacts as a function of radiative forcing (or of equivalent CO2 concentration). The final step is to decide on an allowable probability of incurring harm that had previously been deemed to be unacceptable. Thus, a total of three inputs are required in order to determine allowable GHG concentrations, and from that, allowable emissions, as in Harvey (2006a,b). All of the cited work takes into account only the first input (pdfs of climate sensitivity) and so is quite inadequate. REFERENCES: Harvey, L.D.D. 2006a. Dangerous Anthropogenic Interference, Dangerous Climatic Change, and Harmful Climatic Change: Non-Trivial Distinctions with Significant Policy Implications. Climatic Change (accepted). Harvey, L.D.D. 2006b. Allowable CO2 Concentrations Under the United Nations Framework Convention on Climate Change as a Function of the Climate Sensitivity PDF. Environmental Research Letters (submitted). (Danny Harvey, University of Toronto)	Rejected, article 2 calls for avoiding dangerous anthropogenic interference. A judgement of allowable probability of incurring harm that deems to be unacceptable is policy presriptive, and can not be included. References can not be added at this stage as the AR4-TOR requires papers to be already in press since September 15, 2006.
3-195	A	46	8	0	0	make reference to probability table in 3.5 (Bert Metz, IPCC)	Accepted
3-196	A	46	10	0	0	Insert “speculative” after “between” [I can’t imagine that any of the authors would argue that such costs are anything but speculative] (Danny Harvey, University of Toronto)	Noted, text modified to reflect the uncertainty of cost estimates
3-90	B	46	10	46	15	Figure 3.18 provides little assistance and is confusing. Suggest deletion. (Government of Australia)	Keep as is, delete, or combine with causal chain discussion in 3.5 ??
3-91	B	46	14	0	0	Figure 3.18 doesn't seem to provide much more elucidation than the text description. Needs explanation in the text (p45 line 38). U.S. Government (Government of U.S. Department of State)	Accepted, figure deleted
3-197	A	47	1	47	1	Table 3.4, 3rd column from the left and 3rd low from the top, I think those are advantages of using "Radiative forcing" as Target, instead of disadvantages (REF!)	Accepted
3-92	B	47	1	47	2	Table 3.4: Row: Radiative Forcing Column: Disadvantages - suggest that "Does allow for full flexibility in substitution among gases" should be in the Advantages column.	Accepted

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						(Government of Australia)	
3-93	B	47	1	0	0	Table 3.4: (1) Under the "advantages" column for "global mean temperature", delete "and has been shown to be a reasonable proxy" for impacts. Where has this been shown? In any case, while this might be true for small temperature changes, for larger temperature changes this does not hold. In fact, most impacts analyses indicate a non-linear relationship between temperatures and impacts, whatever both may be. (2) Under the "disadvantages" column, for each entry except for "impacts", add the following: "No direct link to the objective of climate policy". This would be a mirror image of the entry under the "advantage" column for "impacts". Under the "advantages" column for "global mean temperature", delete "and has been shown to be a reasonable proxy" for impacts. Where has this been shown? In any case, while this might be true for small temperature changes, for larger temperature changes this does not hold. In fact, most impacts analyses indicate a non-linear relationship between temperatures and impacts, whateverbothmay be. U.S. Government (Government of U.S. Department of State)	(1) rejected, non-linear relationship can also be interpreted as a proxy (2) accepted: Added "Just indirect link to the objective of climate policy (impacts)" for the first two columns. Unertainty with respect to impacts already addressed for the other rows.
3-94	B	47	1	0	0	Table 3.4. Check the "disadvantages" column for "radiative forcing" … these look like advantages. U.S. Government (Government of U.S. Department of State)	Accepted
3-198	A	47	3	0	0	In some places, "gases" [the correct spelling] is spelt as "gasses" [incorrect spelling] and in other places it is spelt correctly. Do a global search and change as needed. (Danny Harvey, University of Toronto)	Accepted
3-199	A	47	5	0	0	insert "sea level" or something like that before "radiative forcing" (Bert Metz, IPCC)	Accepted
3-200	A	47	7	0	0	"peak" is not a verb. Reword as: 'to allow radiative forcing to peak at a certain" (Danny Harvey, University of Toronto)	Accepted
3-201	A	47	9	0	0	Harvey (2004) should be added to this list, as the subject of this sentence is exactly what I investigated, and before the papers that are cited! REFERENCE: Harvey, L.D.D. 2004. 'Declining temporal effectiveness of carbon sequestration: Implications for compliance with the United Nations Framework Convention on Climate Change', Climatic Change 63: 259-290. (Danny Harvey, University of Toronto)	Noted, will check reference and add if appropriate.
3-202	A	47	10	0	0	This section should include a clear statement that it takes thousands of years to	Rejected, this is a WG1 issue rarely addressed

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						reach equilibrium. Many policy makers may not be aware of this time scale, and equate "stabilisation" with what is going to happen by 2100 or shortly afterwards (hence I believe the early discussion of 550ppm CO2 as a stabilisation target, which gives about 2ºC rise above 1990 by 2100 even when other GHGs are also included, but a much higher warming at equilibrium). It's the difference between climate sensitivity and transient climate response. I believe it is important to clearly spell out that equilibrium warming levels are only one, but not necessarily clear or sufficient, guide to climate impacts and avoided damages, or to mitigation pathways leading to stabilisation, because ultimate equilibrium could be reached over thousands of years via overshoot not only of concentrations but even of temperature itself. The assumptions implicit in the literature on equilibrium warming should be clearly spelt out to avoid the impression that there is a self-evident connection between long-term equilibrium warming goals and short-term actions that would be consistent with this goal. The picture is unfortunately more complex. (Andy Reisinger, TSU IPCC Synthesis Report)	by the stabilization scenario literature.
3-95	B	48	6	48	8	Delete the reference to the Kyoto Protocol and the United States climate policy. Since GWP's are now almost universally applied the specification of two examples is not useful. (Government of Australia)	Rejected, it is useful additional information to list examples where GWPs are used as exchange rates between gases in real world policy.
3-203	A	48	36	49	6	In Figure 3.19 the blue and purple color are mixed. (Government of Finland)	Noted
3-204	A	48	37	0	0	figure 3.19: legend seems mixed up for CH4 (Bert Metz, IPCC)	Noted, legend seems OK
3-205	A	49	26	50	2	Some graphical illustration of peaking pathways would be useful (Bert Metz, IPCC)	Noted, will add figure if space limitations allow it
3-96	B	49	28	49	48	Para needs to be more precise in making clear when referring to long-term concentrations stabilisation outcome; when referring to (peak) annual emissions levels; etc. (Government of Australia)	Accepted, changed text to distinguish between concentration and emissions.
3-206	A	49	33	0	0	add "needed for specific long-term targets. They are based on carbon-cycle models." after "reduction rates" (Bert Metz, IPCC)	Accepted, sentence has been modified
3-207	A	49	34	49	37	The sentence could be clearer if it is written as: "Mainshausen (2006) showed that for low concentration targets (i.e. below 3 W/m2/ 450 ppm CO2-eq) overshoot (e.g. 50 ppm) is inevitable given the feasible maximum rate of emission reduction.	Noted, sentence reformulated, see comment above

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						(Government of Finland)	
3-208	A	49	36	0	0	Here, you use “ppm” but elsewhere you use “ppmv” to refer to GHG concentrations. The latter is better. Do a global search for “ppm” and change to “ppmv”. (Danny Harvey, University of Toronto)	Accepted
3-209	A	49	37	0	0	50 ppm (should be ppmv) is not a rate. After this sentence, add: “Harvey (2004) examined the potential to use sequestration of biomass carbon to draw down atmospheric CO2 concentration after overshooting longterm targets of 350-450 ppmv.” REFERENCE: Harvey, L.D.D. 2004. ‘Declining temporal effectiveness of carbon sequestration: Implications for compliance with the United Nations Framework Convention on Climate Change’, Climatic Change 63: 259-290. (Danny Harvey, University of Toronto)	Accepted, reference added
3-97	B	50	13	50	25	The authors should also include a dot point about how land-use activities were treated in the TAR and how their current treatment may further complicate comparison of mitigation scenarios. (Government of Australia)	Noted, for discussion see 3.3.5.5
3-210	A	51	5	51	23	During the paris review meeting suggestions were made to subdivide category A, because ti is rather wide and then leads to a wide range of probabilities for staying below temperature levels as explored in section 3.5 (and carried foraward to SPM). With 16 studies it might be possible to do this. (Bert Metz, IPCC)	KR suggestion to go doan with category A to 3 W/M2, but not below this.
3-98	B	51	5	51	5	Make clearer to reader by amending: '…change in radiative forcing due to multiple gases and … (Government of Australia)	Accepted
3-211	A	51	14	51	24	Category A is too broad as it includes scenarios ranging from "1.3 to 2.6 C" over preindustrial at equilibrium (see column 5). It is suggested to split this category into a new Cat A, that includes scenarios that aim at equilibrium temp. up to 2 C. The remaining scenarios should form a new Category B. The former categories B to E should become new categories C to F accordingly. The number of scenarios in this category (16 scenarios, see column 6) seems sufficient to allow for a split. The 2 C political target is supported by the EU, the transatlantic "International climate change task force (see report 'Meeting the Climate Challenge', Rt Hon. Stephen Byers MP and Sen. Olympia J Snowe, January 2005) and others. It is therefore	Taken into account, table will be modified (see comment 3-210). The threshold for cat. A will be moved to lowest threshold possible (where at the same time a sufficient number of scenarios would remain there).

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						highly important to have a corresponding scenario category to refer to in this latest IPCC assessment. Table 3.5 to be changed accordingly. (Government of Germany)	
3-212	A	52	0	52	0	Table 3.5: To avoid dangerous climate change, a good point of departure is the 2 degree target which certainly in Europe at least is taken quite seriously. The question then reduces to what GHG stabilization levels are necessary to achieve this. It would seem to me that the Class A in the table is much too broad, including both stabilization levels "unlikely" to " very likely" to reach the 2 degree target. Can it not be split up into two, with one class for the levels in the "likely+" (which would be the aim of policymakers) and one for the rest? Second point: include reference to probabilities of staying below 1.5 degrees warming, if available. While a majority (in Europe) now supports a 2 degree target, there is growing concern that even that may not be sufficient to avoid dangerous climate change and a 1.5 degree target will be more 'safe'. (Donald Pols, Friends of the Earth Netherlands/Milieudefensie)	Taken into account, see comment 3-210, 3-211
3-213	A	52	1	0	0	Table 3.5 conveys an unrealistic sense of certainty. This is because the single best guess climate sensitivity is used in the expression to compute temperature increases, so the range in temperature increase is due only to the range in the input CO2-equivalent concentration. Instead, I recommend – for each row – computing the lower temperature change based on the lower concentration and a lower limit for climate sensitivity of 1.5 K, and computing the upper temperature change based on the upper concentration and an upper limit for climate sensitivity of 4.5 K (both of which are suggested in WG1, Chapter 10, Section 10.7.2). Inasmuch as the existing numbers assume a climate sensitivity of 3 K, you just need to multiply the existing lower temperature change by 0.5 and multiply the upper one by 1.5. Also, the relationship used is so simple that, for the reader's convenience, it should be given in the caption to the table. (Danny Harvey, University of Toronto)	Noted, table will be changed, and for each category the likely range for temperature will be given instead of the present way of using best guess climate sensitivity.
3-214	A	52	1	0	0	table 3.5: for category A and E give also conc range (based on actual studies assessed) (see also comments on subdiving category A (Bert Metz, IPCC)	Accepted
3-215	A	52	9	56	32	I find this discussion to be rather tedious. The few key points could be made in much less space. (Danny Harvey, University of Toronto)	Noted, text will be modified following the other comments on this section
3-216	A	52	25	52	36	Text and fig 3.21 show that current literature shows EARLIER peaking of CO2 (at least for 450 and 550 ppmv CO2) than in SRES. I would expect the opposite since	Accepted, the statement in the SPM is based on the comparison between the WRE

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						multigas studies lead to LATER peking of CO2 (as also highlighted in SPM para 5); what is happening here? Is this maybe the influence of different carbon cycle models (as refered to in SPM paragraph 5? This needs to be clarified (Bert Metz, IPCC)	trajectories (which were widely used in stabilization scenarios during (and before) TAR) and the new stab. scenarios. The shaded area in the figure does not give the individual projections of TAR, and thus not conclusive with respect to timing. The peak time of the full TAR scenarios will be checked, and the text incl. SPM will be revised if necessary.
3-217	A	52	32	52	32	The phrase "If biomass is grown sustainably" should be removed. It unnecessarily introduces a potentially confusing definitionial and accounting question. CCS of biomass-derived CO2 will result in negative emissions. The question of whether forests will regrow to sequester additional carbon is an important one, but it is not dependent on CCS. (Reid Miner, NCASI)	Rejected, if the biomass comes from deforestation, the net emissions balance is not negative.
3-218	A	52	35	0	0	Replace “might” with “are” [we are already at > 350 ppmv] (Danny Harvey, University of Toronto)	Rejected, there are also other possibilities to achieve negative emissions, and whether biomass CCS will play a role is subject to uncertainty.
3-219	A	53	1	53	1	Figure 3.21., please split up the graph for category A+B and combine the graphs for Category D+E (Government of European Community / European Commission)	Accepted
3-220	A	53	21	53	25	The uncertainty in the relationship between concentration level and temperature rise should be in this sub-section or here touched upon. (so called climate sensitivity uncertainty, which is discussed in AR4-WG I or for example, "Hare, B. and M.Meinshausen, “How much warming are we committed to and how much can be avoided?” PIK Report No.93, 2004") (Shunsuke Mori, Tokyo University of Science)	Rejected, the discussion on climate sensitivity uncertainty is already included in section 3.2.1 (including references to Hare and Meinshausen)
3-224	A	54	0	0	0	figure 3.22: legend missing (Bert Metz, IPCC)	Accepted, legend will be added
3-221	A	54	1	54	1	Figure 3.22 is a very illustrative and useful graph! Please make a similar graph for the yearly emssion reductions? (Government of European Community / European Commission)	Rejected, figure using annual emissions reductions will not be illustrative as they strongly depend on the baseline and not only the stabilization target. See discussion on page 56.
3-1	C	54	7	56	32	This section does not appear to discuss the rate of emission reductions required	Taken into account – this is covered in section

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						under different pathways, but surely that is a key determinant of mitigation costs. In general, carbon emission or energy consumption reduction rates exceeding much over 1%/yr have only been associated with major recession. (Government of UK)	3.3.5.1
3-222	A	54	16	0	0	peaking dates are different from data in table 3.14 (and those data are carried forward to SPM); reconcile! Also, use "peak" rather than "stabilise" to be consistent with lines (Bert Metz, IPCC)	Accepted, figure and table will be updated using most recent database (additional scenarios have been added since the expert review)
3-223	A	54	28	54	34	It is not clear why suddenly "a small number of studies" is used, when in the previous paragraph already the peaking dates issue is discussed. I suspect this paragraph is based on pathways and not on full scenarios; clarify The more important question is whether there is a difference between the scenario and the pathwy studies. And the bigger question is how the message of later peaking of CO2 in multigas studies can be reconciled with figure 3.21 (see also other comment) (Bert Metz, IPCC)	Accepted, see comment 3-216
3-99	B	55	11	55	12	Not clear how to read fig 3.23 in relation to median/percentiles of scenario literature. In addition, as commented earlier there is strong doubt as to whether it is valid to interpret emissions scenarios literature by percentiles/median. (Government of Australia)	Taken into account, the figure does not interpret the scenarios in a probabilistic way, but just gives the statistics of the full scenario ensemble and their distribution. Text added pp53, line 28 to clarify that percentiles of distributions do not correspond to probabilities.
3-225	A	55	15	56	24	text is very unclear; reformulate; this is made also problematic by the way fig 3.24is composed; very difficult to get useful messages from this figure; maybe try to disaggregate the various stabilization categories in a table with uncertainty ranges or find other ways to get a better picture (Bert Metz, IPCC)	
3-226	A	55	15	55	25	Would it not be possible to conclude that we can learn form Figure 3.24 that for the short term, the baseline is of less importance compared to the long term emsision reductions? (Government of European Community / European Commission)	Taken into account, text added to emphasize the importance of long-term baseline uncertainty.
3-100	B	55	24	0	0	Reference to Left-hand panel should be right-hand panel? U.S. Government (Government of U.S. Department of State)	Accepted
3-227	A	56	25	56	32	Please indicate more numbers on the yearly emission reduction basis compared to the baseline. This also for the rest of the chapter	Noted, for annual emissions reductions see figure 3.30 (in percent) and table 3.16 for

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						(Government of European Community / European Commission)	absolute numbers (focusing on the year 2030)
3-228	A	56	34	57	30	Following from comment above, it would useful to add a sentence noting the matter of near term infrastructure investment, for meeting greenhouse gas reduction goals in section 3.3.5.2 GHG abatement measures, particularly as it follows on from 3.3.5.1 on Emissions reductions and timing (page 52). (Kirsty Hamilton, Chatham House; UK Business Council for Sustainable Energy)	Accepted, added to text on page 54
3-229	A	57	2	0	0	If "energy" and "industry" are listed as separate sectors, then "energy" should be "energy transformation" and then "industry" is an end-use sector, so you should also list the other major ones (transportation, buildings). (Danny Harvey, University of Toronto)	Rejected, industry refers here to sources out-side the energy transformation sector (e.g., cement production)
3-230	A	57	6	57	6	Delete 'or'. After 'energy', insert: 'and the introduction of fusion power.' Given the maturity of the world fusion development programme (which is beginning construction of a 500MW fusion device - ITER - in France), the substantial safety and environmental advantages of fusion, and the great abundance of its fuels, fusion should be distinguished from fission, not just included in the 'nuclear' umbrella term. (Ian Cook, United Kingdom Atomic Energy Authority)	Rejected, the scenario literature does not support this.
3-231	A	57	6	0	0	"… or the enhanced use of nuclear, fission or fusion, and renewable energy" (Robert Goldston, Princeton Plasma Physics Laboratory)	Rejected, see comment 3-230
3-101	B	57	6	0	0	"… or the enhanced use of nuclear, fission or fusion, and renewable energy" U.S. Government (Government of U.S. Department of State)	Rejected, see comment 3-230
3-232	A	57	21	57	30	But from Figure 3.25, you could conclude that carbon free technologies are more important in the long run. This is different then the conclusion in the SPM and also then figure 3.27. Please come up with a consistent message. (Government of European Community / European Commission)	Noted, Figure 3.25 and 3.27 are not contradicting each other. 1) 3.27 gives the contribution over the century without time dimension, 2) figure 3.27 clearly indicates the importance of zero-carbon emissions options as the main source of emissions reductions. Figure 3.27 will be modified.
3-233	A	57	22	0	0	"are' should be "is" (Bert Metz, IPCC)	Accepted
3-234	A	57	25	57	29	The statement about carbon intensity (CI) reductions being more important the energy intensity (EI) reductions for the most stringent scenarios does not stand up to a simple back-of-the-envelope analysis. Suppose, for example, that energy intensity saturates at a factor of 4 improvement by 2050 (under an aggressive energy efficiency scenario, and readily achievable), and that 100% of the remaining	Rejected, the literature indicated the importance for CI improvements in the long-term. The underlying energy deployment (ranges) in the scenarios are given in section 3.4

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						fossil fuel emissions are eliminated through C-free power by the end of the century. Then the absolute reduction in CO2 emissions due to energy intensity is 3 times more important than carbon intensity reduction. Conversely, if a smaller energy intensity improvement occurs, it may not be possible to eliminate the remaining CO2 emissions through C-free power. Unless the improvement in energy intensity is very small (and thus far below the potential), the reductions due to EI reduction will be more important than the reductions due to CI reduction. This is the exact opposite to what the text states. The text might be true for assumption that I would regard as unrealistic (limited EI improvement, and enormous – and perhaps unfeasible – deployment of C-free power). Thus, you need to spell out the assumed contributions underlying the statements. (Danny Harvey, University of Toronto)	
3-235	A	57	26	0	0	"factor" should be "intensity" (Bert Metz, IPCC)	Taken into account, explanation added
3-236	A	57	27	0	0	"saturated"gives the wrong message; I think the situation is that there still is a large effort on efficiency by around 2100, but due to relative costs the relative contribution shifts to decarbonisation; current wording does not bring that out. (Bert Metz, IPCC)	Accepted, text revised accordingly
3-237	A	57	28	0	0	After "century" insert "(by assumption)", as no-one really knows what can happen by the end of the century or what the practical limits for energy efficiency are (the theoretical limit is at least a factor of 10 improvement in energy intensity). (Danny Harvey, University of Toronto)	Noted, additional explanation provided to explain that the dynamics is due to the relative costs of CI and EI improvements in the long term.
3-238	A	57	29	0	0	In light of my comment on lines 25-29, "confirmed" is the wrong word. Say "found", but then give the counter example that I give in my comments to lines 25-29. (Danny Harvey, University of Toronto)	Accepted
3-239	A	58	13	59	2	The qualitative results are completely unsurprisingly, while the quantitative results are pure guesses (being dependent on the baseline scenario). Maybe you can just succinctly state the obvious points without the figures, or at least shorten the text. (Danny Harvey, University of Toronto)	Rejected, the text reflects main findings from multigas studies indicating that the energy sector remains the dominant source of reductions, even if other sectors are taken into account as well.
3-240	A	58	13	60	16	This section discusses the contribution of various mitigation options, depending on stabilisation levels (on a least cost basis). Current treatment and graphs are not bringing messages out clearly. Fig 3.27 is clearer than 3.26 but suffers from the fact that it is only 2 models and 2 stab levels. This issue is in SPM (with fig 3.27) but is criticised for being selective. Try to presnet information in expanded fif 3.27 format	Accepted, more models will be added, also a second panel will show energy data.

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						(with appropriate text) so that such a modified figure could be used in SPM. During Paris review meeting several remarks were made about the limited contribution of otehr renewables. The point was also made that the models chosen may have been pessimistic about the costs of wind and solar (including soalr thermal). Needs to be discussed and with more models better picture could be given. (Bert Metz, IPCC)	
3-102	B	58	30	58	30	The authors should confirm their finding that together land-use related emissions and non-CO2 gases can contribute only 35% of total emissions. Authors should explain if this figure includes avoided deforestation. (Government of Australia)	Taken into account, text modified to clarify that models consider forest emissions.
3-241	A	59	10	0	0	It is very important to indicate what the "payback time is" – how long does it take to offset the CO2 emissions due to deforestation when setting up the biomass plantations with subsequent emission reductions due to the substitution of fossil fuels with biomass energy? (Danny Harvey, University of Toronto)	Rejected, payback times depend of the rotation time of plants and thus local circumstances. This level of detail can not be provided here.
3-242	A	59	11	59	12	The text in Fig 3.26 is too small to read (REF!)	Accepted
3-243	A	60	1	60	5	Figure 3.27, this figure is misleading since it gives the feeling that there is a high level of agreement between the potential of different mitigation options. Specifically the fact that the role of "other renewables" small in the time frame until 2100 is questionable. In (http://www.wbgu.de/wbgu_jg2003_engl.html, figure 1) you find a scenario with a very different view. (Robert Pitz-Paal, German Aerospace Centre (DLR))	Taken into account, figure will be revised, see comment 3-240
3-244	A	60	1	0	0	Fig. 3.27: When looking at the small contribution from other renewables (especially in the MESSAGE model), I doubt if the applied models can calculate with the stimulating effects on employment from renewable energy use, with their positive effects on the local economy. It seems that the numbers and data from Fig. 3.27 are not from a scenario but fit to a special case without any entitlement for general validity. As we learn from below in lines 10 and 11: 'The numbers should be seen as indicative because of the limited set of just two models' the facts shown in Fig. 3.27 are not well founded, they are not new scintific evidence (but only resultes of just two models). Therefore this disputable Figure should not be part of the SPM. (Manfred Treber, Germanwatch)	Taken into account, figure will be revised, see comment 3-240
3-245	A	60	1	0	0	The quantitative results given in Figure 3.27 are meaningless – they depend on the author's biases and beliefs. For example, in the figure, nuclear is shown as being more important than all non-biomass forms of renewable energy put together.	Taken into account, figure will be revised, see comment 3-240

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						Many others would get quite different results (for examples, scenarios have been developed where wind energy provides close to baseload power by oversizing wind farms relative to transmission links and then discarded excess potential generation during the small percent of the time when the wind blows most strongly). As well, the absolute reductions depend on the assumed baseline scenario. Thus, a caveat should be added to the caption, indicating that the relative importance of different measures depends on the modeller's assumptions and biases, while the absolute reductions depend on the assumed baseline scenario. (Danny Harvey, University of Toronto)	
3-246	A	60	1	60	1	Figure 3.27; interesting and important figure. Please convert the numbers for the carbon free technologies to EJ and split up the biomass numbers in biomass and biomass + CCS. The EJ comparison would be of high valuable for Chapter 11 and the BECS have such a separate discussion that it is important to know how much of the biomass is BECD (Government of European Community / European Commission)	Taken into account, figure will be revised, see comment 3-240
3-247	A	60	1	60	0	Figure 3.27 is misleading to the wrong conclusion that renewables would play a minor part in mitigation between 2000 and 2100 as this figure shows only the additional mitigation potential compared to a baseline scenario with an already high share of renewable energy resources (up to 55% of primary energy in MESSAGE). This fact must be explained in detail in chapter 3. Due to its misleading content, the figure has to be deleted from the TS and SPM. Instead, we suggest to use the numbers given in Table 4.4.4, column 3, for a new figure. (Government of Germany)	Taken into account, figure will be revised, see comment 3-240
3-248	A	60	2	0	0	Figure 3.27: This figure is based on only two models, but it potentially conveys messages about a relative assessment of energy technologies. The figure shows very different results from the IMAGE and MESSAGE models, e.g. concering the relative contribution of nuclear and other renewables. Different categories also would deliver different results, if for example all CCS were combined, and biofuels without CCS combined with other renewables. Please reflect on the broader assessment of the relative contributions of different energy technologies in the literature, to contextualise these two model results. (Harald Winkler, University of Cape Town)	Taken into account, figure will be revised, see comment 3-240
3-249	A	60	3	60	7	Figure 3.27 It is straining credulity that over the next 100 years the mitigation potential of 'other' renewables (solar, wind, geothermal, etc) is so marginal that we're seemingly better off planting trees than changing our energy supply to renewables, and I object to this figure which policy makers will surely interpret as	Taken into account, figure will be revised, see comment 3-240

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						we might as well not develop renewable energy technologies at all. I note that the figure builds on unpublished research (in press, as of September still unpublished). What assurance can we have that the figure reflects scientific consensus when the scientific community has not had any opportunity to reflect on it? Perhaps there are good reasons why the mitigation potential may be so low, but it seems to me to contradict the volumes of research showing very large technical potentials for renewables (see below). Contrast this with AR4 chapter four, specifically Table 4.4.2 which shows a technical potential of hundreds of thousands of EJ for solar, wind, and geothermal energy to 2050 (greatly exceeding cumulative world energy consumption in that period, whereas in 3.27 (in twice the timeframe!) the mitigation potential of these technologies is a trivially small fraction of the total mitigation effort. (Donald Pols, Friends of the Earth Netherlands/Milieudefensie)	
3-250	A	60	12	60	13	As written in my comment to Fig. 3.27 from the 'limited set of just two models' from this figure there is no new intelligence that renewables are no important measures for mitigation - I doubt the generality of this insight. To avoid misunderstanding the text should not ignore 'other renewables' (which contribute 50 Gt reduction in the IMAGE model). Suggestion: Write '… potential of energy conservation, biomass, carbon capture and storage, nuclear and non-CO2 gases as well as the contribution of other renewables in one of the models nevertheless indicates the ...' (Manfred Treber, Germanwatch)	Taken into account, figure will be revised, see comment 3-240
3-251	A	60	16	0	0	To put the scale of the energy aspect of this problem in perspective, for median scenarios it will be necessary to provide non-CO2-emitting power in the range of 150 EJ/year by 2050, 500 EJ/year by 2100 and over 1000 EJ/year during the next century, while ultimately limiting CO2-emitting power to a small fraction of this level. The total requirement over the period until 2200 is in the range of 100,000 EJ. To address this problem requires large-scale non-CO2-emitting energy resources that, in aggregate, are not limited in their fractional market penetration. New technologies thus need to be developed that can almost fully replace carbon-emitting technologies in the long run. (Robert Goldston, Princeton Plasma Physics Laboratory)	Taken into account, energy information will be added to figure 3.27
3-252	A	60	18	64	5	This section might fit better later in 3.3, after the specific options have been discussed. The section is also suffering from the initial focus on showing the full database cost data (in fig 3.28 and the accompanying text). As is said on page 61, line 18-19, an overview of all available literature tends to hide the relationships that	Accepted, fig 3.28 will be removed, and figure 3.29 will be revised to give more representative and illustrative examples.

