WMO

INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE

UNEP

IPCC Fourth Assessment Report

Expert/Government Review of the Second-Order Draft

Chapter 2

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
2-167	A	½	19	12	24	What on earth are you trying to say? Please begin with just one key idea, written in the simplest and most straightforward language possible. (Danny Harvey, University of Toronto)	Noted Write Assessment of SD and cc in this report considers how current development can be made more sustainable. Focus is on how development goals like health, education, energy, food, and water access can be achieved without compromising the global climate. Delete last line
2-1	A	0	0	0	0	in general this chapter is too broad. Should be more abstract nature of definitions (NOIM UDDIN, Macquarie University, Sydney)	NOTED broad coverage of chapter determined by IPCC plenary decision on content and section headings of chapter 2 and therefore constituted terms of reference for Chapter 2 authors. As no specific suggestions were offered in comment, no concrete rewording of chapter was done.
2-2	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 overlooked in the SOD, although it was brought to attention previously in my comments on the FOD. 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). In this Chapter the matter can be dealt with partly as suggested for Chapter 1, by references to "emissions reductions" being replaced by references to "net emissions reductions" with a brief additional sentence to explain why (unless it is felt to be OK to leave the explanatory sentence to appear only once, i.e. in Chapter 1). Additionally I propose some additional wording as section 2.3.4a in my detailed comments below, for which the best reference is Read and Parshotam (2006). However, this is still 'gray' and a sufficient basis for the suggested amendments to this Chapter is Read and Lermit (2005) and Read (2006).	REJECTED the relative balance of sink enhancements or atmospheric CO2 concentration management as opposed to (narrow) emissions reduction measures are covered in the comprehensive sectorial overview in chapter 4-10. It is only the combination of all sectorial measures that need basically a detailed modeling approach in order to determine actual "net" emissions. this technical calculations/concepts are felt inappropriate for a broad overview/framing chapter in which no specific numbers of emission reductions are discussed.

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						(Peter Read, Massey University)	
2-3	A	0	0	0	0	There are a number of places in this Chapter where the assumed very long term nature of the climate change problem drives the argument, an assumption that is becoming increasingly unreliable as evidenced by the discussion in section 2.3.4. and my proposed addition to it. It is suggested that this difficulty be handled by inserting the word "assumed" at various places (as detailed in my specific comments on various pages and lines) together with a brief footnote explanation at the first occurrence on p3. (Peter Read, Massey University)	REJECTED The long-term nature of the climate problem is well acknowledged, and discussing it in the chapter does not mean that shorter-term unfoldings of climate impacts are ignored. rather to the contrary: The chapter notes on various instances the concept of committed warming/climate change, i.e. some changes have already unfolded in the past.
2-4	A	0	0	0	0	There are a number of places in this Chapter where the assumed very long term nature of the climate change problem drives the argument, an assumption that is becoming increasingly unreliable as evidenced by the discussion in section 2.3.4. and my proposed addition to it. It is suggested that this difficulty be handled by inserting the word "assumed" at various places (as detailed in my specific comments on various pages and lines) together with a brief footnote explanation at the first occurrence on p3. (Peter Read, Massey University)	REJECTED see c.2-3 above
2-5	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 overlooked in the SOD, although it was brought to attention previously in my comments on the FOD. 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). In this Chapter the matter can be dealt with partly as suggested for Chapter 1, by references to "emissions reductions" being replaced by references to "net emissions reductions" with a brief additional sentence to explain why (unless it is felt to be OK to leave the explanatory sentence to appear only once, i.e. in Chapter 1). Additionally I propose some additional wording as section 2.3.4a in my detailed comments below, for which the best reference is Read and Parshotam (2006). However, this is still 'gray' and a sufficient basis for the suggested amendments to	REJECTED see c.2-2 above

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						this Chapter is Read and Lermit (2005) and Read (2006). (Peter Read, Massey University)	
2-6	A	0	0	0	0	What type of policy measures are found in the financial instruments option that can included for chapter 2 and 12? (Expert Review Meeting Paris, IPCC)	NOTED Issue of financial instruments is dealt with in chapter 13..
2-7	A	0	0	0	0	this chapter does not offer any practical solutions and is too academic (Expert Review Meeting Paris, IPCC)	REJECTED writing team disagrees with comment on "too academic" nature. This is a scientific assessment. As a framing chapter it has not the objective to offer "practical solutions" but describes theoretical and conceptual issues/models that need to be considered in assessing "practical solutions".
2-8	A	0	0	0	0	the language for distributive justice and equity is not accurate and is biased (Expert Review Meeting Paris, IPCC)	Noted, will be considered in 2.7
2-9	A	0	0	0	0	the discussion between adaptation and mitigation is being overlooked. (Expert Review Meeting Paris, IPCC)	Noted, will be cindered 2.6
2-10	A	0	0	0	0	discussion on SD- still not clear in chapters 2 or 12. This section needs to be revised. The institutional issue- the difference between developing countries and developed countries is not mentioned in a clear manner. (Expert Review Meeting Paris, IPCC)	NOTED SD discussion has been harmonized in joint meetings between Ch 2 and Ch12, text in the chapters has been modified and harmonized. The details of this harmonization can be seen in a special version of the SD subsection, where text integrated from chapter 12 is marked.
2-11	A	0	0	0	0	Definitions found in chapter 2 should be better linked with the rest of the report. Adaptative capacity is very different from adaptation! This differentiation should be made in the chapter on this. Issue of distributive justice and equity- this does not seem to be a framing exercise. This chapter goes into too much detail on this. The differences between developed and developing countries. (Expert Review Meeting Paris, IPCC)	NOTED. Concern of consistent terminology communicated to other chapters
2-12	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	REJECTED ethical issues are dealt with at length in Section 2.7

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						determine 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 discussed here or in Chapter 3 (they 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: 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)	
2-13	A	0	0	0	0	It is a pity that paragraphs on legal issues which were included in the first order draft (page 64, line 37 - page 65, line 8 and paragraph 2.7.8 Legal Issues Including Liability and Compensation Aspects) are not included in the second draft. This issue is important and many development are taking place. (Gert de Gans, Kerkinactie / ICCO)	NOTED original text was deleted since we thought that it could not stay in the short form, but required much more elaboration. We also recognized that the legal issues are more elaborated in Chapters 12 and 13.
2-14	A	0	0	0	0	In this chapter I am missing a paragraph on human behaviour and changes in it, with regard to consumption patterns and climate change mitigation. (Gert de Gans, Kerkinactie / ICCO)	TIC, consumption patters and lifestyles are discussed in sections 2.2 and 2.6
2-15	A	0	0	0	0	I have serious doubts whether it is worth the IPCC's Fourth Assessment devoting 102 pages to this material (despite my personal interests and past experience which includes running a very senior course in decision-making under risk and uncertainty, and writing about it). The summary in the Technical Summary covers most of the Chapter's material succinctly and well. (Michael Jefferson, World Renewable Energy Network & Congresses)	NOTED length will be reduced
2-16	A	0	0	0	0	There is no clear discussion of differences between developing and developed countries. Introduction of some development indicators might be useful to illustrate differences among countries. The current division for developed, developing and EITs countries is not flexible enough to reflect the reality of these countries and additional factors that they have to deal with while addressing climate change.	REJECTED see particularly section 2.6.1 and 2.7 with deals with distributional equity aspects

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						Institutional setup, involvement of stakeholders, access to information, healthcare, education, and other factors influence the way the countries deal with climate mitigation and adaptation. It is not clearly reflected in the chapter. (Ellina Levina, OECD)	
2-17	A	0	0	0	0	The chapter discusses at various occasions the issue of decision making for the long-term uncertain future. Because looking to infinity is impossible, there are suggestions to somewhere fix milestones in the foreseeable future, e.g. to change over from a constant to a declining discount rate. The method of setting C increase / radiative forcing limits at the milestones opens the floor for defining more complete intermediate and terminal conditions on particular developments such as energy use, technology development, etc. This is what "back-casting" implies, and the question of this comment is: why is back-casting not even mentioned in this chapter? (Aviel VERBRUGGEN, University of Antwerp)	NOTED declining discount rates are discussed in section 2.5.1.1. presumably "back-casting" is meant to refer to inverse calculations. These are reviewed in detail for different time horizons in chapters 3 and 11.
2-18	A	0	0	0	0	This chapter is far too long and needs to be re-written in order to have a meaningful impact on the rest of the report, otherwise there is the danger of being overlooked completely (Rutu Dave, IPCC WGIII TSU)	NOTED chapter will be shortened
2-19	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. (Government of UK)	NOTED issue discussed at LA meeting. Final harmonization checks will be assured by TSU.
2-20	A	0	0	0	0	In this chapter, there are no special sections to evaluate current implementations of made decisions, no matter international conventions or national regulations. This is very important and shouldn't be ignored. (Government of China Meteorological Administration)	NOTED Kyoto protocol explicitly referred to in Sections 2.5 and 2.6 Specific national regulations/initiatives cannot be discussed in a framing chapter.
2-21	A	0	0	0	0	The chapter would require a deep revision. (Government of Spain)	NOTED revision in progress.
2-22	A	0	0	0	0	Many references quoted in the main text are missing in the reference list at the end of the chapter. For instance, most references in page 10 (lines 5-40) are not included in the reference list. (Government of Spain)	ACCEPTED references will be completed
2-1	B	0	0	0	0	Section 2.7 is very academic and dense, to the point of being inaccessible to the non-specialist. Further, there are places where the discussion of equity frequently	REJECTED different equity principles emerge out of

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						veers into value-laden language (i.e., section 2.7.4 statements about what a "sense of justice suggests…") Such normative statements should not be made by the IPCC, and such language should be removed. U.S. Government (Government of U.S. Department of State)	different value systems. Discussion of those does not constitute a value bias in view of the writing team, as different value systems and equity principles are discussed next to each other without any endorsement of any particulars.
2-23	A	0	1	0	0	This chapter provides a very rich commentary on a wide range of issues related to climate change response, including the relationships between response measures (adaptation and mitigation) and the important role of the national/regional decision--making context (including state of development). It is well placed to compliment the results-based discussions elsewhere in the WGIII document, and also links well with WGII. (Cohen Stewart, Environment Canada)	NOTED thank you
2-24	A	0	1	0	0	This chapter provides a very rich commentary on a wide range of issues related to climate change response, including the relationships between response measures (adaptation and mitigation) and the important role of the national/regional decision--making context (including state of development). It is well placed to compliment the results-based discussions elsewhere in the WGIII document, and also links well with WGII. (Cohen Stewart, Environment Canada)	NOTED thank you
2-25	A	3	8	0	0	modify to: "environmental, social, and economic" (Grassl Hartmut, Max Planck Institute for Meteorology)	REJECTED sequence reflects SD definition as given by UN (e.g. MDG)
2-26	A	3	14	3	13	Add "may" before "enhance and inhibit". (Government of China Meteorological Administration)	ACCEPTED
2-2	B	3	15	3	18	Suggest reversing the order of 3 groups mentioned. (Government of Australia)	ACCEPTED
2-27	A	3	22	3	22	….from human voluntary….". Delete the word "human" or rephrase. (Government of India)	ACCEPTED
2-28	A	3	24	3	26	This sentence misses the relevant point. The main difficulty for natural science is not changes in the scientific truth but the complexity of phenomena which are not always know with sufficient accuracy and which available computers are not powerful enough to project into the future without uncertainties. (Government of France)	ACCEPTED text modified
2-29	A	3	26	3	26	Change "scientific truth" to "scientific conclusions." Truth is an absolute, but all science is provisional, subject to modification as new evidence or understanding	ACCEPTED text modified

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						becomes available. There is considerable misunderstanding about this concept, and IPCC should not add to that misunderstanding by using the word “truth” in an incorrect context. (Lenny Bernstein, L. S. Bernstein & Associates, L.L.C.)	
2-3	B	3	26	3	26	Change “scientific truth” to “scientific conclusions.” Truth is an absolute, but all science is provisional, subject to modification as new evidence or understanding becomes available. There is considerable misunderstanding about this concept, and IPCC should not add to that misunderstanding by using the word “truth” in an incorrect context. U.S. Government (Government of U.S. Department of State)	ACCEPTED text modified
2-4	B	3	27	0	0	Replace “disclosed” with “estimated”. U.S. Government (Government of U.S. Department of State)	ACCEPTED
2-30	A	3	28	0	0	correct to: "emphasises" (Grassl Hartmut, Max Planck Institute for Meteorology)	ACCEPTED
2-31	A	3	29	3	29	Add summary point from section 2.3.4 (page 21, line 48 to page 22, line 10): "The conventional decision axiom of maximising expected monetary value of policy decisions might not be appropriate. Non-conventional decision criteria to avoid specific unacceptable outcomes even if at a low probability might be required to make robust decisions." (Government of Germany)	ACCEPTED text from subsequent section brought forward
2-32	A	3	32	3	32	"….at project, firm technology, sectoral……". Insert comma (,) after "firm" (Government of India)	ACCEPTED
2-33	A	3	32	3	32	Add a comma between "firm" and "technology". (Government of China Meteorological Administration)	ACCEPTED
2-34	A	3	35	0	0	after "over" insert "assumed" and from "assumed" hang new footnote "Increased understanding of feedback effects in the non-linear dynamics of the climate system, discussed in section 2.3.4, suggest that raised levels of greenhouse gases may precipitate an abrupt climate change event somewhat earlier than the very long term that has hitherto characterised mitigation studies. We draw attention to this by inserting the word 'assumed' in front of 'very long term' at points in this Report where it is appropriate to remind the reader of this concern." (Peter Read, Massey University)	REJECTED see c2-3 above
2-35	A	3	35	3	35	after "over" insert "assumed" and from "assumed" hang new footnote "Increased understanding of feedback effects in the non-linear dynamics of the climate system, discussed in section 2.3.4, suggest that raised levels of greenhouse gases may precipitate an abrupt climate change event somewhat earlier than the very long term	REJECTED see c2-3 above

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						that has hitherto characterised mitigation studies. We draw attention to this by inserting the word 'assumed' in front of 'very long term' at points in this Report where it is appropriate to remind the reader of this concern." (Peter Read, Massey University)	
2-36	A	3	39	0	0	correct to: "literature uses" (Grassl Hartmut, Max Planck Institute for Meteorology)	ACCEPTED
2-37	A	3	39	3	39	" Much of the literature use constant…….". Change “use” to “uses” (Government of India)	ACCEPTED
2-38	A	3	47	3	47	"It is concluded….condition societies'…….". Change “condition” to “conditions” (Government of India)	Rejected, this is not correct language
2-5	B	3	49	0	0	To the factors listed on line 49 add the following: “social, economic and environmental costs of the policies”. U.S. Government (Government of U.S. Department of State)	ACCEPTED
2-39	A	4	6	4	6	It should be pointed out that the stakeholders on equity are distributed in both spatial (international and intranational) and temporal (intergeneration and intrageneration) axis. The original text touches upon interregional and intergenerational equity only. (Shunsuke Mori, Tokyo University of Science)	ACCEPTED
2-40	A	4	13	4	13	"…assessment would be to assess welfare losses…….". Replace “would be to assess” by “evaluates” (Government of India)	ACCEPTED
2-41	A	4	20	4	22	"Social context" should be also added as one of the critical reason. Acceptability of nuclear power is just the example. (Shunsuke Mori, Tokyo University of Science)	ACCEPTED
2-6	B	4	20	4	21	As constructed, the first sentence in this paragraph suggests that emission reductions are perhaps the only way to reduce “climate change concerns”. This is, of course, incorrect, because adaptation can also reduce climate change concerns. Accordingly, modify this sentence to read as follows: “The cost and pace of any response to REDUCE climate change concerns will depend ON ADAPTATION AS WELL AS on the cost, performance, and availability of technologies that can lower ATMOSPHERIC GHG CONCENTRATIONS in the future.” [Note: Inserts are shown in UPPER CASE; deletions are not shown.] U.S. Government (Government of U.S. Department of State)	ACCEPTED text modified
2-42	A	4	23	0	0	After "scales" insert "that are generally assumed to be" (Peter Read, Massey University)	REJECTED see 2-3 above
2-43	A	4	23	4	23	After "scales" insert "that are generally assumed to be"	REJECTED see 2-3 above

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						(Peter Read, Massey University)	
2-44	A	4	28	0	31	Human capital resource and resource scarece are also recognized as drivers to promote the technology. (Toshihiko Masui, National Institute for Environmental Studies)	ACCEPTED
2-45	A	4	28	4	28	Add summary point from section 2.8.2.3 on the role of the Public sector: "The public-sector role includes both technology-push through efforts to stimulate research and development and demand-pull through measures that demand reduced emissions or enhanced efficiency, e.g. taxes, cap-and-trade schemes or portfolio standards." (Government of Germany)	ACCEPTED text from section 2.8. brought forward emphasising the duality of public and private sectors as well as supply-push and demand-pull factors.
2-46	A	4	29	4	29	"Social context" should be also added as one of the critical reason. Acceptability of nuclear power is just the example. (Shunsuke Mori, Tokyo University of Science)	ACCEPTED see c.2-41
2-47	A	4	30	0	0	What is "technical capacity"? (Toshihiko Masui, National Institute for Environmental Studies)	ACCEPTED text clarified
2-7	B	4	33	0	0	Insert a new paragraph on line 33 that would read as follows: "Even the most drastic emission reductions are unlikely to reduce climate change significantly in the next few decades because of the inertia of both the climate system and the energy infrastructure. This suggests that in order to reduce any climate-change-related-damages in the short-to-medium term, it will be necessary to adapt and reduce vulnerability to climate change. Some analysis suggests that over such a time horizon, such an approach would be very cost-effective, particularly if policies emphasize reducing vulnerability to current climate-sensitive problems that are urgent and might be exacerbated by climate change. 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." For greater discussion on this, see Goklany (2005a) and references therein. This is critical information that should be conveyed to policy makers. Rationale: It is noted that while discussion of emission reductions must be integral to any discussion of mitigation, neither emission reductions nor mitigation are ends in themselves. They are predicated on the need to reduce damages due to climate change. Policy makers are owed a clear statement on how rapidly emission	ACCEPTED chapter text amended with modified text emphasizing the need over the short-term for adaptation measures as climate change unfolds and emissions reductions cannot bring down the warming signal quickly.

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						reductions might effect reductions in climate change and, if they are not rapid, what are the options in the meantime. [Reference: 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)	
2-48	A	4	35	0	0	The chapter would be more logical if it followed the stucture of: SD, AM, Risk and Uncertainty, Decision Making, Distributional & Equity aspects, Cots & Potentials, Technology and Regional breakdown (Rutu Dave, IPCC WGIII TSU)	REJECTED chapter sequence was unanimous LA decision in Beijing LA meeting.
2-49	A	4	38	4	39	"….equity aspects, regional dimensions, and …….and transfer". Move "regional dimensions" to next line to reflect chapter sequence. (Government of India)	ACCEPTED
2-50	A	4	39	0	0	add comma after "deployment" (Grassl Hartmut, Max Planck Institute for Meteorology)	ACCEPTED
2-51	A	4	43	4	44	"Section 2.2. Introduces….and a number of issues ……are introduced". Change ”are” to “is”, since the subject is “a” number of issues (Government of India)	ACCEPTED
2-52	A	4	50	0	0	correct to: "as well as" (Grassl Hartmut, Max Planck Institute for Meteorology)	ACCEPTED
2-53	A	5	8	0	0	after "uncertainties" insert "and also notes a decision making approach related to the possibility that climate change may become a more urgent issue on account of potential abrupt climate change". (Peter Read, Massey University)	REJECTED, this issue is dealt with in the uncertainty section on precautionary approaches and values at risk
2-54	A	5	8	5	8	after "uncertainties" insert "and also notes a decision making approach related to the possibility that climate change may become a more urgent issue on account of potential abrupt climate change". (Peter Read, Massey University)	see c.2-53
2-55	A	5	8	0	0	add comma after "climate change policies" (Grassl Hartmut, Max Planck Institute for Meteorology)	REJECTED, not good English
2-56	A	5	8	5	8	and stakeholders WHO assign (Joe Asamoah, International Energy Foundation)	REJECTED, adding who is not good English
2-57	A	5	18	0	0	The discussion of discount rates in Section 2.5 mixes up two different applications of discounting without clearly distinguishing them. One application is in assessing the lifecycle cost of measures to reduce GHG emissions. If a measure to reduce GHG emissions entails a greater upfront investment than would otherwise be made but this investment yields reduced annual operating costs over the lifetime of the	REJECTED this issue is discussed in detail in Sections 2.3, 2.4, and 2.5. There is no need to add a half page additional text in this table-of-content description.

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						investment, then some discount rate needs to be used in computing and comparing the lifecycle costs of alternative investments. This is perfectly legitimate, and the appropriate discount rate is either the market interest rate or some social discount rate. However, Section 2.5 actually discusses discount rates largely in terms of CBA, which is concerned with the economic VALUATION of avoided future climate damage (much of which does not even involve things with a market value), rather than the COST of mitigation measures. The latter is a legitimate subject of WG3, while the discussion of CBA has no place in the WG3 report. WG3 is supposed to be about mitigation and its costs. CBA requires making assumptions about impacts (the subject of WG2), assigning dubious dollar values to irreplaceable and non-substitutable assets (species and ecosystems), and then significantly discounting these losses just because they occur sometime in the future. The justifiable framing issue is Article 2 of the UNFCCC and the need to avoid dangerous anthropogenic interference in the climate system, not CBA, and this framing issue is discussed in Chapter 1. At the very least, explain these two differences in the application of discount rates and acknowledge that many would reject a CBA approach to the climate problem altogether. (Danny Harvey, University of Toronto)	
2-58	A	5	23	0	0	Overlaps with WG2, Chapter 18 (Danny Harvey, University of Toronto)	NOTED
2-59	A	5	32	5	32	in the LONG TERM (Joe Asamoah, International Energy Foundation)	REJECTED Linguistic improvement minor, no substantive comment
2-60	A	5	38	0	0	It can be easily shown that the difference between low and high scenarios of population growth combined (respectively) with low and high scenarios of economic growth per capita (namely, constant at the historical rate of 1.6%/yr, or growing at a rate that declines linearly to 0.8%/yr by 2100), is comparable in importance to the difference between 1%/yr and 2%/yr rates in improvement in the energy intensity of the global economy. This is shown in Figure 1.8 of Harvey (2006), which is attached here and which I recommend including as an illustration of the importance of all four factors in the Kaya identity. Thus, the exclusive focus on technological change, here and later in this chapter, is not scientifically justifiable. Inasmuch as you do introduce the Kaya identity later in the report, you are fully justified in mentioning all four terms of the Kaya identity here. REFERENCE: Harvey, L.D.D. 2006. A Handbook on Low-Energy Buildings and District Energy	REJECTED Statement and conclusion not supported. The use of the Kaya Idendity in this context is methodologically flawed due to overly high spatial aggregation (global analysis) and because it ignores variable interdependency. Reference will be checked.

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						Systems: Fundamentals, Techniques, and Examples. James & James, London, 701 pages. (Danny Harvey, University of Toronto)	
2-61	A	5	39	0	0	after "scales" insert "assumed to be" (Peter Read, Massey University)	REJECTED See 2-3 above
2-62	A	5	39	5	39	after "scales" insert "assumed to be" (Peter Read, Massey University)	REJECTED see 2-3 above
2-63	A	5	39	0	0	delete "over the " and "term" (Grassl Hartmut, Max Planck Institute for Meteorology)	REJECTED (would be grammatically incorrect)
2-64	A	5	42	0	0	correct to "learning-by-doing" (Grassl Hartmut, Max Planck Institute for Meteorology)	ACCEPTED text corrected and modified consistent with comment responses to subsequent sections
2-65	A	5	46	0	0	"regional definitions" of what? I think that you mean to say: "… have used different degrees of regional aggregation or disaggregation, depending on …." (Danny Harvey, University of Toronto)	ACCEPTED
2-8	B	5	50	0	0	Add a new paragraph at the bottom of the page that would track with the previous comment, and read as follows: "Given the inertia of both the climate system and the energy infrastructure, over the next few decades climate change related damages cannot be reduced effectively via mitigation. Therefore, while mitigation would be necessary in the long term, adaptation and vulnerability-reduction measures are necessary to reduce any such damages over the short-to-medium term. Some analysis suggests that over such a time horizon, such an approach would be very cost-effective, particularly if policies emphasize reducing vulnerability to current climate-sensitive problems that are urgent and might be exacerbated by climate change. Such problems include death and destruction due to extreme weather events, and numerous problems that currently hinder sustainable development in the poorer segments of the world, e.g., malaria and other climate-sensitive diseases, hunger and food security, and access to safe water supplies. Dealing with these problems would also advance sustainable development, as well as adaptive and mitigative capacities. Such an approach would also allow climate change concerns to be integrated with broader concerns related to sustainable development". For greater discussion on this, see: (1) Goklany, IM. 2005a. A Climate Policy for the Short and Medium Term: Stabilization or Adaptation? Energy & Environment 16: 667-680. (2) Goklany, IM. 2006a. Integrated Strategies to Reduce Vulnerability and Advance Adaptation, Mitigation, and Sustainable Development. Mitigation and	ACCEPTED text amended by a modified (shortened) text from suggestion.