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						matter for this assessment, ie how costs depend on stabilisation level, baseline and set of mitigation options. Such relationships can only be analysed with a selective use of studies (such as done for fig 3.29; but even there no insight in the role of mitigation options is given). Strongly suggest to delete fig 3.28 and only use selective analyses. Chapter 11 has looked very deeply into the database of cost studies and suggest that it is possible to eliminate certain studies from a comparison based on assumptions made. Such an exercise is needed also for this section in ch 3. In addition, this section would benefit from presenting also marginal cost data (for comparison with short term scenarios/ cost studies and with regional cost information that is only given in terms of marginal costs) (Bert Metz, IPCC)	
3-103	B	60	18	61	34	Even though the relationship between GDP losses and cumulative emission reductions, in particular for the long run, is weak, a brief description of the methodologies used in estimating the GDP losses would be helpful. U.S. Government (Government of U.S. Department of State)	Accepted, text will be added
3-104	B	60	19	60	19	It would be helpful for policy-makers if the authors further drew out their finding that different models use different metrics and that this can have important ramifications in terms of findings of the costs of emissions reductions. (Government of Australia)	Accepted, see 3-103
3-2	C	60	20	62	8	This section could be strengthened by discussing the fundamenal principles that relate top-down, macroeconomic assessments to bottom-up, resource costing based approaches. (Government of UK)	Taken into account – discussion on top-down and bottom-up apprches is covered in Chapter 11.
3-253	A	60	24	0	0	Insert “estimated” before “GDP” (Danny Harvey, University of Toronto)	Accepted
3-254	A	60	24	60	29	Figure 3.28 is seriously misleading. Since the GDP effects are in logarithms, all the negative cost estimates in the scenarios inventory are dropped by the graphics software - and no note is given that this has happened. And the range is frankly incredible, and suggests that the studies being quoted are not suitable for inclusion. What are we to make of the 15% or so reduction in GDP by 2030 for almost no accumulated reduction in GHG emissions? (Government of UK)	Noted, figure will be changed and data will be checked carefully
3-255	A	60	25	0	0	Insert “estimated” before “GDP” (Danny Harvey, University of Toronto)	Rejected, already given in the previous line.
3-256	A	60	28	0	0	Insert “estimated” before “loss” [I don’t think that anyone would disagree with the	Rejected, already given in the previous line.

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						assertion that these numbers are highly uncertain – not much better than pure guesses, as they are highly dependent on many arbitrary internal model parameters] (Danny Harvey, University of Toronto)	
3-257	A	61	11	61	14	Exceptions also occur when baselines and scenarios do assume first-best, least-cost solutions and also allow for induced technological change, provided that substitution elasticities are high. Popp (2006, p. 173) using a model derived from DICE, shows that as targets become more stringent under these conditions, global output rises above baseline in the long term, rising to 0.5% above base by 2100 for 400ppm CO2. This is a critical methodological point because it shows that allowing for carbon-energy and energy-non-energy input substitution in the models can lead to lower costs, although in Popp this is due to use of the backstop technology with assumed high substitution elasticities. Popp, D. (2006) Comparison of climate policies in the ENTICE-BR Model. The Energy Journal, Special Issue on Endogenous Technological Change and the Economics of Atmospheric Stabilisation, pp 163-174. (Government of UK)	Rejected, the specific trend in Popp is just the case for a specific point in time vs. in Barker projects continuous gains from climate policies because of suboptimal allocation of resources under baseline conditions
3-258	A	61	15	61	20	What do you mean with this statement, it seems like a value-ladeness in the modelling? Please elaborate or clarify this statement. (Government of European Community / European Commission)	Rejected, we don't want to comment on the value- ladeness of the modeling analysis.
3-259	A	61	21	61	34	In discussing the costs of emission reduction in terms of loss of GDP, the reader should be reminded that GDP is being used as a proxy for human well-being, but that, beyond some minimum level, it is a poor proxy for human well-being and happiness. For example, if there is smaller GDP because of less consumption and more leisure (which could be a deliberate policy objective), many would regard this as representing an improvement in the quality of life. Conversely, if efforts were directed toward less costly but CO2 friendly transportation systems (compact urban forms served with high-quality, rail-based public transit), expenditures on private transportation and also total transportation expenditures could be reduced, fewer hours would need to be worked, and less time would be spent commuting, but GDP would be smaller. Thus, to some extent at least, the "cost" in terms of reduced GDP is not meaningful. (Danny Harvey, University of Toronto)	Noted, GDP losses are used as proxy of welfare.
3-260	A	61	27	61	35	please also indicate what the costs would be for category A (Government of European Community / European Commission)	Accepted
3-261	A	61	36	61	48	This is the first appearance of the NPV of GDP being used as a cost measure, and indeed as a macroeconomic cost measure. It will become the AR4 quoted source of	Taken into account, 1) although it is true that NPVs give just partial information (costs in a

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						the $ trillions of costs supposedly as a result of mitigation, since the models that have GDP endogenous tend to report %GDP rather than absolute values. Yet the concept is not discussed in Chapter 2 and is not appropriate for Chapter 3 because it is a partial cost. It is more suitable as a concept for a centrally planned economy facing a carbon constraint. In a market economy, when climate policies adopt market-based instruments such as emission permit schemes or carbon taxes, the government of those who are given the permits, have a large inflow of revenues, which can potentially increase GDP and these are simply not accounted for in the NPV calculations. There is considerable literature showing that required reductions in GHGs may lead to higher costs than reductions achieved by market-based instruments, going back to Pearce's paper. At the very least, there should be a discussion in Chapter 2 if the Figure and text are retained, with much more qualification about the cost totals and soem direct comparison given between the two measures of costs when both are available from the same model's projections under idential assumptiosn - to show jsu how exaggerated a view the partical NPV measure gives compared to the comprehensive measure. PEARCE, D.W. 1991. The role of carbon taxes in adjusting to global warming. Economic Journal, 101, 938-948 (Government of UK)	single sector) they provide useful additional information if they are put side-by-side with GDP losses; 2) It is true that carbon trading can offset some of the costs in regions that have revenues from carbon trading, but at the global level (as given in the figure) these transfer costs will roughly single each other out (other regions have to pay for carbon permits). Text will be extended with direct comparisons given between the two measures of costs when both are available from the same model's projections, either in chapter 2 or 3.
3-262	A	61	36	61	50	Please also give the costs in carbon prices that are assumed in the modelling. This is of high importance for policy makers and also for the AR4 as it bridges between chapter 11 and the bottom up chapters (Government of European Community / European Commission)	Accepted
3-263	A	62	4	62	8	The issue is discussed in depth in 11.5, so a forward reference would help the reader here. (Government of UK)	Accepted
3-264	A	62	9	62	0	Figure 3.28: This is a very interesting figure. The figure indicate that the amount of emission reduction from baseline is more influential to GDP losses than the abolute levels of the stabilization, although the range will be widely. You should describe it more clearly in the text. (Keigo Akimoto, Research Institute of Innovative Technology for the Earth (RITE))	Accepted
3-265	A	63	1	0	0	fig 3.29: make clear what the boundary between categories is (where does A stop and B begin, etc) (Bert Metz, IPCC)	Accepted
3-266	A	63	1	63	0	Negative GDP losses due to GHG emission reductions are peculiar and cannot	Noted, figure will be revised, and will focus

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						generally accepted. The model showing the negative GDP losses presumes a mechanism that the larger carbon tax is imposed, the larger investments may take place by the revenue obtained through the carbon tax, and then employment increase and GDP increase will follow. In reality the carbon tax will work to diminish economic activities because of the higher energy prices, and GDP in total will be decreased. However, the model does not consider these effects. The model presumptions could be justified for short time periods; however, for a long time span such as up to 2050 and 2100, the presumed mechanism can never be justified. For these reasons, I strongly recommend you to delete the negative values in Figure 3.29a and the related words. If not, you should at least provide with description regarding the limitations of the model. Otherwise, IPCC will confuse and mislead readers. (the same comments to Figure SPM 5 and Figure TS 15a) (Keigo Akimoto, Research Institute of Innovative Technology for the Earth (RITE))	only models that are established.
3-267	A	63	1	0	0	Figure 3.29(a) The model of E3MG showing the negative value of GDP losses presumes a mechanism that the larger carbon tax is imposed, the larger investments may take place by the revenue obtained through the carbon tax, and then employment increase and GDP increase will follow. In reality the carbon tax will work to deminish economic activities because of the higher energy prices, and GDP in total will be decreased. However, the model does not consider these effects. The model presumptions could be justified for short time periods; however, for a long time span such as up to 2050 and 2100, the presumed mechanism can never justified. For these reason, we strongly recommend you to delete this models results in Figure SPM.5 and together with relevant reference in the text. (Government of Japan)	Noted, figure will be revised, and will focus only models that are established.
3-268	A	63	5	0	0	Figure 3.29: Why does the bottom line buck the trend? I see that on p. 61, you take out the two extremes, but it may help readers to understand why one study shows greater GDP gains for stricter stabilisation targets. If there's a short explanation, please inclue on page 61. (Harald Winkler, University of Cape Town)	Noted, figure will be revised, and will focus only models that are established.
3-269	A	63	5	0	0	This is a nice figure, showing the two different measures of estimated cost. However, the caption should read: "Selected studies [delete "of"] that report (a) ESTIMATED GDP losses, or (b) ESTIMATED abatement costs …." (Danny Harvey, University of Toronto)	Rejected, it's pretty obvious that bthe models present estimations.
3-270	A	63	15	64	5	The graph shows GDP losses with different stabilisation targets. This figure as it is	Rejected, the figure purposefully compares the

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						constructed now is as if you would compare apples and oranges. The graph is misleading and gives wrong impressions. model results cannot be compared because of the following reasons: 1. different baseline assumptions: IMCP focuses on technological changes which is relevant also for the baseline (TC in baseline), IPCC not. 2. different model parameter assumptions: not only for the baseline, but also for substitution elasticities etc.; 3. different model types: top down models and bottom up models usually show very different results, especially because they differ in type, assumptions and TC; 4.different regional scale of models: in IMCP there are some one region -models (Demeter, Mind) which can hardly compared with the other multi regional models;. as this slide with be used as policy recommendation, it is dangerous to present such kind of overview. As the IMCP study focuses primarily on TC, "benefits" of emissions mitigation as presented by the E3ME model, can only be explained by TCs. It is however, difficult to explain decision maker, why emissions mitigation improves GDP. This is not in line with any IPCC study before; furthermore, it is very confusing to have two AIM studies-AIM A1 PS and AIM-IMCP show very different results: this can be explained, as before, through the treatment of TC in IMCP. It is however very difficult to explain outsiders why this is the case. I would strongly recommend either use only IPCC scenarios or run IMCP models in the IPCC mode. (Claudia Kemfert, German Institute for Economic Research)	full range of the literature, providing a synthesis across well established models.
3-105	B	63	15	64	5	The graph shows GDP losses with different stabilisation targets. This figure as it is constructed now is as if you would compare apples and oranges. The graph is misleading and gives wrong impressions. model results cannot be compared because of the following reasons: 1. different baseline assumptions: IMCP focuses on technological changes which is relevant also for the baseline (TC in baseline), IPCC not. 2. different model parameter assumptions: not only for the baseline, but also for substitution elasticities etc.; 3. different model types: top down models and bottom up models usually show very different results, especially because they differ in type, assumptions and TC; 4.different regional scale of models: in IMCP there are some one region -models (Demeter, Mind) which can hardly compared with the other multi regional models;. as this slide with be used as policy recommendation, it is dangerous to present such kind of overview. As the IMCP study focuses primarily on TC, "benefits" of emissions mitigation as presented by the E3ME model, can only be explained by TCs. It is however, difficult to explain decision maker, why emissions mitigation improves GDP. This is not in line with any IPCC study before; furthermore, it is very confusing to have two AIM studies-	See previous comment

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						AIM A1 PS and AIM-IMCP show very different results: this can be explained, as before, through the treatment of TC in IMCP. It is however very difficult to explain outsiders why this is the case. I would strongly recommend either use only IPCC scenarios or run IMCP models in the IPCC mode. (Government of Germany)	
3-271	A	64	3	0	0	Should read "strategies that allow radiative forcing to peak" (Danny Harvey, University of Toronto)	Accepted
3-272	A	64	7	64	7	Nine years after the Kyoto Protocol was agreed a discussion about CO2 versus multigas approaches seems to be somewhat outdated. An analysis of the role of other substances that show radiative forcing (e.g. ozone, aerosol) in mitigation strategies would be more useful. (colateral effects (benefits and/or tradeoffs?) of climate and clean air policies) (Government of European Community / European Commission)	Noted – multigas mitigation literature is relatively new; aerosols and air pollution dealt with in 3.3.5.6.
3-106	B	64	21	64	27	If possible, the authors should include a range of the cost savings that may be possible through targeting non-CO2 gases. (Government of Australia)	Accepted – will add figure from EMF-21.
3-273	A	64	25	64	40	This discussion of GWP versus optimal control heavily overlaps with section 3.3.3; integrate this text there and refer to it here (Bert Metz, IPCC)	Accepted.
3-274	A	64	28	0	0	Insert some references after "well established" (Danny Harvey, University of Toronto)	Accepted.
3-275	A	64	32	0	0	Insert some references after "sequestration" (Danny Harvey, University of Toronto)	Accepted.
3-276	A	65	5	65	9	These numbers are not consistent with the reductions shown for the blue diamond case in the left hand side of Fig 3.30. For that case, an 80% reduction of CO2 emissions is accompanied by 45% and 35% reductions of CH4 and N2O emissions, respectively. Thus, large reductions of these two GHGs can occur purely as a byproduct of efforts to reduce to CO2 emissions. This is the point to emphasize – the opportunity to maximize the benefits of CO2 emission reduction. (Danny Harvey, University of Toronto)	Accepted. Will make numbers consistent with graphs.
3-277	A	66	3	0	0	Insert "for a given radiative forcing" after "CO2" because, if we are already in noncompliance with Article 2 of the UNFCCC (or about to be in noncompliance, as discussed in Harvey 2006), then what is required is to reduce total radiative forcing as much as possible. In that case, the "required" reduction in CO2 is not reduced; rather, it is the extent and duration of non-compliance with the UNFCCC that is reduced.	Rejected – not germain to the assesment made here and policy prescriptive.

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						REFERENCE: Harvey, L.D.D. 2006a. Dangerous Anthropogenic Interference, Dangerous Climatic Change, and Harmful Climatic Change: Non-Trivial Distinctions with Significant Policy Implications. Climatic Change (accepted). (Danny Harvey, University of Toronto)	
3-278	A	66	5	0	0	Delete "of" (Danny Harvey, University of Toronto)	Accepted.
3-279	A	67	8	67	10	This issue of maximum feasible reductions and evolution over time is too important to only refer to in passing. Elaborate (Bert Metz, IPCC)	Noted, figure will be revised, and will focus only models that are established.
3-280	A	67	12	76	20	This section on land-use options is far too long; needs to be shortened; that would also help to bring out the main points better; the summary paragraph at the end does not make it better (main points not clear). Graphs and tables to be improved (graph lay-out and colouring make them hard to read now) (Bert Metz, IPCC)	Accepted. Will consider alternatives for shortening and presentation of graphs.
3-281	A	67	17	0	0	after "soils" insert "including biochar soil amendment" (see Nature August 10, pp624-626 suggesting storage potential of 9.5 Gt C /yr by end of century, in conjunction with biofuel supply - visit Lehmann's website in references with my provided Commentary "Addressing Potential Climate Change") (Peter Read, Massey University)	Rejected. This level of detail on a particular soil management strategy is appropriate for Chapter 8, but not Chapter 3.
3-282	A	67	17	67	17	after "soils" insert "including biochar soil amendment" (see Nature August 10, pp624-626 suggesting storage potential of 9.5 Gt C /yr by end of century, in conjunction with biofuel supply - visit Lehmann's website in references with my provided Commentary "Addressing Potential Climate Change") (Peter Read, Massey University)	Rejected. This level of detail on a particular soil management strategy is appropriate for Chapter 8, but not Chapter 3.
3-283	A	68	24	0	0	Add new sentences "Using a methodology that treats the net emissions effects of specified land use improvements as a perturbation on a SRES A2 b.a.u. scenario, Read and Lermit (2005) and Read and Parshotam (2006 under review) combine both agriculture and forestry sector mitigation along with carbon storage via both CCS and biochar soil amendment to obtain the result noted in Chapter 2, Section 2.3.4. Their approach enables incorporation of a wide range of assumptions, sectors and technologies (including co-production of biofuel with traditional food and fibre, and up to date view of oil price futures) and suggests potentially fruitful research directions for more formal methodologies". (Peter Read, Massey University)	Noted. Review 2005 paper. 2006 paper is not acceptable for consideration since it has not met WGIII's deadline for acceptable literature.

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
3-284	A	68	24	68	24	Add new sentences "Using a methodology that treats the net emissions effects of specified land use improvements as a perturbation on a SRES A2 b.a.u. scenario, Read and Lermit (2005) and Read and Parshotam (2006 under review) combine both agriculture and forestry sector mitigation along with carbon storage via both CCS and biochar soil amendment to obtain the result noted in Chapter 2, Section 2.3.4. Their approach enables incorporation of a wide range of assumptions, sectors and technologies (including co-production of biofuel with traditional food and fibre, and up to date view of oil price futures) and suggests potentially fruitful research directions for more formal methodologies". (Peter Read, Massey University)	Noted. Review 2005 paper. 2006 paper is not acceptable for consideration since it has not met WGIII's deadline for acceptable literature.
3-285	A	70	8	0	0	After "stabilization", indicate the assume stabilized concentration or forcing, as the given GDP loss is otherwise meaningless. (Danny Harvey, University of Toronto)	Accepted. Will do.
3-286	A	70	31	0	0	Delete comma (Danny Harvey, University of Toronto)	Accepted.
3-287	A	70	31	70	37	It does not make sense to include a study using a totally different perspective (cost-benefit) in a comparison of results for different stabilisation levels. (Bert Metz, IPCC)	Accepted. Review where else Sohngen and Mendelsohn (2003) is mentioned in land discussions to ensure appropriate consideration.
3-288	A	70	32	0	0	Insert "that" after "projected" (Danny Harvey, University of Toronto)	Accepted.
3-289	A	70	35	0	0	Should be "explore" (Danny Harvey, University of Toronto)	Accepted.
3-290	A	71	1	71	1	Fighure 3.32. Please also give the graph in EJ (Government of European Community / European Commission)	Noted. However, data may not be available.
3-291	A	71	10	71	11	The text in Table 3.7 is too small to read (REF!)	Accepted. Table should be landscape and a full page.
3-292	A	72	16	72	17	The vague language used here is not acceptable. The present version of the text states that "biomass could be essential to stabilization, especially as a negative emissions strategy that combines biomass with CO2 capture and storage..". It is somehow difficult to grasp how biomass itself could constitute a negative emissions strategy. Rephrase in order to clarify. (Kenneth Möllersten, Swedish Energy Agency)	Accepted. Re-word.
3-293	A	72	17	0	0	after "strategy" insert (Read and Lermit, 2005) (Peter Read, Massey University)	Noted. Review paper to determine appropriate consideration.
3-294	A	72	17	72	17	after "strategy" insert (Read and Lermit, 2005)	Noted. Review paper to determine appropriate

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						(Peter Read, Massey University)	consideration.
3-107	B	72	17	72	17	Suggest replacement of "negative emissions strategy" with "mitigation strategy" for the sake of clarity. (Government of Australia)	Accepted.
3-295	A	72	22	72	22	"Decade" might be here a wrong word. The right one is "century". (Government of Finland)	Accepted.
3-296	A	72	27	0	0	which "decade"? Should it be "century"? (Peter Read, Massey University)	Accepted.
3-297	A	72	27	72	27	which "decade"? Should it be "century"? (Peter Read, Massey University)	Accepted.
3-298	A	72	29	72	36	Biomass is rarely used today in applications of the sort of size that would be compatible with CCS. It should be made more explicit here that biomass' compatibility with large-scale operation of CCS needs further research (especially given the statements earlier in the para about). Detailed techno-economic analyses concerning large-scale biomass conversion (including analysing the biomass supply) with CCS are uncommon, which means that the highly aggregated models that generated these results are based on uncertain assumptions. Further research is needed to reduce these uncertainties. (Kenneth Möllersten, Swedish Energy Agency)	Accepted. Ensure that proper caveats included.
3-299	A	73	22	0	0	There should be a semicolon, not a comma, before "therefore" (Danny Harvey, University of Toronto)	Accepted.
3-3	C	73	34	76	20	The discussion of the time path of carbon pricing appears to be nested within this section for reasons that are not clear. Furthermore, it is not obvious that the authors have derived a correct understanding of the relationship between time-paths of average mitigation costs (which could decline) and those of carbon externalities (which would be expected to rise over time). (Government of UK)	Accepted – will provide better explenation for carbon price time paths related to landuse.
3-300	A	73	40	73	45	after "stabilization." add new sentence "However, since forestry for timber will also co-produce energy biomass by- product, these results need to be reviewed in the context of subsequent shifts in oil price futures". At end of para add "However, Read and Parshotam (2006, under review) note potential synergies between bioenergy and traditional food and fibre, based on land productivity increases achieved through energy sector investments in soil improvement)." (Peter Read, Massey University)	Rejected. 2006 paper is not acceptable for consideration since it has not met WGIII's deadline for acceptable literature. However, consider adding a few words on additional benefits in co-products.
3-301	A	73	40	73	45	after "stabilization." add new sentence "However, since forestry for timber will also co-produce energy biomass by- product, these results need to be reviewed in the	Rejected. 2006 paper is not acceptable for consideration since it has not met WGIII's

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						context of subsequent shifts in oil price futures". At end of para add "However, Read and Parshotam (2006, under review) note potential synergies between bioenergy and traditional food and fibre, based on land productivity increases achieved through energy sector investments in soil improvement)." (Peter Read, Massey University)	deadline for acceptable literature. However, consider adding a few words on additional benefits in co-products.
3-302	A	73	47	0	0	Place quotes around the word "optimal". (Danny Harvey, University of Toronto)	Noted. Given removal of S&M (2003) reference earlier in chapter, consider adding the economics definition of optimal.
3-303	A	74	2	0	0	After "storage. " insert "However high oil prices provide incentives to increase the proportion of biomass in joint production with timber and thus shorten rotations" (Peter Read, Massey University)	Noted. Will consider.
3-304	A	74	2	74	2	After "storage. " insert "However high oil prices provide incentives to increase the proportion of biomass in joint production with timber and thus shorten rotations" (Peter Read, Massey University)	Noted. Will consider.
3-305	A	74	2	74	4	The projection that large sequestration could occur in tropical forests after 2050 assumes (a) that tropical forests have not been completely destroyed by then and permanently converted to other land uses, which by itself could render many of the soils unproductive or induce a new climate state unsuitable to forests, and (b) that the climate has not reverted to a permanent El Nino-like state due to global warming, as it does in some model simulations. These are extremely important assumptions that need to be stated. (Danny Harvey, University of Toronto)	Noted. Consider adding a note that afforestation potential will be constrained by soil and climate conditions.
3-306	A	74	23	0	0	In the caption or on the figure itself, indicate the stabilization levels that are assumed for the different lines. Also, give references for the various modeling studies shown. (Danny Harvey, University of Toronto)	Accepted.
3-108	B	75	5	75	10	If possible, it would be helpful if the authors could provide a range of values for the albedo implications of land-use change. (Government of Australia)	Noted. Literature is thin. Will consider alternatives on what could be said
3-307	A	75	10	0	0	Change "may also need to" with "should also" (Danny Harvey, University of Toronto)	Accepted.
3-308	A	77	14	77	15	Why only a slight reduction? Irrespective of what Smith and Wigley obtained (which will depend on their assumptions), it is intuitively obvious that very large reductions in S emissions could occur as a byproduct of aggressive measures to reduce CO2 emissions. Thus, don't let yourself be so restricted by the particular results of specific, possibly narrowly-based, studies.	Taken into account. Will add text of the importance of baseline emissions.