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						Adaptation Response Strategies for Global Change, forthcoming. Rationale: see rationale for the previous comment. U.S. Government (Government of U.S. Department of State)	
2-66	A	6	5	0	0	The discussion on sustainable development is not very clear and focused. It lacks a clear message that climate change is one of the major environmental, economic and social challenges of our time, and sustainable development is not possible without addressing climate change through mitigation and adaptation efforts. (Ellina Levina, OECD)	NOTED We will make it clear that cc is a key element of SD
2-67	A	6	5	19	36	In this section, one very important linkage between climate change and SD is missing. It should be pointed out that unsustainable use of fossil energy is main contribution of climate change. (Government of China Meteorological Administration)	NOTED This is going to be covered by WGI and Chap 1 and sectoral chapters of WGIII
2-68	A	6	5	19	36	Given that there is a special chapter addressing sustainable development, this section should be further shortened, hopefully to 2/3 or 1/2 of the original length. (Government of China Meteorological Administration)	ACCEPTED Will be reduced
2-69	A	6	9	5	15	could also cite linkages with WG2 report, chapters 18 and 20 (Cohen Stewart, Environment Canada)	Accepted
2-70	A	6	9	5	15	could also cite linkages with WG2 report, chapters 18 and 20 (Cohen Stewart, Environment Canada)	See 69
2-71	A	6	9	6	10	The concept of sustainable development should be stated in a footnote (Debyani Ghosh, Global Energy Partners, LLC)	Rejected The concept is discussed in more depth in section 2.2.4
2-72	A	6	14	0	0	correct to "covered" (Grassl Hartmut, Max Planck Institute for Meteorology)	Accepted
2-73	A	6	14	0	0	add bracket and full stop after "AMSD" (Grassl Hartmut, Max Planck Institute for Meteorology)	Accepted
2-74	A	6	15	6	15	define 'AMSD' (Cohen Stewart, Environment Canada)	Accepted
2-75	A	6	15	6	15	define 'AMSD' (Cohen Stewart, Environment Canada)	See 74
2-76	A	6	19	6	19	Provide complete reference to the Third Assessment Report in a footnote (Debyani Ghosh, Global Energy Partners, LLC)	Rejected In the list of references
2-77	A	6	19	7	8	The Chapter team have chosen the "safe" option of quoting the TAR Figure. However, there are many weaknesses in the Figure, and it is surely worth improving it, since this is the main source for any Synthesis Report Figure. The main problems: mixing of stocks and flows, over-emphasis on adaptation, absent representation of key concepts (greenhouse effect, co-benefits), inadequate	Noted We accept the weaknesses of the figure, but will decide what to do based on coordination with other chapters

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						treatment of the different effects on uncertainties of mitigation and adaptation. (Government of UK)	
2-78	A	6	21	6	25	The direction of "adaptation" in the Figure 2.1, from "climate change" box to "Impacts on human and natural systems" box is not clear, since the action of adaptation is the human actions given the impacts of climate changes. Does it represent that climate changes force human society to adapt? (Shunsuke Mori, Tokyo University of Science)	Noted We accept the weaknesses of the figure, but will decide what to do based on coordination with other chapters
2-79	A	6	22	0	0	Should be “illustrates” (Danny Harvey, University of Toronto)	Accepted
2-80	A	6	22	0	0	Replace “see” with “reproduced as” (Danny Harvey, University of Toronto)	See is ok
2-81	A	6	22	6	22	Replace 'socioeconomic' for 'social and economic' (Government of Spain)	Reject need to reflect TAR terminology
2-9	B	6	24	6	8	Figure 2.1: This schematic is more simplistic than it needs to be. There should be arrows going from “climate change” to “emissions and concentrations” and from the latter to “socio-economic development paths”. The text following this figure should also note that if there is a climate change target (however, specified), then that has implications for the amount (and path) of emissions and concentrations, which then has implications for socio-economic development pathways. Recognize that the figure is taken from TAR, but suggest amplification of additional complexity. U.S. Government (Government of U.S. Department of State)	Noted We accept the weaknesses of the figure, but will decide what to do based on coordination with other chapters
2-82	A	6	25	0	0	In this figure, there is no information about "SD." (Toshihiko Masui, National Institute for Environmental Studies)	Noted We accept the weaknesses of the figure, but will decide what to do based on coordination with other chapters
2-83	A	6	26	0	0	Figure 2.1. Comment 3-file 3-row: Replace 'socioeconomic' for 'social and economic' (Government of Spain)	Noted We accept the weaknesses of the figure, but will decide what to do based on coordination with other chapters
2-84	A	6	29	6	29	Clarify what anthropogenic climate change implies (possibly in a footnote) (Debyani Ghosh, Global Energy Partners, LLC)	Reject, this is a larger issue covered by the whole IPCC process
2-85	A	6	31	0	0	Change “which” to “that” (Danny Harvey, University of Toronto)	Accept
2-86	A	6	31	6	31	Replace 'socioeconomic' for 'social and economic' (Government of Spain)	Reject since it is referring to the figure
2-87	A	6	33	7	8	The climate effects of greenhouse gas emissions needs to be better clarified to the reader. The way it is described now is confusing.	Rejected, we do not want to have a detailed explanation here

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						(Debyani Ghosh, Global Energy Partners, LLC)	
2-88	A	7	6	0	0	substitute "and" for "(e.g.)" (Grassl Hartmut, Max Planck Institute for Meteorology)	Accept
2-89	A	7	13	7	13	Explain in a couple of sentences what the 'portfolio approach' refers to, possibly in a footnote. (Debyani Ghosh, Global Energy Partners, LLC)	Reject since this can we seen from the sentence that tells what the opposite is
2-90	A	7	14	7	15	Explain in a couple of sentences what the 'mitigative capacity' refers to, possibly in a footnote. (Debyani Ghosh, Global Energy Partners, LLC)	Rejected It is defined in 2.6
2-91	A	7	17	7	17	"……show falling GHG emissions…..". Since future scenarios are based on assumptions, how can falling GHG emissions tend to "show" improved governance? At the very least, the primary reference should be added. (Government of India)	Accepted, formulation will be changed to be "tend to be associated with…"
2-92	A	7	17	7	17	Insert 'social and' before political (Government of Spain)	Accepted, but the paragraph will maybe be shortened
2-93	A	7	22	7	23	Replace 'socioeconomic' for 'social and economic' (Government of Spain)	Accepted We will say economic
2-94	A	7	23	7	23	Provide some examples of 'state-of-the-art' environmentally sound technologies (Debyani Ghosh, Global Energy Partners, LLC)	Rejected Extension is not necessary
2-10	B	7	30	7	35	There was an emerging literature that predates the TAR. Some of the earliest work on climate change and sustainable development is contained in Goklany (1995, 2000a); they should be cited. These, among other things, addressed the relationship of sustainable development to both the ability to adapt and to mitigate (nowadays referred to as adaptive and mitigative capacity). A more detailed and comprehensive examination of these issues is contained in Goklany (2006a), which should also be added to the list of citations on lines 32 to 35. Citations: (1) Goklany, I.M., 1995. Strategies to enhance adaptability: technological change, economic growth and free trade. Climatic Change 30, 427-449. (2) Goklany, I.M., 2000a. Potential consequences of increasing atmospheric CO2 concentration compared to other environmental problems. Technology 7S, 189-213. (3) Goklany, I.M. 2006a. Integrated Strategies to Reduce Vulnerability and Advance Adaptation, Mitigation, and Sustainable Development. Mitigation and Adaptation Strategies for Global Change, forthcoming. U.S. Government (Government of U.S. Department of State)	Noted References will be considered Line 30 delete an emerging
2-95	A	7	32	0	0	add publication date of reference Cohen (Grassl Hartmut, Max Planck Institute for Meteorology)	Accepted

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
2-96	A	7	33	0	0	the author's name is "Easterling" (Grassl Hartmut, Max Planck Institute for Meteorology)	Accepted
2-97	A	7	33	0	0	reference Robinson et al. not in publication list (Grassl Hartmut, Max Planck Institute for Meteorology)	Accepted
2-98	A	7	33	0	0	add publication date for reference Morita (Grassl Hartmut, Max Planck Institute for Meteorology)	Accepted
2-99	A	7	33	0	0	add publication date 2001 after reference Schneider (Grassl Hartmut, Max Planck Institute for Meteorology)	Accepted
2-100	A	7	35	0	0	reference Rahman et al. see: above (Grassl Hartmut, Max Planck Institute for Meteorology)	Accepted
2-101	A	7	35	0	0	correct twice to: "et al." (Grassl Hartmut, Max Planck Institute for Meteorology)	Accepted
2-102	A	7	35	0	0	add publication date 1999 after reference Najam (Grassl Hartmut, Max Planck Institute for Meteorology)	Accepted
2-103	A	7	42	7	53	Not very sure as what this paragraph is trying to convey. Consider revising and summarising the salient points in a clearer fashion, and providing some examples. (Debyani Ghosh, Global Energy Partners, LLC)	Accepted Page 7, line 43 will write: Policies and institutions that are focused on development affect GHG emissions and vulnerability. Moreover, these same policies and institutions constrain or facilitate mitigation and adaptation. These indirect effects can be positive or negative…..
2-104	A	7	43	7	45	The sentence is not very clear. It's difficult for the reader to interpret what 'institutions embedded in this' is referring to. Would help to clarify this and provide some examples. (Debyani Ghosh, Global Energy Partners, LLC)	See 103
2-105	A	7	45	7	48	The sentence beginning- 'This also means……targeted towards broader development goals' is incoherent. Please clarify. (Debyani Ghosh, Global Energy Partners, LLC)	See 103
2-106	A	7	48	7	48	despite BEING targeted (Joe Asamoah, International Energy Foundation)	Accepted
2-107	A	7	49	7	49	SUGGESTED THE INTEGRATION OF CLIMATE CHANGE (Joe Asamoah, International Energy Foundation)	Accepted
2-108	A	7	51	0	0	include reference WBGU, 2004 (Grassl Hartmut, Max Planck Institute for Meteorology)	We do not know what this is
2-11	B	7	52	0	0	Add the following new material at the end of this paragraph: “Goklany (2000a, 2005a, 2006a) suggests reducing climate-sensitive hurdles to sustainable	Accepted The argument will be added somewhere in the section

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						development such as low agricultural productivity, hunger, malaria and other tropical diseases, coastal flooding, and water shortages as a method to simultaneously boost sustainable development while reducing vulnerability to both current climate (and variability) and climate change which, moreover, would also advance mitigative capacity. This approach is a subset of a broader development agenda (Goklany 1995) such as that embodied in the Millennium Development Goals (Goklany 2003, 2005a, 2006a). ” Citations: (1) Goklany, I.M., 1995. Strategies to enhance adaptability: technological change, economic growth and free trade. Climatic Change 30, 427-449. (2) Goklany, I.M., 2000a. Potential consequences of increasing atmospheric CO2 concentration compared to other environmental problems. Technology 7S, 189-213. (3) Goklany, I.M. 2005a. “A Climate Policy for the Short and Medium Term: Stabilization or Adaptation?” Energy & Environment 16: 667-680. (4) Goklany, I.M. 2006a. Integrated Strategies to Reduce Vulnerability and Advance Adaptation, Mitigation, and Sustainable Development. Mitigation and Adaptation Strategies for Global Change, forthcoming. U.S. Government (Government of U.S. Department of State)	
2-109	A	8	6	8	9	Consider revising the sentence construction. (Debyani Ghosh, Global Energy Partners, LLC)	Accepted The sentence will be: Climate change adaptation and mitigation can also be the focus of policy interventions and SD can be considered as an issue that is indirectly influenced.
2-110	A	8	6	8	14	The gist of the paragraph is not very clear. Consider revising the paragraph to better convey the message to the reader. (Debyani Ghosh, Global Energy Partners, LLC)	Accepted Write Such climate policies can tend to focus…. In this case climate policy implementation in practice can encounter some conflict between general development goals and the goal of protecting the global environment-
2-111	A	8	11	8	11	in this CASE, CLIMATE change (Joe Asamoah, International Energy Foundation)	Accepted
2-112	A	8	15	8	30	The sentence "In conclusion one might then distinguishing between climate change policies that emerge as an integrated element of general sustainable development policies, and more specific adaptation and mitigation policies that are selected…to address climate change." is confusing and might also be wrong in various circumstances. The examples of specific adaptation measures such as dikes, flood	Accepted We will remove dikes

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						control, etc. provided in the same paragraph further contribute to the confusion. These measures are perfectly normal measures of sustainable development for a country that has been experiencing floods over decades or even centuries (the Netherlands, for example). So, while these measures are also adaptation measures, it is wrong to say that they are "specific adaptation measures" vs. "elements of sustainable development". Adaptation to climate change is a component of sustainable development. In other words, development that disregards impacts from climate change is not sustainable. (Ellina Levina, OECD)	
2-12	B	8	20	0	0	Insert the following new paragraph: "Finally, noting the commonality between various determinants of adaptive and mitigative capacities (e.g., availability of technological options, and access to economic resources, social capital and human capital) and the fact that many factors underlying or related to these determinants are themselves indicators of sustainable development (e.g., per capita income; and various public health, education and research indices), Goklany (2006a) identifies integrated approaches to formulating strategies and a portfolio of specific measures to concurrently advance adaptation, mitigation and sustainable development. These approaches range from broadly moving sustainable development forward (by developing and/or nurturing institutions, policies and infrastructure to stimulate economic development, technological change, human and social capital, and reducing specific barriers to sustainable development) to reducing vulnerabilities to urgent climate-sensitive risks that hinder sustainable development and would worsen with climate change. He further notes that the resulting sustainable economic development would also help reduce birth rates, which could mitigate climate change and reduce the population exposed to climate change and climate-sensitive risks, thereby reducing impacts, and the demand for adaptation." Citation: (1) Goklany, I.M. 2006a. Integrated Strategies to Reduce Vulnerability and Advance Adaptation, Mitigation, and Sustainable Development. Mitigation and Adaptation Strategies for Global Change, forthcoming. U.S. Government (Government of U.S. Department of State)	TIC This is too long for our chapter but we will see if chapter 12 has space for this argument
2-113	A	8	22	8	22	Footnote 1 needs to be better clarified. (Debyani Ghosh, Global Energy Partners, LLC	Accepted We will delete the footnote
2-114	A	8	24	0	0	correct to "supports" (Grassl Hartmut, Max Planck Institute for Meteorology)	Accepted
2-115	A	8	26	8	26	Provide reference to Chapter 18 of the IPCC WGII report in a footnote. (Debyani Ghosh, Global Energy Partners, LLC)	Accepted Reference to full WGII will be provided in the final text

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
2-116	A	8	27	0	0	delete "about these issues" (Grassl Hartmut, Max Planck Institute for Meteorology)	Accepted
2-117	A	8	29	0	0	elaboration on CC and SD relationship in both industrialized and developing nations context (NOIM UDDIN, Macquarie University, Sydney)	Rejected This is addressed in section 2.2.6
2-13	B	8	41	8	45	More is known today than was known in 2002. As a result, the portion of the quote starting with "This occurs because the impact of climate variability…" misses out some very important factors. Specifically, if global impact assessments of the impacts of climate and climate change undertaken on behalf of the UK's DEFRA (which are reported in various places in the WGII report) are to be taken seriously, then impacts of climate change will, for the most part, be small compared to the impacts of non-climate-change-related factors, at least through the 2080s. [See the reference cited below for a more detailed discussion.] This suggests that the latter are greater threats until that time. Accordingly, it is recommended to end the quote just ahead of this particular sentence, i.e., after the period on line 41, and modify the remainder of the paragraph as follows: "This occurs because IN THE LONG TERM, the impact of climate change will affect the ability of countries to achieve sustainable development goals. IN THE SHORT-TO-MEDIUM TERM, HOWEVER, IT IS THE LACK OF SUFFICIENT SUSTAINABLE DEVELOPMENT THAT IMPEDES DEVELOPING COUNTRIES' ABILITY TO (A) COPE WITH ALL MANNERS OF ADVERSITY, INCLUDING CLIMATE VARIABILITY AND CHANGE, AND (B) MITIGATE EMISSIONS (GOKLANY 2005a). THUS INTEGRATED APPROACHES TOWARD THE PURSUIT OF SUSTAINABLE DEVELOPMENT AND CLIMATE POLICY GOALS REQUIRES CONSIDERATION OF THESE TEMPORAL DIFFERENCES IN THE EFFECTIVENESS OF ADAPTATION AND MITIGATION." [Note: Inserts are shown in UPPER CASE; deletions are not shown.] Citation: Goklany, I.M. 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)	Rejected This is not an issue of WGIII to assess whether cc impacts is a small or large issue in DC's in the short term. We will keep text that originally was approved as part of the Synthesis report until new decisions are taken by IPCC
2-118	A	8	42	8	42	Replace 'socioeconomic' for 'social and economic' (Government of Spain)	Rejected Cannot be done in a quotation
2-119	A	9	15	9	15	FURTHERMORE, AS previously (Joe Asamoah, International Energy Foundation)	Accepted

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
2-120	A	9	16	9	18	references Chen et al., Banuri et al., Morita et al., Najam et al., Smit et al., Wilbanks not in publication list (Grassl Hartmut, Max Planck Institute for Meteorology)	Accepted
2-121	A	9	21	12	0	too detailed about SD (NOIM UDDIN, Macquarie University, Sydney)	Accepted Will shorten section
2-122	A	9	21	12	15	I wonder if the recently published MEA's work may not be appropriate here (Jacob Park, Green Mountain College)	Accepted Can be included in section 2.2.6 on indicators and frameworks
2-14	B	9	21	19	16	This part on definitions of sustainable development (SD) and their implications for climate change and climate policy is very messy and not at the level of the other parts. I suggest restricting the analysis to two alternative practical definitions of SD - the adaptive capability and opportunities concept and the capital stocks concept -, to drop the references to the Arrow et al. 2004 paper which is quite unhelpful, and to show the links between climate change and climate policies on the one hand and each of those two alternative definitions of SD on the other hand. The international framework and the indicators approach should only be refered to when they help understand and assess those links. It is useless to repeat the controversies about the SD and the development paradigms. (Government of Switserland)	Rejected The broader discussion has previously been suggested by FOD reviews, but we will consider shortening the section
2-123	A	9	23	12	15	It will be helpful for the reader to see a synthesis of the SD literature from different sources into a summary table. (Debyani Ghosh, Global Energy Partners, LLC)	Rejected No space and too complicated
2-124	A	9	24	0	0	add "the" at the end of the line (Grassl Hartmut, Max Planck Institute for Meteorology)	Accepted
2-125	A	9	25	0	0	write "Agenda" with capital letter (Grassl Hartmut, Max Planck Institute for Meteorology)	Accepted, A capital
2-126	A	9	40	0	0	delete "a practical" (Grassl Hartmut, Max Planck Institute for Meteorology)	Accepted
2-127	A	9	48	0	0	add bracket before "Hardi" (Grassl Hartmut, Max Planck Institute for Meteorology)	Accepted
2-128	A	9	49	0	0	correct "raise" to "rise" (Grassl Hartmut, Max Planck Institute for Meteorology)	Accepted
2-129	A	9	49	11	34	The capital theoretical view on sustainable development is given a prominent place. Perhaps this could be complemented with a paragraph or two with other conceptualisations? (Government of Sweden)	Rejected No space for more concepts
2-130	A	9	50	10	20	Discussion on discounting is interesting but needs to include more literature.	Rejected This is covered in detail in the cost

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						Distributive justice needs to indicate the concept equal per capita emission rights. (Expert Review Meeting Paris, IPCC)	section
2-131	A	9	52	10	28	The relevance of these two paragraphs to the discussion has escaped me. Suggest deletion. (Cédric PHILIBERT, International Energy Agency)	Accepted Will be shortened
2-132	A	10	0	12	0	Here are discussed issues of different concepts and approaches of SD in the literature. This overview is mostly comprehensive enough including the discussion between economists and ecologist. However, as the section (and the whole report) emphasises the issues of social equity, some sentences and references in these terms – e.g. inter/intragenerational justice issues so essential for the concept of SD – would be most welcomed in this Chapter 2.2.4, although they are to some extent considered in Chapter 2.7. This would give some more solid background for the criticisms discussed in the section and for the basic principles of SD (the welfare of future generations, more universal participation in development processes etc.) adopted in the end of the section. A valuable literature reference would be for instance Dobson, Andrew 1998: Justice and the Environment. Conceptions of Environmental Sustainability and Dimensions of Social Justice. Oxford University Press. (Government of Finland)	Accepted We will make a reference to the equity discussion in 2.7
2-133	A	10	5	10	8	Can the Systems Thinking framework for SD be illustrated by a figure? (Debyani Ghosh, Global Energy Partners, LLC)	Rejected This is too complex for a figure
2-134	A	10	9	0	0	add "to be" after "claiming" (Grassl Hartmut, Max Planck Institute for Meteorology)	Accepted
2-135	A	10	9	10	9	"…….claiming more fundamental….". Insert “to be” before “more” (Government of India)	Accepted
2-136	A	10	10	0	0	correct to "appropriate" (Grassl Hartmut, Max Planck Institute for Meteorology)	Accepted
2-137	A	10	10	10	10	"….becomes appropriated…..". Change “appropriated” to “appropriate” (Government of India)	Accepted
2-138	A	10	11	0	0	correct to "of reality" (Grassl Hartmut, Max Planck Institute for Meteorology)	Accepted
2-139	A	10	11	10	11	"…….if reality". Change ”if” to “of” (Government of India)	Accepted
2-140	A	10	18	10	18	"…….(Holling 2001)". This is missing from the references. (Government of India)	Accepted

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
2-141	A	10	21	10	21	"…….(Holling et al., 2002)". This is missing from the references. (Government of India)	Accepted
2-142	A	10	28	10	28	"……(Gunderson and Holling, 2002)". This is missing from the references. (Government of India)	Accepted
2-143	A	10	37	10	37	Please insert the following sentence: Neumayer 1999 has demonstrated that these two concepts are not scientifically falsifiable. Neumayer, Eric, 1999, Weak versus Strong Sustainability: Exploring the Limits of Two Opposing Paradigms, Cheltenham: Edward Elgar (Cédric PHILIBERT, International Energy Agency)	Accepted Reference will be considered
2-144	A	10	40	10	40	FURTHERMORE, POLLUTION (Joe Asamoah, International Energy Foundation)	Accepted
2-145	A	10	43	0	0	correct to "present" (Grassl Hartmut, Max Planck Institute for Meteorology)	Accepted
2-146	A	10	43	10	43	" Arrow et al., 2004……ecologists presents …..". Change “presents” to “present” (Government of India)	Accepted
2-147	A	11	6	11	7	correct to "consider" (Grassl Hartmut, Max Planck Institute for Meteorology)	Accepted
2-148	A	11	9	11	9	Insert 'and social' before networks (Government of Spain)	Rejected Interpersonal means social
2-15	B	11	12	11	17	This list lacks key variables, such as respect for intellectual property and private property, contract rights, and rule of law. U.S. Government (Government of U.S. Department of State)	Rejected, too detailed
2-16	B	11	15	0	0	Why limit this only to environmental taxes and regulations? Suggest striking “environmental”. U.S. Government (Government of U.S. Department of State)	Accepted
2-149	A	11	16	0	0	put the date 2004 in brackets (Grassl Hartmut, Max Planck Institute for Meteorology)	Accepted
2-150	A	11	17	0	0	delete "and" (Grassl Hartmut, Max Planck Institute for Meteorology)	Reject
2-151	A	11	17	0	0	correct to "not yet" (Grassl Hartmut, Max Planck Institute for Meteorology)	Accepted
2-152	A	11	17	11	17	despite capabilities and social CONCEPTS NOT yet at a stage (Joe Asamoah, International Energy Foundation)	Accepted
2-153	A	11	17	11	17	"…despite capabilities……are no yet……". Words missing after "despite". Further	Accepted