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						(Danny Harvey, University of Toronto)	
3-309	A	77	19	77	22	what is the time horizon for this study? Add reference to ch 11 for short term results (Bert Metz, IPCC)	Noted. Will check with Chap 11 if information overlaps.
3-310	A	77	30	77	31	This statement is wrong. Sulphate and carbonaceous aerosols exert a negative radiative forcing, so they do not contribute to global warming – they partly reduce it. (Danny Harvey, University of Toronto)	Taken into account. Will clarify that that sulphate and carbonaceous aerosols exert
3-311	A	77	31	0	0	what does "attendant " mean (Bert Metz, IPCC)	Accepted will clarify text.
3-312	A	77	43	77	44	No contents in subsection 3.3.5.7, maybe this subsection should be deleted since subsection 3.3.6 gives the introductions of "regional and national mitigation scenarios" (REF!)	Accepted. Section title will be deleted.
3-109	B	77	43	77	43	The authors should either populate or delete section 3.3.5.7. (Government of Australia)	Accepted. Section title will be deleted.
3-313	A	77	45	81	7	Be careful to focus only on long-term studies (2050 and beyond) here; several studies referred to are not in the table;Garg is 2035 only; for 2030 studies: refer to ch 11 where these should be discussed. Important deficiency in this section is the lack of comparison with global studies. Without that (asking the question if the regional results are consistent with global ones) this section is not very interesting, because onkly a description. So analyse the differences with global scenario outcomes. (Bert Metz, IPCC)	Taken into account. Comparison between the global and the country studies will be added. Studies of shorter terms (less than 2050) will be deleted.
3-110	B	77	45	0	0	Section 3.3.6 has a clear Northern Hemisphere bias, especially in the cited literature for national scenarios. The authors should review the literature to ensure that no relevant Southern Hemisphere findings have been omitted. (Government of Australia)	Taken into account. Another literature survey will be done.
3-314	A	79	0	0	0	I wonder whether it would be good to include reference to the Swiss 2000W Society, Eberhard Jochem) (Chris Mottershead, BP)	Taken into account. The Swiss scenarios will be checked with a long term targeted scenario suggested in 3-315.
3-315	A	79	0	0	0	Table 3.9. There is no long term scenario for Sweden produced by the Ministry of Environment and the stated reference is missing in the reference list. There is however a long term target according to the definition in the table but with no direct connection to any scenario. (Government of Sweden)	Taken into account. See the considerations in 3-314.

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3-316	A	79	1	0	0	Column of "Target of reduction" is not clear. For example, "80%" means the emission level in target year is 80% of that in the base year, or reduction of emission is 80%? (Toshihiko Masui, National Institute for Environmental Studies)	Accepted. Title will be changed to "Target of emissions reduction". Base year should be added. "CO2 only" or "GHG" will be clarified.
3-111	B	79	1	79	4	Table 3.9: The authors should confirm that this table is complete and explain upon what basis the different national scenarios were selected for inclusion. (Government of Australia)	Taken into consideration. Criteria will be clarified.
3-317	A	80	21	0	0	table 3.10: not readbale in this form; maybe turn into regular table; not clear if energy intensity is in PPP or MER (Bert Metz, IPCC)	Accepted. Table will be modifies to be more readable. The term MER is added.
3-112	B	80	21	0	0	Table 3.10 This is an interesting chart with a great deal of information. It is not intuitive however, may be easy to misinterpret, and takes time to understand. The authors might consider an alternate format. U.S. Government (Government of U.S. Department of State)	Accepted. Table will be modified to be more readable.
3-318	A	80	27	80	27	lines 26-27 as they pertain to Table 3.10 --- The energy intensity improvements cannot have been "reported", because they have not yet taken place. They are goals—and problematic ones at that. In fact, I highly doubt that anything like such high, sustained rates of decline in energy intensity can be achieved in the future in OECD countries, if experience in the 1990s tells us anything. As for the rates of decline in the carbon intensity of energy, these will require both a large amount of CCS and breakthroughs in one or more carbon-free energy technologies. (Christopher Green, McGill University)	Rejected. These numbers are reported in the paper based on projections. It is true that to achieve the high rates of decline require a large amount of CCS and breakthroughs in one or more carbon-free energy technologies. These are explained in the text.9595
3-319	A	80	32	0	0	Change "means" to "measures" (Danny Harvey, University of Toronto)	Accepted.
3-320	A	81	8	81	12	Figure 3.34 is misleading, since it puts Renewables and Nuclear in the same corner, thus readers can hardly differentiate among these two options. Since basically only China uses a lot of coal, this could be indicated in a footnote and the corners could be "oil, gas, coal", "nuclear" and "renewables". (Government of Germany)	Taken into account. The figure could be changed to a table to distinguish the share of nuclear and renewable. Sometimes a figure is easier to understand.
3-113	B	81	8	81	10	Figure 3.34: The authors should explain upon what basis the different countries were selected for inclusion in the figure. (Government of Australia)	Taken into account. The selection of the country mainly comes from data availability. Criteria should be clarified. More data could be included.
3-321	A	81	10	0	0	I would explain in the caption that each of the three vertices of the triangle represents a 100% share for the corresponding energy resource. (Danny Harvey, University of Toronto)	Accepted. The caption will be modified.

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3-322	A	81	10	0	0	figure 3.34: not readable/ understandable (particularly in B/W print); find other way to present the information or delete (certainly if no connection with global picture can be given) (Bert Metz, IPCC)	Taken into account. The figure could be modifies to be more understandable including global picture.
3-323	A	81	11	81	14	The text states "Enhancing the role of nuclear power as another carbon free source of energy. This would require a further increase of the nuclear share in global energy, dependent on the development of 'inherently' safe reactors and fuel cycles, resolution of the technical issues associated with long -term storage of fissile materials and improvement of national and international non-proliferation." Whilst these objectives would be a positive development a further increase of the nuclear share in global energy is not dependent on such developments. For example, existing reactor designs are more than adequate. A modification to the text could be "This would require a further increase of the nuclear share in global energy, which could be assisted through the development...etc" (Jonathan Cobb, World Nuclear Association)	Accepted
3-324	A	81	16	81	19	This refers to 2010; irrelevant for this chaper; delete (Bert Metz, IPCC)	accepted
3-325	A	82	0	86	0	This is an excellent, revealing, and important discussion/presentation. The contents should occupy a higher profile in the chapter and in the SOD in general. But, as I note in my "General Comments", this insightful analysis seems to have been ignored in the rest of the SOD. (Christopher Green, McGill University)	Noted.
3-326	A	82	6	0	0	figure 3.35: this is in its current form not useful; it in fact reiterates that countries have different cost curves; the only way to make it useful would be to compare the marginal costs for certain reductions in individual countries with the results from global analyses; that would show that for many industrialised countries mitigation can be much cheaper by making use of emission trading; care should be taken to make sure what assumptions were made for country/ regional studies in terms of emission trading and to filter out the non- comparable results; the figure can better be deleted and replaced by a table or text (Bert Metz, IPCC)	Accepted. The figure will be modified based on the marginal costs including global modeling results.
3-327	A	82	10	82	13	very confusing (Bert Metz, IPCC)	Taken into account. The sentence will be clarifies the marginal cost information with global and national analysis.
3-328	A	82	15	0	0	Technology is a major driver to reduce GHG emissions. However, structure change (economic industrial structure change from industry to service sector, industry	Reject: The importance of structural change, conservation and demand reductions already

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						structure change from heavy industry to light industry, product structure change from low value-added to high value-added) is another important driver. Moreover, when using a model with endogenous energy service demand to analyze carbon emission reduction, energy service demands might decrease to meet emission constraints. In a word, structure change, technology, and energy service demand reduction are the three main aspects to contribute to GHG emissions. Although this section focuses on technology change, the two other aspects should also be mentioned. (Wenying Chen, Energy, Environment, and Economics Research Institue, Tsinghua Univerisity)	highlighted in the chapter, eg. P.83, ll23.
3-114	B	82	15	86	0	This is an excellent, revealing, and important discussion/presentation. The contents should occupy a higher profile in the chapter and in the SOD in general. But, as noted in the "General Comments", this insightful analysis seems to have been ignored in the rest of the SOD. This is an excellent, revealing, and important discussion/presentation. The contents should occupy a higher profile in the chapter and in the SOD in general. A summary of this section should be included in the Executive Summary. U.S. Government (Government of U.S. Department of State)	Accepted: We will include an updated summary of the section in the ES.
3-329	A	82	24	82	28	It is very important to make the distinction between improved device efficiencies and improved system efficiencies, because the potential improvement in the latter are far larger (and cheaper) than the improvements through the former, yet much of the analysis of mitigation opportunities has focused on the former [this is a point emphasized with respect to buildings in Chapter 6, Section 6.8.3.7]. Thus, on line 26, insert "device" before "efficiencies", and then add a new bullet after the first bullet: "Improved integration of existing technologies into complete systems, especially in the buildings sector". (Danny Harvey, University of Toronto)	Reject: The text on ll.26-28 refers to systems efficiencies not only to single devices. In fact, our basic assumption is that efficiencies of whole energy chains and systems lead to less energy requirements per unit service and lower emissions.
3-115	B	83	1	83	1	"e.g., combined natural gas power plants are more efficient than modern coal power plants" should be changed to "e.g., combined cycle natural gas power plants …," or the author's intended meaning should be more carefully stated. Rationale: It is unclear from the context what these plants are; that is, the plants could be combined cycle power facilities but it is also possible that the author means combined heat and power gas plants or some other concept. This point should be clarified. U.S. Government (Government of U.S. Department of State)	Accepted: change made on p. 83, l1." e.g. combined **cycle** natural gas **and cogeneration** power plants are more efficient than modern coal power plants) thereby further reducing emissions"

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3-330	A	83	8	83	15	Nuclear Power: the risk of nuclear power should be mentioned, especially in such times of war when countries could use nuclear as a weapon. Further risks: environmental, waste, terror: a substitution of existing power plants would mean to create 420 new nuclear power plants: this is economically not feasible and creates to many risks; furthermore, uranium is also a scarce resource (Claudia Kemfert, German Institute for Economic Research)	Rejected: Comment must refer to ll10-14. Text deals quite comprehensively with nuclear issues, but needs to be brief. Therefore, we will not expand the text as it already explicitly discusses safety, storge, non-proliferation and social acceptance issues.
3-116	B	83	8	83	15	Nuclear Power: the risk of nuclear power should be mentioned, especially in such times of war when countries could use nuclear as a weapon. Further risks: environmental, waste, terror: a substitution of existing power plants would mean to create 420 new nuclear power plants: this is economically not feasible and creates to many risks; furthermore, uranium is also a scarce resource (Government of Germany)	Rejected: Comment must refer to ll10-14. Text deals quite comprehensively with nuclear issues, but needs to be brief. Therefore, we will not expand the text as it already explicitly discusses safety, storge, non-proliferation and social acceptance issues.
3-331	A	83	9	0	0	After "solar thermal power plants," add "passive solar design of buildings (for heating, cooling, ventilation, and daylighting)," (Danny Harvey, University of Toronto)	Accepted: We have introduced the suggested text on p.82, l28, where it is more appropriate because this is the passages where conservation and rational use of energy are discussed.
3-117	B	83	11	83	14	Why does the word "inherently" appear in single quotations here? Assume "Inherently safe reactors" refer to passive designs currently being developed. An increase in the nuclear share of global energy is not dependent on the development of these designs, as evidenced by those countries that are safely operating and or/constructing nuclear plants today. Numerous studies have shown that deep geologic repositories are a technically sound solution for long-term storage of used fuel. Dry storage systems are a proven, accepted and widely utilized technology that regulators in many countries license routinely. U.S. Government (Government of U.S. Department of State)	Accepted: We have changed the text to: This would include the development of 'inherently' safe reactors and fuel cycles, resolution of the technical issues associated with long-term storage of fissile materials and improvement of national and international non-proliferation.
3-118	B	83	11	83	14	The text suggests that the share of nuclear power will depend on the development of "inherently" safe reactors and fuel cycles. The implication is that such inherently safe reactors and fuel cycles are not available today. The statement may be somewhat misleading since major nuclear designs already incorporate passive safety systems. Is the text intended to focus on the public perception of the safety of nuclear generation and the nuclear proliferation concern in the fuel cycle stage? Rationale: Designs for the advanced nuclear technology exist and, according to the claims of some nuclear technology vendors, the safety systems are already "proven." In the same section, the text asserts that technological progress will improve national and international non-proliferation. It is not clear how. The	Accept the first comment as in the previous one. Reject the second comment because the text does not claim that technological change will per se improve non-proliferation, but rather that improvement of non-proliferation would enhance nuclear share.

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						author is encouraged to explicitly provide an illustrative action. Rationale: an illustrative clarification will improve confidence in the report's assertion on such a sensitive subject. Authors should be aware of the current literature on inherently safety of state-of-the-art nuclear facilities. U.S. Government (Government of U.S. Department of State)	
3-332	A	83	14	83	15	Between these lines insert the following additional bullet point: 'Accelerating the deployment of fusion power. In the last decade, the fusion development programme has reached a mature stage, and a consortium of seven governmental partners (Europe, Japan, China, Russia, India, South Korea and the United States) has begun construction of a 500 MW fusion device - ITER (meaning 'The Way' in Latin) - in France. Fusion has substantial safety and environmental advantages to secure social acceptance, the projection of viable economics, and extremely abundant and widespread fuels.' (Ian Cook, United Kingdom Atomic Energy Authority)	Reject: Fusion cannot make a substantial contribution to increasing the role of nuclear until the second half of the century. ITER will take about 20 years to prove the feasibility of fusion and another 20 years or so would be required for building first power plants. This would bring fusion into the position reached with fission during the 1950s. In terms of primary energy, the contribution of fusion would not be much higher than 5-6 percent by 2100 assuming the same penetration trends as fusion during the last 50 years. Additional reason for rejecting this comment is that fusion is not considered explicitly in scenarios.
3-333	A	83	14	0	0	Nuclear fusion does not present serious concerns about safety, waste and proliferation. The ITER project, undertaken by China, the European Union, India, Japan, Russia, South Korea and the United States, is planned to demonstrate the scientific and technological feasibility of fusion energy in 2020. Following demonstration power plants in 2035, commercialization could begin before mid-century. With a market penetration rate equal to that of fission worldwide during 1975 – 1985, fusion could provide a substantial fraction of the world's electrical power by 2100. (Robert Goldston, Princeton Plasma Physics Laboratory)	Reject: the same reason as with comment above.
3-119	B	83	14	0	0	after line 14: Nuclear fusion does not suffer from concerns about safety, waste and proliferation. The ITER project, undertaken by China, the European Union, India, Japan, Russia, South Korea and the United States, is planned to demonstrate the scientific and technological feasibility of fusion energy in 2020. Following demonstration power plants in 2035, commercialization could begin before mid-century. With a market penetration rate equal to that of fission worldwide during 1975 – 1985, fusion could provide a substantial fraction of the world's electrical	Reject: the same reason as with comment above.

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						power by 2100. Authors might assess the current literature on nuclear fusion. For example: The ITER project, undertaken by China, the European Union, India, Japan, Russia, South Korea and the United States, is planned to demonstrate the scientific and technological feasibility of fusion energy in 2020. Following demonstration power plants in 2035, commercialization could begin before mid-century. With a market penetration rate equal to that of fission worldwide during 1975 – 1985, fusion could provide a substantial fraction of the world's electrical power by 2100. U.S. Government (Government of U.S. Department of State)	
3-334	A	83	23	0	0	Comma after "century" (Danny Harvey, University of Toronto)	Accepted: Comma added.
3-120	B	83	23	83	23	It is suggested to change "Virtually all scenarios assume that technological" to "Virtually all scenarios, including the reference case or business as usual case, typically project that technological …." Rationale: The scenarios mentioned do not necessarily assume such change. In many models, GDP, structural change, and technological change are often (but not always) predicted by the models because of modeled consumer behavior, the use of economics in decisionmaking, and projected changes in the mix of industries in the future. Further, technological progress, all else being equal, will lead to reductions in energy use and intensity, particularly when a general equilibrium type modeling system is used. U.S. Government (Government of U.S. Department of State)	Accepted: phrase "including reference cases" included after scenarios.
3-335	A	85	10	85	15	Is the grey zone in Figure 3.37 essential? The A2 without technical change (new scenario) did not appear in SRES and its reality is questionable, since fossil resource endowment may not meet the emission pathway. (Shunsuke Mori, Tokyo University of Science)	Rejected: The caption indicates that the gray zone refers to a hypothetical case with "frozen" technology. Figure is taken from literature.
3-121	B	85	12	0	0	The use of frozen technology and economic structures to 1990 levels, while illustrating the importance of technological and structural changes in the economy, overstates by a considerable margin, what the range of achievable improvements might be from 2005 levels since considerable technological and structural change has already occurred in that period. Moreover, the characterization of the 1990 scenario not only suggests that technologies are frozen at their 1990 levels but that the technology mix is that of 1990; that is, that while more efficient technologies were available in 1990 to be chosen, none were allowed in the frozen cases. It is not clear how this discussion adds significantly to the discussion of Figure 3.36. Frozen technologies and economic structures at 2005 levels would have been much more	Rejected: The figure and the analysis comes from literature with 1990 as base year. We cannot change the figure nor the base-year to 2005. Accept: the graphs will be redrawn so that is it possible to read the caption without a magnifying glass.

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						useful to readers like me. The graphs are impossible to read without a magnifying glass and all of the graphics needs to be carefully labeled to be understood. The use of the 1990 technology swamps the effects of further efficiency improvements in the graphics, making them hard to read and seem less important, the opposite of what the report and authors want to communicate. The use of frozen technology and economic structures to 1990 levels, while illustrating the importance of technological and structural changes in the economy, overstates what the range of achievable improvements might be from 2005 levels since considerable technological and structural change has already occurred in that period. Moreover, the characterization of the 1990 scenario not only suggests that technologies are frozen at their 1990 levels but that the technology mix is that of 1990; that is, that while more efficient technologies were available in 1990 to be chosen, none were allowed in the frozen cases. The authors should clarify some of the conceptual issues associated with the frozen technology case. The graphs are impossible to read without a magnifying glass and all of the graphics needs to be carefully labeled to be understood. The use of the 1990 technology swamps the effects of further efficiency improvements in the graphics, making them hard to read and seem less important, the opposite of what the report and authors want to communicate. U.S. Government (Government of U.S. Department of State)	
3-336	A	85	13	0	0	Figure 3.37 1) This figure only indicated the technology role to mitigate GHG emission. However, the reduction potentials from the model must also include the effects from structure change and energy service demand reduction. The total reduction potentials need to be split among the three aspects. 2) The legend for Figure 3.37 should be modified. Firstly, "demand reduction" should be modified to "energy conservation or energy efficiency improvement" otherwise it might be confused with energy service demand reduction. Secondly, "Scrubbing" should be changed to "CCS". (Wenying Chen, Energy, Environment, and Economics Research Institue, Tsinghua Univerisity)	Rejected: Figure 3.36 splits the emissions in scenarios to show the effects of technological change and mitigation. Figure 3.37 includes "demand reducition" and it is not clear how this can be shown separately. The figure is taken from the literature.
3-337	A	85	13	0	0	figure 3.37: unreadbale in current lay-out (Bert Metz, IPCC)	Accepted: the same response as to the US comment (two above). We will make the figure more legible.
3-338	A	85	28	0	0	Change "is" to "are" (Danny Harvey, University of Toronto)	Accepted: changed to "are".
3-339	A	86	0	0	0	□ coal gasification	Rejected. Not clear what the comment refers

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						(http://www.fe.doe.gov/programs/powersystems/gasification/index.html) (Valentin Bartra, Instituto Andino y Amazónico de Derecho Ambiental)	to.
3-340	A	86	3	0	0	ppmv CO2 or CO2 equiv? (Bert Metz, IPCC)	Accepted: 'CO2' added.
3-341	A	86	7	0	0	in stead of "flexibility" it would be better to say that reductions/ stabilisation would generally be cheaper tif there are more options in the scenario. Flexibility is another issue and has more to do with choices that can be made in a specific country for political reasons (such political choices make it generally more expensive; see for instance the staement in IPCC CCS Report about reducing stabilisation costs with 30% or more when adding CCS to the options list) (Bert Metz, IPCC)	Accepted: "a higher degree of flexibility with respect" replaced by "more possibilities".
3-342	A	86	19	0	0	□ coal gasification (http://www.fe.doe.gov/programs/powersystems/gasification/index.html) (Valentin Bartra, Instituto Andino y Amazónico de Derecho Ambiental)	Comment repeated.
3-343	A	86	19	94	5	These section overlap enormously with 3.2.2.1; why repeat it here? It adds info on decarbonisation for mitigation scenarios (not presented in 33, but could be a better place). Same problem as signaled earlier: why comparing post-TAR with TAR/pre-TAR? Better with SRES. Selective studies could probably be more useful to draw relevant conclusions. In summary: most of this material not very useful, and where it is relevant it better fits in 3.2 and 3.3 (and (Bert Metz, IPCC)	Accepted: We will need to eliminated the overlap.
3-344	A	87	1	87	3	It should be stressed that deliberate choices (policy interventions) will be needed in order for this decline in C intensity to occur. Otherwise, the opposite is likely to happen (due to development of tar sands and gaseous and liquid fuels from coal). (Danny Harvey, University of Toronto)	Rejected: Historical experience is compared with intervention scenarios. These by definition include policy interventions. Thus, this needs not be mentioned again.
3-345	A	88	1	90	5	Figure 3.38b, 3.39b, 3.40b 1) "Carbon intensity of GDP" should indicate whether it is based on exchange rate or PPP. And it is suggested to use exchange rate. 2) Moreover it should be consistent in the whole report. (Government of China Meteorological Administration)	1. Accepted: GDP is in MER in all of these scenarios. 2. Rejected: Most scenarios use MER GDP and few use PPP GDP. The two metrics cannot be converted into each other after the fact.
3-346	A	88	2	0	0	Figure 3.38b, 3.39b, 3.40b 1) "Carbon intensity of GDP" should indicate that whether it is based on exchange rate or PPP. And it is suggest to use exchange rate. 2) Moreover it should be consistent in the whole report.	Response the same as above.

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						(Wenying Chen, Energy, Environment, and Economics Research Institue, Tsinghua Univerisity)	
3-347	A	90	16	0	0	Change "indicating" to "which indicate". (Danny Harvey, University of Toronto)	Accepted: Changed.
3-348	A	90	28	90	30	This sentence is confusing and needs to be reworded. (Danny Harvey, University of Toronto)	Accepted: Changed to "Nevertheless, there is a modest increase in carbon intensity of energy improvements in the intervention scenarios above the 75 percentile of the distribution of the recent scenarios".
3-349	A	91	9	91	17	This paragraph also outlines in a useful, clear way the three elements. The second sentence gives the impression that the purpose of deployment at scale is learning by doing, rather than the latter being a positive feedback - it could be written "In addition, deployment of carbon saving technologies at ever larger scales, will produce further benefit through the potential for technological learning..." (Kirsty Hamilton, Chatham House; UK Business Council for Sustainable Energy)	Accepted: Changed to "In addition, deployment of carbon saving technologies at ever larger scales, will produce further benefit through the potential for technological learningthat can result in further improved costs and economic characteristics of new technologies.
3-350	A	91	9	94	5	Are the values in this chapter compatible those in the next section? (Shunsuke Mori, Tokyo University of Science)	Noted: The sections are compatible and consistent as they are based on the same literature and scenarios.
3-351	A	91	19	0	0	Insert "supply-side" before "technologies", as the statement is less true for some end-use technologies. (Danny Harvey, University of Toronto)	Rejected. The text refers to 'full' replacement, which is difficult for end-use technologies as well.
3-122	B	91	19	91	23	The implication of this paragraph is that transitions from one fuel type to another can take a long time, as much as 50 years. The statement is somewhat oversimplified. The key intended point of this section is that rapid fuel transitions in industrialized economies to lower carbon intensities of energy is a major challenge because of the slow turn-over rate of long-lived energy using technologies. However, the statement is not necessarily true for economies that are rapidly expanding (such as China) and are expected to continue to expand robustly for another 20-30 years. The paragraph should be clarified. Rationale: It is important for the reader to understand that for industrialized countries, the transition to a rapid decarbonization scenario is likely to more costly and slower than similar transitions for rapidly growing economies. U.S. Government (Government of U.S. Department of State)	Noted: We agree with the comment but this is not what the text is about. The particular passage refers to fundamental changes in the global energy system and not to fuel changes in rapidly growing parts of the world.
3-352	A	92	1	93	6	Figures 3.41 and 3.42 should indicated other renewables as well, not only biomass. (Government of Germany)	Rejected: The information on all renewables is not available about these new scenarios in the

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							literature. The technologies shown are those that could be discerned for the scenarios included in the assessment. In contrast, biomass is reported.
3-353	A	92	2	0	0	Figure 3.41a, b, Figure 3.42a, b 1) Deployment of primary energy technologies should include renewable energy. 2) All of the four figures show that use of coal decreases in the intervention scenarios. However, if CCS technologies applied, use of coal would increase. And CCS for sure will be one of the important mitigation technologies in the intervention scenarios as many researches indicated. 3) The title as well as description of Figure 3.42a should be added. (Wenying Chen, Energy, Environment, and Economics Research Institue, Tsinghua Univerisity)	1. Rejected: same as above. 2. Rejected: the same as above, because the data are not available. 3. Accepted: Caption to be added.
3-354	A	92	3	0	0	Insert “are” after “shown” (Danny Harvey, University of Toronto)	Accepted. Change made.
3-123	B	92	3	92	4	Are stabilization scenarios a subset of intervention scenarios? U.S. Government (Government of U.S. Department of State)	Accepted: This is correct and the labeling of the figures need to be changed from S for stabilization to I for intgervention.
3-355	A	92	9	0	0	Insert “are” after “shown” (Danny Harvey, University of Toronto)	Accepted. Change made.
3-356	A	93	3	0	0	The caption for Fig 3.42a is missing (Danny Harvey, University of Toronto)	Accepted: Caption added.
3-357	A	93	5	0	0	Insert “are” after “shown” (Danny Harvey, University of Toronto)	Accepted. Change made.
3-358	A	93	12	0	0	portfolio of technologies: why use word technologies here. It seems that you are speaking of the use of primary energy. (Peter Bosch, IPCC TSU)	Noted: Figures show primary energy by source, but this illustrates the deployment of technologies for utilization and supply of this primary energy in the scenarios.
3-359	A	93	13	93	13	“Mitigation generally means significantly less coal” should be changed to “Mitigation generally means significantly less coal if no CCS considered” (Wenying Chen, Energy, Environment, and Economics Research Institue, Tsinghua Univerisity)	Accepted: changed to - (without CCS technologies)
3-360	A	94	7	95	27	This section covers an key topic - on investment in the technology chain, however as per my comment to chapters 1 and 2, for investment (and financing) purposes (and policy to attract this) it is important to differentiate clearly between the R&D	Accepted: RD&D explained and used as appropriate in the section. Changes made.