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						change “no” to “not” (Government of India)	
2-154	A	11	24	0	0	correct to "summarize" (Grassl Hartmut, Max Planck Institute for Meteorology)	Accepted
2-155	A	11	24	11	24	"Arrow et al (2004) summarizes….". Change ”summarizes” to “summarize” (Government of India)	Accepted
2-156	A	11	27	0	0	substitute "criterion" for "criteria" (Grassl Hartmut, Max Planck Institute for Meteorology)	Accepted Criterion is correct
2-157	A	11	27	0	0	After “standards”, insert “(ignoring ecological and physical constraints)” (Danny Harvey, University of Toronto)	Rejected This is not referring to the perspectives of economists
2-158	A	11	29	11	31	"i.e. … unsustainable" content? (Grassl Hartmut, Max Planck Institute for Meteorology)	Accepted Full stop after uncertainties. Theoretical considerations therefore instead focus on factors that make consumption more or less sustainable
2-159	A	11	31	11	31	Unclear sentence: Should the focus rather be on how to make "current consumption sustainable"? (Government of Germany)	Accepted Full stop after uncertainties. Theoretical considerations therefore instead focus on factors that make consumption more or less sustainable
2-160	A	11	33	11	33	Include 'as well as the social values of societies and the lack or poor policies to achieve sustainable development' at the end. (Government of Spain)	Rejected Is not consistent with the argument by the authors
2-161	A	11	35	12	15	The criticism towards sustainable development could begin with a synthesis such as Three common elements in the criticism of sustainable development are … One kind of criticism, that both Wolfgang Sachs raises in the reference cited and for instance Michael Thompson is that SD is too narrow a concept and that it is not enough emphasising various perspectives and worldviews. This makes it reductionistic and problematic. (Government of Sweden)	Rejected We are deleting this section
2-162	A	11	38	11	38	Include 'and environmental education or society' in order to… (Government of Spain)	Rejected We are deleting this section
2-163	A	12	15	0	0	delete "on these issues" (Grassl Hartmut, Max Planck Institute for Meteorology)	Accepted
2-164	A	12	17	13	0	too much details about development paradigm, unnecessary broaden the chapter length (NOIM UDDIN, Macquarie University, Sydney)	Accepted We are deleting this section Rejected
2-165	A	12	17	0	0	This section is terribly written. Much of it can be deleted. The rest needs to be	Accepted Will consider shortening and editing

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						carefully checked over by a professional editor! (the kind that publishers of books use in order to make sure that the writing is easy to understand and therefore that they will in fact be able to sell the book) Granted, the author might not have English as his/her first language, but what about the other lead authors? (Danny Harvey, University of Toronto)	
2-166	A	12	19	0	0	substitute "have to consider" for "is to consider" (Grassl Hartmut, Max Planck Institute for Meteorology)	Accepted, ASSESSMENT ONLY ONE TIME
2-168	A	12	19	12	23	"Assessment of SD…..in meeting these". This paragraph is wordy and un-illuminating. Several words and expressions are repeated e.g., assessment, sustainable, development, in the context of, etc. Language should be made more precise. These comments apply to entire section 2.2. (Government of India)	See 167
2-169	A	12	20	0	0	substitute "special" for "local" (Grassl Hartmut, Max Planck Institute for Meteorology)	See 167
2-170	A	12	21	11	21	Add 'social justice' after 'education' (Government of Spain)	Reject, is not consistent with the listing
2-171	A	12	25	12	35	Far too much jargon and far too many words! How about just saying: "Different analysts have different viewpoints, arising from differing perspectives, and they therefore have different beliefs concerning the parameters that need to be considered in the analysis of the linkages between SD and climate change". (Danny Harvey, University of Toronto)	Accepted We will simplify by deleting lines 32 to 35
2-172	A	12	30	0	0	add "an": "an alternative" (Grassl Hartmut, Max Planck Institute for Meteorology)	Reject
2-173	A	12	32	12	35	delete paragraph, it is a repetition (Grassl Hartmut, Max Planck Institute for Meteorology)	Accepted
2-174	A	12	37	13	11	The reader has to wade through far too much material to find out the key points. The key points should be presented first, then elaborated upon. Thus, begin this segment with something like: "Two different economic paradigms have been used in the assessment of mitigation: that of neoclassical economics, and that of new institutional economics". This gives a road map of what will follow. Then you can proceed to elaborate upon each paradigm in turn. (Danny Harvey, University of Toronto)	Noted, we will try to make the messages more clear in the editing
2-175	A	12	51	0	0	Change "are" to "is" [the subject is "character"] (Danny Harvey, University of Toronto)	Accepted
2-17	B	13	3	0	0	Strike "above" and insert "below". U.S. Government (Government of U.S. Department of State)	Accepted

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
2-18	B	13	5	13	12	The notion of high agreement, limited evidence appears to have been translated in the SPM to high confidence, limited evidence, which as noted in SPM is problematic. U.S. Government (Government of U.S. Department of State)	SPM issues
2-19	B	13	8	13	9	It would be useful to introduce the abbreviations HM for High agreement, much evidence; HL for High agreement, limited evidence, etc. in this table, since those terms have been used in the SPM. U.S. Government (Government of U.S. Department of State)	Accepted
2-176	A	13	15	0	0	citation of North is missing (Grassl Hartmut, Max Planck Institute for Meteorology)	Noted This is not the exact North language but referred based on another text
2-177	A	13	20	13	20	Insert 'a society and' economy (Government of Spain)	Rejected We are only referring to institutional economics here
2-178	A	13	24	0	0	use capital letter for "Role" (Grassl Hartmut, Max Planck Institute for Meteorology)	Accepted
2-179	A	13	24	0	0	add "on" before "the Role" (Grassl Hartmut, Max Planck Institute for Meteorology)	Accepted
2-180	A	13	39	13	50	This is not relevant to development paradigms, and much of the cited material would be highly contentious anyway. Delete this entire paragraph – nothing will be lost! (Danny Harvey, University of Toronto)	Rejected We disagree
2-181	A	13	40	0	0	put the date 1993 in brackets (Grassl Hartmut, Max Planck Institute for Meteorology)	Noted We can delete 1993
2-182	A	13	40	0	0	add "concludes" after the last brackets at the end of the line (Grassl Hartmut, Max Planck Institute for Meteorology)	Reject
2-183	A	13	41	0	0	delete "concludes", see:above (Grassl Hartmut, Max Planck Institute for Meteorology)	Reject
2-184	A	14	5	14	8	This is pure mumble jumble – delete it entirely! (Danny Harvey, University of Toronto)	Noted Sentence write cc policies in the context of capabilities and human wellbeing can then include considerations about the extent to which the policies can support the access of individuals to specific resources as well as freedoms.
2-185	A	14	10	14	14	This is not related to development paradigms, so delete it (Sen's work is discussed later, in Section 2.7). (Danny Harvey, University of Toronto)	Rejected, it is related
2-186	A	14	12	14	12	"….one need to look ….". Change "need" to "needs"	Accepted

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						(Government of India)	
2-187	A	14	16	19	16	The write-up under this section is not very well-integrated. Consider revising the structure of the writing and the presentation of the frameworks so that at the end of the section the central themes are clearer to the reader. Consider a synthesis table that summarizes the concepts under the different international frameworks. (Debyani Ghosh, Global Energy Partners, LLC)	We will add a paragraph in the end that explains the relations between the frameworks
2-188	A	14	18	19	36	We really appreciate this section and believe that the Fourth Assessment Report needs to relate to frameworks for evaluation of the links between climate change and sustainable development. However, we lack a synthesis of the four frameworks presented as well as a clearer application of what the framework emphasise in the climate change - sustainable development link. The section of Boulanger (page 18, lines 36 to 46) could be used for this purpose, expanded with other references of the "key" issues in this kind of frameowrks. (Government of Sweden)	We will add a paragraph in the end that explains the relations between the frameworks
2-189	A	14	19	0	0	correct to "perspectives" (Grassl Hartmut, Max Planck Institute for Meteorology)	Accepted
2-190	A	14	19	14	19	State the time frame 'short to medium term' perspective is referring to. (Debyani Ghosh, Global Energy Partners, LLC)	Reject
2-191	A	14	20	14	22	This section promises more than it delivers. No framework is “offered” and except for a reference to Munasinghe and Swart (2005), there is little discussion of how climate change is “addressed” by these frameworks. (Government of India)	Noted We will delete…”and will discuss how cc can be addressed jointly based on these frameworks”, since we think that it is too ambitious to conclude with a general framework
2-192	A	14	47	14	47	At the end of the paragraph, add 'and key areas of the social "fabric" (social organizations and institutions; balanced demographic structure; cultural diversity and social values improvement; social participation in climate change policies; democracy and governance; and peace among other) (Government of Spain)	Accepted, we will add some of the suggested issues
2-193	A	15	0	15	0	links to climate impacts are missing in table 2.1 (Expert Review Meeting Paris, IPCC)	Rejected This is not true, cc vulnerability and adaptation are included
2-24	B	15	0	0	0	Table 2.1: energy and water are treated separately for MDG goals 1 & 2. No mention of water needed for energy production and the ensuing pressure on water due to certain energy production technologies. U.S. Government (Government of U.S. Department of State)	Accepted Mention energy water link
2-20	B	15	1	15	3	It is not intuitively obvious, at least to this reviewer, why climate change will increase economic disparity between genders across country lines. Some	Noted This is related to section 2.7

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						explanation should be added. Also, the phrase "Cuts in government expenditures to cope with climate change …" is unclear. It appears to mean cuts in government expenditures for activities other than coping with climate change. If this is the case, the wording needs to be made explicit. U.S. Government (Government of U.S. Department of State)	Cuts in expenditures on cc can increase poverty since cc is supposed particularly to affect the poor Gender issues: Ask Anil Markandya
2-194	A	15	6	15	6	" Climate policy……Millennium Development Goals that was…..". Change "was" to "were" (Government of India)	Accepted
2-195	A	15	9	0	0	add "WBGU (2004)" as reference (Grassl Hartmut, Max Planck Institute for Meteorology)	Noted We do not know this reference
2-21	B	15	9	0	0	Add the following new sentence after the period on line 9: "Analysis suggests that pursuing these goals would be very cost-effective in reducing vulnerability to climate-sensitive problems (including climate change problems) affecting these sectors, and to increase adaptive and mitigative capacity (Goklany 2005a, 2006a). Citations: (1) Goklany, I.M. 2005a. "A Climate Policy for the Short and Medium Term: Stabilization or Adaptation?" Energy & Environment 16: 667-680. (2) Goklany, I.M. 2006a. Integrated Strategies to Reduce Vulnerability and Advance Adaptation, Mitigation, and Sustainable Development. Mitigation and Adaptation Strategies for Global Change, forthcoming. U.S. Government (Government of U.S. Department of State)	References will be checked and argument eventually will be added in a relevant place
2-196	A	15	11	15	20	In chapter 1, page 24 lines 14-19 reference is made to more recent decisions made (in 2006) by the CSD on environmentally sound, socially acceptable and economically viable energy for sustainable development. It is recommended to include it in this paragraph. (Gert de Gans, Kerkinactie / ICCO)	Noted, cross reference to Chapter 1
2-197	A	15	30	0	0	text of table 2.1: use capital letters "Climate Change" (Grassl Hartmut, Max Planck Institute for Meteorology)	Accepted
2-198	A	15	30	0	0	text of table 2.1: correct to "MDGs" (Grassl Hartmut, Max Planck Institute for Meteorology)	Accepted
2-199	A	15	30	0	0	text in table 2.1, column 3, line 5: add comma after "natural resources" (Grassl Hartmut, Max Planck Institute for Meteorology)	Accepted
2-200	A	15	30	0	0	Table 2.1: It is an interesting and useful table. However, it lacks climate change impacts. It is a very important component that determines adaptation measures, makes mitigation more urgent, and also affects sectors and their performances in terms of mitigation and adaptation. For example, low runoff might have negative impacts on hydro energy and cause the use of available fuel instead which will have	See 193

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						impacts on emissions and will require additional mitigation efforts. High temperatures will increase demand for cooling, increasing demand for electricity, etc. (Ellina Levina, OECD)	
2-201	A	15	30	17	5	Table 2.1 includes only positive linkages from MDGs to Climate Change mitigation and adaptive capacity. The text on page 15 from line 11 on points, however, also to the danger, that climate impacts impede on the prospects for reaching the MDGs. Examples for that should be given in the table, possibly in a new column. Examples could be income losses (MDG 1) due to crop failure or water scarcity for irrigation; a second possible example would be pressure on MDG 8 (safe drinking water) because of changing precipitation patterns and scarcity of water in some regions, to give but a few examples. (Government of Germany)	See 193
2-22	B	15	30	16	0	Table 2.1: In the 2nd, 3rd, 4th and 5th rows, dealing with poverty, hunger, and different goals for education, note under the "Climate Change Links" column, that meeting these MDGs would also help societies reduce vulnerability to climate-sensitive diseases which, in turn, will also enhance adaptive and mitigative capacity. For detailed rationale, see Goklany (2006a). Citation: Goklany, I.M. 2006a. Integrated Strategies to Reduce Vulnerability and Advance Adaptation, Mitigation, and Sustainable Development. Mitigation and Adaptation Strategies for Global Change, forthcoming. U.S. Government (Government of U.S. Department of State)	Rejected We are not having references inside the table References will be checked
2-23	B	15	33	0	0	Unaware that the US government has adopted the use of declining interest rates in any formal policy context, although that term may appear in US government guidance. U.S. Government (Government of U.S. Department of State)	Noted This is considered for section 2.5
2-25	B	16	0	0	0	Table 2.1: Under the "Climate Change Links" in the last two rows, change "the adaptive capacity" to "increase adaptive and mitigative capacity". For detailed rationale, see Goklany (2006a). Citation: Goklany, I.M. 2006a. Integrated Strategies to Reduce Vulnerability and Advance Adaptation, Mitigation, and Sustainable Development. Mitigation and Adaptation Strategies for Global Change, forthcoming. U.S. Government (Government of U.S. Department of State)	Accept in the second last, but reject in the last (this only deals with water systems)
2-202	A	16	1	17	0	Table 2.1. a) Some items in this table are numbered and some are not...need to be consistent. b) items in this table dealing with "infant mortality" and "safe drinking water". Both of these these should also have entries on "waste and wastewater	Accepted Numbers will be removed Add water issues related to infant mortality

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						management and treatment" because IF the urban infrastructure includes waste and wastewater management, public health is improved via cleaner water and diminished contact between wastes and people. With respect to climate change mitigation, there are significant co-benefits of GHG mitigation from improved waste and wastewater management and treatment (decreased methane and nitrous oxide emissions). (Jean Bogner, Landfills +, Inc)	
2-203	A	16	30	0	0	text in table 2.1, column 2: substitute "spent" for all "spend" (Grassl Hartmut, Max Planck Institute for Meteorology)	Accepted
2-28	B	17	0	0	0	This figure needs fixing. Note that the version in Chapter 2 (p. 78) is acceptable and should be used. U.S. Government (Government of U.S. Department of State)	Accepted
2-29	B	17	0	0	0	Table 2.1: Under the "Climate Change Links" in the 2nd and 3rd last rows, change "the adaptive capacity" to "increase adaptive and mitigative capacity". For detailed rationale, see Goklany (2006a). Citation: Goklany, I.M. 2006a. Integrated Strategies to Reduce Vulnerability and Advance Adaptation, Mitigation, and Sustainable Development. Mitigation and Adaptation Strategies for Global Change, forthcoming. U.S. Government (Government of U.S. Department of State)	See 2-25
2-30	B	17	0	0	0	Table 2.1: 2nd MDG goal: under Climate Change links, what is meant by "carbon sequestration" 3rd MDG: water/energy nexus – using water efficiently should help improve the amount of available potable water – this is not mentioned because energy and water are treated separately. U.S. Government (Government of U.S. Department of State)	Rejected Increased food production per hectare will also increase carbon sequestration Accepted Water link will be added
2-204	A	17	1	0	0	text in table 2.1, column 1: delete "6" in line 1 (Grassl Hartmut, Max Planck Institute for Meteorology)	Accepted
2-205	A	17	1	0	0	text in table 2.1, column 1 is incomplete (Grassl Hartmut, Max Planck Institute for Meteorology)	Accepted
2-26	B	17	5	17	7	This sentence mentions two technology deployments, but does not adequately distinguish between the two. The result is very confusing. U.S. Government (Government of U.S. Department of State)	Accepted
2-206	A	17	6	17	7	The 2005 Millenium Development Goals Report includes a wide range of indicators measuring progress towards achieving individual goals (e.g. proportion of areas protected, energy use per unit of GDP, proportion of people using improved sources of drinking water); what is the value added of more complex indicators? Does the use of complex indicators facilitate or hinder the exploration	Rejected We do not have space for such a discussion here, it can eventually be covered in chapter 12

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						of linkages between climate change and sustainable development? (Cohen Stewart, Environment Canada)	
2-207	A	17	6	17	7	The 2005 Millenium Development Goals Report includes a wide range of indicators measuring progress towards achieving individual goals (e.g. proportion of areas protected, energy use per unit of GDP, proportion of people using improved sources of drinking water); what is the value added of more complex indicators? Does the use of complex indicators facilitate or hinder the exploration of linkages between climate change and sustainable development? (Cohen Stewart, Environment Canada)	Rejected We do not have space for such a discussion here, it can eventually be covered in chapter 12
2-208	A	17	7	0	0	add "a", "of a robust set" (Grassl Hartmut, Max Planck Institute for Meteorology)	Accepted
2-209	A	17	10	0	0	delete double "(Farsari and Prastacos" and put bracket before date (Grassl Hartmut, Max Planck Institute for Meteorology)	Accepted
2-210	A	17	13	19	16	This discussion is a diversion from the topic of GHG mitigation, so this section can be largely deleted. (Danny Harvey, University of Toronto)	Rejected This is relevant for considering cc in the context of SD
2-211	A	17	15	0	0	write "Index" with capital letter (Grassl Hartmut, Max Planck Institute for Meteorology)	Accepted
2-212	A	17	15	0	0	"A brief introduction to some of these indexes is given in the following". The "following" could not be find anywhere. This is just an example of the need for the deep revision mentioned above (Government of Spain)	Accepted, we will write below
2-213	A	17	16	17	17	Where is the introduction to the indexes provided? (Debyani Ghosh, Global Energy Partners, LLC)	Accepted, we will write below
2-27	B	17	19	17	24	This sentence should be broken down, into two sentences. U.S. Government (Government of U.S. Department of State)	Accepted Full stop after dimensions and.. A process for agreeing……
2-214	A	17	20	0	0	add comma after "dimensions" (Grassl Hartmut, Max Planck Institute for Meteorology)	See 27
2-31	B	18	2	0	0	It's not clear to what the "two processes" mentioned in this sentence refer. U.S. Government (Government of U.S. Department of State)	Noted
2-215	A	18	6	18	6	Change "Reducing and improving waste management" to "Improving waste and wastewater management." [Do not want to advocate "reducing waste management."] (Jean Bogner, Landfills +, Inc)	Noted, OECD text will be checked and wastewater will be added if it is included
2-216	A	18	14	18	14	Clarify what 'protection costs' are.	Accepted, Environmental protection costs

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						(Debyani Ghosh, Global Energy Partners, LLC)	
2-217	A	18	18	18	18	Define ODA. (Debyani Ghosh, Global Energy Partners, LLC)	Accepted
2-218	A	18	26	0	0	delete comma after first "development" (Grassl Hartmut, Max Planck Institute for Meteorology)	Accepted
2-219	A	18	26	0	0	delete ", CSD" (Grassl Hartmut, Max Planck Institute for Meteorology)	Accepted
2-220	A	18	30	18	34	This segment is particularly abstract, full of jargon that many readers will not understand, but not developed enough to be meaningful. This segment definitely should be deleted. (Danny Harvey, University of Toronto)	Agreed, delete
2-221	A	18	36	0	0	put date in brackets (Grassl Hartmut, Max Planck Institute for Meteorology)	Accepted
2-222	A	18	42	18	46	This follows from comment on page 17; AIM and similar impact checklists can highlight issues and raise awareness about the linkages between climate change and sustainable development, but only if there are explicit entry points for climate change in the evaluation of future development options; the evaluation could focus on the implications of changing vulnerabilites and risks caused by changes in climate statistics (extreme events, etc.) coinciding with changes in response capacity emerging from development choices; could refer to Working Group II, chapters 17-20. (Cohen Stewart, Environment Canada)	Rejected We do not have space for such a long discussion
2-223	A	18	42	18	46	This follows from comment on page 17; AIM and similar impact checklists can highlight issues and raise awareness about the linkages between climate change and sustainable development, but only if there are explicit entry points for climate change in the evaluation of future development options; the evaluation could focus on the implications of changing vulnerabilites and risks caused by changes in climate statistics (extreme events, etc.) coinciding with changes in response capacity emerging from development choices; could refer to Working Group II, chapters 17-20. (Cohen Stewart, Environment Canada)	Rejected We do not have space for such a long discussion
2-224	A	18	45	0	0	correct to "expressively" (Grassl Hartmut, Max Planck Institute for Meteorology)	Reject
2-225	A	18	51	18	51	"elaborated their action plan……..". Change “plan” to “plans” (Government of India)	Accept
2-226	A	19	6	0	0	delete double "(Swanson et al." and put bracket before date	Accept

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						(Grassl Hartmut, Max Planck Institute for Meteorology)	
2-227	A	19	8	0	0	correct to "towards" (Grassl Hartmut, Max Planck Institute for Meteorology)	Accept
2-228	A	19	8	19	8	"….progress to-wards….". Change "to-wards" to "toward" (Government of India)	Accept
2-229	A	19	23	19	23	"Some of the decisions that are critically import….". Change "import" to "important" (Government of India)	Accept
2-230	A	19	25	0	0	correct to "can lead to both" (Grassl Hartmut, Max Planck Institute for Meteorology)	Accept
2-231	A	19	27	0	0	replace "a" with "an assumed" (Peter Read, Massey University)	Reject, it will make the text unclear
2-232	A	19	27	19	27	replace "a" with "an assumed" (Peter Read, Massey University)	See 232
2-233	A	19	31	0	0	add "national" before "government" (Grassl Hartmut, Max Planck Institute for Meteorology)	Rejected It is already said in the sentence
2-234	A	19	32	0	0	delete "strictly by the nation-state" (Grassl Hartmut, Max Planck Institute for Meteorology)	Accepted Remove strictly only
2-235	A	19	37	27	34	In this section, decision making mechanism at two levels might be described. One is to describe the current decision-making mechanim at national level; another one is to describe current decision-making mechanism at international level. (Government of China Meteorological Administration)	Noted, this material is transferred to chapter 13
2-32	B	19	38	27	34	Section 2.3 on decision making is a critically important section for policy makers. The themes of the key-subsections of 2.3 should be more clearly included in the Executive Summary. (Government of Australia)	Accepted. Amend para at line 10 p3 to include nature of climate change problem – long term, irreversibility and uncertainty and public good.
2-236	A	19	40	20	16	This section should state how the two kinds of risks could be balanced- the risks of irreversible climate change and irreversible mitigation actions. (Debyani Ghosh, Global Energy Partners, LLC)	Rejected. This chapter outlines broad strategies (eg act-learn-act approaches) and chapter 3 deals with options in more detail.
2-237	A	19	42	19	44	A quasi certain irreversibility of a millenia time scale is the presence in the atmosphere of 22 % of the emitted CO2: see WG 1 TS page 17, line 4 and page 43, line15 to 26 (Government of France)	Agree and insert as a new sentence at line 44 p19 after sentence ending "…Schneider, 2004)."
2-33	B	19	47	0	0	Modify "The combination of environmental irreversibility with these uncertainties" to read as follows: "The POTENTIAL of environmental irreversibility COMBINED with these uncertainties". U.S. Government	Reject. Some level of irreversibility is almost certainly unavoidable (and therefore not potential) - note insert above re WG 1 TS page