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						and the deployment (commercialisation, deployment of existing but not widely used 'technologies'). The subheading implies this section is only dealing with the R&D/D end, but the final paragraph (page 95, line 20) raises 'deployment incentive policies' . To be useful this needs to be more precise as to what it is referring. This differentiation has been simply explained by van Aalst in a background paper explaining finance issues (Van Aalst, Paul, 2004. Innovative Options for Financing the Development and Transfer of Technologies, Background Information Paper for UNFCCC workshop of same name (for this topic see page 11). He outlines that for financing/investment for successful existing technologies (at the scaling up stage e.g. wind power or solar PV) will be easier as risks will be perceived as lower and deliverables are known. Whereas developing new technologies has higher risk - venture capitalists generally require far higher returns - issues like guaranteeing the desired outcome, expected time to market, visibility on future market demand etc. (,)	
3-361	A	94	7	95	27	This section has only 1 reference, heavily overlaps with the beginning of section 3.4 and does not really address investment issue (which would be very relevant). Investment implications are not discussed elesewhere so this could be a focus of theis section. (Bert Metz, IPCC)	Accepted: Change to be made based WEO 2006, IIASA scenarios, WEA, etc.
3-362	A	94	9	95	19	This chapter does not correspond well to the following chapters and might be merged with 3.3 (Claudia Kemfert, German Institute for Economic Research)	Rejected: Not clear what should be done. Section 3.3 is on mitigation and stabilization and here we focus on technology issues.
3-124	B	94	9	95	19	This chapter does not correspond well to the following chapters and might be merged with 3.3 (Government of Germany)	Rejected: Same as above.
3-363	A	94	11	0	0	Insert “are” after “area” (Danny Harvey, University of Toronto)	Accepted: area replaced by are.
3-364	A	94	21	0	0	Insert “that” after “ensure” (Danny Harvey, University of Toronto)	Accepted: change made.
3-125	B	94	23	94	24	It is not clear if the economic value of improved technologies is net of R&D costs. U.S. Government (Government of U.S. Department of State)	Accepted: WE have to ask Jae Edmonds whether this is net or not.
3-365	A	94	26	0	0	Figure 3.43 1) It would be clearer to the readers if the left side figure could indicate that the cost reduction axis is for PV. 2) Assumptions for the cost, energy penalty and capacity for sequestration	1. Accepted: Caption corrected, we will consider changing the colors in the two panels.

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						technologies in future should be briefly described. (Wenying Chen, Energy, Environment, and Economics Research Institue, Tsinghua Univerisity)	2. Accepted: Caption corrected, we will consider changing the colors in the two panels.
3-366	A	94	26	0	0	Insert “one” after “enable” (Danny Harvey, University of Toronto)	Accepted: Change made.
3-367	A	94	26	95	9	"Top panel" and "Bottom panel" should be changed to "Left panel" and "Right panel", respectively. (Keigo Akimoto, Research Institute of Innovative Technology for the Earth (RITE))	Accepted: Change made.
3-368	A	94	30	95	9	In the description of the value of improved technology, reference also needs made to the fact that substituting non-price volatile options such as renewable energy for price volatile fossil fuels, reduces the risk and therefore cost to the economy associated with that fuel price-volatility. This factor has been thoroughly examined by Dr Shimon Awerbuch [see for example Awerbuch, S. and Sauter, R., 2005a. Exploiting the Oil-GDP effect to support Renewables Deployment. [online] Paper No. 129, SPRU Electronic Working Paper Series. Available from URL http://www.sussex.ac.uk/spru/] he states: "Many people believe that RE-based electricity costs more. They therefore conclude that diversity must also cost more. They figure that when wind energy at 5 cent/kWh is added to a 3-cent/kWh fossil generating mix, overall cost must rise. But talking about generating costs without also talking about financial risks created primarily by fuel price volatility is like watching a movie with the sound turned off: you miss a big part of the story. Adding RE technologies to a fossil portfolio may well raise overall weighted-average cost. But it also produces a second effect, equally important but widely ignored: it reduces risk (Awerbuch, 2004a,b). The two effects will always combine to reduce expected generating costs. Greater renewables presence in the generating mix therefore enhances energy security while it reduces cost." (page 7). (Kirsty Hamilton, Chatham House; UK Business Council for Sustainable Energy)	Reject: Scenarios do not include information that would allow the evaluation of financial risks and other issues raised in the comment.
3-369	A	94	31	0	0	“Top” should be “Left” (Danny Harvey, University of Toronto)	Accepted: Changes made.
3-370	A	94	31	95	3	Readers could be mislead by these descriptions. "Reference scenario" is not used by meaning of BaU here, but is used by meaning of reference value in the technology costs. The saving costs for each stabilization target are compared to those under different assumptions of technology costs for the same stabilization target (not BaU) in Figure 3.43. In order to avoid the confusion, "550 ppmv stabilization	Rejected: While the comment is correct, we do not accept the argument that stabilization scenarios should be called stabilization case. The latter expression is more appropriate in the case one is directly discussing the

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						scenario" should be changed to "550 ppmv stabilization case", for example. (Keigo Akimoto, Research Institute of Innovative Technology for the Earth (RITE))	reference scenario and its stabilization cases.
3-126	B	94	32	94	32	The discussion in Figure 3.43 describes savings in billions of 1990 US dollars whereas the graphs describe the savings in billions of $1996 US dollars. Rationale: These need to be consistent. U.S. Government (Government of U.S. Department of State)	Accepted; Caption corrected.
3-371	A	95	3	0	0	"Bottom" should be "right" (Danny Harvey, University of Toronto)	Accepted: Changes made.
3-372	A	95	11	95	18	These descriptions are wrong. This conclusion can be apply only to PV and CCS, or to zero- or nearly zero-emission technologies. There are many types of energy saving technologies, and some of them (e.g., gas combined cycle power plant having high efficiency) would be most useful for a midium emission reduction target (e.g., 650 ppmv). The analyzed technologies should not be generalized in the conclusion, and the descriptions should be changed. (Keigo Akimoto, Research Institute of Innovative Technology for the Earth (RITE))	Noted: We agree with the argument. However, this is not the point of the text, rather we emphasize the relationship between the target stringency and technology deployment in the stabilization scenarios.
3-127	B	95	11	95	15	"distance" is the wrong word - perhaps consider using "gap". U.S. Government (Government of U.S. Department of State)	Reject: technological distance is an often-used concept. Here we refer to the "distance" between current and future technologies.
3-373	A	95	14	0	0	After "analysis", insert the following: "Estimate cost savings depend on the reference scenarios and on the assumed rate of improvement of energy efficiency, and so are merely illustrative of the potential magnitude of the benefits". (Danny Harvey, University of Toronto)	Rejected: The statement is generally true and not specific to this conclusion which is generic for different reference and stabilization scenarios in the literature.
3-374	A	95	20	95	27	this paragraph is in contrast to the statements of the next paragraph and also with chapter 11, 11.4.;There have been several studies on the cost-benefit assessment of "return on investment" (Claudia Kemfert, German Institute for Economic Research)	Accepted; We have added a sentence on the induced technology literature. The original text is correct in that it refers to more conventional treatment fo technological change without non-convexities.
3-128	B	95	20	95	27	this paragraph is in contrast to the statements of the next paragraph and also with chapter 11, 11.4.;There have been several studies on the cost-benefit assessment of "return on investment" (Government of Germany)	Accepted: see above.
3-375	A	95	29	0	0	3.4.3 adjust title of section to cover the content. (Peter Bosch, IPCC TSU)	Accepted: Title has been changed.
3-376	A	95	29	117	0	In the discussion of timing of abatement, the report discusses the hedging over	Noted: We have added the Schellnhuber et al

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						uncertainty of knowledge of the climate system (p117), as well as deployment rate of technology (p95). A possible additional point is that if postponed mitigation is to meet the same long-term temperature target as early mitigation, the of year-on-year abatement must be significantly greater. This has wide economic, technological, logistical, and political implications - to the extent that postponed mitigation may make it impossible to reach the same targets as with early mitigation, thereby putting us at risk of dangerous climate change. This is discussed in: {Kalbekken, S. and Rive, N. (2006) Why delaying emissions cuts is a gamble. In: HJ, Schellnhuber, W. Cramer, N. Nakicenovic, T. Wigley, G. Yohe (eds), Avoiding Dangerous Climate Change, Cambridge University Press, The Edinburgh Building, Cambridge CB2 2RU, UK, pp 361-373, ISBN: 13 978-0-521-86471-8.} In addition, the chapter discusses scenarios to meet a long-term climate target (i.e. long-term temperature change). A further interesting point could be the discussion of the implications of choosing a rate-based climate target, rather than a magnitude-based climate target. By this, we mean keeping the rate of temperature change below a specific target level. This places the emphasis on keeping near-term emissions levels low, particularly short-lived (but potent) gases such as CH4 and aerosols such as SO2. Thus, rate-based climate targets could be used for interim climate agreements. This is discussed in: {O'Neill, B. C., & M. Oppenheimer, 2004, Climate change impacts are sensitive to the concentration stabilization path, Proceedings of the National Academy of Sciences (PNAS) 101 (47), 16411-16416.} og {O'Neill, B. C., M. Oppenheimer & A. Petsonk, 2006, Interim targets and the climate treaty, Climate Policy 5, 639-645.} (Government of Norwegian Pollution Control Authority)	reference in responding to the previous comment. The issue of "overshooting" and accelerated mitigation is treated in Section 3.3 and needs not be repeated here again.
3-377	A	96	0	0	0	□ Fussion collaboration (European Fusion Development Agreement (EFDA) □Public Private partnerships □Public domain technologies (Valentin Bartra, Instituto Andino y Amazónico de Derecho Ambiental)	Rejected: Comment not clear.
3-378	A	96	4	0	0	It would be more understandable if the learning curves for some technologies can be added. (Wenying Chen, Energy, Environment, and Economics Research Institue, Tsinghua Univerisity)	Rejected: Learning curves could indeed be added. However, Ch 2 deals with conceptual issues including learning curves while ch 4-11 deal with specific sectoral learning curves.
3-379	A	96	4	0	0	□ Fussion collaboration (European Fusion Development Agreement (EFDA) □Public Private partnerships □Public domain technologies	Rejected: Comment not clear.

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						(Valentin Bartra, Instituto Andino y Amazónico de Derecho Ambiental)	
3-380	A	96	9	0	0	The use of the term ITC needs some consideration. Chapter 11 uses ITC only in cases if technological change is induced by government actions Learning by doing and Spillovers are mentioned separately. Chapter 3 seems to use ITC loosely as a synonym to Endogenous Technological Change. (Peter Bosch, IPCC TSU)	Rejected: ITC is a broad concept (especially in scenarios) and should not be limited here to the more narrow one suggested by the comment. Endogenous refers to how technology is treated in a model and/or scenario.
3-381	A	96	15	96	17	Was technology investigated in TAR? I don't think so; so why this sentence? (Bert Metz, IPCC)	Rejected: The role of technology was treated in TAR both in terms of scenarios (ch 2) and in ch. 10.
3-382	A	96	16	96	17	It is not clear whether the costs of stabilisation are measured as a reduction in GDP compared to the baseline in 2050 or whether these are the annual costs. If it is the former, the number seems small; if it is the latter, then one should be clear. This could be done by inserting the words "per year" after "GDP" in line 17. (Kenneth Ruffing, Non-affliated)	Accepted: These are annual values. Changes made.
3-383	A	96	16	0	0	550 ppmv CO2 or CO2 equiv? (Bert Metz, IPCC)	Accepted: change made to CO2.
3-384	A	96	29	96	36	This paragraph makes a very important point in relation to the impact of policy uncertainty on investment decisions ref transforming energy systems. A reference reinforcing this conclusion from evidence-based work on the electricity sector is the grey-literature paper Sullivan, R., and Blyth, W., August 2006 "Climate Change Policy Uncertainty and the Electricity Industry: Implications and Unintended Consequences", Briefing Paper, Chatham House, from URL www.chathamhouse.org.uk (Rory Sullivan is from Insight Investment Management, which is the asset management arm of HBOS Ltd). They find that policy uncertainty (e.g. next phases of ETS) is already causing delays in power station investment decisions. This topic also arises Ch3, page 99, line 23. [see also comment to Chapter 2, page 23]. (Kirsty Hamilton, Chatham House; UK Business Council for Sustainable Energy)	Rejected: The paper is not peer review literature. It is relevant but not essential for the argument in the text.
3-385	A	96	29	96	30	It will be clearer what is being talked about if you insert "(the required carbon tax)" after "carbon prices" on line 29, and change "price" to "tax" in line 30. (Danny Harvey, University of Toronto)	Accepted; Text changed to "(the required carbon tax or cap and trade policy)".
3-129	B	96	34	96	34	Replace "targets and policies" with "targets and/or policies", as there is no reason that long-term policies will not reduce uncertainties in decision making. (Government of Australia)	Accepted: text changed as suggested.

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3-386	A	96	38	96	44	What ids cheaper, ITC or no ITC? Text seems to be contradictory (Bert Metz, IPCC)	Accepted: The question is ambiguous as posed. Scenarios without ITC would generally have higher abatements costs. However, endogenous and exogenous treatment is different and it all depends on the model and scenario assumptions. Text changes made to reflect this issue.
3-387	A	96	46	0	0	"these findings": what findings? (Bert Metz, IPCC)	Accepted: text changed to clarify that "these" refers to lower abatement costs with ITC.
3-388	A	96	48	0	0	"justified" seems policy prescriptive (Bert Metz, IPCC)	Accepted: changed to achieved.
3-389	A	97	1	97	3	compared to what? (Bert Metz, IPCC)	Accepted; compared to a baseline without technological change.
3-390	A	97	3	97	4	This is only true if compared to the hypothetical case of "freezing 1990 technology". If compared to a reference case with "continued technology development, no climate policy", advanced technology development does not at all reduce emissions. It just reduces the cost of stabilization, but reductions are induced by a carbon tax. Reference: Edmonds, J., Clarke, K., Dooley, J., Kim, S.H., Smith, S.J. 2004. Stabilization of CO2 in a B2 world: insights on the roles of carbon capture and storage, hydrogen, and transportation technologies, Energy Economics, 26(2004): 517–537. See also chapter 11.5.4, page 59, line 41 for evidence, that mitigation policies have a bigger emission reduction impact than technology policies alone. (Government of Germany)	Accepted: Sentence deleted.
3-391	A	97	4	97	5	"The following sentence is not clear: ..Van Vuuren et al. (2004) also concluded that technology development is a key in achieving emission.. I assume tha authors mean emission reduction. (Leonardo Barreto, Paul Scherrer Institute)	Accepted: Sentence completed.
3-392	A	97	4	98	25	messages do not come out clearly from this section (Bert Metz, IPCC)	Noted; The main message is that ITC reduces the abaiment costs and can help with achieving lower stabilization targets.
3-393	A	97	5	0	0	"achieving ……." ? (Bert Metz, IPCC)	Accepted: Sentence completed.
3-394	A	97	7	0	0	this sentence says costs would be reduced if many technologies are developed in parallel; this is too simplistic; technologies also have a cost and implementation	Accepted: The emphasis is on many technologies and not on development in

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						profile and that makes them suitable for early or later application; bringing technologies to market should therefore also take this account, because there could be an investment/ R&D crowding out effect if all efforts are done in parallel; in addition there is also the lock-in phenomenon, briefly mentioned in 3.4.3.3 (bit not elaborated) (Bert Metz, IPCC)	parallel. R&D is relatively cheap compared to deployment and diffusion. Thus parallel R&D efforts need lead to excessive costs. Text changed to highlight diversified technology portfolios.
3-395	A	97	10	97	14	"Berglund and Söderholm (2006) provide an overview and a critical analysis of the recent literature on incorporating induced technical change in energy systems models. Special emphasis is put on surveying recent studies aimed at integrating learning-bydoing into bottom-up energy systems models through so-called learning curves. The survey indicates that this model work represents a major advance in energy research, and embeds important policy implications, not the least concerning the cost and the timing of environmental policies (including carbon emission constraints)". References: 1. Berglund, C., and P. Söderholm., 2006: Modeling Technical Change in Energy-system Analysis: Analysing the Introduction of learning-by-doing in bottom-up energy models. Energy Policy 34, 1344-1356 (Leonardo Barreto, Paul Scherrer Institute)	Accepted: Reference added.
3-396	A	97	17	0	0	is there a differenc ebetween endogenous and induced technological change/ learning? (Bert Metz, IPCC)	Noted: Yes, inducement refers to the nature of change while endogenous refers to how it is modeled.
3-397	A	97	22	97	25	This is a very important point! It needs to be stated in the Executive summary. It is a key conclusion given in the Executive Summary of Chapter 6 with regard to the buildings sector: most of the technologies needed to achieve deep reductions in building energy use already exist, and a significant portion of the savings can be achieved at no net lifecycle cost. (Danny Harvey, University of Toronto)	Noted: To be included in ES.
3-398	A	97	26	0	0	The barriers for technology transfer from developed countries to developing countries should also be introduced. (Wenying Chen, Energy, Environment, and Economics Research Institue, Tsinghua Univerisity)	Reject: This is covered in section 2.8.3 in Ch 2.
3-399	A	97	26	0	43	As there are no outcomes in this section (3.4.3.3.) it duplicates fully with Ch 2 section 2.8.3. Also other parts of 3.4.3 cite few outcomes for the long term and might be shortened to reduce duplication with ch 2. (Peter Bosch, IPCC TSU)	Noted: We will consider to shorten the section and avoid some of the duplicaton.
3-400	A	97	27	97	42	The barriers for technology transfer from developed countries to developing	Reject: This is covered in section 2.8.3 in Ch

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						countries should also be introduced in Section 3.4.3.3. (Government of China Meteorological Administration)	2.
3-130	B	97	36	97	36	The authors should explain how "inadequate environmental codes" can act as a barrier to development of technology. (Government of Australia)	Accepted: Text changed to reflect the fact that lack of inadequate environmental codes would hider development of environmentally sound technologies, eg. reduction of pollution and GHG emissions,
3-401	A	97	44	0	0	Technology gap between developed and developing countries should be described for major climate friendly technologies in this section. And the importance of technology transfer from developed countries to developing countries should also be analyzed. (Wenying Chen, Energy, Environment, and Economics Research Institue, Tsinghua Univerisity)	Reject: This is covered in section 2.8.3 in Ch 2.
3-402	A	97	44	98	14	Technology gap between developed and developing countries should be described in this section. And the importance of technology transfer from developed countries to developing countries should also be analyzed. (Government of China Meteorological Administration)	Reject: This is covered in section 2.8.3 in Ch 2.
3-403	A	97	49	98	4	Reference comments to Chapter one on streamlining the approach to energy security throughout WGIII. The expression here of the potential for 'strong alignment' between response to energy security and climate change is a critical one for policymakers. This approach should be used consistently throughout WGIII, when matters of energy security and climate change are raised. (Kirsty Hamilton, Chatham House; UK Business Council for Sustainable Energy)	Noted.
3-404	A	98	0	98	0	Chapter 3.5 should be linked to Chapter 2.6 or more specifically to 2.6.2 where important background information is provided. (Government of Germany)	Accept. DONE. Note that Chapter 2 page 48 refers to “the trade off between adaptation and mitigation” this should be edited to read “when making decisions about levels of investment in adaptation and mitigation”
3-405	A	98	16	0	0	Section 3.5 would be better placed in the WG2 report, and there is indeed an entire chapter on the same material. It is now much longer than in the draft for expert review. This implies that most of the material in Section 3.5 has not been through expert review (and it shows). Doesn't this violate IPCC procedures? (Richard Tol, Economic and Social Research Institute)	Reject. The material in 3.5 is now in its third iteration of expert review. It is the TSU’s decision to include this in the WG3 report.
3-406	A	98	16	115	0	Section 3.5 would benefit from reorganization and I think it should be before Section 3.4 on technologies. Also this section should assemble all findings	Accept. This is very helpful as we were aware of the need to restructure the sections 3.5 and

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						concerning benefits of climate policy and their influence on targets (i.e. parts of 3.6.2). This way, a section of this chapter would have all information concerning the choice of long-term targets (i.e. the benefits from climate policies). See a suggestion here: 3.5 Determination of long-term scenarios (if swapped with the section on technologies, it would be Section 3.4) There are several methods to determine long-term scenarios: cost-effectiveness, inverse modeling, cost-benefit, and risk analysis. As we will see, inputs about adaptation are required in all of these processes. 3.5.1 Business-as-usual and Cost-effectiveness scenarios Using cost-effectiveness allows to build scenarios on prescribed targets (or on the absence of target in the case of a BAU), defined by shareholders and policy-makers, using in an empirical way a large set of metrics (person-at-risk, economic losses, ecosystem resilience levels, key vulnerabilities from Chp. 19, etc.). Integrated assessment models allow then to assess - a posteriori - the consequences of the selected emission scenario, to determine (1) if and how ecosystems and societies will be able to adapt to the change; and (2) if the overall consequences will be "acceptable". (this section would include the previous 3.5.2.1 and parts of 3.6.2.1) 3.5.2 Inverse modeling Because acceptable and unacceptable outcomes can be defined a priori (e.g., Mastrandrea and Schneider), it is useful to assess the envelope of scenarios, which satisfy these conditions. This can be done using inverse modeling approaches. (this section would include the previous 3.5.2.2 and parts of 3.6.2.1) 3.5.3 Cost-benefit To go further, cost-benefit analyses can be carried out using a measure of the damages associated with each concentration of GHG. (social cost of carbon, Nordhaus & Mendelsohn analyses...). (this section would include 3.5.2.3 and 3.5.2.4 and 3.6.2.2) 3.5.4 Risk analysis approaches Facing both the scientific and technical difficulties of the CBA and the arbitrary part of the cost-effectiveness analysis, risk analysis approaches have recently been favored. (this section would include 3.5.3)	3.6. This will be addressed in making a final draft.

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						3.5.5 The role of adaptation In CBA, adaptation plays a direct role in the determination of mitigation efforts: the large the adaptation capacity, the less mitigation efforts will be carried out. This dependency is still present - but implicitly - in cost-effectiveness or inverse modeling approaches: the definition of what is acceptable and unacceptable clearly depends on the idea one has about adaptive capacity. This makes it essential of assess adaptive capacity, raising new issues. (here, we can have the introduction of 3.5.2 (before the title of 3.5.2.1) and the previous 3.5.1) 3.5.6 Ancillary benefits From Section 3.3.5.6 -- One main conclusion of the literature review is the lack of consistency between the concentration objectives empirically selected (by scientists and decision-makers) using multiple criteria and the concentration objectives determined by cost-benefit analysis. This inconsistency illustrate the low confidence we have in our assessment of climate change damages. ---------- Section 3.6.2.3 on non-CO2 gases should be introduced in the mitigation costs section. Section 3.6.3 on short-term opportunities can become a real Section 3.6. ---------- This organization seems to me much clearer and closer to your objectives. (Stephane Hallegatte, Météo-France)	
3-407	A	98	16	98	17	Title of section 3.5. should give emphasis to mitigation, adaptation and climate impacts (or avoided damages). Rename: Interaction between mitigation, adaptation and climate impacts in the light of decision making under long run uncertainty. The content of this section refers to all three components. (Government of Germany)	Accept but revision of titles cannot be decided by authors – discuss with wider group
3-131	B	98	16	115	31	Section 3.5 on mitigation and adaptation seems to repeat a lot of the information contained in Chapter 1 section 1.2.3 and Chapter 2 section 2.6. These sections should be synthesised into one discussion of adaptation and mitigation for the WG3 report. In addition this section tends to cross into the mandate of WG2 and its	Accept. We have now cross referenced to section 2.6. We will cross reference to CH 1. The TSU asked us to include this material

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						discussion of impacts. (Government of Australia)	linking with WG2 in WG3.
3-132	B	98	16	0	0	Sections 3.5.1 and 3.5.2 are not well integrated with the rest of the chapter and section 3.5.3 is really the most interesting and most substantive of the sub-sections in 3.5. As such, a re-organization of 3.5 would be useful, moving 3.5.3 up front and making it the centerpiece, followed by discussions of cost-benefit analyses, and modeling mitigation and adaptation. U.S. Government (Government of U.S. Department of State)	Accept. We are restructuring 3.5 and 3.6
3-133	B	98	16	0	0	Section 3.5 - The section title doesn't capture what is really covered in the section. The section touches on the adaptation-mitigation relationships in 3.5.1 but then shifts away to discussions of climate change uncertainty and impacts in long-term modeling and links to climate change impacts. A more appropriate title might be simply "Mitigation, impacts, and adaptation." U.S. Government (Government of U.S. Department of State)	Accept. But revision of titles cannot be decided by authors
3-408	A	98	19	98	19	Rename: The interaction between levels of mitigation, adapation and climate impacts (Government of Germany)	Accept. Revision of titles cannot be decided by authors
3-134	B	98	19	0	0	Section 3.5.1 (part 2 of 2 of comment) - As for (2), advances on (1) are necessary for analyzing adaptation and mitigation simultaneously within one framework. Page 98, lines 38-41 describes the value of being able to do this. This statement should also discuss the current capacity to do it, which is very limited. U.S. Government (Government of U.S. Department of State)	Accept
3-135	B	98	19	0	0	Section 3.5.1 (part 1 of 2 of comment) - Very interesting to discuss how adaptation affects mitigation. What is missing is (1) a more fundamental discussion of impacts modeling in the integrated assessment modeling stabilization results, and (2) an assessment of combined mitigation-adaptation modeling in the literature. As for (1), which feedbacks from impacts are being captured--e.g.., CO2 fertilization, forest fire prevalence, heating and cooling demand, labor productivity? How do these or might these impacts alter the mitigation picture from current analyses? The understanding is that climate feedbacks are either not being modeled, or only just starting to be modeled, by integrated assessment models. Damages from impacts may be modeled but with limited/or no feedback to mitigation decisions. Furthermore, if impacts feedbacks are modeled they are modeled as gradual changes and average changes. U.S. Government (Government of U.S. Department of State)	Accept, will include in restructured 3.5/3.6 combined with Hallegate article requested below

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3-136	B	98	19	128	5	Much of this material is poorly integrated with the rest of the chapter. The authors should find ways to bring forward the discussion of risk management. These sections need to be rewritten and clarified; e.g., hedging strategy in section 3.6 should be discussed in the same section as risk management in section 3.5. U.S. Government (Government of U.S. Department of State)	Accept. We are improving the integration of sections 3.5 and 3.6 and cross referencing to 3.3 where appropriate.
3-137	B	98	21	0	0	Insert the following new paragraph as introductory material: "On one hand, adaptation and mitigation are substitutable to the extent that adaptation can increase the level at which climate change is deemed to become dangerous, or postpone the timing of mitigation efforts, either of which could reduce present value costs of mitigation (Goklany 2000a, 2003). On the other hand, adaptation and mitigation are complementary to the extent that mitigation is necessary to reduce adverse damages that cannot be reduced effectively or efficiently through adaptation." Citations: (1) Goklany, IM. 2000a. Potential Consequences of Increasing Atmospheric CO2 Concentration Compared to Other Environmental Problems. Technology 7S: 189-213. (2) Goklany, IM. 2003. Relative Contributions of Global Warming to Various Climate Sensitive Risks, and Their Implications for Adaptation and Mitigation. Energy & Environment 14: 797-822. The authors may consider the point that adaptation and mitigation are substitutable to the extent that adaptation can increase the level at which climate change is deemed to become dangerous, or postpone the timing of mitigation efforts, either of which could reduce present value costs of mitigation. Citations: (1) Goklany, IM. 2000a. Potential Consequences of Increasing Atmospheric CO2 Concentration Compared to Other Environmental Problems. Technology 7S: 189-213. (2) Goklany, IM. 2003. Relative Contributions of Global Warming to Various Climate Sensitive Risks, and Their Implications for Adaptation and Mitigation. Energy & Environment 14: 797-822. U.S. Government (Government of U.S. Department of State)	Reject – these references neither consider uncertainty (about either damages or costs of mitig/ad) or risk of catastrophic or other types of key vulnerabilities (e.g. climate thresholds for food production in a particular region). They also promotes "the idea that human systems have almost unlimited capacity to adapt to change but not the financial resources to invest in major mitigation efforts (e.g., Goklany 2000, 2005)" whilst Luers & Moser 2005 – respond with "this belief is challenged increasingly in the scientific literature through theoretical and empirical studies" (e.g., Moser 2005, Tompkins and Adger 2005)
3-138	B	98	24	98	26	Replace the semicolon on line 24 with a period, and the subsequent text before the period on line 26 with the following: "IN ADDITION, SEVERAL APPROACHES ARE AVAILABLE THAT, independent of direct response to climate change, WOULD enhance both the capacity to adapt to and mitigate the effects of climate change in the future (Bosello 2005; Tol 2005a, GOKLANY 1995, 2000a, 2006a; see also TAR, Hourcade et al., 2001). THESE INCLUDE MEASURES TO: (A) REDUCE THE VULNERABILITY TO CURRENT CLIMATE AND CLIMATE VARIABILITY PARTICULARLY IF THEY REDUCE CLIMATE-SENSITIVE	Reject - this is a narrow view not taking into account: 1) commitment to greater climate change risks which occurs if we do not act to mitigate in near term nor risk of surpassing thresholds for irreversible, catastrophic change; 2) inter-generational equity and intra-generational equity questions. 3) Assumes unlimited capacity to adapt – prioritizing

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						HURDLES TO SUSTAINABLE DEVELOPMENT AND/OR (B) THROUGH THE ESTABLISHMENT OR ENHANCEMENT OF INSTITUTIONS THAT FOSTER SUSTAINABLE DEVELOPMENT AND ITS CONTRIBUTORY FACTORS SUCH AS TECHNOLOGICAL CHANGE AND SUSTAINABLE ECONOMIC GROWTH (GOKLANY 1995, 2003, 2005a)." [Note: Inserts are shown in UPPER CASE; deletions are not shown.] Citations: (1) Goklany, IM. 1995. Strategies to Enhance Adaptability: Technological Change, Economic Growth and Free Trade. Climatic Change 30: 427-449. (2) Goklany, IM. 2000a. Potential Consequences of Increasing Atmospheric CO2 Concentration Compared to Other Environmental Problems. Technology 7S: 189-213. (3) Goklany, IM. 2003. Relative Contributions of Global Warming to Various Climate Sensitive Risks, and Their Implications for Adaptation and Mitigation. Energy & Environment 14: 797-822. (4) Goklany, IM. 2005a. A Climate Policy for the Short and Medium Term: Stabilization or Adaptation? Energy & Environment 16: 667-680. (6) Goklany, IM. 2006a. Integrated Strategies to Reduce Vulnerability and Advance Adaptation, Mitigation, and Sustainable Development. Mitigation and Adaptation Response Strategies for Global Change, forthcoming. The authors might consider whether they have effectively discussed measures that (a) reduce the vulnerability to current climate and climate variability particularly if vulnerability and variability reduce climate-sensitive hurdles to sustainable development and/or (b) through the establishment or enhancement of institutions that foster sustainable development and its contributory factors such as technological change and sustainable economic growth (Goklany, 1995, 2003, 2005a)." U.S. Government (Government of U.S. Department of State)	avoided mitigation costs (today) - fails to consider long term risks and costs (of mitigation, adapation or climate) – issues on which there is a growing scientific literature
3-409	A	98	25	0	0	There is also geoengineering. (Richard Tol, Economic and Social Research Institute)	We will cross reference to Ch 11 where geoengineering is covered
3-410	A	98	30	0	0	2.9.2.3 should be 2.8.2.2 (Bert Metz, IPCC)	Accept DONE
3-411	A	98	31	0	0	Research may also increase uncertainty. (Richard Tol, Economic and Social Research Institute)	Accept
3-412	A	98	33	0	0	Adaptation and mitigation are substitutes, not complements. (Richard Tol, Economic and Social Research Institute)	Reject - even in an economic optimization framework Bosello shows they are complements due in large part to the different time frames over which they affect impacts.
3-413	A	98	35	0	0	Insert "direct" before "benefits"	DONE

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						(Danny Harvey, University of Toronto)	
3-414	A	98	36	0	0	After "century", insert "(co-benefits, however, occur immediately)". (Danny Harvey, University of Toronto)	DONE
3-415	A	98	37	98	37	Full stop after "implemented". New sentence: "However, there are limits to adaptation". (Pat Finnegan, Grian)	DONE
3-416	A	98	41	98	41	Add "and also across time" to the end of the existing sentence to follow "regions of the world". Then cross-reference to Chapter 2, particularly 2.6. (Pat Finnegan, Grian)	DONE
3-139	B	98	42	0	0	Insert the following new paragraph on line 42: "In consonance with these considerations, based on an evaluation of the global impacts of climate change under various mitigation scenarios (including CO2 stabilization at 550 and 750 ppm) and the relative costs associated with different schemes to either mitigate climate change or reduce vulnerability to various climate-sensitive hazards (namely, malaria, hunger, water shortage, coastal flooding, and losses of global forests and coastal wetlands), Goklany (2005a) indicates that, at least for the next few decades, risks and/or threats associated with these hazards would be lowered much more effectively and economically by reducing current and future vulnerability to those hazards rather than through stabilization. There are three reasons for this. First, such an approach would reduce damages from both current climate (and variability) as well as climate change large part because this approach would advance the goals of sustainable development. Second, climate-sensitive damages almost always exceed damages due to climate change alone. Third, such an approach would advance sustainable development by reducing climate-sensitive hurdles to such development. This indicates that while mitigation may be unavoidable iun the long term, over the next few decades, i.e. the short-to-medium term, the focus of climate policy ought to be to: (a) broadly advance sustainable development (particularly in developing countries since that would generally enhance their adaptive capacity to cope with numerous problems that currently beset them, including climate-sensitive problems), (b) reduce vulnerabilities to climate-sensitive problems that are urgent today and might be exacerbated by future climate change, and (c) implement "no-regret" emission reduction measures while at the same time striving to expand the universe of such measures through research and development of cleaner and more affordable technologies. Such a policy would help solve current urgent problems facing humanity while preparing it to face future problems that might be caused by climate change (see, also, Goklany 2003)."	Reject – it is not the IPCC's role to be policy prescriptive, hence we cannot recommend any particular focus for climate policy. There is extensive coverage of the linkage between climate policy and sustainable development in Chapter 12.

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						The authors may consider whether such an approach would reduce damages from both current climate (and variability) as well as climate change large part because this approach would advance the goals of sustainable development. Second, climate-sensitive damages almost always exceed damages due to climate change alone. Third, such an approach would advance sustainable development by reducing climate-sensitive hurdles to such development. This indicates that while mitigation may be unavoidable iun the long term, over the next few decades, i.e. the short-to-medium term, the focus of climate policy ought to be to: (a) broadly advance sustainable development (particularly in developing countries since that would generally enhance their adaptive capacity to cope with numerous problems that currently beset them, including climate-sensitive problems), (b) reduce vulnerabilities to climate-sensitive problems that are urgent today and might be exacerbated by future climate change, and (c) implement "no-regret" emission reduction measures while at the same time striving to expand the universe of such measures through research and development of cleaner and more affordable technologies. Such a policy would help solve current urgent problems facing humanity while preparing it to face future problems that might be caused by climate change (see, also, Goklany 2003)." Citations: (1) Goklany, IM. 2005a. A Climate Policy for the Short and Medium Term: Stabilization or Adaptation? Energy & Environment 16: 667-680. (2) Goklany, IM. 2003. Relative Contributions of Global Warming to Various Climate Sensitive Risks, and Their Implications for Adaptation and Mitigation. Energy & Environment 14: 797-822. U.S. Government (Government of U.S. Department of State)	
3-417	A	98	43	99	2	This discussion about uncertainty is not true anymore (and, indeed, has not been true for a long time). Given a pdf for climate sensitivity with 5th and 95th percentiles of 1.5 K and 4.5 K, respectively (something established with high confidence by the mid 1980s or sooner, and supported by the latest WG1 report), and given a pdf for the threshold of global mean temperature change beyond which large negative impacts occur (something first suggested in the mid 1980s and fully supported by the latest WG2 report, Chapters 4 and 19 in particular), and given an acceptable probability of incurring impacts previously deemed to be unacceptable of 10%, it immediately follows that stringent emission reductions must begin immediately (or rather, should have started 20 years ago) and must continue for several decades (see Harvey, 2006a,b). As shown very clearly in Harvey (2006c), there is no plausible resolution of current uncertainties that eliminates the need for	We will adapt text to make clear that we are not advocating any policy standpoint and this is purely theoretical method to identify elements of a portfolio of actions which include mitigation and research into new technologies. We cannot recommend immediate action is because it would be policy prescriptive, but we will reference your work if accepted for publication in time and make clear the consequences of inaction.

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						several decades of stringent emission reduction. Thus, there is no real "difficulty" for climate decision makers. It is really very clear what needs to be done, and this is a crucially important point that the IPCC needs to make (waiting until AR5 will be too late). The rest is mumble jumble that just clouds the issue. REFERENCES: Harvey, L.D.D. 2006a. Dangerous Anthropogenic Interference, Dangerous Climatic Change, and Harmful Climatic Change: Non-Trivial Distinctions with Significant Policy Implications. Climatic Change (accepted). Harvey, L.D.D. 2006b. Allowable CO2 Concentrations Under the United Nations Framework Convention on Climate Change as a Function of the Climate Sensitivity PDF. Environmental Research Letters (submitted). Harvey, L.D.D.: 2006c, 'Plausible resolution of uncertainties in global-warming science has no near-term practical implications for climate policy', Climate Policy (submitted). (Danny Harvey, University of Toronto)	
3-418	A	99	1	0	0	Manne and Richels championed acting-and-learning. (Richard Tol, Economic and Social Research Institute)	Accepted – add cite Manne & Richels 2002 DONE
3-140	B	99	4	99	32	This paragraph could be rewritten for clarity - it is at least two separate lists of points (the word "Third" appears on line 16 and in line 24). It would be preferable to make at least two paragraphs of these points. U.S. Government (Government of U.S. Department of State)	Accept
3-141	B	99	7	99	8	The text in parentheses is subjective and doesn't add to the assessment. U.S. Government (Government of U.S. Department of State)	Accept DONE - removed
3-142	B	99	10	0	0	Add after the period on line 10, the following: "This is probably due to the fact that adaptation was for a long time viewed by many in the climate change community as a competitor for attention and resources from policy makers." Some candor on this score on the part of the IPCC would be cathartic. U.S. Government (Government of U.S. Department of State)	We reject this exact statement but we will search for a similar one on this topic in the literature
3-143	B	99	15	99	24	The third argument outlined in lines 15 through 24 is based on a very narrow view of what constitutes adaptation, and is valid for adaptations that rely on the results of site-specific impacts assessments, which are likely to be uncertain for quite some time in the future. Accordingly, modify the sentence starting on line 24, as follows: "Uncertainty about climate change will slow down the rate of long-term investment ON SITE-SPECIFIC adaptation strategies AND MEASURES (Kokic et al. 2005;	Noted, we agree that reducing vulnerability is a part of adaptation. However, many of the specific examples are general development goals and not specific to adaptation to climate change. The linkage between climate change and sustainable development is dealt with

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						Kelly, Kolstad, and Mitchell 2005). HOWEVER, THERE ARE SEVERAL APPROACHES AND MEASURES FOR ADAPTATION THAT CAN BE UNDERTAKEN SUCCESSFULLY WITHOUT RELYING ON SITE-SPECIFIC IMPACTS ASSESSMENTS. THEY INCLUDE MEASURES TO REDUCE THE VULNERABILITY TO CURRENT CLIMATE AND CLIMATE VARIABILITY PARTICULARLY IF THEY COULD BE EXACERBATED BY CLIMATE CHANGE AND COULD INCREASE CLIMATE-SENSITIVE HURDLES TO SUSTAINABLE DEVELOPMENT (GOKLANY 2000a, 2003). FOR EXAMPLE, A MALARIA VACCINE OR A MORE EFFECTIVE AND ENVIRONMENTALLY-SOUND INSECTICIDE WOULD REDUCE MALARIA REGARDLESS OF WHETHER IT IS CAUSED BY CLIMATE CHANGE OR A NON-CLIMATE-CHANGE-RELATED FACTOR (GOKLANY AND KING 2004). SIMILARLY, EFFORTS TO IMPROVE AGRICULTURAL PRODUCTION UNDER MARGINAL CLIMATIC AND SOIL CONDITIONS THAT EXIST TODAY BUT COULD BECOME MORE PREVALENT UNDER CLIMATE CHANGE WOULD YIELD A DOUBLE DIVIDEND IN THAT IT WOULD INCREASE PRODUCTION (AND, THEREBY, HELP ALLEVIATE HUNGER) UNDER BOTH BASELINE CONDITIONS AND CONDITIONS THAT MIGHT BECOME MORE COMMON DUE TO CLIMATE CHANGE (GOKLANY 2003, 2005a). SPECIFIC MEASURES INCLUDE FOCUSING R&D INTO ENHANCING YIELDS UNDER SUCH CONDITIONS, AND STRENGTHENING EXISTING OR, IF NECESSARY, DEVELOPING NEW INSTITUTIONS TO TRANSFER RESULTS OF AGRICULTURAL R&D FROM RESEARCH INSTITUTES TO FARMERS (GOKLANY 2006a). IN ADDITION, ADVANCING SUSTAINABLE DEVELOPMENT EITHER THROUGH ENHANCEMENT OF THE MILLENNIUM DEVELOPMENT GOALS OR, MORE BROADLY, THROUGH THE ESTABLISHMENT OR ENHANCEMENT OF INSTITUTIONS THAT FOSTER SUSTAINABLE DEVELOPMENT AND ITS CONTRIBUTORY FACTORS SUCH AS TECHNOLOGICAL CHANGE AND SUSTAINABLE ECONOMIC GROWTH WOULD INCREASE BOTH ADAPTIVE AND MITIGATIVE CAPACITY (GOKLANY 2005a). IN RECOGNITION OF SUCH OPPORTUNITIES, ONE OF THE CRITERIA FOR SELECTING ADAPTATION MEASURES OR STRATEGIES IS THAT THEIR LIKELY SUCCESS SHOULD BE INDEPENDENT OF RESULTS FROM SITE SPECIFIC IMPACTS ASSESSMENTS (GOKLANY 1995)." The authors may consider whether the third argument outlined in lines 15 through 24 is based on a	extensively in Chapter 12. Section 3.5 will contain a discussion of the linkage between climate policy and development pathways. Hence we reject the suggested modification to the text.

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						very narrow view of what constitutes adaptation, and is valid for adaptations that rely on the results of site-specific impacts assessments, which are likely to be uncertain for quite some time in the future. There are several approaches and measures for adaptation that can be undertaken successfully without relying on site-specific impacts assessments. Those approaches include measures to reduce the vulnerability to current climate and climate variability particularly if vulnerability and variability could be exacerbated by climate change and could increase climate-sensitive hurdles to sustainable development (Goklany 2000a, 2003). For example, a malaria vaccine or a more effective and environmentally-sound insecticide would reduce malaria regardless of whether it is caused by climate change or a non-climate-change-related factor (goklany and king 2004). Similarly, efforts to improve agricultural production under marginal climatic and soil conditions that exist today but could become more prevalent under climate change would yield a double dividend in that it would increase production (and, thereby, help alleviate hunger) under both baseline conditions and conditions that might become more common due to climate change (goklany 2003, 2005a). Specific measures include focusing r&d into enhancing yields under such conditions, and strengthening existing or, if necessary, developing new institutions to transfer results of agricultural r&d from research institutes to farmers (Goklany 2006a). In addition, advancing sustainable development either through enhancement of the millennium development goals or, more broadly, through the establishment or enhancement of institutions that foster sustainable development and its contributory factors such as technological change and sustainable economic growth would increase both adaptive and mitigative capacity (Goklany 2005a). In recognition of such opportunities, one of the criteria for selecting adaptation measures or strategies is that their likely success should be independent of results from site specific impacts assessments (Goklany 1995). Citations: (1) Goklany, IM. 1995. Strategies to Enhance Adaptability: Technological Change, Economic Growth and Free Trade. Climatic Change 30: 427-449. (2) Goklany, IM. 2000a. Potential Consequences of Increasing Atmospheric CO2 Concentration Compared to Other Environmental Problems. Technology 7S: 189-213. (3) Goklany, IM. 2003. Relative Contributions of Global Warming to Various Climate Sensitive Risks, and Their Implications for Adaptation and Mitigation. Energy & Environment 14: 797-822. (4) Goklany, IM. 2005a. A Climate Policy for the Short and Medium Term: Stabilization or Adaptation? Energy & Environment 16: 667-680. (6) Goklany, IM. 2006a.	

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						Integrated Strategies to Reduce Vulnerability and Advance Adaptation, Mitigation, and Sustainable Development. Mitigation and Adaptation Response Strategies for Global Change, forthcoming. U.S. Government (Government of U.S. Department of State)	
3-419	A	99	21	0	24	Two of my papers investigate specifically this question: how to carry out an adaptation strategy when adaptation investments are quasi-irreversible and future climate largely unknown (especially at the local scale): Hallegatte S., J.C. Hourcade, P. Ambrosi, 2006b, Using climate analogues for assessing climate change economic impacts in urban areas, accepted by Climatic Change Hallegatte S., 2006, A Cost-Benefit Analysis of the New Orleans Flood Protection System. Regulatory Analysis 06-02. AEI-Brookings Joint Center, Mar 2006. (Stephane Hallegatte, Météo-France)	Accept – will include
3-420	A	99	23	0	0	Uncertainty would slow investment only under particular decisions. (Richard Tol, Economic and Social Research Institute)	We will clarify this sentence.
3-144	B	99	24	99	24	Replace "Third" with "Fourth". (Government of Australia)	Accept DONE
3-145	B	99	24	0	0	Replace “Third” with “Fourth”. U.S. Government (Government of U.S. Department of State)	Accept DONE
3-146	B	99	32	0	0	Insert a new paragraph on line 34, as follows: “Goklany (2005a) has undertaken an assessment of the relative reduction (over the short-to-medium term) in various categories of climate-sensitive damages and associated costs under various mitigation and adaptation scenarios. This analysis was based on estimates of the global populations at risk from malaria, water shortage, hunger, and coastal flooding, and losses of global forests and wetlands through the 2080s. His results indicate that over this time frame, climate-sensitive damages can be reduced more effectively and by a larger amount by focusing on reducing vulnerability to climate-sensitive problems that might be exacerbated by climate change, or even through efforts to enhance sustainable development. One reason for this result are that the ‘co-benefits’ of efforts to reduce vulnerability to climate change (and advance adaptive capacity) are exceedingly large because the contribution of climate change to climate-sensitive damages is, for the most part, small compared to the contribution of non-climate-change-related damages (i.e., baseline or reference	Noted, we agree that reducing vulnerability is a part of adaptation. The linkage between climate change and sustainable development is dealt with extensively in Chapter 12. Section 3.5 will contain a discussion of the linkage between climate policy and development pathways. Hence we reject the suggested modification to the text.

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						climate and climate variability) (Goklany 2006a)." The authors may wish to consider inserting a new paragraph on line 34, as follows: "Goklany (2005a) has undertaken an assessment of the relative reduction (over the short-to-medium term) in various categories of climate-sensitive damages and associated costs under various mitigation and adaptation scenarios. This analysis was based on estimates of the global populations at risk from malaria, water shortage, hunger, and coastal flooding, and losses of global forests and wetlands through the 2080s. His results indicate that over this time frame, climate-sensitive damages can be reduced more effectively and by a larger amount by focusing on reducing vulnerability to climate-sensitive problems that might be exacerbated by climate change, or even through efforts to enhance sustainable development. One reason for this result are that the 'co-benefits' of efforts to reduce vulnerability to climate change (and advance adaptive capacity) are exceedingly large because the contribution of climate change to climate-sensitive damages is, for the most part, small compared to the contribution of non-climate-change-related damages (i.e., baseline or reference climate and climate variability) (Goklany 2006a). U.S. Government (Government of U.S. Department of State)	
3-421	A	99	36	99	37	The idea that one "needs" monetized metrics for formal policy analysis is pure opinion. The analysis in Harvey (2006a,b,c) is a formal analysis (that is, a quantitative, logically structured analysis) that uses no monetary metrics but comes to conclusions about the required concentration ceilings and the required near-term emissions policy. Revise to read, "Many authors have concluded that monetized metrics of the impacts of climate change are needed ….., although Harvey (2006a,b,c), for example, has derived policy recommendations without the use of monetized metrics." REFERENCES: Harvey, L.D.D. 2006a. Dangerous Anthropogenic Interference, Dangerous Climatic Change, and Harmful Climatic Change: Non-Trivial Distinctions with Significant Policy Implications. Climatic Change (accepted). Harvey, L.D.D. 2006b. Allowable CO2 Concentrations Under the United Nations Framework Convention on Climate Change as a Function of the Climate Sensitivity PDF. Environmental Research Letters (submitted). Harvey, L.D.D.: 2006c, 'Plausible resolution of uncertainties in global-warming science has no near-term practical implications for climate policy', Climate Policy (submitted).	Accept, we will include.

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						(Danny Harvey, University of Toronto)	
3-422	A	99	38	0	0	Studies do not only point to the need for monetisation, a fair number of studies also provides estimates. (Richard Tol, Economic and Social Research Institute)	Accept we will add brief discussion
3-423	A	99	38	0	0	"increasingly" why increasingly? This goes back to the early days of climate policy analysis, and conceptually way further back. (Richard Tol, Economic and Social Research Institute)	Accept removed DONE
3-424	A	99	41	99	42	The paper "Mori et.al. (2006, in press) ," Integrated Assessments of Global Warming Issues and an Overview of Project PHOENIX – A Comprehensive Approach", IEEJ Transactions of Electrical & Electronic Engineering(TEEE), John Willy & Sons, Nov., 2006 (in Press)" also mentions this issue from a view of integrated assessment. (Shunsuke Mori, Tokyo University of Science)	We will obtain reference and include if relevant
3-425	A	99	42	0	0	analysts should steer clear of normative judgement (Richard Tol, Economic and Social Research Institute)	Reject. This is impossible to do! Choice of discount.rate is normative – the statement is correct – normative assumptions are embedded in economic analyses
3-147	B	99	42	99	42	Suggest replacing "are required to make.." with "will still be required to make…" U.S. Government (Government of U.S. Department of State)	Accept DONE
3-426	A	99	47	0	0	Table 3.11 does not add much. There are many indicators, what a surprise. Just listing indicators without further comment may lead one to conclude that any indicator goes. (Richard Tol, Economic and Social Research Institute)	Reject because it is important that we convey the possible range of alternative metrics.
3-148	B	99	47	0	0	Insert the following new paragraph at line 47, as follows: "Yet another methodological challenge is how to account for co-benefits from mitigation and vulnerability-reduction actions which may also advance sustainable development. The co-benefits of actions that would reduce vulnerability and/or advance sustainable development are, over the next few decades, likely to swamp the direct benefits of reducing damages solely from climate change because, as noted, the contribution of climate change to climate-sensitive damages is, for the most part, small compared to the contribution of non-climate-change-related damages (i.e., baseline or reference climate and climate variability). Goklany (2006a) offers a conceptual approach based on Dang et al. (2003) which, in turn, is derived from Fankhauser (1998)." The authors might consider the following point - Yet	Noted. The linkage between climate change and sustainable development is dealt with extensively in Chapter 12. Section 3.5 will contain a discussion of the linkage between climate policy and development pathways. We will draw the attention of Ch 12 to references (1) (2) and (3).

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						another methodological challenge is how to account for co-benefits from mitigation and vulnerability-reduction actions which may also advance sustainable development. The co-benefits of actions that would reduce vulnerability and/or advance sustainable development are, over the next few decades, likely to swamp the direct benefits of reducing damages solely from climate change because, as noted, the contribution of climate change to climate-sensitive damages is, for the most part, small compared to the contribution of non-climate-change-related damages (i.e., baseline or reference climate and climate variability). Goklany (2006a) offers a conceptual approach based on Dang et al. (2003) which, in turn, is derived from Fankhauser (1998). Citations: (1) Goklany, IM. 2006a. Integrated Strategies to Reduce Vulnerability and Advance Adaptation, Mitigation, and Sustainable Development. Mitigation and Adaptation Response Strategies for Global Change, forthcoming. (2) Dang, H.H., Michaelowa, A. and Tuan, D.D.: 2003, 'Synergy of adaptation and mitigation strategies in the context of sustainable development: the case of Vietnam', Climate Policy 3S1, S81–S96. (3) Fankhauser, S.: 1998, The Costs of Adapting to Climate Change, Washington, Global Environment Facility. U.S. Government (Government of U.S. Department of State)	
3-427	A	99	48	0	0	Table 3.11 is a good table, but why are some entries in italics and some not? (Danny Harvey, University of Toronto)	Accept – if we retain the table in this form we will explain why
3-149	B	99	48	0	0	Table 3.11 - First, for consistency, it would be better to use WGII tables or assemble the table here from WGII tables and then reference WGII. Second, the table is on impacts, but should be discussed in relationship to adaptation and mitigation. The authors might consider moving these non-monetary metrics discussion to the cost-benefit monetary metrics discussion. First, for consistency, the authors should use WGII tables or assemble the table here from WGII tables and then reference WGII. Second, the table is on impacts, but should be discussed in relationship to adaptation and mitigation. The authors might consider moving these non-monetary metrics discussion to the cost-benefit monetary metrics discussion. U.S. Government (Government of U.S. Department of State)	Accept. We are well aware of the need for consistency with WGII and a process has been set up to ensure this. We are reorganizing the sections 3.5&3.6 and will attend to the location of the discussion of metrics.
3-432	A	100	0	0	0	table 3.11: why different fonts?; edit literature references (Bert Metz, IPCC)	Accept. We will clarify that the italics are to indicate the benefits of moving from one stabilization level to another
3-428	A	100	1	100	1	Add link to chapter 2.6 at the end of sentence. (Government of Germany)	Accept DONE.