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						(Government of U.S. Department of State)	17, line 4 and page 43, line 15 to 16. As well there is the quasi-certainty of at least some species loss.
2-238	A	19	48	19	48	"….Narain et al., 2004……". Narain et al., 2004 is missing from the references. (Government of India)	Agreed. Insert.
2-239	A	19	49	0	0	before "b)" insert " - see for example Read and Lermit (2005) for a decision sequencing proposal designed to enable the high cost aspects of addressing potential abrupt climate change to be postponed until it becomes imminent". (Peter Read, Massey University)	Reject. Not a framing issue.
2-240	A	19	49	19	49	before "b)" insert " - see for example Read and Lermit (2005) for a decision sequencing proposal designed to enable the high cost aspects of addressing potential abrupt climate change to be postponed until it becomes imminent". (Peter Read, Massey University)	Already covered. See above
2-241	A	20	7	0	0	add comma before top d) (Grassl Hartmut, Max Planck Institute for Meteorology)	Agreed. Add comma
2-242	A	20	9	20	9	"….even all communities (Cline, 2005)". Cline, 2005 is missing from the reference. (Government of India)	Agreed. Insert reference
2-243	A	20	11	20	16	There is no meaningful risk that initial actions to reduce GHG emissions (at least the next 20 years of even vigorous actions to reduce emissions) will turn out to be unnecessary. This is shown conclusively in Harvey (2006). Given the present state of knowledge (climate sensitivity having a probability distribution function (pdf) with 5th and 95th percentiles of 2-5 K, respectively, as indicated in the WG1 AR4 report, and the pdf for the threshold of significant worldwide harm having 5-95 percentiles of 1-2 K, which represents a synthesis of WG2 AR4), and assuming an allowable probability of incurring harm previously deemed to be unacceptable of no more than 10%, then it immediately follows that we already violate Article 2 of the UNFCCC, and emissions of CO2 need to be reduced to zero as quickly as possible (i.e., by the end of this century) in order to minimize the extent and duration of noncompliance with Article 2. If, hypothetically, it were to be shown in 2020 that the climate sensitivity is no more than 2 K, and the allowable warming 2 K, then initial emission reductions (assumed to reduce global emissions to the 2010 level by 2020) would need to continue for another 10-20 years in order to come into compliance with Article 2. Only if climate sensitivity is 1 K (a value for which there is no scientific support at present) and allowable warming is 2 K, would the reductions up to 2020 not be fully necessary. However, in this case, significant changes in ocean chemistry, almost certain to have significant negative	Accepted in part: Insert "perceived by investors" after "risks" in line 15 p20. This section is written from the viewpoint of a (private) investment decision make to illustrate the way that uncertainty about policies can induce inertia in investments. While the reviewer might have a strong normative view that there is a "need for at least several decades of emissions reductions" this begs the question of how much reduction how soon and does not recognize that nationally or globally governments might not agree to sustain the policy signals necessary to ensure the commercial viability of early low emissions investments. Cite at line 16: Sullivan, R., and Blyth, W., August 2006 "Climate Change Policy Uncertainty and the Electricity Industry: Implications and

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						consequences on marine life, would occur if emissions are not reduced. Thus, there is no escaping the need for at least several decades of emissions reductions. Conversely, the risks associated with early actions to reduce emissions are small and can be easily minimized further. These risks, discussed in Harvey (1996), include such risks as follows: (i) resources might be diverted from other urgent needs; (ii) economic growth might be reduced; (iii) reduction measures might cost more than expected; (iv) early action might cost more than later action; (v) reduction measures might have undesired side effects; (vi) reduction measures might require heavy-handed government intervention; and (vii) reduction measures might not work. With gradual implementation of a diversified portfolio of measures, these risks can be greatly reduced. However, to the extent that the current discussion of uncertainty (in Chapter 2 of WG3 and elsewhere in AR4) leads to further delay in implementing emission reductions, these very risks are increased. Thus, my recommendation is to replace the existing text with the material given above, more or less as given above. REFERENCES: Harvey, L.D.D.: 1996. 'Development of a risk-hedging CO2 emission policy: Part II: Risks associated with measures to limit emissions, synthesis, and conclusions', Climatic Change 34, 41-71, 1996. 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)	Unintended Consequences", Briefing Paper, Chatham House, from URL www.chathamhouse.org.uk Hamilton, K., and Kenber, M., April 2006, "Business Views on International Climate and Energy Policy", report commissioned by UK Government,
2-244	A	20	13	20	13	The irreversibillity of human actions are basically short term (e.g. low emission technologies as well as the high embikements can be replaced by others when the investment is recovered.) except for the case where the irreversible impact are provided on the natual environment. (Shunsuke Mori, Tokyo University of Science)	Accepted: Add "long-lived" between "large-scale" and "investments" in line 13. Chapter 3 deals in more detail with these issues. Not appropriate to add more detail in framing chapter.
2-245	A	20	20	20	47	This section could be improved upon to better convey the 'public good character of climate change' to the reader. (Debyani Ghosh, Global Energy Partners, LLC)	TIC.
2-246	A	20	20	20	23	Benefits from mitigation action, which are available to all, can not be separated from the fact that the public character of the atmosphere has resulted in the situation that especially the industrialized countries are taking advantage of the intrinsic capacity of the earth to absorb CO2 (starting from the principle of equity	Accepted: Insert new para at line 25.– "The capacity of natural systems to absorb CO2 is a global common. Not all countries have contributed equally to the accumulated stock

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						which means that every human being should be entitled to an equal part of this capacity which is the emission per year of about 2 tons of CO2 per person). It is recommended also to stress this aspect of the public good character of climate change. This also applies to GHGs in general. (Gert de Gans, Kerkinactie / ICCO)	of greenhouse gases in the atmosphere. This has raised equity issues about access to the capacity of natural systems to absorb GHG."
2-247	A	20	23	20	24	Give examples of how some countries may benefit temporarily from climate change. (Debyani Ghosh, Global Energy Partners, LLC)	Rejected: Not appropriate for a framing chapter.
2-34	B	20	23	0	0	Modify the last sentence in this paragraph as follows: "Some countries may actually benefit from LOW-TO-MODERATE climate change". U.S. Government (Government of U.S. Department of State)	Accepted.
2-248	A	20	28	20	30	Better elucidate the sentence- ' The incentive to evade……..distribution of net benefits'. May be helpful to provide some examples. (Debyani Ghosh, Global Energy Partners, LLC)	Accepted: delete the words in parenthesis in line 29 "(mitigation is largely additive)"
2-249	A	20	28	20	28	Explain what 'carbon leakage' means. (Debyani Ghosh, Global Energy Partners, LLC)	Accepted: Carbon leakage is/will be explained in the glossary.
2-35	B	20	33	20	37	It is not certain whether the benefits from climate mitigation action is, and will be in the future, skewed toward the least-developed countries. U.S. Government (Government of U.S. Department of State)	Accepted: Delete words in parentheses in lines 33, 34 and 35.
2-250	A	20	34	0	0	delete "and" before "marginal cost" (Grassl Hartmut, Max Planck Institute for Meteorology)	Rejected: – these are different concepts.
2-251	A	20	39	20	47	References to the case studies mentioned would be useful information (Rutu Dave, IPCC WGIII TSU)	Accepted: Insert 'eg. Caincross, F. (2004) What makes environmental treaties work? Conservation in Practice, Vol. 5 No. 2, Spring.
2-252	A	20	42	0	0	delete double full stop (Grassl Hartmut, Max Planck Institute for Meteorology)	Accepted.
2-253	A	20	42	20	42	"….to the negotiation processesi". Change "precessesi" to "processes" (Government of India)	Accepted
2-254	A	20	52	0	0	before "might" insert "(including the time lags inherent in this IPCC assessment process)" (Peter Read, Massey University)	Reject. Lags inherent in the IPCC process are unremarkable in the context of the timescales of climate change policy making. Insert "," after "inertia" line 51.
2-255	A	20	52	20	52	before "might" insert "(including the time lags inherent in this IPCC assessment process)" (Peter Read, Massey University)	See above
2-256	A	21	10	21	13	conversely, if governments do provide longer-term clarity of policy, then investors	Reject Agree that this point is valid but it is

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						WILL be more willing to invest. The phrase "loud, long and legal" was tabled at the Renewables Conference in June 2004 by the financial sector. (Andrew Dlugolecki, University of East Anglia)	implicit in the existing sentence and adding the converse simply adds unnecessary length.
2-257	A	21	13	0	0	add full stop (Grassl Hartmut, Max Planck Institute for Meteorology)	accepted
2-258	A	21	15	22	10	This section strikes me as a bit confusion. It seems to suggest that there are some mistaken assumptions about the risk of catastrophic or disruptive climatic change, which I agree with. But what is the correct view or set of assumptions? This is not made clear or left rather ambigious (Jacob Park, Green Mountain College)	Accepted. Break up into separate sentences for each possible discontinuity. “Although some studies raise the possibility that isolated, economic costs of events such as a shutdown of the North Atlantic Thermohaline circulation might not be as high as assumed (Link and Tol 2004)” will follow comment on possible disruption to NATC.
2-259	A	21	21	0	0	Insert “and” before “a shutdown” (Danny Harvey, University of Toronto)	See above
2-260	A	21	23	21	26	Garbled sentence (Danny Harvey, University of Toronto)	Agreed. See earlier comment.
2-261	A	21	23	21	26	The second part of this sentence is inconclusive (from "increases.." on) and should be completed (Government of Germany)	As above
2-262	A	21	30	21	36	"The conventional" decision theory refered here seems to be too much simplified. The term "conventional decision making " to be replaced by "theoretical decision making based on cardinal utility theory". (Shunsuke Mori, Tokyo University of Science)	Accepted. Insert after “based on” in line 31 “cardinal utility theory.” Commence next sentence “This assumes that it is….”
2-263	A	21	30	21	46	this seems a very out-of-date position to entertain. It has long been accepted that complex systems with strong non-monetary components cannot be merely equated in financial terms, and a "best" solution chosen. At the least multi-criteria tools are required, as discussed in the next paragraph, where the possibility of "de minimis" constraints is tabled. In fact, later this is discussed in more detail eg pages 25-26, but it is misleading to curtail the exposition here , leaving the reader to infer that CBA is OK. (Andrew Dlugolecki, University of East Anglia)	Reject – CBA is still a widely used tool with many government decision makers and the para does not imply that it is “OK”. The current drafting points to the assumptions underpinning at least some current decision making analysis. The draft goes on to deal with analytic approaches which are not necessarily constrained by these assumptions.
2-264	A	21	42	0	0	substitute ",i.e." for "-that is" (Grassl Hartmut, Max Planck Institute for Meteorology)	Agree
2-265	A	21	43	0	0	add comma after "species" (Grassl Hartmut, Max Planck Institute for Meteorology)	Agree

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2-266	A	21	45	22	10	While lexicographic preferences and loss aversion are of interest, the most directly relevant aspect of preferences inconsistent with standard expected utility is the overweighting of low-probability extreme outcomes, as in cumulative prospect theory (Amos Tversky and Daniel Kahneman. Advances in prospect theory: Cumulativerepresentation of uncertainty. Journal of Risk and Uncertainty, 5:297–323, 1992.) . This idea was originally put forward in rank-dependent expected utility theory (Quiggin, J. (1982), 'A theory of anticipated utility', Journal of Economic Behavior and Organization 3(4), 323–43.) (John Quiggin, University of Queensland)	Agreed. Perhaps insert line 5 page 22 after "… magnitude)" ", and that low-probability extreme outcomes are overweighted. (Tversky and Kahneman (1992; Quiggin 1982)" Insert references. Cumulative representation of uncertainty. Journal of Risk and Uncertainty, 5:297–323, 1992.) . (Quiggin, J. (1982), 'A theory of anticipated utility', Journal of Economic Behavior and Organization 3(4), 323–43.)
2-267	A	21	46	21	46	Implicit in this art of reasoning is the assumption of weak sustainability, commented above. Shouldn't this be explicitly highlighted? (Francisco Aguayo, El Colegio de México)	Noted: The concept is clear in the text and consideration will be given to adding a defini tion of weak sustainability to the glossary. Add "and that it is possible and appropriate to assume that the current generation's preferences will remain stable over time and should be privileged over successive generations."
2-268	A	21	48	0	0	correct to "suggests" (Grassl Hartmut, Max Planck Institute for Meteorology)	Agree
2-269	A	21	48	21	48	" Recent literature….sciences suggest….". Change "suggest" to "suggests" (Government of India)	Agreed.
2-36	B	21	48	0	0	Note that just because empirical work shows that humans make decisions in a certain way, does not mean that such approaches are optimal. (Of course it may also be true that maximizing net benefits is not an optimal approach.) This is simply to say that decisions about how to compare risks and costs of enormous magnitude must in the end be guided by normative rules. U.S. Government (Government of U.S. Department of State)	Accepted. At line 12 p22 insert "No one analytic approach is optimal. Decision making inevitably involves applying normative rules. Some normative rules are described below and in section 2.7 Distributional and EquityAspects."
2-270	A	22	10	0	0	after "(" insert "Read, 1994 (Chapter 3)," -- [[for info LA's, this proposes a 'social objection' criterion that gives zero weight to scenarios that risk catastrophic outcomes]] (Peter Read, Massey University)	Rejected. This AF4 is focused on literature post the TAR.
2-271	A	22	10	22	10	after "(" insert "Read, 1994 (Chapter 3)," -- [[for info LA's, this proposes a 'social objection' criterion that gives zero weight to scenarios that risk catastrophic	See above.

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						outcomes]] (Peter Read, Massey University)	
2-272	A	22	10	0	0	delete full stop after "decisions" (Grassl Hartmut, Max Planck Institute for Meteorology)	Accepted
2-273	A	22	10	22	10	Correct/update references: 1) Chichilnisky, G., 2000 (not 2002); 2) Lempert, R. and Schlesinger, M., 2000, Robust strategies for abating climate change, Climatic Change 45, 387-401. Alternatively, you may choose as reference: Lempert, 2004, A new decision sciences for complex systems, PNAS 99, 7309-7313; 3) Kriegler, E., Held, H., and Bruckner, T., 2006, Climate Protection Strategies Under Ambiguity About Catastrophic Consequences. In: J. Kropp and J. Scheffran (Eds.), Advanced Methods for Decision Making and Risk Management in Sustainability Science, Nova Publishers, New York (see announcement of the book at https://www.novapublishers.com/catalog/product_info.php?products_id=4989) (Elmar Kriegler, Potsdam Institute for Climate Impact Research and Carnegie Mellon University)	Accepted
2-274	A	22	11	0	0	Insert new figure 2.1a [[it does not seem possible to insert a new figure in this Comments section so please insert the figure (and superposed text box) from my Commentary titled "Addressing Potential Abrupt Climate Change" which Dave Rutu has agreed to circulate to LA's and also has available electronically]] and new paragraph as follows " 2.3.4.1 Mitigating the threat of abrupt climate change [[this subhead in italics]] In response to this growing understanding of the threat of abrupt climate change, a small body of literature, some still grey, addresses the (hopefully) effective mitigation of potential abrupt climate change. It grows from the concept of BECS or bioenergy with carbon storage (Obersteiner et al, 2001) a negative emissions system in which biosphere management for increased photosynthesis (Read, 2005) removes CO2 from the atmosphere and the resulting flow of biomass is used as fuel, with some portion of the resulting CO2 stored out of the atmosphere. Then large-scale low-cost (likely negative cost at current oil prices) deployment of capture-ready bio-energy systems is a first, precautionary, stage and retro-fitted CCS a likely high-cost second stage. This 'holistic strategy' is per contra the generality of mitigation studies that treat 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. The relative effectiveness of the two approaches is illustrated in Figure 2.1a, showing a return to pre-industrial levels before mid-	Rejected. Not a framing issue. The comment suggests inserting information about technical strategies which should be directed to Chapter 9 on Biomass or Chapter 13 on Policies.

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						century under the holistic strategy (Read and Parshotam, 2006). [[INSERT FIGURE ABOUT HERE]] The explanation is that 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 to decarbonise i.e. to do without any fuel other than hydrogen. This explains why mitigation is generally regarded as very costly unless achieved over the very long term. Once absorbed into biomass, CO2 can be kept from returning to atmosphere by negative emissions technology systems like BECS, comprising technology chains that involve: the entire range of land uses and organic waste recycling for biomass raw material supply co-produced with conventional farm and forest products; its conversion to commercial energy carriers – electricity, gas and transportation bio-fuels – and/or to non-energy products in bio-refineries, sawmills, paper mills , etc.; linked to carbon storage in various ways, ranging from deep geological aquifer storage of CO2, to in-soil and above-soil storage of carbon in labile and stable forms, including forest plantations (that may comprise a strategic reserve of biomass raw material) and in structures, bio-plastics and wood artefacts. Figure 2.1a is based on illustrative calculations related to a small set of BECS technologies applied over very large areas of land. Numerous caveats apply pending the outcome of further research using spatially differentiated data sets for local land quality and climate. Amongst these is the need to apply environmental and socio-economic sustainability controls, without which more harm may be done than good, e.g. the reported burn-off of tropical forest to clear land for palm-oil based production of bio-diesel." (Peter Read, Massey University)	
2-275	A	22	11	0	0	Insert new figure 2.1a [[it does not seem possible to insert a new figure in this Comments section so please insert the figure (and superposed text box) from my Commentary titled "Addressing Potential Abrupt Climate Change" which Dave Rutu has agreed to circulate to LA's and also has available electronically]] and new paragraph as follows " 2.3.4.1 Mitigating the threat of abrupt climate change [[this subhead in italics]] In response to this growing understanding of the threat of abrupt climate change, a small body of literature, some still grey, addresses the (hopefully) effective mitigation of potential abrupt climate change. It grows from the concept of BECS or bioenergy with carbon storage (Obersteiner et al, 2001) a negative emissions	See above.

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						system in which biosphere management for increased photosynthesis (Read, 2005) removes CO2 from the atmosphere and the resulting flow of biomass is used as fuel, with some portion of the resulting CO2 stored out of the atmosphere. Then large-scale low-cost (likely negative cost at current oil prices) deployment of capture-ready bio-energy systems is a first, precautionary, stage and retro-fitted CCS a likely high-cost second stage. This 'holistic strategy' is per contra the generality of mitigation studies that treat 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. The relative effectiveness of the two approaches is illustrated in Figure 2.1a, showing a return to pre-industrial levels before mid-century under the holistic strategy (Read and Parshotam, 2006). [[INSERT FIGURE ABOUT HERE]] The explanation is that 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 to decarbonise i.e. to do without any fuel other than hydrogen. This explains why mitigation is generally regarded as very costly unless achieved over the very long term. Once absorbed into biomass, CO2 can be kept from returning to atmosphere by negative emissions technology systems like BECS, comprising technology chains that involve: the entire range of land uses and organic waste recycling for biomass raw material supply co-produced with conventional farm and forest products; its conversion to commercial energy carriers – electricity, gas and transportation bio-fuels – and/or to non-energy products in bio-refineries, sawmills, paper mills , etc.; linked to carbon storage in various ways, ranging from deep geological aquifer storage of CO2, to in-soil and above-soil storage of carbon in labile and stable forms, including forest plantations (that may comprise a strategic reserve of biomass raw material) and in structures, bio-plastics and wood artefacts. Figure 2.1a is based on illustrative calculations related to a small set of BECS technologies applied over very large areas of land. Numerous caveats apply pending the outcome of further research using spatially differentiated data sets for local land quality and climate. Amongst these is the need to apply environmental and socio-economic sustainability controls, without which more harm may be done than good, e.g. the reported burn-off of tropical forest to clear land for palm-oil based production of bio-diesel."	

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						(Peter Read, Massey University)	
2-276	A	22	12	22	40	Again, this discussion about uncertainty fails to state the obvious, namely, that the current concentration of CO2 already is in non-compliance with Article 2 of the UNFCCC, or will soon be in noncompliance, as clearly shown in Harvey (2006a,b) using pdfs for climate sensitivity and for the temperature threshold for significant negative impacts worldwide that are consistent with AR4 WG1 and WG2, respectively. That is, if "danger" is defined as no more than a 10% chance (or even a 25% chance) of incurring damage previously deemed to be unacceptable, then the current concentration of CO2 already constitutes dangerous anthropogenic interference in the climate system. In light of this, the wording in lines 22-26 in particular can be characterized as mumble-jumble: skirting around the real issues, suggesting that we still don't know what needs to be done, without actually telling policymakers anything concrete. Same comment for lines 34-36: the issue is not that we need better information in order to "improve the quality of decisions" and to produce "a more refined ordering of decisions through time", the issue is the need to impress on policymakers and politicians the need to apply EXISTING knowledge in order to get at least the basic, first order decision correct, namely: that we need to undertake vigorous emission reductions beginning now, and that such efforts will have to continue for several decades under the most optimistic plausible set of assumptions concerning the outcome of present scientific uncertainties. 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)	Noted, Article 2 issues are addressed in Chapter 1.
2-37	B	22	14	22	40	When referring to uncertainty, use the formal guidance notes dated July 2005 for the IPCC AR4, to ensure that uncertainties are dealt with consistently. Chapter 2 should include the three tables (from the guidance notes) together with a full explanation of each. U.S. Government (Government of U.S. Department of State)	Agree – done in section 2.4.1 starting at page 28
2-277	A	22	18	0	0	add "to" at the beginning of the line	Agreed

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						(Grassl Hartmut, Max Planck Institute for Meteorology)	
2-278	A	22	22	0	0	after "is" insert "generally assumed to be" (Peter Read, Massey University)	Agreed
2-279	A	22	22	22	22	after "is" insert "generally assumed to be" (Peter Read, Massey University)	Repetition – See above
2-280	A	22	22	0	0	delete second hyphen "long-term solutions" (Grassl Hartmut, Max Planck Institute for Meteorology)	Agreed
2-281	A	22	25	22	26	The methods discussed in Chichilnisky, 2000, Lempert and Schlesinger, 2000, and Kriegler et al. 2006, might be extended to the case of learning, but this is not explicitly addressed in the papers. So the omission of the clause "while allowing learning to occur" might be more appropriate here. (Elmar Kriegler, Potsdam Institute for Climate Impact Research and Carnegie Mellon University)	Agree
2-282	A	22	26	0	0	add comma after "occur" (Grassl Hartmut, Max Planck Institute for Meteorology)	See above
2-283	A	22	26	22	26	Isn't it convenient to add that this view is more in tune with the precautionary and anticipatory principles discussed below (section 2.3.7)? (Francisco Aguayo, El Colegio de México)	Agreed. Insert after "risks" line 25 "(see 2.3.7 below)".
2-284	A	22	36	22	36	"Manne,A. S., and Richels,R. G., "Buying Greenhouse Insurance ", The MIT Press, 1992" should be also referred as a pioneering work on ATL action. (Shunsuke Mori, Tokyo University of Science)	Agreed. Insert reference
2-285	A	22	44	23	12	Linked to final part of the comment above, for many business/investors the 2020-2025 timeframe is more important than the 2050 from the point of view of confidence in understanding policy impacts on current markets/projects, and that policies are going to last across the horizon of a project. This comment and the above are relevant to the matter of Dealing with Risks and Uncertainties in Decisionmaking, section 2.3.7, although it would require an additional paragraph dealing with investor perspectives. It would also be relevant at the end of section 2.5.2.1 on Discount Rates, to indicate that there are a variety of factors influencing investment decisions. More generally, investment is a relevant topic throughout WGIII, of particular importance to sections on technology (which requires public or private investment), analysis of carbon price and the role of policy (chapter 13). (Kirsty Hamilton, Chatham House; UK Business Council for Sustainable Energy)	Accepted. Insert at line 47 a new paragraph: "Uncertainties about climate policies at a decadal scale are a source of concern for many climate relevant investments in the private sector (for example power generation investment) which have long expected economic lives."
2-286	A	22	45	0	0	before "long" insert "assumed" (Peter Read, Massey University)	Accepted
2-287	A	22	45	22	45	before "long" insert "assumed"	Repetition.