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
3-150	B	100	1	100	50	Table 3.11 should be deleted or replaced with a similar table from WG2 as it is clearly within the mandate of WG2 rather than WG3. (Government of Australia)	Section 3.5 has a remit to cover avoided damages and therefore some material from WG2 has to be repeated to show what we are avoiding – and there is not space to reproduce the whole table, thus we have with WG2 selected some rows from it.
3-151	B	100	1	0	0	In the first line below the table: Replace "trade-offs" with "trade-offs and synergies". U.S. Government (Government of U.S. Department of State)	Accept. We changed it to "interactions" DONE
3-429	A	100	3	0	0	Change "area" to "areal" (Danny Harvey, University of Toronto)	Accept. DONE
3-430	A	100	12	0	0	Add Donner et al. (2006). REFERENCE: Donner, S.D., Skirving, W.J., Little, C.M., Oppenheimer, M., Hoegh-Guldberg, O.: 2005, 'Global assessment of coral bleaching and required rates of adaptation under climate change', Global Change Biology 11, 2251-2265. (Danny Harvey, University of Toronto)	Accept. DONE
3-431	A	100	28	0	0	Add Barnett et al. (2005), who review potential impacts of global warming on water supplies in regions dependent on melting of winter snow cover and on glacier meltwater. Currently, more than one sixth of the world's population is dependent on such water sources, including one quarter of China's population. Serious water shortages are likely to arise in such regions within a few decades. REFERENCE: Barnett, T.P., Adam, J.C. and Lettenmaier, D.P.: 2005, 'Potential impacts of a warming climate on water availability in snow-dominated regions', Nature 438, 303-309. (Danny Harvey, University of Toronto)	Accept – we're familiar with this paper we agree good to cite here if the table is retained in the final draft. DONE
3-433	A	101	4	101	5	clarify why energy efficient buildings may limit human vulnerability to heat waves (Bert Metz, IPCC)	Accept. We will explain that it is due to insulation
3-434	A	101	10	103	39	Three approaches are introduced and described in some detail; after that in separate sections 3.5.2.1 to 3.5.2.4, these approaches are further discussed; suggest to shorten chapeau 3.5.2 and move the elaboarations to the specific sections (Bert Metz, IPCC)	Accept. We are restructuring section 3.5 and 3.6
3-152	B	101	10	0	0	Section 3.5.2 (part 2 of 2 of comment) - As a matter of fact, Section 3.5.3.2 already does a very nice job of bringing in the alternative pathways literature (p113 starting line 27) relative to the rest of the chapter (which is cost-effective scenarios	Accept. We are restructuring section 3.5 and 3.6

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						literature). Recommend dropping the inverse modeling and scenarios discussions in 3.5.2 (or round-out what is in 3.5.3.2). A discussion of cost-benefit analysis (like 3.5.2.3) is important and could fit nicely after the 3.5.3 discussion. Also, some sort of comparison of the cost-benefit and stabilization results would be helpful--e.g.., optimal stabilization and its costs vs. costs associated with stabilization targets. U.S. Government (Government of U.S. Department of State)	
3-153	B	101	10	0	0	Section 3.5.2 (part 1 of 2 of comment) - The categories used to group the literature do not really make sense. For example, cost-effective modeling is used in both stabilization and inverse analyses--finding the least cost mitigation pathway given climate related constraints. The categorization is not adding much to content--really they are alternative ways of considering impacts--constraints (targets and pathways) that are proxies for acceptable/unacceptable impacts (and cost-effective means to achieving the constraints) and cost-benefit analyses that search for optimal (vs. prescribed) mitigation. We're afraid that the categorization will only confuse readers who have just been reading about stabilization results in sections 3.1 - 3.4. Alluding to these alternative modeling methodologies is useful but would be better done in the context of the rest of the chapter...(see part 2 of 2) U.S. Government (Government of U.S. Department of State)	Accept. We are restructuring section 3.5 and 3.6
3-435	A	101	14	0	0	There should be a semicolon before “however” and a comma after (Danny Harvey, University of Toronto)	Accept DONE
3-436	A	101	20	101	28	make reference to appropriate parts of 3.3 (Bert Metz, IPCC)	Accept
3-437	A	101	22	0	0	Probabilistic integrated assessment does so much more than risk of overshoot. (Richard Tol, Economic and Social Research Institute)	Taken into account. Changed “as” to “in” – this was a language problem.
3-438	A	101	22	0	0	There should be a semicolon before “thus” and a comma after (Danny Harvey, University of Toronto)	Accept DONE
3-439	A	101	23	101	25	It is not really the probability of some climatic change that matters and which should be assessed, but rather, the probability of harm that matters. For each climatic change, there is a certain probability of harm, ranging from small for small climatic changes, to large for large climatic changes. The phrase “that quantify the likelihood of a particular outcome” is ambiguous, but could be modified here to refer specifically to harm and to make the clarifications made here. (Danny Harvey, University of Toronto)	Accept. We will clarify the text.
3-440	A	101	30	101	30	How about giving some references to the "Safe Landing Analysis" and "Tolerable Windows Approach".	Accept

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						(REF!)	
3-441	A	101	34	0	0	Conceptually, tolerable windows and safe landing are the same; historically, safe landing is the older concept (although really is it just minimax regret) -- tolerable windows are just another attempt of PIK at usurpation. (Richard Tol, Economic and Social Research Institute)	Reject: No change
3-442	A	102	7	0	0	Why does monetisation hide uncertainty? (Richard Tol, Economic and Social Research Institute)	Accept: Change sentence slightly – drop word uncertainty and replace with "outcomes expressed in different metrics" DONE
3-443	A	102	8	0	0	Cost-efficiency is not an English word; I think it is Franglais. You mean cost-effectiveness. (Richard Tol, Economic and Social Research Institute)	Accept DONE
3-154	B	102	8	102	8	"cost-effective" analysis, not "cost-efficiency". Economic efficiency is a term equivalent to "optimal" outcomes from cost-benefit analysis that equates marginal benefits and costs. U.S. Government (Government of U.S. Department of State)	Accept DONE
3-444	A	102	10	0	0	The marginal net present value of costs and benefits are equated. (Richard Tol, Economic and Social Research Institute)	Accept. Changed to "minimize the discounted sum of mitigation and adaptation costs and damages" DONE.
3-445	A	102	14	0	0	you mean "the large scale of IA analyses, making it difficult to characterize adaptation at local scale"? (Bert Metz, IPCC)	Accept clarified text DONE
3-446	A	102	16	0	0	Should be "drivers" (Danny Harvey, University of Toronto)	Accept DONE
3-447	A	102	21	0	0	Uncertainty would increase or decrease depending on the aggregation rule and, of course, the locality. (Richard Tol, Economic and Social Research Institute)	Accept. Will clarify wording as reviewer has misunderstood meaning.
3-155	B	102	22	102	24	The sentence starting on line 22 is an oversimplification. See comments on page 99, lines 15-24 (this chapter). As noted, there are numerous options for adaptation that don't need to rely on local assessments of climate change (or, more importantly, its impacts). In fact, one of the criteria for selecting adaptation measures or strategies is that their likely success should be independent of results from site-specific impacts assessments (Goklany 1995). Such an approach would save every one, including analysts, a lot of time and futile effort. The authors should consider whether there are options for adaptation that don't need to rely on local assessments of climate change (or, more importantly, its impacts). In fact, one of the criteria for selecting adaptation measures or strategies is that their likely	Reject - what Goklany outlines as strategies to enhance adaptation are simply development policies and have little to do with adaptation specifically to predicted climate change

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						success should be independent of results from site-specific impacts assessments (Goklany 1995). U.S. Government (Government of U.S. Department of State)	
3-448	A	102	26	0	0	Alternatively, analysts may have been too optimistic on adaptation (compare Mendelsohn's with Miller's work). (Richard Tol, Economic and Social Research Institute)	Accept, we request a citation for Miller's work
3-449	A	102	27	0	31	Assessing the actual adaptive capacity would require precise investigations of realistic adaptation strategies, taking into account both the uncertainty on future climate, which makes it difficult to design an adequate strategies, and the short-term economic or political constraints, which makes it difficult to implement policies with immediate (certain) costs and remote (uncertain) benefits (see an example for housing adaptation strategies in Hallegatte, Hourcade and Ambrosi, 2006 in press). (Stephane Hallegatte, Météo-France)	Accept, we will include reference
3-156	B	102	27	102	31	Insert after the period on line 31, the following: "Nevertheless, despite some optimistic assumptions regarding specific adaptation measures, there is still a tendency to overestimate negative impacts and underestimate positive impacts. Impacts assessments generally look at only a subset of options that will be available in the future (Goklany 2005a, 2005c). For example, in the Parry et al. (2004) study of global agricultural production and hunger, adaptive responses are based on available technologies as of the time when the study was conducted, not on technologies that would be available in the future or any technologies developed to specifically cope with the negative impacts of climate change (Parry et al., 2004, page 57). But the potential for future technologies to cope with climate change is large, especially if one considers bioengineered crops (Goklany 2003b). Moreover, most studies, if they consider it at all, do not fully account for increases in adaptive capacity that ought to occur due to secular (i.e., time dependent) technological development, the level of economic growth assumed in the scenarios that are used to drive emissions in their analyses, or improvements in human and social capital that would likely accompany both economic growth and technological change (Goklany 2005c, 2006a). Hence, while impacts assessments may have overestimated the efficacy of specific adaptation options, they have generally underestimated the universe of options available to them." The authors may consider whether despite some optimistic assumptions regarding specific adaptation measures, there is still a tendency to overestimate negative impacts and underestimate positive impacts. Impacts assessments generally look at only a	We will obtain the references and consider whether to include it. We are completely aware of the exact treatment of adaptation in the Parry et al (2004) study. Specifically adaptation methods considered are: (a) "level 0" adaptation at zero cost at the farm level, by shifting planting dates and available crop varieties (b) "level 1" low cost adaptation at the farm level by methods such as choice of crop, variety, planting date, and irrigation : this is assumed applied 100% in developed countries and 75% in developing countries and (c) "level 2" adaptation involving some regional or national policy change resulting in major changes in planting dates, availability of new cultivars, extensive expansion of irrigation and increased fertilizer application (Parry . 2005). These imply economic

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						subset of options that will be available in the future (Goklany 2005a, 2005c). For example, in the Parry et al. (2004) study of global agricultural production and hunger, adaptive responses are based on available technologies as of the time when the study was conducted, not on technologies that would be available in the future or any technologies developed to specifically cope with the negative impacts of climate change (Parry et al., 2004, page 57). But the potential for future technologies to cope with climate change is large, especially if one considers bioengineered crops (Goklany 2003b). Moreover, most studies, if they consider it at all, do not fully account for increases in adaptive capacity that ought to occur due to secular (i.e., time dependent) technological development, the level of economic growth assumed in the scenarios that are used to drive emissions in their analyses, or improvements in human and social capital that would likely accompany both economic growth and technological change (Goklany 2005c, 2006a). Hence, while impacts assessments may have overestimated the efficacy of specific adaptation options, they have generally underestimated the universe of options available to them. Citations: (1) Goklany, IM. 2003b. "Agricultural Technology and the Precautionary Principle." In R. Meiners and B. Yandle, eds., Agricultural Policy and the Environment (Lanham, MD: Rowman and Littlefield, 2003), pp. 107-133. (2) Goklany, IM. 2005a. A Climate Policy for the Short and Medium Term: Stabilization or Adaptation? Energy & Environment 16: 667-680. (3) Goklany, IM. 2005c. Is a Richer-but-warmer World Better than Poorer-but-cooler Worlds? 25th Annual North American Conference of the US Association for Energy Economics/International Association of Energy Economics, September 21-23, 2005. (4) Goklany, IM. 2006a. Integrated Strategies to Reduce Vulnerability and Advance Adaptation, Mitigation, and Sustainable Development. Mitigation and Adaptation Response Strategies for Global Change, forthcoming. U.S. Government (Government of U.S. Department of State)	adjustments and are applied in developed countries only, based on current GDP.
3-450	A	102	34	0	0	It seems that there should be a "not" after "does" (Danny Harvey, University of Toronto)	Accept we will reword sentence
3-451	A	102	37	103	9	Discussion not clear. There are two arguments: 1) mitigation reduces growth, making society more vulnerable; and 2) mitigation prevents climate damages, avoiding loss of growth and making society less vulnerable. It can't be that both arguments are valid in all circumstances. Elaborate! (Bert Metz, IPCC)	Accept to elaborate
3-452	A	102	39	0	0	The studies you list are a mix of papers that do not adequately reflect development,	Taken into account. We will elaborate on the

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						studies that complain about that, and studies that try to improve matters. (Richard Tol, Economic and Social Research Institute)	treatment of development issues
3-453	A	102	44	0	0	Tol and Dowlatabadi do not show that. They show that emission reduction would reduce adaptive capacity. Tol (2005, Environment and Development Economics) makes the point you make here. (Richard Tol, Economic and Social Research Institute)	Accept – we will adapt text to make more limited point on adaptive capacity, modified by Hallegate comment below
3-454	A	102	46	0	49	I would replace: "They suggest that (over-)investment in mitigation might limit funds available for such development which would boost adaptive capacity and thus could further aggravate climate damages, at least in this region and sector (see also Tol 2005a)." By "Assuming a trade-off between investments in mitigation and investments in development, they suggest that (over-)investment in mitigation could reduce adaptive capacity and, therefore, aggravate climate damages. They disregarded so far, however, the possibility of synergies between mitigation and development (e.g., CDMs)." (Stephane Hallegatte, Météo-France)	Accept – we will adapt text
3-455	A	102	49	0	50	I think that in "Tol and Yohe (2006) note that in a global economy there is a trade-off between investment in climate mitigation and in hastening the pace of development", the verb "note" seems to imply to much certainty and not enough controversy... Why not using "claim" instead? (Stephane Hallegatte, Météo-France)	Accept DONE
3-456	A	102	49	0	0	At the end of the sentence, add ", although this can be avoided by focusing on mitigation options, such as end-use energy efficiency, that generate net cost savings" (Danny Harvey, University of Toronto)	Accept DONE
3-157	B	103	2	0	0	Add after the period on line 2, the following: "In addition, over-investment in mitigation, even if restricted to developed countries, could retard economic growth both globally and in developing countries thereby retarding the development of their adaptive capacity. Based on such considerations, Goklany (2000b, 2003a, 2005a) suggests that it might be counterproductive – and less precautionary -- from the point of view of developing countries, in particular, to launch aggressive mitigation programs that go beyond no-regret actions." The authors may want to consider adding after the period on line 2, the following: "In addition, over-investment in mitigation, even if restricted to developed countries, could retard	We will obtain the references and consider including them

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						economic growth both globally and in developing countries thereby retarding the development of their adaptive capacity. Based on such considerations, Goklany (2000b, 2003a, 2005a) suggests that it might be counterproductive – and less precautionary -- from the point of view of developing countries, in particular, to launch aggressive mitigation programs that go beyond no-regret actions." Citations: (1) Goklany, I.M. 2000b. Applying the Precautionary Principle to Global Warming. Center for the Study of American Business, Washington University, St. Louis, Mo., USA. Policy Study 158. November 2000. (2) Goklany, IM. 2003a. Relative Contributions of Global Warming to Various Climate Sensitive Risks, and Their Implications for Adaptation and Mitigation. Energy & Environment 14: 797-822. (3) Goklany, IM. 2005a. A Climate Policy for the Short and Medium Term: Stabilization or Adaptation? Energy & Environment 16: 667-680. U.S. Government (Government of U.S. Department of State)	
3-457	A	103	3	0	0	Bosello uses a static model. Kemfert messed up her dynamics; see Roson and Tol (2005, Integrated Assessment). Fankhauser and Tol (2005, Resource and Energy Economics) have a more reasonable model. (Richard Tol, Economic and Social Research Institute)	Noted. We will include the additional two references and discuss the issue further
3-458	A	103	3	0	0	"A number of authors are beginning to investigate climate feedbacks on the economy in dynamic macroeconomic modelling frameworks". I would like to mention: Hallegatte S., 2005, The time scales of the climate-economy feedback and the climatic cost of growth, Environmental Modelling and Assessment, 10 (4), pp. 277-289 (Stephane Hallegatte, Météo-France)	Accept
3-459	A	103	4	0	0	Kemfert and Schumacher was not peer-reviewed. The model was the same as in Kemfert. How can a standard CGE misallocate capital? (Richard Tol, Economic and Social Research Institute)	Accept – we will adapt the text to use refs from previous work Kemfert 2002a & 2002b – or weave in with previous text see above – 3-457.
3-460	A	103	15	0	0	determine > co-determine (Richard Tol, Economic and Social Research Institute)	Noted. Changed to strongly influence DONE
3-461	A	103	20	0	0	today > at pre-industrial times (Richard Tol, Economic and Social Research Institute)	Noted.
3-462	A	103	22	103	27	The assumption of linearity does not seem tenable in the light of knowledge about damage curves eg the reinsurance industry has published extensively on this issue.	Taken into account. Accept on non-linearity – but we need to underscore the uncertainty in

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						We should be more definite about the likely right form of function! (Andrew Dlugolecki, University of East Anglia)	shape of damage curves as no one knows what a simplified damage function would look like – it depends entirely on normative aggregation assumptions.
3-463	A	103	24	0	0	This point was made by Peck and Teisberg in 1994, not by Courtois in 2004; ditto for Roughgarden and Schneider. (Richard Tol, Economic and Social Research Institute)	Accept – we will add ref for original work on this
3-464	A	103	25	0	0	"Roughgarden and Schneider (1999) reformulated Nordhaus' DICE model to show that with alternative, yet equally plausible, damage functions a significantly more aggressive optimal policy is obtained thus highlighting the importance of taking care in choice of functional form." I would replace the end of this sentence by "the importance of a careful choice of the damage function form and the lack of robustness of the findings from this class of models.". (Stephane Hallegatte, Météo-France)	Accept DONE
3-465	A	103	25	103	25	after "Roughgarden and Schneider (1999)" insert "and Ackerman and Finlayson (2006)" (Frank Ackerman, Global Development and Environment Institute, Tufts University)	Accept: We will include this reference
3-466	A	103	27	103	27	after end of sentence add "Ackerman and Finlayson (2006) also demonstrate that plausible sensitivity analyses on different aspects of the DICE model have significantly nonlinear interactions, underscoring the problems that may arise when relying on long-range forecasts from models of this type." [note to editors: copy of Ackerman and Finlayson, now in press, is available on request from Frank.Ackerman@tufts.edu.] (Frank Ackerman, Global Development and Environment Institute, Tufts University)	Accept – we will add similar statement
3-467	A	103	29	0	0	Extreme events are not excluded from impact analyses; in fact, they are implicit. In the Hallegatte and Kemfert studies, the impacts do not arise from the inclusion of weather extremes, but rather from the way the model is formulated. (Richard Tol, Economic and Social Research Institute)	Reject & accept: This is not true – extremes are only averaged in means, and do not appear in themselves as "shocks" to the system; although there are some exceptions with partial extremes
3-468	A	103	29	103	39	As noted about pages 21-24, scenarios that ignore impacts are unrealistic and should not be presented to policymakers. This paragraph on recent work shows why. (Andrew Dlugolecki, University of East Anglia)	Accept.

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3-469	A	103	31	0	0	The Calzadilla study was not peer-reviewed. Like Kemfert, Hallegatte's model is mis-specified, greatly amplifying the economic impact. (Richard Tol, Economic and Social Research Institute)	Reject : Calzadilla is in legitmate grey literature; Kemfert + Schumacher study is a DIW working paper; Hallegate's work has been peer reviewed
3-470	A	103	33	0	0	Link and Tol (2004, Portuguese Economic Journal) study the impacts of a shutdown of the thermohaline circulation, Tol et al. (2006, Journal of Risk Research) of the collapse of the West-Antarctic Ice Sheet using an integrated assessment model. In a series of papers, Keller studies the policy implications of a THC shutdown, again using an integrated assessment model. There is also a paper by Yohe and colleagues. In the next sentence, you contradict yourself (Richard Tol, Economic and Social Research Institute)	Accept – we will cover these studies.
3-471	A	103	35	103	39	The monetary assessment of the extreme events is intrinsically uncertain with subjective value judgement. Therefore, the text should include "with high uncertainty on the monetary damages" as is shown in 3.5.2.4, P.107. (Shunsuke Mori, Tokyo University of Science)	Reject – high uncertainty about monetary assessment is discussed in later section.
3-472	A	103	38	0	0	Keller does not show that abrupt climate change implies more stringent action; in fact, he shows that action should be either more stringent or less stringent. (Richard Tol, Economic and Social Research Institute)	Reject – Keller et al 05 – looks at WAIS and coral reefs thresholds and concludes: "Our analysis suggests that it may well be an economically sound policy to pay the price of avoiding a WAIS disintegration"
3-473	A	103	43	0	0	Why are these two models singled out? (Richard Tol, Economic and Social Research Institute)	Accept – we will adjust emphasis
3-474	A	103	45	0	0	Is 1999 recently? (Richard Tol, Economic and Social Research Institute)	Accept –
3-475	A	104	14	104	26	this paragraph fits better in 3.5.3 (Bert Metz, IPCC)	We will consider this with 3.5 & 3.6 condensing decision
3-476	A	104	18	104	19	As stated in my comment to page 101, line 23-25, it is not the probability of some climatic change that matters and which should be assessed, but rather, the probability of harm that matters. The probability of harm involves integrating over the harm pdf for each climatic sensitivity in a climate sensitivity pdf, and integrating over the climate sensitivity pdf, as in Harvey (2006a,b). This work should be cited here. REFERENCES: Harvey, L.D.D. 2006a. Dangerous Anthropogenic Interference, Dangerous Climatic Change, and Harmful Climatic Change: Non-Trivial Distinctions with Significant Policy Implications. Climatic Change (accepted).	Accept: we will include if work accepted for publication in time

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						Harvey, L.D.D. 2006b. Allowable CO2 Concentrations Under the United Nations Framework Convention on Climate Change as a Function of the Climate Sensitivity PDF. Environmental Research Letters (submitted). (Danny Harvey, University of Toronto)	
3-158	B	104	28	104	28	Please use consistent terminology with page 101 where "guardrail" is not used. U.S. Government (Government of U.S. Department of State)	Accept: Changed to "tolerable windows approach" DONE
3-477	A	104	31	0	0	Why is this tool important? Füssel was not the first to use response surfaces; in fact, that techniques is decades old and has been use in climate for ages. (Richard Tol, Economic and Social Research Institute)	Noted.
3-478	A	104	37	0	0	prohibits > prevents; what are "biome changes of more than 35% worldwide"? Is the classification forbidden to be changed? (Richard Tol, Economic and Social Research Institute)	Accept – check with FT [depends on 3.5 & 3.6 condensing decision]
3-479	A	104	40	0	0	protection of what from what? (Richard Tol, Economic and Social Research Institute)	Accept rework sentence [depends on 3.5 & 3.6 condensing decision]
3-480	A	104	40	104	43	this sentence fits better in 3.5.3 (Bert Metz, IPCC)	Taken into account. Consider this with 3.5 & 3.6 condensing decision
3-481	A	104	41	0	0	what do Den Elzen et al. conclude? (Richard Tol, Economic and Social Research Institute)	Accept - replace sentence with one highlighting conclusions [Detlef]
3-482	A	104	44	0	0	If this were a review for a journal, I would have stopped reading and rejected the paper -- regardless of what comes next. This section is badly written and badly researched. The authors should be reprimanded for wasting the reviewer's time. However, this is the IPCC, and lower review standards apply. (Richard Tol, Economic and Social Research Institute)	Noted. We acknowledge the need to restructure the section.
3-483	A	105	3	0	0	caption of Figure 3.44 "Admissible corridors for energy-related CO2 emissions for different levels of regional income loss if at least 65 % of the world's ecosystems are to be preserved under climate change"; I would add "mitigation" between "regional" and "income" to avoid the reader to get confused between climate change damages and mitigation costs. (Stephane Hallegatte, Météo-France)	Accept
3-484	A	105	5	105	16	text and figure 3.44 too complex; try to simplify, e.g. colour bands in figure (Bert Metz, IPCC)	Accept – we may remove the figure entirely
3-485	A	105	15	0	0	Should be "shows" [subject is "middle line"] (Danny Harvey, University of Toronto)	Accept DONE
3-486	A	105	16	0	0	65% of ecosystems IN SITU	Noted

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						(Richard Tol, Economic and Social Research Institute)	
3-159	B	105	18	105	27	Insert on line 22 after the period the following: "However, the probability of such events is unknown, and, according to Gregory et al. (2004), if this occurs at all, it is unlikely to occur until at least 140 years hence. In addition it's not clear what effect that would have if the European winter temperatures are more a function of atmospheric circulation patterns rather than ocean currents (Seager 2002, Weaver and Hillaire-Marcel 2004, Wunsch 2004), or whether there would be an overall cooling that would override temperature increases due to warming. Finally, the impacts of the combined effects of a shutdown, were it to occur, and climate change are unknown" The authors may want to consider inserting on line 22 after the period the following: "However, the probability of such events is unknown, and, according to Gregory et al. (2004), if this occurs at all, it is unlikely to occur until at least 140 years hence. In addition it's not clear what effect that would have if the European winter temperatures are more a function of atmospheric circulation patterns rather than ocean currents (Seager 2002, Weaver and Hillaire-Marcel 2004, Wunsch 2004), or whether there would be an overall cooling that would override temperature increases due to warming. Finally, the impacts of the combined effects of a shutdown, were it to occur, and climate change are unknown" . However, note there are studies that take other views on the collapse of the thermohaline circulation. Citations: (1) Gregory, J. M., et al. 2005. A model intercomparison of changes in the Atlantic thermohaline circulation in response to increasing atmospheric CO2 concentration. Geophysical Research Letters 32: L12703, doi:10.1029/2005GL023209. (2) Seager, R., et al. 2002. Is the Gulf Stream responsible for Europe's mild winters?: Quarterly Journal of the Royal Meteorological Society 128: 2563-2586. (3) Weaver, A. J., and C. Hillaire-Marcel. 2004. Ice growth in the greenhouse: A seductive paradox but unrealistic scenario. Geoscience Canada 31: 77-85. (4) Wunsch, C. 2004. Gulf Stream safe if wind blows and Earth turns. Nature 428): 601. U.S. Government (Government of U.S. Department of State)	Noted. However re THC our chapter should handle not its probability or impact but if such a threshold exists, what are the implications for mitigation pathways should society want to avoid triggering such a threshold.
3-487	A	105	20	0	0	please add: at least, according to a particular THC model that is quite an outlier in the literature (Richard Tol, Economic and Social Research Institute)	Reject – this is WG2 material
3-488	A	105	22	105	27	this fits better in 3.5.3 (Bert Metz, IPCC)	Noted – we are restructuring 3.5&3.6
3-489	A	105	24	0	27	This has no place in the IPCC. Other studies show that 750 ppm and higher would be justified under some the TAR Reasons for Concern. Besides, only very	Reject- it is in the peer-reviewed literature on inverse modeling, so it can and should

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						optimistic studies show that the road to 550 ppm leads through Kyoto -- most studies show that Kyoto leads to approximately nowhere, and some argue that Kyoto makes matters worse, not better. (Richard Tol, Economic and Social Research Institute)	legitimately be included in the section.
3-490	A	105	24	0	0	across SOME OF these numeraires (Richard Tol, Economic and Social Research Institute)	Accept – change text "selected numeraires"
3-491	A	105	24	105	27	This is an extremely important point, and needs to be prominently stated in the Executive Summary, Technical Summary, and Summary for Policymakers. (Danny Harvey, University of Toronto)	Taken into account, depends on outcome of discussions outside this chapter
3-492	A	106	1	0	0	title suggest that cost-effectiveness is also discussed in this section; is not the case however (Bert Metz, IPCC)	Noted as we restructure 3.5&3.6
3-493	A	106	3	0	0	why is optimized between inverted commas? (Richard Tol, Economic and Social Research Institute)	Reject no change
3-494	A	106	10	106	30	The treatment of the possibility of catastrophe in the Nordhaus-Boyer model is deficient in a number of respects. The approach is to estimate the probability of a single catastrophic possibility, equivalent to a permanent loss of 25 per cent of income, and evaluate a certainty equivalent assuming a coefficient of relative risk aversion equal to 4. The estimated certainty equivalent is around 1 per cent of income for a median scenario involving warming of 2.5 C and 6 per cent for a warming of 6 C There are a number of problems. First, the estimated probabilities, derived by adjusting the median value from a panel of experts in 1994, are conservative (1.2 per cent for a 2.5 C warming and 6.8 per cent for a 6 C warming). Second, the risk aversion measure is lower than that implied by observations on the risk premium for equity. The risk premium for euqity reflects the market price of systematic risk, associated with much smaller fluctuations. Third, the analysis fails to take appropriate account of low-probability events with losses more substantial than those considered in the scenario. Even occurring with probability 0.1 a possible loss of 50 per cent of income would add substantially to the estimated damage. And even a very small possibility of a truly catastrophic outcome, such as runaway warming would be associated with a substantial risk premium. Finally the modelling fails to take appopriate account of the convexity of the damage function and the implications of uncertainty. Consider a model run where the best estimate of warming is 2.5 C but suppose this arises from a probability	Noted - but treatment of this level of detail of one model not possible. We will elaborate if there is space.