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						(Peter Read, Massey University)	
2-288	A	22	48	22	48	But TRADITIONALLY, STUDIES assume (Joe Asamoah, International Energy Foundation)	Accepted – insert comma.
2-289	A	23	14	28	9	Major problems with this section remain because the section fails to acknowledge the numerous ethical questions that arise with decision-making under scientific uncertainty (Donald Brown, Pennsylvania Consortium for Interdisciplinary Environmental Policy)	Noted: See section 2.7.2 at page 55. Add at page 23 line 35 "Issues associated with equity dimensions of decision making under conditions of uncertainty are discussed in section 2.7.2 below".
2-290	A	23	18	23	18	"large scale insurance" is a concept that is not defined. I would prefer to use the terms risk management or risk hedging, since the key element of insurance is risk pooling, which is not intended here I believe eg see line 30. (Andrew Dlugolecki, University of East Anglia)	Agreed. Replace "large scale insurance" with "risk hedging"
2-291	A	23	18	23	18	Include at the end 'For the purpose of climate change policies, the three of them require broad participation of the society to success'. (Government of Spain)	Accepted. Insert sentence l 31 p 24 "This requires broad participation of society to succeed."
2-292	A	23	28	23	40	2.3.5 should also raise the impact of climate policy uncertainty on business decisionmaking - this is a key issue for policymakers to understand, and there is emerging evidence-based publication in this area - for example: 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). Also Hamilton, K., and Kenber, M., April 2006, "Business Views on International Climate and Energy Policy", report commissioned by UK Government, examining the transmission between international policy and its implementation, and business investment. Standard & Poors the rating agency in its report Climate Change Credit Survey: A Study of Emissions Trading, Nuclear Power, and Renewable Energy, [online report, November 2005] also comments explicitly on this matter, with a subheading 'Uncertainty delays investment' referring to commentary on EU Climate Change Policy looking at the electricity generation sector (page 7) . Risk and Return are key issues for investors, and in general terms they are used to dealing with those factors using various risk management tools. "In very general terms, firms or projects that are exposed to greater levels of risk simply need to provide a higher return on investment in order to attract capital." (Chatham House, 2006). Energy or climate policy uncertainty (including the risk of policy/regulatory changes by governments, which impact on returns) is one of the risks which will be	Noted. These issues are dealt with at section 2.3.1 at pages 19 and 20 and appropriate references have been included.

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						assessed as part of an investment, and is particularly important in policy-created markets. In some sectors particularly exposed to climate policy such as the power sector, this can result in investment delays: investment in for example a power station is more or less irreversible, therefore it literally pays to wait till some climate or energy policy risks have been resolved (e.g. key elements of the EU Emissions Trading Scheme). What businesses and investors are looking for is the scale and timing of governmental response to climate change, and clarity on what this will mean for the markets in which they are operating, across a time horizon relevant to their investments. (Kirsty Hamilton, Chatham House; UK Business Council for Sustainable Energy)	
2-293	A	23	31	23	35	The connection between precaution and deep uncertainty is a very important point. As an illustration, you could cite the guideline of the European Commission on the applicability of the precautionary principle. It says that a recourse to the principle presupposes "a scientific evaluation of the risk which because of the insufficiency of the data, their inconclusive or imprecise nature, makes it impossible to determine with sufficient certainty the risk in question" (European Commission, 2000, Communication of the Commission on the precautionary principle, COM(2000) 1, pg. 15). Formalizations of this connection to deep uncertainty can be found in Cheve, M., Congar, R., 2002, Managing Environmental Risks under Scientific Uncertainty and Controversy. In: van Ierland, E.C., Weikard, H.P., Wessler, J. (Eds.), Proceedings of the International Conference on Risk and Uncertainty in Environmental and Resource Economics, Wageningen University, June 5-7, 2002. Another reference is Henry, C., Henry, M., 2002, Formalization and Applications of the Precautionary Principle, Discussion Paper #0102-22, Department of Economics, Columbia University (Elmar Kriegler, Potsdam Institute for Climate Impact Research and Carnegie Mellon University)	Agreed. From line 30 the text could read "First, 'precaution' relates to decision making in situations of deep uncertainty. It applies in the absence of sufficient data or conclusive or precise probabilistic descriptions of the risks (Cheve and Congar, 2000; Henry and Henry 2002)) or the possibility of irreversibility (Gollier et al 2000).
2-294	A	23	32	23	32	in this CONCEPT, THE legitimacy (Joe Asamoah, International Energy Foundation)	Rejected. Prefer the existing drafting – the 'context" referred to is "deep uncertainty", not "precaution"
2-295	A	23	37	23	39	It would be appropriate to include into this paragraph that precaution can also be related to the presence of irreversibility as formalised in Gollier, C., Julien, B., and Treich, N., 2000, Scientific Progress and Irreversibility: An Economic Interpretation of the Precautionary Principle. Journal of Public Economics 75: 229-253. (Elmar Kriegler, Potsdam Institute for Climate Impact Research and Carnegie	Agree. Addressed in text above

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						Mellon University)	
2-296	A	23	40	23	49	The paragraph concludes that decision makers can make decisions about uncertainty using three frames. This discussion fails to mention that decision-making under uncertainty raises deep ethical questions when the decision-maker is making a decision that affects others who could be put at risk by the decision and have not consented to be put at risk. Such actions raise basic questions of human rights and who should bear the burden of harm. Particularly when the decision could result in creating a risk of death, or food insecurity. Climate change makes normal decision making under uncertainty ethically problematic if a party decides the risks of great harm should be tolerated. The features of climate change that make such decisions ethically problematic. T are: For the above reasons, there is ethical consensus among philosophers that an excuse to not reduce one's emissions to their fair of global emissions due to scientific uncertainty about magnitude and timing of impacts is ethically problematic the argument that a nation need not reduce its GHG emissions because of scientific uncertainty about consequences of timing and magnitude does not withstand minimum ethical scrutiny because of: a. The enormous adverse potential impacts on human life, liberty and personal security, as well as on and the environment from human induced climate change. b. The disproportionate effects on the poorest people of the world. c. The real potential for potentially catastrophic climate surprises much greater than impacts often predicted that rely on assumptions of smooth, linear responses to climate change. d. The fact that much of the science of the climate change problem has never been or is not now in dispute even if one acknowledges uncertainty about timing or magnitude of climate change impacts. e. The fact that climate change damage is probably already being experienced by some people. f. The strong likelihood that serious and irreversible damage will be experienced before all scientific uncertainties can be eliminated. g. The fact that the longer nations wait to take action, the more difficult it will be to stabilize greenhouse gases at levels which don't create serious damage to humans, plants, animals, and ecosytems. h. The fact that nations agreed in the UNFCCC not to use scientific uncertainty as an excuse for inaction on climate change when they agreed to the precautionary principle.	Insert at line 25 after the text quoting the UNFCCC Article 3 a footnote: Section 2.7.2 discusses the ethical questions about burden and quantity of proof as well as those of procedural justice.

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						i. The fact that those most vulnerable to climate change impacts have not consented to the risk imposed by climate change. For this reason, something needs to be inserted in section 2.3.7 that states. how policy makers deal with scientific uncertainty about climate change impacts raises ethical questions about burden of proof and quantity of proof as well as procedural justice questions about who gets to decide about what risks are tolerable. (Donald Brown, Pennsylvania Consortium for Interdisciplinary Environmental Policy)	
2-297	A	23	41	0	0	delete abbreviations of first names (Grassl Hartmut, Max Planck Institute for Meteorology)	Agreed. Delete initials.
2-38	B	23	42	23	43	The example is subjective. Just as many would say that using nuclear power to mitigate CO2 emissions is not a trade-off, but instead a double win—the win of mitigation and the win of reaping the rewards of nuclear power. It is recommended that the example be replaced or dropped. U.S. Government (Government of U.S. Department of State)	Rejected. Without suggesting that any energy source is risk free, nuclear power has been judged by many countries to raise risks - or costs - that they are not prepared to accept. At least some are reconsidering those views in the light of global warning. The US GNEP is at least one example of a program designed to offset perceived risks associated with a greater use of nuclear power.
2-298	A	23	45	23	46	Define the 'imperative of responsibility' school. (Debyani Ghosh, Global Energy Partners, LLC)	Accepted. Insert '..which implies an overruling duty of collective care to avoid universal capacity (Jonas 1979)"
2-299	A	23	50	23	50	Quiggin (2005) suggests, however, that the precautionary principle may be understood in terms of choice in the presence of unforeseen contingencies. If unforeseen contingencies are likely to produce unfavorable rather than favorable surprises, as is the case in many environmental settings, those advocating an incompletely-understood change to an existing stable system face a strong burden of proof to show that the change can reasonably be expected to be beneficial. Quiggin (2005) also presents a more general incompleteness hypothesis, arguing that formal decision models are inherently incomplete, and that this incompleteness will typically generate excessive optimism in relation to choices where the outcomes are imperfectly understood, as opposed to those where the outcomes are well understood. The precautionary principle in environmental policy and the theory of choice under uncertainty, Working Paper M05_3, 27/4/2005, John Quiggin, 10–13 February	Accepted. Line 32 add after "risks" "and in circumstances where the possibility of unforeseen contingencies is suspected" Change the text to read at line 51 to read: "There is no single agreed definition of precautionary decision making in the scientific literature."

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						http://www.uq.edu.au/economics/rsmg/WP/WPM05_3.pdf (John Quiggin, University of Queensland)	
2-300	A	23	51	23	51	. Claims that there is no formal definition of the precautionary principle in the scientific literature-a statement that is true but potentially misleading to the extent that it implies that the absence of a definition makes it is not useful. The sentence currently reads as if the absence of a clear definition allows it to be ignored. Everyone agrees that the precautionary principle is, at minimum, a burden shifting requirement-the application of the precautionary principle rrequires that those who want to use scientific uncertainty as justification for doing little or nothing demonstrate that they are acting prudently in situations where the precautionary principle is triggered, a case that applies to the UNFCCC. (Donald Brown, Pennsylvania Consortium for Interdisciplinary Environmental Policy)	Rejected. The usefulness, even if imprecise, of the concept is well reflected in its use in a number of international and national legal instruments – which is referred to in the text. The text notes, which is indisputable that there is no single definition and a plurality of interpretations. It is not appropriate to privilege any one definition and the UNFCCC text is reproduced in full.
2-39	B	23	51	0	0	(1) Delete "scientific" because decision-making inevitably requires more than science. (2) Add the following new sentence at the end: "However, Goklany (2002) has suggested a framework for decision-making under the precautionary principle that considers trade-offs between competing risks." Citation: Goklany, I.M. 2002. "From Precautionary Principle to Risk-Risk Analysis." Nature Biotechnology 20 (November 2002): 1075. U.S. Government (Government of U.S. Department of State)	(1) Rejected: at no point does this sentence suggest that decision making is just a matter of science – the reference is rather to a class of literature. (2) Accepted. Insert suggested text and reference at end of previous paragraph line 44. Delete "however" at beginning of proposed inserted text.
2-40	B	24	6	24	7	For the U.S. when property losses are estimated in terms of wealth at risk, there is no indication of an increasing trend. As far as it is known, no such analysis has been done at the global level, therefore while insurance companies might be changing their actuarial tables, it is debatable as to whether it is based on scientific information. This should be noted. U.S. Government (Government of U.S. Department of State)	Accepted: delete the paragraph – the paragraph is not fully supported by WGII 7.2
2-301	A	24	10	24	10	In fact reinsurers possibly cover just 10% of the total economic cost of catastrophes, since only about 20% of the economic cost is insured,(much less in developing nations), and around half of that is reinsured. Additionally, recollect that catastrophes represent about half of the cost of climatic damage, so the total share of reinsurers in dealing with climatic damage is around 5%. (Andrew Dlugolecki, University of East Anglia)	Accepted. Replace first sentence at line 10 with "The risk of catastrophes is particularly commercially important for reinsurers, that is large …." Also insert cross reference to WGII Box 7.2
2-302	A	24	15	24	26	Is this detailed descriptions of the various financial instruments relevant here? (Cédric PHILIBERT, International Energy Agency)	Rejected; they are useful for demonstrating the point and should be mentioned by name as

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							a minimum. Add "During the last decade a market for weather derivatives has appeared that allows firms to hedge against unfavourable climate outcomes" at line 18.
2-303	A	24	15	24	36	On line 29, I would query that 5billion USD is a threshold for cataclysms. The insurance industry would see it as around 100 billion USD insured, or 200 billion USD total economic costs, since these events are seen as perfectly possible under present conditions.The discussion of economic tools could extend to weather derivatives perhaps.On line 30 , I agree that systemic resilience IS the best approach- insurers always seefinancial risk transfer as the last step in risk management. On line 33, there are many more commentators than Mills to refer to, and all would agree his point, that it is unlikely that insurers will or can, foot the bill..See eg ABI paper of 2004," A changing climate for insurance" or Chief Risk Officers Initiative Briefing on Tropical Cyclones 2006, or ppaer by Allianz and WWF in 2005 "Climate Change and the Financial Sector: an agenda for action", or UNEPFI 2-volume report of 2002 . (Andrew Dlugolecki, University of East Anglia)	Accepted – delete the text in brackets.
2-41	B	24	34	24	34	Delete "rise to the occasion" as this is unnecessary and subjective. (Government of Australia)	Accepted. Delete
2-42	B	24	36	0	0	It should also be noted that greater availability of insurance helps individuals shift a portion of their risks to other entities (see, e.g., Goklany, 2006b. Death and Death Rates Due to Extreme Weather Events: Global and U.S. Trends, 1900-2004, June 6, 2006, prepared for the proceedings of the Climate Change & Disaster Losses Workshop, Hohenkammer, Germany, May 25–26, 2006. U.S. Government (Government of U.S. Department of State)	Accepted. Insert at line 32 at commencement of para "A greater availability of insurance helps individuals shift a portion of their risks to other entities (see, e.g., Goklany, 2006b), however, Mills (2005)…..". Insert in references: Goklany, Death and Death Rates Due to Extreme Weather Events: Global and U.S. Trends, 1900-2004, June 6, 2006, prepared for the proceedings of the Climate Change & Disaster Losses Workshop, Hohenkammer, Germany, May 25–26, 2006. U.S. Government
2-43	B	24	38	27	34	This section on decision-support tools is also a bit of a mess, mixing decision criteria (e.g. cost-benefit vs multi-attribute) with actual decision-support tools such as IAMs. It seems preferable to start with a comparison of decision criteria, in particular with a discussion of the widely used costs vs. benefits criterion and its strengths and limitations, followed by a discussion of how the criteria can be	Rejected. This section is essentially a description of widely used tools. Decisions Criteria are discussed in 2.3.4 and in section 2.7 dealing with ethics. HOWEVER at line 6 p25 insert after "unpredictability" "and very

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						implemented practically. Green accounting and IAMs and other simulation models provide the data needed to implement decision criteria. They are compatible with several criteria. (Government of Switserland)	long time horizons". Insert new sentence to follow: "Scenarios are a foundation source for much climate policy analysis"
2-304	A	24	40	0	0	delete enumeration sign (Grassl Hartmut, Max Planck Institute for Meteorology)	Accepted. Change
2-305	A	25	19	0	0	add "e.g." after "scenarios" and delete following brackets (Grassl Hartmut, Max Planck Institute for Meteorology)	Accepted. Change
2-306	A	25	28	25	31	Explain in a foonote briefly the different kinds of approaches mentioned. (Debyani Ghosh, Global Energy Partners, LLC)	Rejected. The point is better made in the text.
2-307	A	25	33	25	36	Explain in a foonote briefly the different kinds of approaches mentioned. (Debyani Ghosh, Global Energy Partners, LLC)	See above.
2-308	A	25	34	25	34	Include 'sociological analysis' (Government of Spain)	Accepted. Insert
2-309	A	26	5	26	5	Add this paragraph: ' Sociological analysis includes the understanding of how society operates in terms of beliefs, values, attitudes, behavior, social norms, social structure, regarding climate change. This analysis includes both quantitative and qualitative approaches, among them general surveys, statistics analysis, focus group, public participation process, media content analysis, Delphi, among others'. (Government of Spain)	Accpeted: insert as a new paragraph at line 26 on page 27 following paragraph ending "…compare different policy impacts."
2-310	A	26	12	0	0	delete "follow" (Grassl Hartmut, Max Planck Institute for Meteorology)	Agreed. Delete "follow and"
2-311	A	26	20	26	20	Include this point:' Public participation processes, which optimize policies adequacy, implementation, and acceptance'. (Government of Spain)	Accepted Add at line 27 "public participation processes like citizens juries, consultation, and polling."
2-312	A	26	40	26	46	One issue in applying cost-benefit analysis and others which convert the impacts in monetary term to climate change issues is that one decision maker cannot assess all the events since the number of objectives and stakeholders are too many. Therefore it is often hard to keep the consistency among the judgements. Ambiguity of subjective value judgements of the assessments can piled up in the final stage. The larger the target of climate policy becomes, the larger the ambiguity is. (Shunsuke Mori, Tokyo University of Science)	Noted.
2-313	A	26	50	26	51	Replace 'socioeconomic' for 'social and economic' (Government of Spain)	Accepted. Replace.
2-314	A	27	20	0	0	write "analytical decision" (Grassl Hartmut, Max Planck Institute for Meteorology)	Accepted. Change to "decision analysis methods"

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2-315	A	27	20	0	0	delete comma after "Markandya" (Grassl Hartmut, Max Planck Institute for Meteorology)	Agree. delete
2-316	A	27	36	0	0	Section 2.4 comment: In my opinion it is a pity that there is no sign of probability theory here, not even reference to a consistent or coherent concept of how to interpret probabilities. A major chance to familiarize the interested public has therefore been missed. As my comments will make clear, an interested lay person has a great chance of being confused. My comments aim at fixing the most important shortcomings of the approach chosen here. (Leo Schrattenholzer, IIASA)	Noted.
2-317	A	27	36	35	10	One consistent definition of risk and uncertainty would certianly be valueable for the report and chapter (Rutu Dave, IPCC WGIII TSU)	Noted. There is no definition in the Guidance notes nor in the Manning's Guidance 2003 concept paper. This reflects the lack of a settled definition in the literature.
2-318	A	27	39	0	0	After “here to stay”, insert: “In spite of this, a synthesis of current knowledge concerning climate sensitivity and the thresholds for significant damage to ecosystems, risks of melting of the Greenland Ice Sheet or collapse of the West Antarctic Ice sheets, and other hazards, and taking into account uncertainties and for a wide range of assumptions concerning allowable risks, implies that several decades of substantial emission reductions will be needed in order to keep the CO2 concentration below levels that can be regarded as ‘dangerous anthropogenic interference in the climate system’ (Harvey, 2006a,b,c)”. Something along these lines is needed because it is necessary to keep repeating the message that uncertainty is not an excuse for delay in taking strong action beginning now! Everything else in this section amounts to minor details compared to this central message, but the central message (which, I stress, follows immediately from the synthesis of knowledge embodied in the WG1 and WG2 reports) is missing. 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	Reject. The theme in this framing chapter is the description of the nature of risk and uncertainty and how they are handled in the report. Article 2 matters are dealt with in chapter 1.

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						(submitted) (Danny Harvey, University of Toronto)	
2-319	A	27	42	27	50	The distinction between risk and uncertainty as put forward in this paragraph may be a little bit unfortunate, since the reader might be misled to think that uncertainty is a situation where no probabilities exist. However, this is only true in so far "objective" probabilities are concerned. The use of "subjective" probabilities is part and parcel of the conventional paradigm for describing decision making under uncertainty (as axiomatized by Savage). In distinguishing Savage's approach from Knight's approach to uncertainty, Knightian uncertainty is commonly called "deep" uncertainty. (Elmar Kriegler, Potsdam Institute for Climate Impact Research and Carnegie Mellon University)	Noted. The ambiguity is pervasive in the literature, especially outside Economics.
2-320	A	27	43	27	44	The definition of risk is not clear: What is meant by "combination"? Please clarify. Also an example would be helpful. (Leo Schrattenholzer, IIASA)	Accepted Replace "This...loss" with "This allows a variety of ways of combining probabilities and consequences, one of which is expected loss, defined as the product of probability and loss."
2-321	A	27	44	0	0	begin sentence with capital letter "Following" (Grassl Hartmut, Max Planck Institute for Meteorology)	Rejected
2-322	A	27	45	0	0	correct to "This" to "this" (Grassl Hartmut, Max Planck Institute for Meteorology)	Noted, text will be edited.
2-323	A	28	5	0	0	add "in", "in this report" (Grassl Hartmut, Max Planck Institute for Meteorology)	Accepted
2-324	A	28	8	28	8	"Finally, the final sections on….". Change "Finally, the final sections" to "the final section". (Government of India)	Accepted
2-44	B	28	9	29	15	It should be noted the confidence levels and likelihoods assigned to specific phenomena, outcomes, etc., as assigned in this document are based on the authors' judgments. It does not necessarily mean that reviewers and governments concur, if for no reason other than that the precise methodology and its specific applications were neither provided with the document nor was there enough time given to sift and evaluate through the specific applications. U.S. Government (Government of U.S. Department of State)	Noted. However, in this section, confidence levels and likelihood are not assigned to specific phenomena or outcomes.
2-325	A	28	13	32	31	Although this obviously the way the report describes risks in the report, there are	Noted.

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						normative questions about whether descriptions of risks that do not acknowledge issues of who should have the burden of proof and how much information is needed to meet that burden of proof are ethically problematic. Because nations have consented to be bound by the precautionary principle in relation to climate change science, the failure to apply the precautionary principle in developing climate change policies also violates the ethical norm that a nation should keep its promises. Nations have a duty to consider all plausible adverse climate change impacts in setting policy including low probability, high consequence impacts. In determining whether low probability, high consequence impacts are acceptable, nations need to provide opportunity for those most vulnerable to climate change to participate in this decision (Donald Brown, Pennsylvania Consortium for Interdisciplinary Environmental Policy)	
2-326	A	28	38	28	43	The bullet point, as it appears now, is confusing to the reader. Should be written in a clearer fashion. (Debyani Ghosh, Global Energy Partners, LLC)	Accepted. Text will be clarified.
2-45	B	28	41	29	15	The WG3 report includes a new metric to characterise uncertainty, as set out in Table 2.3 that is not present in the WG1 or WG2 reports. This may tend to confuse readers as in many places across the WG3 report the new characterisation is used in lieu of the standard notations for likelihood and confidence used in the other reports. The authors should consider the value and utility of incorporating this new metric. (Government of Australia)	Noted. Authors from all WGIII chapters considered whether to use Table 2.3 and unanimously found it valuable.
2-327	A	28	43	0	0	chapter number is missing (Grassl Hartmut, Max Planck Institute for Meteorology)	Accepted. Insert “9”
2-328	A	29	0	29	0	Tables 2.3 , 2.4, 2.5: it remains unclear for the reader what the meaning and purpose is for the various qualifications presented: evidence, agreement, confidence, likelihood. Also the distinct class borders of the confidence and the likelihood density functions, confuses the standard reader. What is the relationship between the terms presented? When obvious, it is perhaps good to add to the Glossary (that also includes an Abbreviations & Acronyms list and Chemical symbols, a separate page "Qualifying Uncertainty and Judgement" with the established conventions). I went on to investigate the case and studied the "Guidance Notes, July 2005", but did not get more clarity. Comments on the Guidance Notes are added in the separate word-file "Terminology on Uncertainty AV.doc"; please answer the questions of that note.	Accepted. Will edit text and tables for clarity.

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						(Aviel VERBRUGGEN, University of Antwerp)	
2-329	A	29	0	29	0	Table 2.3: What must one conclude from the "...." in this table? As I also commented on the SPM's use of HM, HL and LL, the acronym-abbreviation letters choosen are perhaps not the best ones for a broad readership, because a (silent) convention accepted by many authors is the use of H=High, M=Medium, L=Low; in the SPM and here however M is used for Much. Is it possible to agree (here and for the SPM) on some standard, e.g. HaHe (High agreement, High evidence) for HM; HaLe (High agreement, Low evidence) for HL ; LaLe (Low agreement Low evidence) for LL (footnote 13); and analogously for all *a*e combinations with *=H,M,L. We also could include such a convention in the Abbreviations list.The nine cells of table 2.3 could then be filled systematically. (Aviel VERBRUGGEN, University of Antwerp)	Accepted Replace ... by “Medium” Suggestion forwarded to the Uncertainty cross-cutting subgroup and TSU.
2-331	A	29	0	29	0	Lines in the rows at the left of the Table 2.3 are jumbled (Government of India)	Accepted Table presentation will be corrected.
2-46	B	29	0	0	0	Table 2.3 - Meaning is not explicit. U.S. Government (Government of U.S. Department of State)	Accepted Table presentation will be corrected.
2-330	A	29	7	0	0	table 2.3: text left of columns? (Grassl Hartmut, Max Planck Institute for Meteorology)	Accepted Table presentation will be corrected.
2-332	A	30	28	30	24	A useful comparison is with insurance practice, where underwriters calculate the Maximum Probable Loss (MPL) - there are many references to this see the Geneva Papers on Risk and Insurance, or Munich Re and Swiss Re websites. (Andrew Dlugolecki, University of East Anglia)	Noted.
2-333	A	30	38	30	47	The distinction of likelihood and confidence as put forward in this paragraph is unfortunate. Both terms have a clear meaning in statistics where likelihood refers to the conditional probability of observing data given some hypothesis, and confidence level to the cut-off criterion used in hypothesis testing and the construction of confidence intervals. Both meanings have little to do with what the authors seem to have in mind. l propose a different distinction in terms of aleatory uncertainty emerging from inherent stochasticity in variables versus epistemic uncertainty deriving from lack of knowledge about data, physical relationships etc. In the former case, “objective probabilities” might be available in terms of limiting frequencies, while in the latter case the uncertainty involves belief (which are always to some extent subjective). It might be useful to discuss the betting paradigm that is used to interprete the meaning of subjective probabilities in the absence of any frequentist interpretation. However, the betting interpretation of probability stands on shaky grounds and it is easy to generalise (e.g. buying price	Rejected The terms follow the guidance note.

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						lower than selling price) or abandon it in order to arrive at more general descriptions of uncertainty (like imprecise probability = sets of probabilities). (Elmar Kriegler, Potsdam Institute for Climate Impact Research and Carnegie Mellon University)	
2-334	A	30	39	30	39	Please define what is meant by "degrees of truth" and/or give a reference to an authoritative book that explains the term. Otherwise, this sounds like a badly remembered "degree of belief" (de Finetti). (Leo Schrattenholzer, IIASA)	Accepted Terms deleted.
2-335	A	31	17	0	0	delete "6" at the end of the paragraph (Grassl Hartmut, Max Planck Institute for Meteorology)	Accepted Footnote call will be retypeset.
2-336	A	31	17	31	17	FUTURE, not 'future6' (Joe Asamoah, International Energy Foundation)	Accepted Footnote call will be retypeset.
2-337	A	31	21	32	31	The typology clearly misses the category of subjective probability, where probabilities are understood as degree of belief as reflected in the propensity to act. This concept was axiomatized by Savage, and constitutes the dominant approach to quantify decision making under uncertainty to date (subjective expected utility theory). I am a bit wary about the prominent place that possibility takes in this typology. The rigorous definition in terms of acceptable odds is not limited to possibility, but is applicable to imprecise probabilities in general. In fact, under some perspective, possibility can be seen as very special case of imprecise probability. There are, of course, other semantics for possibility (e.g, Zadeh, 1978, Dubois and Prade, 1988), but their usefulness for climate change analyses remains in doubt. In any case, all arguments in favor of possibility put forward in this typology are equally applicable to the more general concept of imprecise probability (deep uncertainty). Therefore, I propose to drop possibility from the typology and in turn expand the paragraph on deep uncertainty. Imprecise probability includes an entire hierarchy of uncertainty models starting on top with the most general model of convex sets of probabilities including interval probability including two-monotone Choquet capacities (often used in economics to model decision making under deep uncertainty, see Mukerji, S., 2000, A survey of some applications of the idea of ambiguity aversion in economics, International Journal of Approximate Reasoning 24, 221-234, for an overview) including Dempster-Shafer theory including probability theory and possibility theory (under a set of probability interpretation, see Dubois and Prade, 1992, When upper probabilities are possibility measures, Fuzzy Sets and Systems 49, 203-244). It would be important to provide more references in the paragraph on deep uncertainty to point	1. Add subjective probability Rejected All categories discussed here can be defined both objectively and subjectively. 2. Drop possibility Rejected Possibility and deep uncertainty are both given 10 lines. 3. More references Accepted Add Kriegler 2005, Kriegler et al. 2006 4. Interval uncertainty Accepted (at the end of deep uncertainty) Insert p32 l 12 "Under deep uncertainty, reporting a range of plausible values allow the decision maker to apply their own views on precaution."

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						out that these concepts have been applied to several aspects of climate change and climate policy. Here are prominent examples: Lange, A. (2000) Decisions on greenhouse gas emissions under uncertainty, Discussion Paper Nr. 315, Interdisciplinary Institute for Environmental Economics, University of Heidelberg (economic application of Choquet capacities); Kriegler, E. and Held, H., 2005, Utilizing belief functions for the estimation of future climate change, International Journal of Approximate Reasoning 39, 185-209; Hall, J., Twyman, C., Kay, A., 2005, Influence diagrams for representing uncertainty in climate-related propositions, Climatic Change 69, 343-365; Borsuk, M.E., Tomassini, L, 2005, Uncertainty, imprecision, and the precautionary principle in climate change assessment, Water Science & Technology 52:66, 213-225. The variety of decision criteria that you mention in the paragraph on deep uncertainty have been applied to a climate policy analysis in Kriegler, E., Held, H., and Bruckner, T., 2006, Climate Protection Strategies Under Ambiguity About Catastrophic Consequences. In: J. Kropp and J. Scheffran (Eds.), Advanced Methods for Decision Making and Risk Management in Sustainability Science, Nova Publishers, New York. Finally, the typology of uncertainty representations should include the case of interval uncertainty specifying only a range of plausible values (also a special case of imprecise probability). This case should be mentioned not only for the sake of completeness, but also for the fact that intervals have been the IPCC's favority means of quantifying uncertainty in the past. (Elmar Kriegler, Potsdam Institute for Climate Impact Research and Carnegie Mellon University)	
2-338	A	31	23	0	0	delete bracket (Grassl Hartmut, Max Planck Institute for Meteorology)	Accepted
2-339	A	31	23	31	23	Here is an extra closing parenthesis. (Leo Schrattenholzer, IIASA)	Accepted
2-340	A	31	23	31	23	the line may be clarified as follows: RISK EXISTS WHEN there is a well-founded probability distribution (Joe Asamoah, International Energy Foundation)	Accepted First sentence to read “In typologies of uncertainty, risk refers to situations where there is a well founded probability distribution.”
2-341	A	31	23	31	23	"Risk is when…….distribution)". Delete “)”. There is no preceding “(“ (Government of India)	Accepted
2-342	A	31	42	0	0	add "The seminal work of" before Knight (Grassl Hartmut, Max Planck Institute for Meteorology)	Accepted

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2-343	A	31	49	31	49	Note 6: last but one line, replace 2060 by 2006 (Government of France)	Accepted
2-344	A	32	2	0	0	Box 2.1.; third paragraph. Comment: Replace 'socioeconomic' for 'social and economic' (Government of Spain)	Accepted
2-345	A	32	8	0	0	correct to: "associates" (Grassl Hartmut, Max Planck Institute for Meteorology)	Accepted
2-346	A	32	10	0	0	correct to: "sometimes" (Grassl Hartmut, Max Planck Institute for Meteorology)	Accepted
2-347	A	32	15	32	15	The reference to “the marble bag example” is mystifying, since there is no reference to a marble bag earlier in the chapter. (Lenny Bernstein, L. S. Bernstein & Associates, L.L.C.)	Accepted Sentence deleted
2-47	B	32	15	32	15	The reference to “the marble bag example” is mystifying, since there is no reference to a marble bag earlier in the chapter. U.S. Government (Government of U.S. Department of State)	Accepted Sentence deleted
2-348	A	32	16	32	19	The global temperature is a fuzzy, continuously varying, variable which is crucial to every climate discussion; the more so the geographical distribution of yearly averaged temperatures and precipitations. Probability distribution function must be substituted to probability value when you shift from variables allowed to have a discrete number of values to smoothly varying variables. This para is unclear and confusing and should be deleted or rewritten. (Government of France)	Accepted. p 32 l 14-23 Will be rewriten
2-349	A	32	23	32	23	UNFCCC not UNFCC (Joe Asamoah, International Energy Foundation)	Accepted
2-350	A	32	26	0	0	"at hand, no model" content? (Grassl Hartmut, Max Planck Institute for Meteorology)	Rejected
2-351	A	32	32	0	0	box 2.1, line 2: correct to: "gas emission" (Grassl Hartmut, Max Planck Institute for Meteorology)	Accepted
2-48	B	32	32	33	5	Box 2.1: The authors provide a discussion of the controversy on quantifying belief in the SRES, however, they do not provide an assessment of the controversy or provide a clear explanation of the treatment of this controversy in the current WG3 report. (Government of Australia)	Accepted. See inserted text from 2-254 below
2-352	A	32	40	32	40	“Sempiternal” is a legitimate, but very obscure, English word. (This reviewer had to use a large dictionary to find its meaning.) If the goal is communication, it should be replaced by “on-going” or “ever-lasting,” which are much more	Accepted Replace with “ongoing”

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						understandable synonyms. (Lenny Bernstein, L. S. Bernstein & Associates, L.L.C.)	
2-49	B	32	40	32	40	"Sempiternal" is a legitimate, but very obscure, English word. If the goal is communication, it should be replaced by "on-going" or "ever-lasting," which are much more understandable synonyms. A reference to the box is needed in the text. U.S. Government (Government of U.S. Department of State)	Accepted Replace with "ongoing"
2-353	A	32	50	32	51	In the language adopted in this section, it appears that you would have to say instead that the argument is that objective probabilities cannot be determined. Otherwise, you would argue against scientists quantifying their "confidence or belief" (according to the definition on p. 30, line 41). If that were indeed so, the report would destroy the basis for its reasoning about the communication of risk and uncertainty (Subsection 2.4.1.). (Leo Schrattenholzer, IIASA)	Accepted Insert "objective" before "probabilities"
2-354	A	33	3	33	4	In spite of the difficulty, there is an increasing tendency to estimate pdfs for climate sensitivity, and these are discussed extensively in the WG1 report (see Chapter 9, Sections 9.6.2 and 9.6.3 and Chapter 10, Sections 10.5.2 and 10.5.4). The discussion should be revised to reflect this. WG2 (chapters 4 and 19 in particular) has assigned subjective temperature thresholds for a variety of significant negative impacts. (Danny Harvey, University of Toronto)	Accepted. Insert at end of box 2.1
2-1	C	34	10	35	10	This section on uncertainties and costs misses the point that a risk, if the consequences would be sufficiently large, can interact with the tools and underlying assumptions of analysis. (Government of UK)	Noted, it is covered in section 2.5.2.1 and 2.3.8 a cross reference will be added to section 2.4.6
2-355	A	34	14	34	14	The difficulty is how to value the societal benefits INCLUDED IN THESE RISK REDUCTIONS (Joe Asamoah, International Energy Foundation)	Accepted
2-356	A	34	15	0	0	delete "which include" (Grassl Hartmut, Max Planck Institute for Meteorology)	Accepted
2-357	A	34	15	34	15	"……risk reductions, which include.". Words missing after "include" (Government of India)	Accepted delete after coma
2-358	A	34	15	34	15	Some words are missing (Government of France)	Accepted delete after coma
2-359	A	34	15	34	15	This sentence is incomplete after "include" and should be completed. (Government of Germany)	Accepted delete after coma

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
2-360	A	34	24	34	25	I am pleased to see the clear statement that CBA cannot be sufficient as a tool. This should clearly spelled out WHENEVER it is raised.It is only valid for very narrow decision-making situations. (Andrew Dlugolecki, University of East Anglia)	Noted
2-361	A	34	32	0	0	substitute "climate change" for "global warming" (Grassl Hartmut, Max Planck Institute for Meteorology)	Accepted
2-362	A	34	35	34	38	What is meant by "positive correlation of individual risks"? (Cohen Stewart, Environment Canada)	Accepted Replace by “This”
2-363	A	34	35	34	38	What is meant by "positive correlation of individual risks"? (Cohen Stewart, Environment Canada)	Accepted Duplicates 2-362
2-364	A	34	35	0	0	see: above (Grassl Hartmut, Max Planck Institute for Meteorology)	Accepted
2-365	A	34	35	34	44	This paragraph explains exactly why I am not happy about the use of "insurance" as a term for hedging climatic risk (Andrew Dlugolecki, University of East Anglia)	Noted
2-366	A	34	38	0	0	see: above (Grassl Hartmut, Max Planck Institute for Meteorology)	Accepted
2-367	A	34	46	34	52	This paragraph goes off the rails- to say that CBA is consistent with the Precautionary Principle does NOT mean it is OK to use CBA!! (Andrew Dlugolecki, University of East Anglia)	Noted. Paragraph will be clarified.
2-368	A	35	0	0	0	I find the relationship between cross-cutting issues and framing issues confusing and suggest after "Chapter 1" insert "including the four cross-cutting issues mentioned there and other matters covered in sections 2.6, 2.8 and 2.9" (Peter Read, Massey University)	Noted.
2-377	A	35	0	0	0	I find the relationship between cross-cutting issues and framing issues confusing and suggest after "Chapter 1" insert "including the four cross-cutting issues mentioned there and other matters covered in sections 2.6, 2.8 and 2.9" (Peter Read, Massey University)	Noted, cross reference to chapter 1
2-369	A	35	7	0	0	correct to: "yield" (Grassl Hartmut, Max Planck Institute for Meteorology)	Accepted
2-370	A	35	8	0	0	see: above (Grassl Hartmut, Max Planck Institute for Meteorology)	
2-371	A	35	18	0	0	correct to: "definition" (Grassl Hartmut, Max Planck Institute for Meteorology)	Accepted
2-372	A	35	19	35	19	"…boundaries in section 2.8)". Change “2.8” to “2.9” (Government of India)	Accepted

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2-373	A	35	35	0	0	delete "as", "to be given" (Grassl Hartmut, Max Planck Institute for Meteorology)	Accepted
2-374	A	35	40	35	40	The lumping of general equilibrium and Keynesian econometric models into one under macroeconomic models tends to obscure an important distinction. General equilibrium models tend to be frictionless, analyzing comparisons between equilibria and ignoring costs of moving from one to another. Keynesian econometric models generally include transition costs, which in certain instances can be large. When long run policies are considered the two may yield similar results, but the distinction between the two types of models should be clarified here. (Lenny Bernstein, L. S. Bernstein & Associates, L.L.C.)	Reject This is correct, but the structure focuses on levels of analysis so macroeconomic is a level where different models can be applied, so it will be inconsistent with the structure to separate macroeconomic to reflect the different models.
2-375	A	35	40	35	45	This brief section is almost the only place in the whole report that the concept of macroeconomic costs are discussed. However the concept that is actually used in the modelling and discussed in Chapters 3 and 11 is the effect on GDP, and the NPV of abatement costs. Both concepts need careful discussion since they are the main measures of macroeconomic costs later in the report. It appears that the NPV of abatement costs is being calculated by valuing each period's additional abatement (difference between GtC from scenarios with and without climate policies) at the marginal cost of carbon (the carbon price in CGE modelling) for the projection period. This is the procedure described for the data shown in Figure 3.29. The concepts need assessment and discussion in Chapter 2. The NPV of abatement costs is not the same as that of the carbon tax revenues (assuming that the carbon price is entirely due to a carbon tax) since the tax will apply to all GHG emissions, not just the reduction projected for a period. (Government of UK)	Accepted Will be considered briefly in section 2.5.3
2-50	B	35	40	35	40	The lumping of general equilibrium and Keynesian econometric models into one under macroeconomic models tends to obscure an important distinction. General equilibrium models tend to be frictionless, analyzing comparisons between equilibria and ignoring costs of moving from one to another. Keynesian econometric models generally include transition costs, which in certain instances can be large. When long run policies are considered the two may yield similar results, but the distinction between the two types of models should be clarified here. U.S. Government (Government of U.S. Department of State)	Similar as 374
2-376	A	35	47	36	38	Give examples of private and social costs in the climate change context. (Debyani Ghosh, Global Energy Partners, LLC)	Accepted
2-378	A	36	5	36	5	"….like for exapmle….". Delete "like".	Accepted

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						(Government of India)	
2-379	A	36	19	36	19	Erase "financial," Justification: The section title to which the paragraph belongs is "external costs" and the financial costs are not external to the GHG source. To include this private costs category in this sentence is confusing even more because the paragraph is dedicated to estimation of the volume of private and social costs; the amount of financial costs are always established in market prices. Moreover, financial costs - as labour, raw material costs, etc. mentioned in line 21- are one of the main components of pollutants (or GHG emission sources) private costs because market works properly to incorporate them into monetary costs paid for production/emission. (ANA YABAR, Instituto de Ciencias Ambientales. Universidad Complutense de Madrid (SPAIN))	Rejected The point about both financial and private costs is that externalities are not taken into account here.
2-380	A	36	22	36	24	Change: ", however, as far as the estimation of social cost is……..resource scarcity ". Include: after "social costs is concerned": "market failures, recent changes in social valuation of environmental goods or services as public goods and market distortions coming from regulations or public policies would prevent prices from….." Justification: The sentence leads to the conclusion that fiscal policy in particular and some other public policies or measures are the only reason for "market failure" and private/social costs distortion. The main concept of social cost implies that externalities and market failures exists (otherwise market prices would always reflect real resource scarcities) but public sector policies not always are responsible for those. (ANA YABAR, Instituto de Ciencias Ambientales. Universidad Complutense de Madrid (SPAIN))	We will clarify the issue to avoid too much focus on fiscal policies
2-381	A	36	25	36	25	"….the private cost is higher than social cost". For completeness, should also give an example of when private costs are less than social costs, when for instance sops/incentives are given to companies/industries to locate in a particular place. (Government of India)	Accepted, example will be given
2-382	A	36	28	36	28	Insert: Opportunity costs must also include other global problems that may have higher and more immediate benefits than GHG mitigation projects. The book	Rejected Opportunity costs are the value of resources in the best alternative. The

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						Global Crises, Global Solutions, Lomborg, B., Cambridge University Press, 2004, reports on a conference of leading economists who identified 13 different global problems that could be mitigated more cost-effectively than global warming. Therefore most GHG mitigation projects will make the world worse off if done before these other global problems have been mitigated. See also Summers who makes the same point. (Summers, L. H., Economist, 5/30/1992, Vol. 323, Issue 7761, p65.) (Lenny Bernstein, L. S. Bernstein & Associates, L.L.C.)	traditional CBA "decision rule" recommends to implement all projects or policies with a net surplus and is not recommending that e.g. climate policies should not be pursued because other alternatives with a higher surplus have not been implemented
2-51	B	36	28	36	28	Insert: Opportunity costs must also include other global problems that may have higher and more immediate benefits than GHG mitigation projects. The book Global Crises, Global Solutions, Lomborg, B., Cambridge University Press, 2004, reports on a conference of leading economists who identified 13 different global problems that could be mitigated more cost-effectively than global warming. Therefore most GHG mitigation projects will make the world worse off if done before these other global problems have been mitigated. See also Summers who makes the same point. (Summers, L. H., Economist, 5/30/1992, Vol. 323, Issue 7761, p65.) U.S. Government (Government of U.S. Department of State)	See 382
2-383	A	36	34	36	38	Erase the sentence. Justification: The chapter objective is not to teach undergraduates in Economics. Is not necessary to distinguish private from social costs and also is reiterative. (ANA YABAR, Instituto de Ciencias Ambientales. Universidad Complutense de Madrid (SPAIN))	Rejected It is a key background for the cost estimates in the AR4 and will therefore be kept
2-384	A	36	42	0	0	substitute "several" for "a number of" (Grassl Hartmut, Max Planck Institute for Meteorology)	Rejected We will keep number since we see no difference
2-397	A	37	0	39	0	Some reference to the literature on hyperbolic discounting would be relevant here Loewenstein, G. and Prelec, D. (1992). Choices Over Time New York, Russell Sage Foundation (John Quiggin, University of Queensland)	Accepted References will be checked
2-385	A	37	12	0	0	Section 2.5.2.1 Discount rates page: 2-37 Finally, a key idea of the Awerbuch reconciliation argument is that different cost and benefit streams cannot all be discounted at the same rate. Like individual rates, Societal discount rates must be adjusted for systematic risk or covariance with national income. For example, investment in renewable energy may produce benefits that are negatively correlated to national income because fossil fuel prices	Rejected It is inconsistent to use different discount rates in the same analysis. If some "good" (for example renewable energy) is considered to have specific benefits, these benefits should be addressed in the analysis by specific values of those benefits

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						are negatively correlated to the economy [Awerbuch, 1993, 1995; Lind 1982; Awerbuch-Sauter, 2006]. A renewable energy source therefore provides benefits that are greatest during bad ecocomic times-- when fuel prices are the highest. From a national perspective renewables can therefore be viewed as producing benefits that are greatest during those times when the economy is doing poorly, so that they act like insurance, reducing the overall variability of national income. Capital market theory tells us that the benefits of such an investment would be discounted at very low rates. Additional References to go with Comments: Awerbuch, S. (1993) "Issues in the Valuation of PV/Renewables: Estimating the Present Value of Externality Streams With A Digression on DSM," Proceedings: National Regulatory Conference on Renewable Energy, (Savannah, GA), D.C.: National Association of Regulatory Utility Commissioners, October 1993 Awerbuch, S. and Sauter, R. (2006) "Exploiting the oil–GDP Effect to Support Renewables Deployment, Energy Policy, Vol. 34 pp. 2805-2819. Awerbuch, S. (1995) "Market-Based IRP: It's Easy!" Electricity Journal, Vol. 8, No. 3 (April), 50-67; Awerbuch, S. (1993), "The Surprising Role of Risk and Discount Rates in Utility Integrated-Resource Planning," The Electricity Journal, Vol. 6, No. 3, (April), 1993, 20-33; Gramlich, Edward, The Benefit-Cost Analysis of Government Programs, Prentice Hall, 1981. Lind, R. C. "A Primer on the Major Issues Relating to the Discount Rate for Evaluating National Energy Options," in Robert C. Lind, Kenneth Arrow, et. al. (Eds.) Discounting for Time and Risk in Energy Policy, DC: Resources for the Future, Brookings (Johns Hopkins University Press) 1982. (Shimon AWERBUCH, SPRU - University of Sussex)	References will be considered
2-386	A	37	12	39	44	Latest publications on discounting: John Cairns (2006): Development in discounting: With special reference to future health events. Energy and Resource Economics, 28, p. 282-297. Comment to the section on discount rates: Although the use of other than exponential discounting is receiving more attention, from an energy-economy model perspective the use of e.g. hyperbolic discount rates raises methodical questions. The dominance of constant rate exponential discounting has barely been changed. (Wilhelm Kuckshinrichs, Forschungszentrum Juelich GmbH)	Noted, reference will be considered
2-387	A	37	13	39	44	Consider shortening and better structuring the discount rate section.	Noted, Structuring will be considered, but it