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						distribution where there is a 30 per cent probability of no warming, a 50 per cent probability of 2.5 C warming and a 20 per cent probability of 6 C warming. The mean is unchanged, but the expected loss associated with catastrophe risk, using the estimates cited above is now nearly 2 per cent. (John Quiggin, University of Queensland)	
3-495	A	106	10	106	30	the treatment of species extinction and o. This is almost certainly the most serious single cost of global warming for developed countries, but Nordhaus and Boyer use trivially low estimates: $2.5 billion per year for the United States, and $1 billion for Europe. The latter sum also includes damage to cultural sites such as possible flooding in Venice. The basis for the Nordhaus-Boyer is the assumption that the ecosystem damage associated with climate change is equivalent to a 50 per cent reduction in the capital value of National Parks. However, National Parks represent only a small proportion of US public policy actions designed to protect natural ecosystems. Most obviously, the Endangered Species Act restricts a variety of development actions potentially harmful to endangered species. Although only a small number of species are protected, relative to those that would be endangered by climate change, and only a small range of economic activity is affected, the economic cost of the Endangered Species Act has been estimated (admittedly by critics) at $3.5 billion per year. Other legislation, including the Wetlands Protection Act, involves 11 substantial public expenditure and economically costly restrictions on development. Even developmentalist legislation such as the Water Resources Development Act of 1986 involves substantial direct allocations of resources to the preservation of biodiversity, and even larger indirect costs associated with design requirements dictated by concerns about environmental impacts. In quantitative terms, the economic impact of more general environmental protection laws, including the Clean Air Act and Clean Water Act, is substantially greater than that of measures specifically directed at preserving species. The Clean Water Act, in particular, goes well beyond requirements to protect human health, which could be addressed more cheaply by water treatment. Although it is hard to assess the total cost of environmental protection, it seems clear that it is substantial in relation to GDP. Assessments of the productivity slowdown of the 1970s have frequently pointed to environmental regulation as a significant contributor to the slowdown in measured productivity growth (in economic terms, of course, it would be more correct to state that the failure to take account of environmental externalities led to an overestimation of output and growth in the period before regulation). An alternative approach to deriving estimates of the welfare loss associated with large-	Taken into account: we accept and can emphasise that the Nordhaus & Boyer assumptions are debatable but our chapter is not the place to elaborate on this argument – a brief discussion of difficulty of monetization of non-market impacts comes later.

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						scale biodiversity loss would be through the use of stated preference methods such as contingent valuation and choice modelling. Examination of the results of studies of individual sites suggests that the aggregate willingness to pay for preventing such biodiversity loss would be substantial: of the order of 1 to 5 per cent of income compared to the value of 0.025 used by Nordhaus and Boyer. Stated preference methods are, ultimately, a proxy for political processes and the strong public support for costly environmental preservation measures is an indication that the Nordhaus-Boyer valuation is a serious underestimate. Much more work is needed before realistic monetary values can be placed on the environmental damage likely under a 'business as usual' policy and on the environmental benefits of deep cuts in emissions. Nevertheless, it seems 12 reasonable to assert that the benefits are likely to be of the same order of magnitude (say 1 to 5 per cent of national income) as the costs of emissions reductions. That is, mitigation of environmental damage alone is sufficient to justify a substantial program aimed at reducing emissions. (John Quiggin, University of Queensland)	
3-496	A	106	12	0	0	Why is this review limited to the work of Nordhaus? There is also post-TAR work by Maddison, Mendelsohn, Rehdanz, Smith, and Tol. (Richard Tol, Economic and Social Research Institute)	Accept – will mention other work.
3-497	A	106	12	106	28	is this reflecting the WG II results? Should be; make reference (Bert Metz, IPCC)	Accept
3-160	B	106	12	106	28	A clearer explanation is needed of how precisely the damage functions used by Nordhaus and Boyer (2000) and Nordhaus (2006) were developed. Were those functions developed similar to the procedure described on lines 11 through 27, page 103 (this chapter)? What impacts assessments did those functions rely on, how robust are these assessments, did those functions consider changes in future adaptive capacity (due to higher levels of economic and technological development, and higher human and social capital)? U.S. Government (Government of U.S. Department of State)	Accept – we'll make clear which parts of 3.5&3.6 apply to this work, although there isn't space for a detailed critique
3-498	A	106	17	0	0	2.5 degrees above what? (Bert Metz, IPCC)	Accept
3-499	A	106	24	0	0	Insert "that" after "suggests" (Danny Harvey, University of Toronto)	Accept DONE
3-161	B	106	30	106	41	With respect to the THC, how robust are the results in light of more recent work in this area. See comment related to lines 18-27 on page 105 (this chapter). U.S. Government	Noted but this chapter is not the place for this WG2 material.

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						(Government of U.S. Department of State)	
3-500	A	106	32	0	0	Link and Tol say no such thing. On the contrary, they estimate that a shutdown of the thermohaline circulation would bring economic benefits. (Richard Tol, Economic and Social Research Institute)	Accept – we will edit
3-501	A	106	35	0	0	Neither Keller nor Mastandrea estimate impacts; they just assume something. Link and Tol estimate impacts, but this study is omitted. (Richard Tol, Economic and Social Research Institute)	Accept – this is true. Text can be clarified.
3-502	A	106	48	0	0	Insert a comma after "overall" (Danny Harvey, University of Toronto)	OK DONE
3-162	B	106	48	107	4	This is not a very constructive. Results from every model depend on the assumptions. Benefit-cost analysis is a useful way to bring together information and is a fundamental part of policy decision-making. What is important is understanding the assumptions, the sensitivities to those assumptions, identifying reasonable/unreasonable assumptions, and looking for consensus on assumptions. It would be more useful to provide guidance on how to improve upon current cost-benefit analysis. The Jacoby (2004) reference suggests that it is not the method that is a problem, but the quality of the available input information, and therefore, the focus should be here. Results from every model depend on the assumptions. Benefit-cost analysis is a useful way to bring together information and is a fundamental part of policy decision-making. What is important is understanding the assumptions, the sensitivities to those assumptions, identifying reasonable/unreasonable assumptions, and looking for consensus on assumptions. It would be more useful to provide guidance on how to improve upon current cost-benefit analysis. The Jacoby (2004) reference suggests that it isn't the method that is a problem, but the quality of the available input information, and therefore, efforts should be focused here. U.S. Government (Government of U.S. Department of State)	Noted. We agree that benefit cost analysis is useful but it needs to be complemented by other analyses because of the problems with underlying data and the controversial and subjective nature of the assumptions that must be made in such an analysis.
3-503	A	107	1	0	0	Azar and Schneider were not the first to point this out. See e.g. the Pearce chapter in the SAR. Interestingly, the older study goes on to refute the Azar and Schneider argument, pointing out that although you can get a wide range of marginal damage cost estimates by, say, varying the discount rate, you cannot vary the discount rate at will -- and this considerably limits the results of cost-benefit analysis. (Richard Tol, Economic and Social Research Institute)	Reject. There are many different views of appropriate values of the discount rate in the literature.
3-504	A	107	12	108	18	this fully belongs to the cost-benefit discussion in 3.5.2.3; missing in this section is a discussion on discount rates, which is an essential element (that is now in 3.6); move it from 3.6 to this section	Accept – we are restructuring

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						(Bert Metz, IPCC)	
3-163	B	107	12	109	6	Section 3.5.2.4 should reference the discussion of the social cost of carbon undertaken in Chapter 20 of the WG2 report. (Government of Australia)	Accept
3-505	A	107	14	0	0	"Key outputs of optimal control models are estimates of the social costs of carbon (SCC)": it seems to me that social costs of carbon are not calculated using optimal control models but are used in optimal control models. (Stephane Hallegatte, Météo-France)	Accept
3-164	B	107	19	107	20	Figure 3.45 needs a considerably more detailed explanation if the figure is to serve any useful purpose for policy readers. In particular why are "Weights factors" for India and Africa included? (Government of Australia)	Accept – we are likely to remove it
3-506	A	107	21	0	0	Add "PTP=pure time preference". (Danny Harvey, University of Toronto)	Accept DONE
3-507	A	107	21	0	0	figure 3.45: is too complex; suggest to delete (Bert Metz, IPCC)	Accept we will delete
3-508	A	107	21	107	21	Figure 3.45, Source: Hope 2006 - Stern Review. Why is Stern Review added here? Is it meant to be a reference? Not mentioned in reference list. (Government of Germany)	Accept - Typo
3-509	A	108	3	0	0	FUND does not have a simplified damage function. (Richard Tol, Economic and Social Research Institute)	Accept we will edit
3-165	B	108	5	108	7	This seems to incorrectly characterize the issue. The issue here is not really the monetization, but the aggregation across sectors and regions. Monetized sectoral and regional impacts detail will provide information on winners and losers. U.S. Government (Government of U.S. Department of State)	Accept – adapt text
3-510	A	108	7	0	0	Aggregation is a generic problem that plagues any metric. Tol (2005, Global Environmental Change) computes the Gini coefficient of climate change impacts using, oh horror, monetary estimates as the basis. (Richard Tol, Economic and Social Research Institute)	Accept – adapt text
3-511	A	108	9	0	0	figure 3.46: simplify/ clarify figure idea is good, but too consud\sing in current lay-out (Bert Metz, IPCC)	Accept will revise figure
3-512	A	108	10	0	0	Watkiss and Downing only present qualitative effects. Tol (2005, Energy Policy) shows the same things but then quantitatively. Hope does that too, but based on a	Accept we will add cites to Figure

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						single model. Tol uses all published estimates from multiple models. (Richard Tol, Economic and Social Research Institute)	
3-513	A	108	12	0	0	Non-market impacts are not necessarily negative. Heatlh impacts may well be positive. (Richard Tol, Economic and Social Research Institute)	Reject. There is little evidence of that – only 1 reference, WG2 outputs will assess this
3-514	A	108	13	0	0	Health impacts may well be positive, particularly if a value if place on life rather that life-year lost. (Richard Tol, Economic and Social Research Institute)	Reject: our understanding is that WGII, Health chapter authors disagree with this point.
3-515	A	108	20	108	20	This section title is titled "risk management" whereas the content of the section is more along the lines of risk assessment under the selective and hypothetical situation where a stabilization scenario would be abided by, irrespective of what may be learned over the considerable time to stabilization. Suggest that the section be recast and include consideration of the expected extent of stabilization path change and objective change given the literature on decision making under uncertainty. And suggest that this section be merged with section 3.6 which seems to provide a more generic view of risk management whereas this section follows a specific framework. (Haroon Kheshgi, ExxonMobil Research and Engineering Company)	Noted. We are restructuring 3.5&3.6
3-516	A	108	20	108	20	The section tends to repeat much of the content in WG2, Chapter 19. Suggest that this section draw from a broader literature on risk management, and risk management frameworks, and reference rather than duplicate Chapter 19. (Haroon Kheshgi, ExxonMobil Research and Engineering Company)	Reject. It is selective and repeats the minimal level of information necessary.
3-517	A	108	23	108	26	the method used to derive this important table deviates from what WG I is presenting in AR4; in the context of the Synthesis Report discussions attempts are being made to modify the method to be fully consistent with WGI . This is worth the effort because the information in the table is now carried forward to the SPM and is too important to be lost at the approval stage; this section should be in 3.5.3.1 (together with table 3.12) (Bert Metz, IPCC)	Accept in hand.
3-518	A	108	27	0	0	Table 3.12 belongs in WG1; if it stays, it would need a reference. (Richard Tol, Economic and Social Research Institute)	Reject, part of remit of this section to link mitigation adaptation and impacts
3-519	A	108	27	0	0	table 3.12: heading for T number columns should be "average GMT (at equilibrium) for best guess climate sensitivity" (Bert Metz, IPCC)	Accept
3-520	A	108	28	108	0	Table 3.12 - This is a very powerful table!! Footnote 15 suggests that the table is illustrative. What does this mean given that pretty strong statements/conclusions are	Accept – process in hand to ensure consistency with WG1.

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						made based on this table on page 113 (lines 3-15)? It says the table is derived from WGI Chap. 10. Does that mean WGI fully endorses the table--both the methods for constructing it and, more importantly, the results? If not, then it is not appropriate to include in the WGIII report. If the authors decide that an illustration of this kind of link is important to the chapter, then it seems only appropriate to eliminate the table and use a single textual example that clearly notes the methods and that it is illustrative. This table bridges WGI, WGII, and WGIII and, if retained, it is highly likely that it will be used by readers for their own purposes. Therefore, it is extremely important that it be generated and supported by WGI, and if WGI is not willing to do that, then it either be dropped altogether or substantially downplayed and caveated. U.S. Government (Government of U.S. Department of State)	
3-528	A	109	0	0	0	Footnote 15: Please consult with WG1 about the consistent treatment of uncertainty in deriving the specific information in this table. The translation of "likely" into an 80% log-normal confidence interval should be checked with experts from WG1 to ensure consistency across IPCC WG reports. (Andy Reisinger, TSU IPCC Synthesis Report)	Accept – a WG1 discussion is in hand
3-521	A	109	1	109	1	Several suggestions for the table: 1) state that the table does not include contributions from natural variability which may have caused pre-anthropogenic variations in temperatures on the order of 1 degree C (reference WG1 assessment of variability in temperature over the past 1000+ years); 2) note that the effect of aerosols is neglected in this table; 3) consider also presenting the table with switched axes, i.e., the range of stabilization levels to reach a given temperature objective. (Haroon Kheshgi, ExxonMobil Research and Engineering Company)	Noted: will ask WG1 to provide detail for they provide in final draft
3-522	A	109	1	109	4	Where did this table come from, and how was it generated? I suspect that it is a product of the CH 3 authors, as no reference is given as the source, and that the divisions are somewhat arbitrary. However, it can be generated somewhat rigorously using a logarithmic pdf for climate sensitivity, with the parameters of the pdf distribution (log mean and log standard deviation) specified in the table caption. I have done this in the attached Excel spreadsheet, using a pdf with 5th and 95h percentiles at 1.5 K and 4.5 K, respectively. Feel free to use the Table in the Excel spreadsheet. There are some differences between my version of Table 3.2 and what is in the SOD; maybe with an alternative climate sensitivity pdf, it will be possible to replicate the results in Table 3.12, but the reader is not told what pdf (if any) was used in generating Table 3.12. I suggest adding the comment that the boundary	Taken into account: a new process is in place to update the table with official WG1 approval hence we cannot use your data. (Original table was produced from draft WG1 material).

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						between the areas marked as "Very Likely" and "Likely" gives the temperature change that there is a 10% risk of exceeding for each CO2-equivalent concentration. With this information, it is useful to extend the temperature columns to higher warming (as I have done in my version of the figure). The column heading "best guess climate sensitivity" is incorrect; it should be "best guess equilibrium climate change", as "climate sensitivity" refers specifically to the equilibrium change for a CO2 doubling equivalent. (Danny Harvey, University of Toronto)	
3-523	A	109	6	113	23	This section largely overlaps with Chapter 19 of WG2. It is, nevertheless, useful to summarize the material in WG3, but I believe that it belongs in Chapter 1, in the context of the discussion of DAI. As it is, there is some overlap with the discussion in Chapter 1. (Danny Harvey, University of Toronto)	Reject – TSU requested brief summary included here
3-524	A	109	6	0	0	Section 3.5.3.1: In this section, as in earlier parts of this chapter (esp section 3.3), I am missing a clear statement about the long time scales it takes to reach equilibrium temperature, and also a reference to the different time scales of some of the impacts (some listed in table 3.13). Some impacts occur almost instantaneously with temperature (or at least within decades), whereas others take centuries to millennia (eg Greenland ice sheet - the melting could be reversible as long as temperatures drop again at some later stage in the 22nd or even 23rd century - we simply don't know at what point the melting process becomes irreversible). On the other hand, extinction of species is always irreversible. Omission of timescales and reversibility/irreversibility makes the discussion too simplistic and could be seen as misleading. Depending on what impact policymakers value most highly, some significant overshoot emission pathways leading to a given long-term stabilisation level could be entirely acceptable, whereas for other impacts, overshoot would be unacceptable. Since short-term mitigation actions are determined by the flexibility we assume for allowing overshoot, this is highly policy relevant and hence deserves a more critical assessment than the current draft provides. (Andy Reisinger, TSU IPCC Synthesis Report)	Taken into account – we will add text discussing the issue of timescales to reach equilibrium which in most cases is shorter than implied in your comment
3-525	A	109	11	109	11	A typographical error appears present? Table 3.12 (vs. 3.5)? U.S. Government (Government of U.S. Department of State)	Accept Done
3-526	A	109	14	109	15	I disagree – it is the climate sensitivity (the global mean warming for the specific forcing of a CO2 doubling) that provides the link between radiative forcing and key vulnerabilities (this is because global mean temperature change scales roughly linearly with radiative forcing, with the scaling factor being related to the climate	Noted – although your science is correct we are using temperature simply to link WG2 and WG3 material as this is the most convenient way to do so

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						sensitivity). (Danny Harvey, University of Toronto)	
3-527	A	109	17	109	19	Replace the sentence starting on line 17 with following: "WGII (Ch. 19) definition of key vulnerabilities IN THEORY takes into account not only predicted impacts but also the ability and potential of different systems to adapt to climate change (WGII, Ch. 19), HOWEVER, IN PRACTICE, CHANGES IN ADAPTIVE CAPACITY OVER TIME ARE RARELY INCORPORATED FULLY, IF AT ALL (GOKLANY 2003, 2005A, 2005C; TOL 2005A). SUCH INCREASES IN ADAPTIVE CAPACITY OUGHT TO OCCUR DUE TO SECULAR (I.E., TIME DEPENDENT) TECHNOLOGICAL DEVELOPMENT, AND GREATER LEVEL OF ECONOMIC GROWTH ASSUMED IN THE SCENARIOS USED TO DRIVE EMISSIONS IN THEIR ANALYSES, AS WELL AS IMPROVEMENTS IN HUMAN AND SOCIAL CAPITAL THAT WOULD LIKELY ACCOMPANY BOTH ECONOMIC GROWTH AND TECHNOLOGICAL CHANGE (GOKLANY 2006A). FOR SUCH REASONS THERE IS A TENDENCY TO OVERESTIMATE ADVERSE IMPACTS ON SOCIAL AND ECONOMIC SYSTEMS, WHILE UNDERESTIMATING POSITIVE CONSEQUENCES." [Note: Inserts are shown in UPPER CASE; deletions are not shown.]. See, also, above comments related to lines 27-31, page 102, this chapter. The authors may wish to consider whether the WGII (Ch. 19) definition of key vulnerabilities in theory takes into account not only predicted impacts but also the ability and potential of different systems to adapt to climate change (WGII, ch. 19), however, in practice, changes in adaptive capacity over time are rarely incorporated fully, if at all (Goklany 2003, 2005a, 2005c; Tol 2005a). such increases in adaptive capacity ought to occur due to secular (i.e., time dependent) technological development, and greater level of economic growth assumed in the scenarios used to drive emissions in their analyses, as well as improvements in human and social capital that would likely accompany both economic growth and technological change (Goklany 2006a). for such reasons there is a tendency to overestimate adverse impacts on social and economic systems, while underestimating positive consequences See, also, above comments related to lines 27-31, page 102, this chapter. Citations: (1) Goklany, IM. 2000a. Potential Consequences of Increasing Atmospheric CO2 Concentration Compared to Other Environmental Problems. Technology 7S: 189-213. (2) Goklany, IM. 2003. Relative Contributions of Global Warming to Various Climate Sensitive Risks, and Their Implications for Adaptation and Mitigation. Energy & Environment 14: 797-822. (3) Goklany, IM.	Rejected – as we explain in the text there are limits to adaptation and various simulations of damages have both over- or under-estimate adaptive capacity. The studies referred to omit consideration of extreme events and catastrophic change.

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						2005a. A Climate Policy for the Short and Medium Term: Stabilization or Adaptation? Energy & Environment 16: 667-680. (6) Goklany, IM. 2006a. Integrated Strategies to Reduce Vulnerability and Advance Adaptation, Mitigation, and Sustainable Development. Mitigation and Adaptation Response Strategies for Global Change, forthcoming. U.S. Government (Government of U.S. Department of State)	
3-533	A	111	0	0	0	Table 3.13: Please ensure full consistency of this table with any revisions undertaken by WGII. Also, it will not be clear to readers when the caption says "adapted from WGII" whether this table is identical, or whether it has been modified. It probably would be best to directly copy the table, and delete the word "adapted" in the caption. (Andy Reisinger, TSU IPCC Synthesis Report)	Accept – we are well aware of need and process is in hand
3-529	A	111	1	0	0	Table 3.13 really just replicates WG2. Why include it? It also replicates the mistakes -- this is an ad hoc, inconsistent collection of unrepresentative anecdotes. It contains no information whatsoever. (Richard Tol, Economic and Social Research Institute)	Reject – necessary to complete picture of mitigation adaptation and avoided damages
3-530	A	111	1	0	0	For a number of reasons, I have urged that the Tables in Chapter 19 of WG2 (from which Table 3.13 has been adapted) give impacts in terms of temperature changes since pre-industrial times (rather than since 1990) (one reason for this is that some other chapters in WG2 give impacts in terms of temperature changes since pre-industrial times, so at the moment there is no consistency within WG2). Obviously, you have to be consistent with whatever Ch 19 decides, so check to see what they decide to do for the final draft. (Danny Harvey, University of Toronto)	Noted – we will follow IPCC lead on this
3-531	A	111	1	112	1	Table 3.13 have been split into two pages inappropriately with one portrait page and one Landscape page. This Table may be adjusted to one page. (Muhammad Latif, Applied Systems Analysis Group)	Accept
3-532	A	111	1	0	0	table 3.11: not the standard terminology of confidence level; meaning of different fonts? (Bert Metz, IPCC)	Accept will address
3-166	B	111	1	112	1	The information in table 3.13 is clearly under the mandate of WG2 not WG3 and should be deleted - a reference to Chapter 19, WG2 would be more appropriate. (Government of Australia)	Reject – TSU requires us to cover this material here
3-167	B	113	1	113	15	Delete this explanation for Table 3.12 as it merely repeats the information contained in the Table. (Government of Australia)	Noted

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3-534	A	113	3	113	15	This discussion is not quite right. Given 5-95 percentiles for the pdf of climate sensitivity of 1.5 K and 4.5 K, respectively (this is the longstanding consensus, although recent work cited in the WG1 suggests much larger 95th percentiles for climate sensitivity), the following can be stated: "A CO2-equivalent concentration of 450 ppmv is likely to INCURR impacts associated with 1-3 K global mean warming above pre-industrial conditions, or 0.4-2.4 K warming above 1990. A CO2-equivalent concentration of 560 ppmv (which corresponds to a real CO2 concentration of 450 ppmv or even less) is likely to incur impacts associated with 1.5-4.5 K global mean warming above pre-industrial, or about 1-4 K above 1990." It seems to be better to say what is likely to be incurred (as in the above), rather than what is likely to be avoided, and to speak in terms of warming wrt pre-industrial conditions (optionally also wrt 1990) because the pre-industrial condition was close to a steady state. It is also clearer to state the assumed range of climate sensitivities, as in my opening comment. (Danny Harvey, University of Toronto)	Taken into account, note that we will follow WG1 lead on climate sensitivity range
3-535	A	113	3	113	9	Confusing description. Please re-write. U.S. Government (Government of U.S. Department of State)	Accept
3-536	A	113	8	113	8	Replace "3 degrees" with "2.4 degrees" since all other values have been given in relation to 1990, which is also the reference for the 2 to 4 degrees impact range in Table 3.13. (Government of Germany)	Accept done.
3-537	A	113	17	0	0	Insert "that" after "note" (Danny Harvey, University of Toronto)	Accept DONE
3-538	A	113	18	0	0	add "of the climate sensitivity" after 'distribution" (Bert Metz, IPCC)	Accept DONE
3-539	A	113	21	0	0	table 3.12 meant? (no risk information in 3.5) (Bert Metz, IPCC)	Accept DONE
3-540	A	113	21	113	21	Typo? Table 3.12 (vs. 3.5)? U.S. Government (Government of U.S. Department of State)	ACcept DONE
3-541	A	113	23	113	0	Citation for this statement? U.S. Government (Government of U.S. Department of State)	Noted
3-542	A	113	28	0	0	A temperature limit is not the only possible policy target. Another is a concentration limit, so after "such as" add "a concentration ceiling or" (Danny Harvey, University of Toronto)	Accept - will edit text
3-543	A	113	29	0	0	Harvey (2004) belongs in this list too. This paper assessed combinations of emissions and ocean C sequestration (with leakage) that stabilize atmospheric CO2	Noted – will consider including this work