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						(Debyani Ghosh, Global Energy Partners, LLC)	will be difficult to shorten also seen in the light of the many suggestions for adding material given by the reviewers
2-388	A	37	14	0	0	Section 2.5.2.1 Discount rates page: 2-37 The descriptive and prescriptive are not necessarily disparate. Awerbuch (1993) shows that when the growth in real damage (or future mitigation) costs of environmental externalities of a finite-lived project are included per Gramlich (1981), a societal discount rate of 0.0% derives so that total project environmental cost equal the first year cost time the project life. Prescriptive rates are not directly comparable to descriptive rates observed in the market place. The latter include income taxes – i.e. a 6% market rate of return compensates investors for risk as well as for taxes that will have to be paid (Awerbuch, 1993). Social discount rates by comparison are net of all corporate and personal taxes (ibid). Given marginal corporate and individual tax rates of, say, 35% and 30% respectively, a 6% market rate of return converts to 6% □ (1 – 0.35 (1 – 0.30) = 2.7%. This approach gives a "good" approximation of the Social discount rate [Lind 1982, 76].Additional References to go with Comments: Awerbuch, S. (1993) "Issues in the Valuation of PV/Renewables: Estimating the Present Value of Externality Streams With A Digression on DSM," Proceedings: National Regulatory Conference on Renewable Energy, (Savannah, GA), D.C.: National Association of Regulatory Utility Commissioners, October 1993 Awerbuch, S. and Sauter, R. (2006) "Exploiting the oil–GDP Effect to Support Renewables Deployment, Energy Policy, Vol. 34 pp. 2805-2819. Awerbuch, S. (1995) "Market-Based IRP: It's Easy!" Electricity Journal, Vol. 8, No. 3 (April), 50-67; Awerbuch, S. (1993), "The Surprising Role of Risk and Discount Rates in Utility Integrated-Resource Planning," The Electricity Journal, Vol. 6, No. 3, (April), 1993, 20-33; Gramlich, Edward, The Benefit-Cost Analysis of Government Programs, Prentice Hall, 1981. Lind, R. C. "A Primer on the Major Issues Relating to the Discount Rate for Evaluating National Energy Options," in Robert C. Lind, Kenneth Arrow, et. al. (Eds.) Discounting for Time and Risk in Energy Policy, DC: Resources for the Future, Brookings (Johns Hopkins University Press) 1982. (Shimon AWERBUCH, SPRU - University of Sussex)	Reference will be considered
2-389	A	37	14	0	0	Section 2.5.2.1 Discount rates page: 2-37	Noted, references will be considered

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						According to Awerbuch's (1993) reconciliation argument the basic approach to evaluating risk for public projects is similar to the CAPM approach used for private investments, as long as an adjustment is made for taxes. Since individuals will place the same value on the returns from a public project as they would on an identical stream from a private project, the discount rates would be the same except for an adjustment for the effect of taxes [Lind 1982, 72] (plus corrections for consumer surplus and displacement of private investment/spending in some cases). This holds because in all equilibrium market rates of return reflect the fact that actual, after-tax returns are lower. Additional References to go with Comments: Awerbuch, S. (1993) "Issues in the Valuation of PV/Renewables: Estimating the Present Value of Externality Streams With A Digression on DSM," Proceedings: National Regulatory Conference on Renewable Energy, (Savannah, GA), D.C.: National Association of Regulatory Utility Commissioners, October 1993 Awerbuch, S. and Sauter, R. (2006) "Exploiting the oil–GDP Effect to Support Renewables Deployment, Energy Policy, Vol. 34 pp. 2805-2819. Awerbuch, S. (1995) "Market-Based IRP: It's Easy!" Electricity Journal, Vol. 8, No. 3 (April), 50-67; Awerbuch, S. (1993), "The Surprising Role of Risk and Discount Rates in Utility Integrated-Resource Planning," The Electricity Journal, Vol. 6, No. 3, (April), 1993, 20-33; Gramlich, Edward, The Benefit-Cost Analysis of Government Programs, Prentice Hall, 1981. Lind, R. C. "A Primer on the Major Issues Relating to the Discount Rate for Evaluating National Energy Options," in Robert C. Lind, Kenneth Arrow, et. al. (Eds.) Discounting for Time and Risk in Energy Policy, DC: Resources for the Future, Brookings (Johns Hopkins University Press) 1982. (Shimon AWERBUCH, SPRU - University of Sussex)	
2-390	A	37	15	0	0	after "policies" insert "are generally assumed to " (Peter Read, Massey University)	Rejected
2-391	A	37	15	37	15	after "policies" insert "are generally assumed to " (Peter Read, Massey University)	Rejected We do not see that this is only an assumption, but we will change text to avoid that short term impacts are excluded
2-392	A	37	15	37	18	As discussed in my comment to page 5, line 18, there are two very distinct ways in which discounting is used in climate policy analysis – one related to the assessing the lifecycle costs of various mitigation options and a legitimate subject of WG3,	Noted, The discussion about discounting does not specifically apply to CBA, it is a general element of all economic analysis over time.

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						the other related to CBA and the valuation by the present generation of future impacts and, in my opinion, not a legitimate subject of WG3. I strongly object on moral grounds to the whole idea of discounting future impacts of climatic change, especially impacts involving loss of irreplaceable and non-substitutable ecological assets whose value cannot be quantified in monetary terms in any meaningful way. However, CBA seems to be firmly entrenched in the minds of the authors of this (and some other) chapters. At the very least, introduce this section by clearly making the basic distinction between the two ways in which discounting can be used, and keep the discussion of the two applications clearly separate (the present draft slips back and forth between the two applications of discounting as if they were the same thing, maybe because different people contributed different parts). When introducing the second use of discount rates (in CBA), point out that some people reject CBA altogether as a method for determining appropriate emission levels, relying instead on risk averse approaches such as the "tolerable windows" approach. If any thing like lines 17-18 is kept, then after "analysis" add the following: "under the assumption that ecological impacts of climatic change can be quantified in monetary terms in any meaningful way, and that it is appropriate to discount the monetary values so assigned". (Danny Harvey, University of Toronto)	We will make this clear. Add a comment on discounting issues, related to climate policy goals, when they are not monetized
2-2	C	37	15	39	44	The description of discounting does not properly reflect modern economic understanding of the issue and its application to a problem like climate change. First, is it a mischaracterisation to say there is an "ethical / prescriptive" approach to discounting, versus a "descriptive" approach derived from market rates. There are fundamental principles from which public sector discount rates applicable to long-term public goods can be derived, these form the appropriate tool for evaluating public policy towards a problem like climate change, and there is no reason why these should align with those derived from private sector returns. Second, the appropriate discount rate is scenario-dependent, because it hinges in part upon expectation of future consumption possibilities; hence it also needs to reflect risks, eg. if climatic impacts could be large enough materially to affect future wellbeing. (Government of UK)	Noted, we have in the discounting sestion noted that discount rates depend on risks. This is part of the argument for using hyperbolic discount rates. Will add the argument about public sector evaluations.
2-52	B	37	21	37	30	Change "ethical" to "so-called ethical" on lines 21 and 30, and add the following new sentence at the end of line 28: "However, it is not clear that it is necessarily more ethical to use a low (or lower) discount rate on the notion that it protects future generations because that could also deprive current generations of the	Noted, We will change language to make it clear that some experts find the rate ethical. The argument about high versus low rates and

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						resources needed to fix urgent problems that currently prevail (e.g., hunger, malaria and other climate sensitive diseases) in order to benefit future generations who are more likely to be (a) richer, (b) have access to a broader and more effective set of technological options, (c) presumably would have greater human and social capital, and therefore (d) be more able to fix the problems that afflict them than the current generations (Schelling 1995; Dowlatabadi 1997; Goklany 1992, 2000a, 2003; Tol and Dowlatabadi 2001). In fact, since economic and technological development, are constantly accreting, it is conceivable that such a shift in resources would make both present and future generations poorer and less-technologically advanced, and make both generations worse-off, essentially defeating the whole purpose of using low(er) discount rates." Citations: (1) Schelling, T.C.: 1995, 'Intergenerational discounting', Energy Policy 23, 395–401. (2) Dowlatabadi, H.: 1997, 'Assessing the health impacts of climate change', Climatic Change 35, 137–144. (3) Goklany, I.M.: 1992, 'Adaptation and climate change', paper presented at the Annual Meeting of the American Association for the Advancement of Science, Chicago, February 6-11. (4) Goklany, I.M.: 2000. "Potential Consequences of Increasing Atmospheric CO2 Concentration Compared to Other Environmental Problems." Technology 7S (2000): 189-213. (5) Goklany, I.M.: 2003, 'Relative contributions of global warming to various climate sensitive risks, and their implications for adaptation and mitigation', Energy & Environment 14, 797-822. (6) Tol, R.S.J. and Dowlatabadi, H.: 2001, 'Vector borne diseases, development & climate change', Integrated Assessment 2, 173-181. U.S. Government (Government of U.S. Department of State)	the suggested new sentence is already included in a shorter form on page 38 lines 8-11. However, we can add more details without adding the long text.
2-393	A	37	33	37	34	The correct wording would be: the gamma factor reflects "the income-elasticity of the marginal utility of income". (Cédric PHILIBERT, International Energy Agency)	Rejected No income and consumption is not the same
2-394	A	37	39	37	44	I note with interest that the current drafting simply omit to say anything on this coefficient, so the reader cannot infer any discount rate from the values suggested for only the GDP growth rates and the pure time preference. This omission I believe reveals the problematic nature of this issue. I therefore suggest adding the following: "What makes this reasoning problematic, though, is that an ethical approach leading to fix at zero the pure time preference in intergenerational context, is inconsistent with keeping from a purely descriptive approach the usual values (1 or close to 1) for the income-elasticity of marginal utility of income, which only applies to each single individual. As Philibert (2006) notes a	Rejected The argument will require a detailed discussion which is beyond our scope in relation to the space that have been allocated to the cost section

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						prescriptive approach based for example on a Ralwsian maximin approach to that coefficient would give it an infinite value, for nothing can justify the deprivation of the current poorer generation for the sake of the future, richer generations (as reflects the growth rate chosen if positive)." Philibert, Cédric, 2006, Discounting the Future, in Pannell, David J. and Steven G.M. Schilizzi (eds), Economics and the Future - Time and Discounting in Private and Public Decision Making, Edward Elgar Publishing (Cédric PHILIBERT, International Energy Agency)	
2-395	A	37	42	37	44	It should be explained that the ethical approach is based on the premise the equal weight should be placed on the interests and needs of every individual, present and future, so that discounting is morally inappropriate. From this is follows that gamma should be zero. A good reference articulating this viewpoint is Howarth (2001). (Danny Harvey, University of Toronto)	Accepted Reference will be checked
2-53	B	37	42	37	42	The authors need to define what they consider as an "ethical attitude" or they should delete this reference. (Government of Australia)	Accepted Ethical can be deleted but the rest is kept
2-396	A	37	46	0	0	Footnote 8, line 3: delete "and" before "integral" (Grassl Hartmut, Max Planck Institute for Meteorology)	Accepted
2-398	A	38	5	38	6	I suggest: Portney and Weyant (1999) and Pannell and Schilizzi provide good overviews of the literature on…" Pannell, David J. and Steven G.M. Schilizzi (eds), 2006, Economics and the Future - Time and Discounting in Private and Public Decision Making, Edward Elgar Publishing (Cédric PHILIBERT, International Energy Agency)	Accepted References will be checked
2-399	A	38	8	38	11	It is essential that some more background be given concerning the so-called "descriptive" approach. The giant assumption is made by those who use this approach that it is a description of how people would want to discount intergenerational impacts involving their own children and grandchildren, when in fact it is a description of short-term discount rates involving decisions that have nothing to do with intergenerational issues and which are therefore inapplicable to the global warming issue. In particular, it is essential to explain why people discount future benefits in their day-to-day decisions, and then to assess their applicability to intergenerational costs and benefits. There are three reasons: (1) due to impatience or pure time preference, (2) due to rising income, and (3) because of uncertainty over the future. Reason (1) is clearly inapplicable to intergenerational costs and impacts. Reason (2) is valid for	Accepted Reference will be checked. The uncertainty and risk issues related to costs are also dealt with in section 2.4.6, ask Christian for more details

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						intergenerational costs, but is applicable only to those costs that involve damage to human capital, for which the (assumed) increased wealth of future generations legitimately reduces the impact of this category of future damage. However, even here there is a flaw in that the costs of emission control will fall largely on the affluent members of affluent societies, while future impacts will fall largely on the poor members of poor societies – people who, even 100 years from now, and not likely to be richer than present rich people (the counterargument would be that the greater overall wealth of future generations can be used to compensate those adversely affected, but this idea is an abstract fiction unrelated to the way the world operates at present). Reason (3) is also inapplicable to the global warming issue – people may not wish to save too much for the future because of the risk that they might die tomorrow, but we do expect there to be future generations, so the risk-related component in observed discounting by individuals is also inapplicable. All of these points are well articulated by Howarth (2005), and it is important that they be made here. REFERENCES: Howarth, R.B. 2001. Intertemporal social choice and climate stabilization. International Journal of Environment and Pollution 15, 386-405. Howarth, R.B. 2005. Against high discount rates. Advances in the Economics of Environmental Research 5, 103-124. (Danny Harvey, University of Toronto)	
2-400	A	38	24	0	0	correct to: "riskless" (Grassl Hartmut, Max Planck Institute for Meteorology)	Accepted
2-401	A	38	25	0	0	substitute "climate change" for "global warming" (Grassl Hartmut, Max Planck Institute for Meteorology)	Accepted
2-402	A	38	25	38	25	Suggest you add a "Third, the rates of return on marginal investment cannot be durably higher than the growth rate of the economy, as shown by Rabl (1996)." You may add: "Any investment, however small with a return rate greater than the growth rate of the economy would have, after enough time has elapsed, an output greater than the whole economy." (Rabl, Ari, 1996, Discounting of long term costs: What would future generations prefer us to do?", Ecological Economics 17: 137-45) (Cédric PHILIBERT, International Energy Agency)	Accepted Check reference
2-403	A	38	30	0	0	correct to: "intra-generational" (Grassl Hartmut, Max Planck Institute for Meteorology)	Accepted

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2-404	A	38	30	38	30	Please insert in this sentence a brief reference to Rabl's argument: "the impossibility for return rates on investments to remain above the GDP growth in the long run" (Cédric PHILIBERT, International Energy Agency)	See 402
2-405	A	38	34	38	37	Newell and Pizer did not perform a survey, and Weitzman did not only perform a survey. I suggest the following rewriting of the second sentence: "Weitzman (1998) considered the weighted average of the net present values computed using the two possible discount rates corresponding to two different growth rates and future states of the economy. He showed this average is dominated by the value computed using the lower discount rate, for the present value of the richer future world is trivially small as it is associated with the higher discount rate. As a result, if future growth is uncertain, the discount rate should come progressively closer to the "lowest possible" discount rate. Newell and Pizer (2003) obtained similar conclusions by studying the effects of uncertain discount rates on returns on investments." (Cédric PHILIBERT, International Energy Agency)	Accepted References will be checked
2-406	A	38	37	38	40	I do not think the suggestion in these two sentences - short term adjustements of discount rates to real market interest rates - is backed by the current literature and receives a great level of agreement. Suggest deleting these two sentences. (Cédric PHILIBERT, International Energy Agency)	Ask Christian
2-407	A	38	41	38	41	I understand you wanted to be relatively short on discounting. Nevertheless I suggest the insertion of a new paragraph here which brings several new arguments very much related to climate change: "Another argument links the discussion of discounting to that of valuation of environmental assets . Assets that are not reproducible or substitutable by the means of the economy should be given a value growing over time at a rate close to the discount rate (Krutilla, 1967; Fisher and Kurtilla, 1974, 1975; Boiteux, 1976; Hanley and Spash, 1993; Desaigues and Point, 1993). As Neumayer (1999) put it "substituability, not discounting, is the issue". Philibert (1999; 2006) discusses the variations of this argument and further suggests that valuation of possible but uncertain climate change damages following this argument could lead to "non marginal" economic damages, thus increasing the uncertainty that affects GDP growth rates and finally reinforcing the argument for declining discount rates." Main References: Boiteux, Marcel, 1976, A propos de la 'Critique de la théorie de l'actualisation', Revue d'économie Politique, Septembre-Octobre; Krutilla, John V., 1967, Conservation reconsidered, American Economy Review, 57, 777-786; Neumayer, Eric., 1999, Global warming: discounting is not the issue, but substituability is, Energy Policy 27: 33-43; Philibert, Cédric., 1999, The economics of climate change and the theory of discounting, Energy Policy 27:	The argument will be added in a short form

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						913-929; Philibert, Cédric, 2006, Discounting the Future, in Pannell, David J. and Steven G.M. Schilizzi (eds), Economics and the Future - Time and Discounting in Private and Public Decision Making, Edward Elgar Publishing. All other references, if warranted, can be found in the latter (attached). (Cédric PHILIBERT, International Energy Agency)	
2-408	A	39	6	39	8	How on earth could a discount rate of 5%/yr ever be justified, given a rate of pure preference of 0% and observed historical growth of GDP/P of 1.6%/yr since the 1960s but falling over time? Just delete this stuff! (Danny Harvey, University of Toronto)	Check data by Gollier
2-409	A	39	11	0	0	correct to: "long-term structure" (Grassl Hartmut, Max Planck Institute for Meteorology)	Accepted Write time
2-410	A	39	15	39	15	Insert: Some economists, however, argue that society is harmed by investing in any project that earns less than the market rate of interest because each year after the project is started, society will regret not having postponed the project one more year. (For example, investing $1 million in a 3% project instead of in a 10% market rate project, results in 1 year in a loss of $70,000. If we had waited one more year we could have had $1.1 million to invest.) See for example, Summers, L. H., Economist, 5/30/1992, Vol. 323, Issue 7761, p65. and Montgomery, W. D., "A Market Based Discount Rate: Comments on Bradford", in Discounting and Intergenerational Equity, Portney, P.R. and J.P. Weyant, eds., Resources for the Future, Washington, DC 1992, pp45-50. (Lenny Bernstein, L. S. Bernstein & Associates, L.L.C.)	Noted, This discussion is taken in relation to page 38 lines 8-11 that has been suggested amended
2-54	B	39	15	39	15	Insert: Some economists, however, argue that society is harmed by investing in any project that earns less than the market rate of interest because each year after the project is started, society will regret not having postponed the project one more year. (For example, investing $1 million in a 3% project instead of in a 10% market rate project, results in 1 year in a loss of $70,000. Waiting one more year could have resulted in $1.1 million to invest.) See for example, Summers, L. H., Economist, 5/30/1992, Vol. 323, Issue 7761, p65. and Montgomery, W. D., "A Market Based Discount Rate: Comments on Bradford", in Discounting and Intergenerational Equity, Portney, P.R. and J.P. Weyant, eds., Resources for the Future, Washington, DC 1992, pp45-50. U.S. Government (Government of U.S. Department of State)	See 410
2-411	A	39	22	39	23	"Finally, the office of Management….both recognizes….". The sentence as phrased is incomplete and has words missing; if no words are missing, then the "both" should be deleted.	Accepted Rewording

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						(Government of India)	
2-55	B	39	22	39	23	This sentence is incomplete and appears to refer to an antecedent that has been deleted. U.S. Government (Government of U.S. Department of State)	Accepted Will be checked
2-412	A	39	25	0	0	p. 2-39 line 25 (It is important to remind that these rates discount certainty equivalent cash-flows.) Societal rates derived by economists generally do not make reference to risk, but it would seem these rates are meant for cost or benefit streams whose correlation to the national income = 1.0. Certainty-equivalent or 'riskless' costs and benefits would be discounted at lower rates. I repeat the general comment from Section 2.5.2.1 that contrary to the widely held impression, the same discount rate will be correct for both benefits and costs only by accident, since the risk for these will usually not be the same. Additional References to go with Comments: Awerbuch, S. (1993) "Issues in the Valuation of PV/Renewables: Estimating the Present Value of Externality Streams With A Digression on DSM," Proceedings: National Regulatory Conference on Renewable Energy, (Savannah, GA), D.C.: National Association of Regulatory Utility Commissioners, October 1993 Awerbuch, S. and Sauter, R. (2006) "Exploiting the oil–GDP Effect to Support Renewables Deployment, Energy Policy, Vol. 34 pp. 2805-2819. Awerbuch, S. (1995) "Market-Based IRP: It's Easy!" Electricity Journal, Vol. 8, No. 3 (April), 50-67; Awerbuch, S. (1993), "The Surprising Role of Risk and Discount Rates in Utility Integrated-Resource Planning," The Electricity Journal, Vol. 6, No. 3, (April), 1993, 20-33; Gramlich, Edward, The Benefit-Cost Analysis of Government Programs, Prentice Hall, 1981. Lind, R. C. "A Primer on the Major Issues Relating to the Discount Rate for Evaluating National Energy Options," in Robert C. Lind, Kenneth Arrow, et. al. (Eds.) Discounting for Time and Risk in Energy Policy, DC: Resources for the Future, Brookings (Johns Hopkins University Press) 1982. (Shimon AWERBUCH, SPRU - University of Sussex)	Accepted We will check literature, Christian
2-413	A	39	27	0	0	before "long" insert "assumed" (Peter Read, Massey University)	Accepted Make clear that it can also be short term
2-414	A	39	27	39	27	before "long" insert "assumed" (Peter Read, Massey University)	See 411

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2-415	A	39	28	0	0	Replace "emission reduction" with "net emission reduction, i.e. emission reduction minus increase in biotic absorption" (Peter Read, Massey University)	Rejected This is a general issue for the whole report, so we will keep the formulations except if a general decision is taken on this issue
2-416	A	39	28	39	28	Replace "emission reduction" with "net emission reduction, i.e. emission reduction minus increase in biotic absorption" (Peter Read, Massey University)	See 413
2-417	A	39	30	0	0	Replace "emissions reduction" with "net emissions reduction" (Peter Read, Massey University)	See 413
2-418	A	39	30	39	30	Replace "emissions reduction" with "net emissions reduction" (Peter Read, Massey University)	See 413
2-419	A	39	35	39	35	"For mitigation effects with …., the country…". Replace “the” by “a” (Government of India)	A country
2-420	A	40	8	0	0	Should be “that private consumers and industry face” (Danny Harvey, University of Toronto)	Accepted
2-421	A	40	9	40	11	The sentence does not make logical sense. (Danny Harvey, University of Toronto)	Rewording
2-422	A	40	13	40	18	No doubt all of these imperfections arise in private markets. But it is important to understand that many also affect public sector activity. There too there is a lack of information, distorted incentives, lack of competition and other institutional failures. If comparisons between BAU and policy scenarios recognize the one but not the other, they may become distorted. There is a very extensive public choice literature in which public sector behavior is modeled and the models tested, e.g., William A. Niskanen, Bureaucracy and Public Economics (1994) or Policy Analysis and Public Choice: Selected Papers (1998). While this literature and its many implications cannot be fully discussed in this report, there should be mention that public sector inefficiencies may impact policies and measures intended to correct market inefficiencies. (Lenny Bernstein, L. S. Bernstein & Associates, L.L.C.)	This is correct, we can mention it
2-56	B	40	13	40	18	No doubt all of these imperfections arise in private markets. But it is important to understand that many also affect public sector activity. There too there is a lack of information, distorted incentives, lack of competition and other institutional failures. If comparisons between BAU and policy scenarios recognize the one but not the other, they may become distorted. There is a very extensive public choice literature in which public sector behavior is modeled and the models tested, e.g., William A. Niskanen, Bureaucracy and Public Economics (1994) or Policy	See 422