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						at various concentrations. REFERENCE: Harvey, L.D.D. 2004. 'Declining temporal effectiveness of carbon sequestration: Implications for compliance with the United Nations Framework Convention on Climate Change', Climatic Change 63: 259-290. (Danny Harvey, University of Toronto)	
3-544	A	113	33	0	0	cost of what to whom? (Richard Tol, Economic and Social Research Institute)	Accept will explain
3-545	A	113	35	0	0	After the references, add "and the loss of windows of opportunity associated with irreversible urban planning decisions or building designs that do not take into account longterm emission constraints". Change "This could challenge" with "This will seriously compromise" (Danny Harvey, University of Toronto)	Accept DONE
3-546	A	113	36	0	0	Neither Hare nor Meinshausen is an ecologist. (Richard Tol, Economic and Social Research Institute)	Noted
3-547	A	113	38	0	0	Nicholls and Lowe is about sea level, not temperature; and adaptation is not problematic in their study. (Richard Tol, Economic and Social Research Institute)	Noted – will adapt text
3-548	A	113	42	114	33	I don't think that there is any evidence that delaying action will lower mitigation costs, while there is much evidence that it will increase costs (because greater rates of change are required later for a given target, and due to the loss of windows of opportunity and due to the delay in initiating learning-by-doing wert to technology). Thus, insert "may" before "appear". (Danny Harvey, University of Toronto)	Accept DONE
3-549	A	113	43	113	43	Define "overshoot pathways" for the lay reader. No definition found in this chapter. U.S. Government (Government of U.S. Department of State)	Accept
3-550	A	113	44	0	0	O'Neill and Oppenheimer is conceptual and qualitative. How can a conclusion like this follow? (Richard Tol, Economic and Social Research Institute)	Noted we will explain
3-561	A	114	0	0	0	table 3.14 does not belong here; could be merged with table 3.5 (Bert Metz, IPCC)	Reject – would create too many columns and table needs to be read in conjunction with both sections 3.5 and 3.3
3-551	A	114	2	114	9	issue of overshoot pathways is very relevant for policy making; try to elaborate more; reference to den Elzen (now in 3.5.2.2) fits here	Accept we will elaborate

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						(Bert Metz, IPCC)	
3-552	A	114	4	114	9	This is a bit like comparing apples and onions, since overshoot scenarios have been developed as an alternative to non-overshooting scenarios with similar mid-term emissions (say 2020) but lower stabilisation levels. So this sentence should be followed by "On the other hand, overshoot scenarios increase the probability of staying below a 2 C target when compared to non-overshoot scenarios with similar short to medium-term emission trajectories." (Government of Germany)	Noted although we may not be able to refer to a 2C target specifically
3-553	A	114	9	0	0	What is special about 2dC? As far as I know, the IPCC is a UN body, not an EU agency. (Richard Tol, Economic and Social Research Institute)	Noted we will explain we are not recommending a particular target
3-554	A	114	14	114	0	Table 3.14 - Two items: (1) Define "dnr", and (2) guidance is needed on how to interpret the ranges for the two "Year" columns. U.S. Government (Government of U.S. Department of State)	Accept
3-555	A	114	14	114	18	Table 3.14 should be adapted according to the proposed new categories (split of category A). Further, in the current setup, for category A the range of peaking (column 4) should read 2000-2030 (see page 54, line 16) (Government of Germany)	Noted we will consider this for final version
3-556	A	114	19	115	2	this is summary for 3.5.3 as a whole I think; then make this separate section 3.5.3.3; missing in this summary is the implication of stabilisation levels for probability to stay below ceertain T targets and the issue of overshoot profiles (used in most of the low level stabilisation scenarios and intersting policy implications) (Bert Metz, IPCC)	Accept we will address
3-557	A	114	35	115	2	Suggest add to this summary paragraph, perhaps as a short new paragraph. "Whether a society is risk-taking or risk-averse in the face of climate change is also an ethical issue, given that risk takers may impose future costs and limit development options of future generations." (Ralph Chapman, Victoria University of Wellington)	Taken in account – we will consider this further.
3-558	A	114	35	115	2	Given the uncertainties surrounding the magnitude and timing of climate change, its impacts, effects of mitigation measures, and the long-term and global nature of climate change, a traditional risk management tool would have limited usefulness in developing mitigation strategies and policies. It is also difficult to characterize a country, such as the U.S., risk averse or risk taking in responding to climate change. The authors may wish to consider whether given the uncertainties surrounding the magnitude and timing of climate change, its impacts, effects of mitigation measures, and the long-term and global nature of climate change, a traditional risk	Reject - Nothing here says that we are only including "traditional" risk management approaches (e.g. quantified) – rather risk management refers to a range of tools that allows both quantitative and qualitative tools to come together in a meaningful way -- careful reflection about climate change risk especially in deliberative, democratic policy-

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						management tool would have limited usefulness in developing mitigation strategies and policies. It is also difficult to characterize a country, such as the U.S., risk averse or risk taking in responding to climate change. U.S. Government (Government of U.S. Department of State)	setting contexts – bringing what we know about climate change together with stakeholder views to facilitate consensus on evidence and policy-relevant interpretations of the fact.
3-559	A	114	36	0	0	These last two sentences are unbalanced. They suggest that only climate change has risks, but that emission reduction is without risks or costs. (Richard Tol, Economic and Social Research Institute)	Reject – but we will make it clear we are talking about climate change risks here.
3-560	A	114	36	114	37	Please reconcile "(small) risk of triggering significant…abrupt climate change" with the text on page 105 (lines 20-27) that implies the opposite could be true. U.S. Government (Government of U.S. Department of State)	Accept – will attend to wording
3-562	A	115	4	127	8	section 3.6 heavily overlaps with 3.3 and 3.5; this overlap should be eliminated by moving material to 3.5 (discount rate issue) and deleting parts (particularly in 3.6.2.1- most of the material- , 3.6.2.2- most of the material- in relation to 3.5 and multi gas piece in 3.6.2.3 with respect to 3.3). It would be very unhelpful to have different discussions on the same issue in 3.5 and 3.6. removing the material from 3.5 is not an option, because of the importance of the issue of 3.5 for some of the big messages from this report in SPM. (Bert Metz, IPCC)	Accept – we have restructured
3-563	A	115	6	115	14	This discussion is all out-of-date. The issue now is the extent and duration of non-compliance with the UNFCCC, Article 2, as clearly shown in papers of mine referred to in previous comments. Current scientific uncertainty has no near term implications for emission policy as, for any plausible outcome of current uncertainties, stringent emission reductions are required for at least the next 3-4 decades. “Calibration” will consist of determining if and when (at some time after 2040) we can begin to slacken off in emission reductions. This is the inescapable conclusion of the summary of WG1 and WG2 of AR4, which can be represented by pdfs for climate sensitivity and for the threshold of global mean temperature change associated with large (and unacceptable) impacts (the latter pdf incorporates both uncertainty in impacts and disagreements concerning when the impacts become unacceptable) . (Danny Harvey, University of Toronto)	Taken into account. We cannot be policy prescriptive but our analysis of avoided damages and different stabilization levels will show when emissions would need to be reduced by to avoid risks of key vulnerabilities from Ch 19 in WG2. This will indicate what is necessary to comply with Article 2. However, this analysis may or may not be based on pdfs of climate sensitivity, since we will follow a WG1 lead on this issue.
3-564	A	115	22	115	24	Premature retirement of existing equipment is a non-issue; there are plenty of other things that can be done during the initial stages of emission reduction, and we can wait to replace equipment as part of natural turnover IF we begin emission	Taken into account

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						reductions policies now. Raising the non-issue of premature retirement of existing equipment just clouds the issue and diverts attention from the need to begin emission reductions now. (Danny Harvey, University of Toronto)	
3-565	A	115	35	115	40	How about giving some examples and references of models mentioned in this paragraph. (REF!)	Accepted
3-566	A	115	38	0	0	"They both" : it is unclear what "both" refers to. (Stephane Hallegatte, Météo-France)	Accept
3-168	B	117	5	117	5	This Figure should be numbered 3.47 not 3.6-1. (Government of Australia)	Accept
3-567	A	117	20	117	24	This section should include an introductory sentence alluding to previous sections of this chapter, which highlight the importance of early, well designed, policy actions (noting the comment above on the Tyndall Centre Briefing) to maximise the potential to influence near-term investment decisions in infrastructure, as well as the development and deployment of new and existing technology; and the impact that policy uncertainty has on investment, and market confidence that governments are taking climate change seriously. (Kirsty Hamilton, Chatham House; UK Business Council for Sustainable Energy)	Accept that we need a bridging passage to this effect
3-568	A	117	25	118	41	This section is nothing more than the personal opinion of whoever happened to write it. (Danny Harvey, University of Toronto)	Disagree : this section is based upon the well established literature
3-569	A	118	1	118	4	I flatly disagree with these statements, for reasons explained in my comments to page 45, lines 29-49. (Danny Harvey, University of Toronto)	Your comments on p45 do not change fact that in practice concentration ceilings are treated as a surrogate for dangerous anthropogenic climate change, which is the objective of UNFCCC
3-570	A	118	8	118	9	What? The opposite is true – using temperature ceilings sidesteps the whole issue of uncertainty because it requires ASSUMING some climate sensitivity in going from the given temperature ceiling to GHG concentration, which must be done in order to deduce allowed emissions. As Article 2 calls for the prevention of "danger", the only thing that can be done is to work out the allowed concentrations given some plausible upper limit for climate sensitivity (or using a pdf for climate sensitivity and for the harm threshold). (Danny Harvey, University of Toronto)	We agree – there is a wording problem which we will rectify
3-571	A	118	8	118	16	It seems odd to cite the TAR here. Could you use the findings of the AR4 WG1	Accept- we will try to include the new

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						assessment? (Andy Reisinger, TSU IPCC Synthesis Report)	information from AR4
3-572	A	118	18	118	22	This statement is so obviously self-evident that it does not need the IPCC to state it backed up by a long string of references. (Danny Harvey, University of Toronto)	Agree but still necessary to say this
3-573	A	118	31	0	0	Too vague (Danny Harvey, University of Toronto)	Agree will explain
3-574	A	118	33	118	41	These are all valid points. (Danny Harvey, University of Toronto)	Agree
3-575	A	118	43	120	2	I recommend entirely deleting Section 3.6.2.2, as it centers around a cost-benefit analysis approach to deciding how much to reduce emissions, which is contrary to Article 2 of the UNFCCC. For example, Article 2 calls for the preservation of ecosystems, period (without reference to their market value to humans). Furthermore, CBA requires consideration of the potential impacts of climatic change, which is the subject of WG2, not WG3. Finally, Chapter 3 has become too long (the really good stuff is in the first two thirds; now it just become tedious to keep reading). (Danny Harvey, University of Toronto)	Reject because we are reviewing the literature and the literature includes CBA
3-576	A	118	43	120	2	Section 3.6.2.2 seems to be looking for literature references to justify early action, and discounting references (such as the WRE work and its successors) that argue for slower initial approaches. U.S. Government (Government of U.S. Department of State)	Taken into account: we will give this careful consideration during the revision
3-169	B	118	43	120	5	Section 3.6.2.2 on assumptions concerning cost-benefit functions, should include discussion illustrating that assumptions (and how those assumptions are modelled) have important ramifications for the costs of emissions abatement. (Government of Australia)	Accept . Rearrangment of 3.5 and 3.6 will allow incorporation of this.
3-577	A	119	8	119	17	This is a completely abstract argument that is based entirely on the assumption that it is permissible to trade off increasing climate "damage" (which includes species extinction and human death) against increases in material consumption. It implicitly assumes a willingness to not comply with Article 2 of the UNFCCC, and a willingness to impose involuntary risks on others. The conclusions are an artifact of discounting, which is contrary to the risk-averse and fiduciary trust nature of Article 2. All of the assumptions are contrary to the way most people think, and so have no relevance to the real world. This work does not merit mention by the IPCC. (Danny Harvey, University of Toronto)	Reject because cost benefit analysis is part of the literature. We actually spend much of the section pointing out the disadvantages of the approach and hence review other approaches which could be used in a risk management approach such as tolerable windows, scenario analysis etc
3-578	A	119	8	119	17	Does the conclusion that the higher the exponent, the lower the optimal short term	The answer is yes and we will explain better

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						abatement hold true if discount rates are assumed to decline over time as discussed elsewhere in the AR IV? U.S. Government (Government of U.S. Department of State)	
3-579	A	119	19	119	27	This paragraph needs to be substantially revised. It assumes that any surprises or discontinuities are going to be unpleasant, but this is not a proven fact. Surprises and discontinuities may also cut the other way, particularly given the uncertainties in knowledge about the climate system. Although there is more literature on unpleasant surprises, that may be because more effort has gone into identifying them, but pleasant surprises or surprises not related to GHG emissions cannot be ruled out. If one insists on including the risks of surprises or abrupt climate change, then one should do this based on a systematic cataloguing of the universe of possibilities instead of an anecdotal (or catch-as-catch-can) approach, and then one has to assign probabilities to their impacts. If a systematic approach to identifying surprises is not used, it is possible to end up with polices that are essentially inappropriately skewed toward addressing these anecdotes. The authors may wish to consider whether this paragraph assumes that any surprises or discontinuities are going to be unpleasant, but this is not a proven fact. Surprises and discontinuities may also cut the other way, particularly given the uncertainties in knowledge about the climate system. Although there is more literature on unpleasant surprises, that may be because more effort has gone into identifying them, but pleasant surprises or surprises not related to GHG emissions cannot be ruled out. If one insists on including the risks of surprises or abrupt climate change, then one should do this based on a systematic cataloguing of the universe of possibilities instead of an anecdotal (or catch-as-catch-can) approach, and then one has to assign probabilities to their impacts. If a systematic approach to identifying surprises is not used, the results could be polices that are essentially inappropriately skewed toward addressing these anecdotes. U.S. Government (Government of U.S. Department of State)	Reject – section is based on literature review and we did not find literature on pleasant surprises
3-170	B	119	21	119	21	Replace "carbon tax" with "emissions price", as it is the costs placed on emitting, rather than the form that that cost takes, which is important in this instance. (Government of Australia)	Agree will do
3-580	A	119	22	119	24	The sentence of "Azar and Schneider …" should be deleted due to the following reasons. 1) The litterature will not be a reviewed paper. 2) The original descriptions would be lead from the paper of Mastrandrea and Schneider, Climate Policy, 2001. However, the paper only attempted the sensitivity analyses regarding to global warming impacts of THC with the ranges assumed by aurthors and obtained a wide	We will investigate

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						range of the optimal emission profiles. the description in the paper by Azar and Schneider cannot be lead from the results of the paper by Mastrandrea and Schneider. (the same comment to TS, p. 34) (Keigo Akimoto, Research Institute of Innovative Technology for the Earth (RITE))	
3-581	A	119	34	119	37	This is a completely vacuous argument that does not merit serious consideration, much less mention by the IPCC. First, we do not know for sure where the thresholds lie. Second, there is likely to be a whole string of thresholds for various catastrophes at increasing global mean temperature changes. Even if we can't avoid the first, we might be able to avoid the second or third and subsequent catastrophes. Thirdly, most of the world I think is interested in more than economic soundness; not everyone has been reduced to an economic-optimizing machine divorced of any moral or ethical considerations. (Danny Harvey, University of Toronto)	We disagree – counter examples appear in the literature. This type of exercise is made in order to inform the reader and let him make the appropriate choice for his own ethic
3-582	A	119	34	119	40	This should be deleted from "Together with ..." until "...pointed out by." because this relys on the very theoretical (and most probably wrong) assumption, that there is only one threshold for triggering large scale irreversible damages. It could be misleading to fatalism towards seemingly unavoidable climate change. (Government of Germany)	We don't disagree so we will clarify the statement
3-583	A	119	37	119	39	This is based on the assumption that a temporary overshoot is safe. This may be the case wrt collapse of the Greenland Ice Sheet or of the West Antarctic Ice Sheet, although we don't know how long of an overshoot is safe. It is probably not true for collapse of coral reef ecosystems. Thus, the arguments here are very flimsy. (Danny Harvey, University of Toronto)	The sentence was not meant to imply that overshoot is safe – we will clarify
3-584	A	119	39	0	0	The term "exaggerated" is a value laden term that reflects the personal bias of whoever this sentence, and it should be replaced with a neutral term if the entire section is not deleted altogether. (Danny Harvey, University of Toronto)	Agree - we will change the wording
3-585	A	119	43	119	48	This material should be reworded to make it clear that you are not suggesting that we wait until 2040 before deciding what to do. As clearly shown in Harvey (2006), there is no plausible outcome of current scientific uncertainty that eliminates the need for at least several decades of stringent emission reductions, beginning now. A more refined estimate of climate sensitivity may tell as that we can slacken off some time after 2040 as far as avoiding too large a climatic change is concerned, but consideration of the chemical effects of absorption of CO2 by the oceans (which are completely independent of climate sensitivity) still require significant	Agree – we will clarify – window of opportunity was not meant to imply that we do nothing before 2040 so we will clarify

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						constraints on CO2 emissions and an eventual phase out if we are to avoid what are almost certain to be severe negative impacts on the marine biota. REFERENCE: Harvey, L.D.D.: 2006, 'Plausible resolution of uncertainties in global-warming science has no near-term practical implications for climate policy', Climate Policy (submitted). (Danny Harvey, University of Toronto)	
3-586	A	120	4	0	0	Page 120 Section 3.6.2.3 The title of this section should be changed since this section mainly describes roles of biological and geological carbon sequestration as well as multi-gas instead of timing of action on non-Co2 gases and on carbon sequestration. (Wenying Chen, Energy, Environment, and Economics Research Institue, Tsinghua Univerisity)	This has been taken care of by a rewrite
3-587	A	120	4	121	48	this section could better be called "impermanent mitigation options" , which would be a nice title for a discussion on the value of such impermanent options. A more precise summary of the IPCC CCS report findings on this (see SPM and TS) is needed (current ones too superficial) (Bert Metz, IPCC)	See above
3-588	A	120	23	120	26	This is too general a statement to be correct. For example, the effect of stabilization at 450 ppmv instead of 750 ppmv is surely much more important than the particular pathway (within reason) used to reach 450 ppmv. (Danny Harvey, University of Toronto)	We will clarify
3-589	A	120	29	120	30	Add sentence illustrating that those CCSs are temporal reservoirs and options allowing delay of introducing other technologies, as long as they are guarantteed relative economic advantage and environmental safety. (Shuzo Nishioka, National Institute for Environmental Studies)	Disagree – CCS may be in part a permanent reservoir
3-590	A	120	29	120	30	This statement assumes that the cost of CCS is less than the additional alternative mitigation measures that would be taken in its place, but it is not at all clear that this is true. Thus, the statement is really just a reflection of the unstated assumptions of whoever wrote this sentence. It must be modified. (Danny Harvey, University of Toronto)	We will clarify within the space constraints
3-591	A	120	31	120	32	Add a line explaining how CCS is supposed to lead to an expansion of non-fossil fuel methods of generating electricity. (Danny Harvey, University of Toronto)	Disgaree
3-592	A	120	46	120	46	Please, add the following text: "Korhonen et al. (2002) concluded that the	We will try to consider this within the space

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						impermanent sequestering of carbon in the ecosystem can even contradict the objective of CO2 stabilisation in the atmosphere. The estimated benefit due to impermanent carbon sequestration depend on the time frame considered, wheather one is interested in limiting the rate of the climate change in decadal scale or halting the climate change in centennial scale." Ref.: Korhonen, R., Pingoud, K., Savolainen, I., Matthews, R.: The role of carbon sequestration and the tonne-year approach in fulfilling the objective of Climate Convention. Environmental Science and Policy, Vol 5, 2002, pp. 429-441. (Government of Finland)	constraints of the chapter
3-593	A	121	24	0	0	Add " Read and Parshotam (2006) extend the previous result, based on forestry and forest biomass only, by including agricultural land use improvements (with sugar cane in tropical regions and switchgrass in temperate regions) and using FAO estimates of land availability (Bot et al, 2000). They assume a daunting rate of land use improvement, assumed to be driven by rising concerns over abrupt climate change, to derive a return to pre-industrial CO2 levels before 2040, with a substantial contribution coming from carbon stored through the growth of a strategic stock of biomass raw material in new plantations. With stabilisation achieved, land can subsequently revert to food production in the latter half of the century, when more advanced zero emissions technologies, such as PV's are cheaply available. " (Peter Read, Massey University)	This is not the biomass chapter
3-594	A	121	24	121	24	Add " Read and Parshotam (2006) extend the previous result, based on forestry and forest biomass only, by including agricultural land use improvements (with sugar cane in tropical regions and switchgrass in temperate regions) and using FAO estimates of land availability (Bot et al, 2000). They assume a daunting rate of land use improvement, assumed to be driven by rising concerns over abrupt climate change, to derive a return to pre-industrial CO2 levels before 2040, with a substantial contribution coming from carbon stored through the growth of a strategic stock of biomass raw material in new plantations. With stabilisation achieved, land can subsequently revert to food production in the latter half of the century, when more advanced zero emissions technologies, such as PV's are cheaply available. " (Peter Read, Massey University)	This is not the biomass chapter
3-595	A	122	1	0	0	Page 122 Section 3.6.3 This section explained different sectors' mitigation potentials in 2030 for stabilization targets in order to evaluate short-term mitigation	The technology list for 2020 and 2030 discussed in chapter 4 to 9. And global models

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						opportunities in long-term stabilization scenarios. It would be more understandable if tables with assumptions (cost, efficiency, application scale etc.) for main mitigation technologies in 2030 from the models can be illustrated. (Wenying Chen, Energy, Environment, and Economics Research Institue, Tsinghua Univerisity)	have different modeling methodologies for technology progress.
3-596	A	122	12	0	0	make reference to respective section in ch 11 (Bert Metz, IPCC)	Accept
3-597	A	122	16	0	0	delete "short-term" (reserved for <2030) (Bert Metz, IPCC)	Accept
3-598	A	123	1	0	0	Table 3.15, Page 123: WIAGEM: please change my affiliation: Humboldt University and DIW Berlin (instead of SPEED, Oldenburg) (Claudia Kemfert, German Institute for Economic Research)	Accept
3-172	B	123	1	0	0	Table 3.15, Page 123: WIAGEM: please change my affiliation: Humboldt University and DIW Berlin (instead of SPEED, Oldenburg) (Government of Germany)	Accept
3-599	A	124	23	0	0	fig 3.33 is in land-use section; does not seem to be appropriate reference here (Bert Metz, IPCC)	We will clarify
3-600	A	125	1	0	0	Table 3.16: why are the MACs of the base year shown instead of 2030? (Claudia Kemfert, German Institute for Economic Research)	This is given by lecture review for these studies, it is hard to change the target here. Here a note on relationship among 550ppmv, 4.5W/m2 and 2C will be added, to be understandable for readers who do not know this very well.
3-601	A	125	1	126	0	Page 125,126 Table 3.16, 3.17 The stabilization target in this Table is expressed by several different ways, e.g., ppmv, W/m2, and temperature. It is suggest to use ppmv only considering there are a relationship between ppmv, radiation and temperature. (Wenying Chen, Energy, Environment, and Economics Research Institue, Tsinghua Univerisity)	In this session, purpose is to link the long term mitigation with short term mitigation, it is good to present the sector based mitigation potential from long-term mitigation modelers, to compare with the result from chapter 4 to 10, which could provide useful information for readers.
3-602	A	125	1	126	0	Tables 3.16 and 3.17. Similar to Table TS.7. Given the wide variability in the numbers for any one sector, plus all the differences in the sectoral classifications between the models and the chapter 4-10 classifications, I would recommend deleting the "sector mitigation potentials" and just including the "Global Total" in this table. Also, it's troubling to see numbers from these models presented as 5 significant figures...suggest rounding to 2-3 sign. figures and using scientific	We will check

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						notation. (,)	
3-603	A	125	1	125	5	WIAGEM seems to be misplaced in the 4-5 W/m2 category and should be moved to Table 3.17. This would change the range in page 126, line 4 to $9/tCO2eq to $190/tCO2eq (Government of Germany)	Accept
3-171	B	125	1	0	0	Table 3.16: why are the MACs of the base year shown instead of 2030? (Government of Germany)	Accept Done
3-604	A	126	6	0	0	table 3.17: lay-out to be improved (Bert Metz, IPCC)	Accept will do
3-605	A	127	9	0	0	figure 3.48 (and tables 3 16 and 3.17): sectoral data differ considrably from bottom-up data in ch 11; is caused to a large extent by different sectoral breakdowns in long-term global models (as far as I know); if this is indeed the case and no correction can be made, such sectoral breakdown data from global models can better be deleted, because it confuse the comparison with bottom up information; (Bert Metz, IPCC)	Accept
3-606	A	127	10	128	0	Figure .3.48 a) Need to explain WHICH models are included in this figure which gives min, max, and median values. Is median value meaningful in this context given the differences between models? .b) Not possible to read numbers with smaller bars--would recommend using log scale for Y axis and giving min and max only so that results which span more than one order of magnitude can be seen. (,)	Accept
3-607	A	129	5	129	5	correct title of the article is "The Economics of Inaction on Climate Change: A Sensitivity Analysis" (Frank Ackerman, Global Development and Environment Institute, Tufts University)	Accept
3-608	A	131	15	131	18	The publication should be cited as follows: Bruckner, T., K. Zickfeld: Low Risk Emissions Corridors for Safeguarding the Atlantic Thermohaline Circulation, Paper presented at the Expert Workshop on Greenhouse Gas Emissions and Abrupt Climate Change, September 30, 2004, Paris (http://www.iet.tu-berlin.de/~bruckner/Publications/paris04.pdf), submitted to Mitigation and Adaptation Strategies for Global Change. (Thomas Bruckner, Technical University of Berlin)	Accept, bring to cross cutting issues
3-609	A	134	15	134	15	Please spell my family name correctly. (Leo Schrattenholzer, IIASA)	Accept

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3-610	A	137	17	137	47	"Comment on reference title: The same reference name throughout the report would be better for readers, i.e. Intergovernmental Panel on Climate Change or IPCC. In addition, text also describes the same reference name." (Koichi Mizuno, National Institute of Advanced Industrial Science and Technology)	Accept
3-611	A	139	7	139	9	Correct citation: Kemfert, C. and K. Schumacher, 2005: Costs of Inaction and Costs of Delayed Action in Climate Protection: Assessment of Costs of Inaction or Delayed Action of Climate Protection and Climate Change. DIW Berlin. (Government of Germany)	Accept
3-612	A	140	24	0	0	This paper appeared in the Portuguese Economic Journal, 3, 99-114. (Richard Tol, Economic and Social Research Institute)	Accept