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						Analysis and Public Choice: Selected Papers (1998). While this literature and its many implications cannot be fully discussed in this report, there should be mention that public sector inefficiencies may impact policies and measures intended to correct market inefficiencies. U.S. Government (Government of U.S. Department of State)	
2-423	A	40	17	40	17	Change: "section 2.4.5.3." by the right one (may be: section 2.5.2.3.) (ANA YABAR, Instituto de Ciencias Ambientales. Universidad Complutense de Madrid (SPAIN))	Accepted
2-424	A	40	23	0	0	footnote 11, replace "emissions reduction" with "net emissions reduction" (Peter Read, Massey University)	See 413
2-425	A	40	23	40	23	footnote 11, replace "emissions reduction" with "net emissions reduction" (Peter Read, Massey University)	See 413
2-426	A	40	23	40	23	Give a couple of examples of 'no regret options'. (Debyani Ghosh, Global Energy Partners, LLC)	Rejected We will like to keep it short and examples are context specific and i.e. depend on the baseline
2-427	A	40	25	40	27	Explain what internal impacts of 'no regret options' are. (Debyani Ghosh, Global Energy Partners, LLC)	Accepted, we will try to avoid the term internal
2-428	A	40	25	41	14	The discussion seems to look at the issue from only one side. If no regrets options are those that, when all internal and external impacts are taken into account, make economic sense, then there would appear to be another category that could be labeled as "hidden regret" options, which may appear favorable from a private sector perspective but which, when all internal and external impacts are taken into account, are not socially favorable. A better definition of no regrets options might focus more on information economics, i.e., a set of options that, were private sector actors fully informed as to the costs and benefits they would choose, but without which they do not. Such a definition would limit the scope of what's meant and also suggest practical remedies. (Lenny Bernstein, L. S. Bernstein & Associates, L.L.C.)	Rejected We will like to stick to previous IPCC definitions here since introducing new concepts will require a lengthy discussion. We will emphasize information as a key element.
2-57	B	40	25	41	14	The discussion seems to look at the issue from only one side. If no regrets options are those that, when all internal and external impacts are taken into account, make economic sense, then there would appear to be another category that could be labeled as "hidden regret" options, which may appear favorable from a private sector perspective but which, when all internal and external impacts are taken into account, are not socially favorable. A better definition of no regrets options might focus more on information economics, i.e., a set of options that, were private sector actors fully informed as to the costs and benefits they would choose, but without	See 428

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						which they do not. Such a definition would limit the scope of what's meant and also suggest practical remedies. U.S. Government (Government of U.S. Department of State)	
2-429	A	40	26	40	26	Duplication of Foot note: number 12, is equal to number 13 (in page 41, line 14) (ANA YABAR, Instituto de Ciencias Ambientales. Universidad Complutense de Madrid (SPAIN))	Accepted Will be corrected
2-430	A	40	30	40	33	Ilustrate 'market imperfections' with examples. (Debyani Ghosh, Global Energy Partners, LLC)	Rejected This is already done page 40 lines 12-18
2-58	B	40	44	0	0	Add the following sentence at the end of the paragraph: "Also, opportunity costs should be considered to verify whether the co-benefits can be obtained more efficiently and/or rapidly through efforts directed specifically at obtaining these co-benefits most efficiently. It may be, under a variety of circumstances, more efficient to obtain air pollution reductions through controls targeted at such pollutants rather than coupling them with efforts to reduce GHG emissions, even if the latter results in some air pollution reductions. This might be the case, for example, for existing sources that are well-controlled for air pollution, or where conservation and/or fuel switching options are limited." U.S. Government (Government of U.S. Department of State)	Accepted Will be mentioned briefly
2-59	B	40	45	41	9	There is a major conceptual with the notion of "double dividends". If there are indeed distortions in tax regimes then these distortions should been removed regardless of whether or not they are coupled with efforts to reduce GHG emissions. Thus it is inappropriate to assign benefits from the dividends from reducing such distortions to GHG reduction activities. That makes as much sense as opposing reductions in the distortions unless they are coupled with mitigation efforts. Accordingly, it is recommended that the bullet on "Double dividend" be eliminated, and instead, having a separate paragraph that reads as follows: "SOME HAVE SUGGESTED COUPLING instruments (such as taxes or auctioned permits) that would reduce GHG emissions and would provide revenues to the government with reductions in existing distortionary taxes ("revenue recycling"), ARGUING THAT CONSTITUTES A 'DOUBLE DIVIDEND' BECAUSE THE revenues GENERATED COULD reduce the economic cost of achieving greenhouse gas reductions. The magnitude of this offset WOULD DEPEND on the existing tax structure, type of tax cuts, labor market conditions, and method of recycling (Bay and Upmann, 2004; Chiroleu-Assouline and Fodha, 2005; Murray, et al., 2005). HOWEVER, IT CAN ALSO BE ARGUED THAT IF THERE ARE	Accepted Will be mentioned briefly

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						INDEED DISTORTIONS IN TAX REGIMES THEN THESE DISTORTIONS SHOULD BEEN REMOVED REGARDLESS OF WHETHER OR NOT THEY ARE COUPLED WITH EFFORTS TO REDUCE GHG EMISSIONS. THUS IT IS INAPPROPRIATE TO ASSIGN BENEFITS FROM THE DIVIDENDS FROM REDUCING SUCH DISTORTIONS TO GHG REDUCTION ACTIVITIES. " [Note: Inserts are shown in UPPER CASE; deletions are not shown.] U.S. Government (Government of U.S. Department of State)	
2-431	A	41	5	41	5	Include after: "gas reductions." : "Tax rate differentiations and other fiscal incentive schemes for less carbon options - frequent in energy and transport sectors - and other tax reduction provisions would also modify those costs" Justification: Not to forget those which are frequently used in EU countries. (ANA YABAR, Instituto de Ciencias Ambientales. Universidad Complutense de Madrid (SPAIN))	Rejected Too specific since there are many different taxes
2-432	A	41	7	41	7	Include after: "of recycling": "and tax differentiation" Justification:. Not to forget those which are frequently used in EU countries. (ANA YABAR, Instituto de Ciencias Ambientales. Universidad Complutense de Madrid (SPAIN))	See 431
2-433	A	41	11	0	0	Insert "or of" before "ancillary" (Danny Harvey, University of Toronto)	Accepted
2-434	A	41	16	41	39	Transaction costs are somewhat broader than the discussion here suggests. They arise from differences in information among transactors, which require resources to equalize. In this application, they might also include costs associated with rent seeking, for instance to secure "free" emission right allocations from regulatory bodies. Given the scope of a potential worldwide system to constrain GHG emissions, costs of rent seeking behavior may prove significant. There is an extensive literature on rent seeking behavior that goes back many years, see e.g., Richard Posner, "The Social Costs of Monopoly and Regulation," Journal of Political Economy, August 1975, pp. 807-27. (Lenny Bernstein, L. S. Bernstein & Associates, L.L.C.)	Reject Too specific, we are asked only to give very brief definitions here
2-60	B	41	16	41	39	Transaction costs are somewhat broader than the discussion here suggests. They arise from differences in information among transactors, which require resources to equalize. In this application, they might also include costs associated with rent seeking, for instance to secure "free" emission right allocations from regulatory bodies. Given the scope of a potential worldwide system to constrain GHG	See 434

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						emissions, costs of rent seeking behavior may prove significant. There is an extensive literature on rent seeking behavior that goes back many years, see e.g., Richard Posner, "The Social Costs of Monopoly and Regulation," Journal of Political Economy, August 1975, pp. 807-27. U.S. Government (Government of U.S. Department of State)	
2-435	A	41	41	42	18	Provide some examples of ancillary benefits. Also provide a discussion on how a comparative cost-benefit assessment should be conducted for an ancillary benefit (say reduced local pollution as a result of climate mitigation policies) as an outcome of climate policies vis-a-vis the costs for undertaking the action as a national policy (costs of reducing local pollution alone). (Debyani Ghosh, Global Energy Partners, LLC)	Accepted We will add a little bit on local air pollution control versus integration with CC policies see 58
2-436	A	41	44	41	44	"…studies have made a preliminary attempts to assess…". Change "a preliminary attempt" to "preliminary attempts" (Government of India)	Accepted
2-437	A	41	46	41	48	Cite some studies from literature. (Debyani Ghosh, Global Energy Partners, LLC)	Noted We will look for literature but the text is meant to be a very short defition
2-438	A	42	9	42	9	"…and energy access that arrive from the project". Change "arrive" to "accrue" (Government of India)	Accepted
2-439	A	42	16	0	0	Delete "the scenario …. in particular on" (Danny Harvey, University of Toronto)	Accepted
2-440	A	42	26	0	0	after "over" insert "assumed" (Peter Read, Massey University)	Accepted We will make it clear that it can also be short term
2-441	A	42	26	42	26	after "over" insert "assumed" (Peter Read, Massey University)	Accepted We will make it clear that it can also be short term
2-442	A	42	27	42	33	It seems, that "intergenerational" and "intragenerational" have been mixed up and should be swapped in the text. (Government of Germany)	Accepted Will be corrected
2-443	A	42	35	42	35	I suggest inserting right after the reference to section 2.4.5.1: "Particularly important in this respect might be the suggestion that environmental assets that are not reproducible or subsistuable by the means of the economy should be given a value growing over time at a rate close to the discount rate". The following needs some small editing to start a new sentence with the uncertainty on the preferences of future generations. (Cédric PHILIBERT, International Energy Agency)	Noted Has been considered based on another review comment related to discounting
2-444	A	42	46	42	46	"In this way there is a lot of …..". Change "is" to "are" (Government of India)	Accepted

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
2-445	A	42	49	42	49	"……to treat all human beings equal….". Either insert “as” before “equal” or change “equal” to “equally” (Government of India)	Accepted Rewording
2-61	B	42	50	42	50	The authors explain how the valuation of non-market costs were treated in the TAR but fail to provide information on whether the TAR view is followed in the current report, or another valuation paradigm is used. The authors should include a clear section on how they deal with non-market costs. (Government of Australia)	Rejected This has been considered to be a WGII issue, but is briefly discussed in Chapter 3
2-446	A	43	9	0	0	delete "is", "it outlines" (Grassl Hartmut, Max Planck Institute for Meteorology)	Accepted
2-447	A	43	9	43	9	Furthermore, it is outlines…..". Change “outlines” to “outlined” (Government of India)	Accepted
2-448	A	43	16	43	18	The following is an attempt to overcome….estimates of potentials". This sentence is phrased too indirectly—attempt, overcome, lack, intransparency (opacity?), so that it is hard to figure out what is meant. Should be phrased more directly. (Government of India)	Rewording
2-449	A	43	23	43	28	The discussion on costs needs to be more elaborate and comprehensive. (Debyani Ghosh, Global Energy Partners, LLC)	Rejected This is done in other places in the cost section
2-450	A	43	25	0	0	correct to: "less than x $ per tonne" (Grassl Hartmut, Max Planck Institute for Meteorology)	Accepted
2-451	A	43	25	0	0	add comma before "e.g." (Grassl Hartmut, Max Planck Institute for Meteorology)	Accepted
2-452	A	43	28	43	28	real "year 2000" prices... (Aviel VERBRUGGEN, University of Antwerp)	Rejected This is to specific to have one year, will be explained in empirical chapters
2-453	A	43	30	46	8	Provide a table with definition and comparison among the different potentials, with examples of each. (Debyani Ghosh, Global Energy Partners, LLC)	TIA , this is provided in chapter 11
2-454	A	43	32	0	0	delete "that", "terms used" (Grassl Hartmut, Max Planck Institute for Meteorology)	Accepted
2-455	A	43	36	43	36	"that can be overcome by policies and measures": this is a firm statement that reduces the term "barrier" to a subset of obstacles, because some of these are rather natural (e.g. The dispersed, diffuse and hidden character of the use of energy) and cannot be "overcome". Is it the purpose to limit the definition of barriers to such a subset? (Aviel VERBRUGGEN, University of Antwerp)	Noted

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2-456	A	43	38	43	39	does the term "technologies and policies" include things like "behavior, change in lifestyles, ..."? (Aviel VERBRUGGEN, University of Antwerp)	Accepted Yes
2-457	A	43	45	0	0	Footnote 14, line 5: add comma before "e.g." (Grassl Hartmut, Max Planck Institute for Meteorology)	Accepted
2-458	A	43	45	0	0	Footnote 14, line 3: add comma after quotation mark and full stop after bracket (Grassl Hartmut, Max Planck Institute for Meteorology)	Accepted
2-62	B	43	48	43	48	Footnote 14: Other countries besides those in Europe have also implemented mitigation policies. Other examples should be provided or this sentence should be deleted. (Government of Australia)	Accepted Other countries will be added
2-459	A	44	13	0	0	add comma before "i.e." (Grassl Hartmut, Max Planck Institute for Meteorology)	Accepted
2-460	A	44	15	44	16	Is it so that this gap will widen through time - all the time? It , seems that in a dynamic view the market potential after old policies took effect, will equal the enhanced market potential, and so on. It is: one can read the sentence in the opposite way: as the enhancing policies take effect, the gap narrows. ?? (Aviel VERBRUGGEN, University of Antwerp)	Accepted Rewording
2-461	A	44	47	0	0	Footnote 17, line 2: add full stop at the end of the line (Grassl Hartmut, Max Planck Institute for Meteorology)	Accepted
2-462	A	45	6	45	6	Include before: “resources”: “goods and” Justification: The atmosphere is more than a resource is a public good, defined in paragraph 2.3.3, page 20 of this chapter. (ANA YABAR, Instituto de Ciencias Ambientales. Universidad Complutense de Madrid (SPAIN))	Accepted
2-463	A	45	12	45	12	Change: “resource of an atmosphere …”: by: “public good of an atmosphere…..” Justification: The atmosphere is more than a resource is a public good, defined in paragraph 2.3.3, page 20 of this chapter. (ANA YABAR, Instituto de Ciencias Ambientales. Universidad Complutense de Madrid (SPAIN))	Rejected
2-464	A	45	33	45	33	"Physical potential" implies need for new technology whereas "technical potential" relies on demonstrated technology...recommend stating this explicitly for the "physical potential." (Jean Bogner, Landfills +, Inc)	Check with 4-11
2-465	A	45	39	0	0	delete "(NVP)" (Grassl Hartmut, Max Planck Institute for Meteorology)	Rejected No, this term is understood by many

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
2-466	A	45	39	45	41	This is a confusing statement, in that it can be read to say that different discount rates should be applied to different parts of a given economic flow. So, e.g., if a person purchases gasoline over the lifetime of his automobile, the present value of the financial cost of gasoline to him would be discounted at one rate, whereas the present value of the social cost of the emissions from burning the gasoline would be discounted at a second rate. This does not seem a plausible interpretation, particularly since private costs are a part of social costs. A better way of expressing the statement might be: "NPVs are calculated by discounting with an appropriate rate. For a purely private transaction, a financial rate would be used, whereas activities with social consequences would be discounted at a social rate." (Lenny Bernstein, L. S. Bernstein & Associates, L.L.C.)	Noted It will be made clear that only one rate is used in the same analysis
2-63	B	45	39	45	41	This is a confusing statement, in that it can be read to say that different discount rates should be applied to different parts of a given economic flow. So, e.g., if a person purchases gasoline over the lifetime of his automobile, the present value of the financial cost of gasoline to him would be discounted at one rate, whereas the present value of the social cost of the emissions from burning the gasoline would be discounted at a second rate. This does not seem to be a plausible interpretation, particularly since private costs are a part of social costs. A better way of expressing the statement might be: "NPVs are calculated by discounting with an appropriate rate. For a purely private transaction, a financial rate would be used, whereas activities with social consequences would be discounted at a social rate." U.S. Government (Government of U.S. Department of State)	See 466
2-467	A	45	43	45	45	the last two statements cover the same practice, i.e.: a discount factor is applied on the emission reductions in future years; one either stays with the NPV of the discounted quantities, or one levelizes the NPV to an annual magnitude. It seems at odds to levelize a sum of non-discounted quantities, or do they like this? (Aviel VERBRUGGEN, University of Antwerp)	Accepted Will be explained with a footnote
2-64	B	46	0	0	0	Section 2.6 on mitigation and adaptation seems to repeat a lot of the information contained in Chapter 1 section 1.2.3 and Chapter 3 section 3.5. These sections should be synthesised into one discussion of adaptation and mitigation and care needs to be taken to ensure that the discussion of potential impacts firstly does not cross into the mandate of WG2, and secondly remains consistent with the findings of the WG2 report. (Government of Australia)	Accepted
2-468	A	46	7	0	0	write "are successfully"	Accepted

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						(Grassl Hartmut, Max Planck Institute for Meteorology)	
2-469	A	46	7	0	0	correct to: "implying" (Grassl Hartmut, Max Planck Institute for Meteorology)	Accepted
2-470	A	46	7	0	0	add comma before "if" and after "reduced" (Grassl Hartmut, Max Planck Institute for Meteorology)	Accepted
2-471	A	46	8	46	8	Replace 'socioeconomic' for 'social and economic' (Government of Spain)	Accepted
2-472	A	46	39	0	0	use brackets and comma, "(2000, p. 226) (Grassl Hartmut, Max Planck Institute for Meteorology)	Accepted
2-473	A	46	39	46	39	Adgerrefers …Woolcock and Naryan, 2000….". Woolcock and Naryan, 2000 is missing from the references. It is very likely that the name Narayan has been mis-spelt. (Government of India)	Accepted
2-474	A	46	42	0	0	"the state" content? (Grassl Hartmut, Max Planck Institute for Meteorology)	Noted
2-475	A	47	7	0	0	Change “are” to “is” [subject is “adaptive capacity”] (Danny Harvey, University of Toronto)	Accepted, We will say engaged
2-476	A	47	7	47	7	"…subjugated, and coastal protection…". Would recommend using a milder word than “subjugated” (Government of India)	Accepted
2-477	A	47	9	47	11	need to update WGII Chapter 20 citation (Cohen Stewart, Environment Canada)	Accepted
2-478	A	47	9	47	11	need to update WGII Chapter 20 citation (Cohen Stewart, Environment Canada)	Accepted
2-479	A	47	16	0	0	Change “like” to “as”, and change “is reflecting” to “reflects” (Danny Harvey, University of Toronto)	Noted We will check reference
2-65	B	47	17	0	0	Insert after the period on line 17, the following: “Recognizing the synergies between a society’s development, and its ability to adapt and mitigate, Goklany (1995) advanced some principles for maintaining or, where necessary, developing the social, legal and economic frameworks necessary to make progress on all three goals by enabling the conduct of three broad interrelated strategies , namely, stimulating technological change, sustainable economic growth and free, unsubsidized trade.” Citations: Goklany, I.M., 1995. Strategies to enhance adaptability: technological change, economic growth and free trade. Climatic Change 30, 427-449. U.S. Government (Government of U.S. Department of State)	Accepted

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
2-480	A	47	22	0	0	correct to: "inherent" (Grassl Hartmut, Max Planck Institute for Meteorology)	Accepted
2-481	A	47	39	0	0	Should be “requires” [subject is “implementation”] (Danny Harvey, University of Toronto)	Accepted
2-482	A	47	46	0	0	correct to: "depends" (Grassl Hartmut, Max Planck Institute for Meteorology)	Accepted
2-483	A	47	46	0	0	Should be “depends” [subject is “assessment”] (Danny Harvey, University of Toronto)	Noted Check reference, but we do not see any difference to our text
2-66	B	47	50	47	52	Modify the sentence starting on line 50 as follows: “In the same way, food security policies ARE MORE LIKELY TO BE IMPLEMENTED SUCCESSFULLY IF THERE IS SUFFICIENT ACCESS TO FINANCIAL, HUMAN AND SOCIAL CAPITAL SO THAT LAND AND WATER MANAGEMENT CAN BE IMPROVED AND MORE USABLE FOOD IS PRODUCED PER UNIT OF LAND AND WATER USED IN AGRICULTURE (GOKLANY 1998, GOKLANY AND SPRAGUE 1992).” [Note: Inserts are shown in UPPER CASE; deletions are not shown.] Citations: (1) Goklany, I.M. 1998. “Saving Habitat and Conserving Biodiversity on a Crowded Planet.” BioScience 48 (1998): 941-953. (2) Goklany, I.M., and M.W. Sprague. 1992. Sustaining Development and Biodiversity: Productivity, Efficiency and Conservation, Policy Analysis No. 175, Cato Institute, Washington, DC. U.S. Government (Government of U.S. Department of State)	Noted , see other review comment
2-484	A	48	0	48	0	mitigation/adaptation impacts are not linked with choices made in international agreement (Expert Review Meeting Paris, IPCC)	Noted We will make a reference to chapter 13
2-485	A	48	35	50	10	The discussion on choices between mitigation and adaptation portfolios needs to be linked with a discussion on the status and further development of the international agreements on climate change. Without an international framework for climate change mitigation, the choices between adaptation and mitigation at any national or even regional level would be superficial. Mitigation makes a difference for adaptation only at the aggregate level. In the absence of an international framework, if one country significantly reduces its emissions in the hope not to spend money on adaptation, another country might increase its emissions in the meantime and undermine the efforts of the first country. (Ellina Levina, OECD)	Rejected We asked to have it by the IPCC plenary
2-486	A	48	36	0	0	What is the point of Section 2.6.2? I would delete it, especially as this chapter is already longer than it need be. This section overlaps with Chapter 18 of WG2 and	Accepted End of the sentence will be deleted

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						Section 3.5 of Chapter 3 of WG3. (Danny Harvey, University of Toronto)	
2-487	A	48	40	48	41	The phrase “which must be taken into consideration in a balanced approach” is a classic example what are called “weasel words”: words that are so vague and general that they can mean anything to anyone, and so nobody can possibly object to them. The phrase is therefore meaningless. It says nothing concrete, and does not provide any useful advice to policymakers. (Danny Harvey, University of Toronto)	Reject
2-488	A	48	43	0	0	before "long" insert "generally assumed to be" (Peter Read, Massey University)	Reject
2-489	A	48	43	48	43	before "long" insert "generally assumed to be" (Peter Read, Massey University)	Rejected Is too specific for the text, we only giving an example
2-490	A	48	48	48	50	Installing air conditioning is only one of many possible options for adapting to a warmer climate, and the least sophisticated of the options. Other options include shading of existing buildings or at least of windows, installed low-solar heat gain glazing, designing new buildings so that they are not inherently uninhabitable without air conditioning in the first place, or taking actions to reduce the existing urban heat island effect, all of which are discussed at length in my recent book (Harvey, L.D.D. 2006. A Handbook on Low-Energy Buildings and District Energy Systems: Fundamentals, Techniques, and Examples. James & James, London). Thus, it is possible to simultaneously adapt and reduce emissions. (Danny Harvey, University of Toronto)	Accepted
2-491	A	48	51	0	0	put date into brackets (Grassl Hartmut, Max Planck Institute for Meteorology)	Accepted We will add the argument in relation to the uncertainty section
2-492	A	48	51	49	15	This paragraph is describing the effect of differences in uncertainties associated with climate change, adaptation and mitigation on the net benefits of climate change policies. It is also important to bring out the difference between climate policies in their effect on the uncertainties themselves. Mitigation actions reduce the uncertainties of climate change and therefore its impacts and the uncertainties associated with adaptation. Adaptation reduces the uncertainties of the impacts, but has very little if any effect on reducing the uncertainties of climate change. Somewhere in the chapter there should be a clear statement on this point - perhaps in the discussion of the TAR in Figure 2.1. (Government of UK)	Rejected We cannot make this argument about degree of consensus since this is not based on literature
2-493	A	48	51	49	15	This paragraph reports Schneider views, without any appreciation on the degree of consensus on his views. It would be fair to note that human beings when faced with	Accepted

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						the risk of a major damage may K33make their decision more on the basis of a jugement on the consequences of the damage than on the indication that the risk probabilty is one out of 1000 chance or one out of 10 000chance. (Government of France)	
2-494	A	49	5	49	5	Add after options "and their costs" (Government of France)	Rejected We are referring Schneiders arguments so we cannot make these changes. The issues related to discount rates are discussed in section 2.5
2-67	B	49	13	49	15	(1) Replace “subjective” with “objective” on line 13.as it is not convincing that anything subjective has value associated with it. It just means that certain prejudices and predilections may prevail. (2) It is not convincing, that using declining discount rates may not in fact be unethical, if not counterproductive. As noted in the previous comments on p. 37 (this chapter), this could reduce the resources current generations need to fix urgent problems that they currently suffer from (e.g., hunger, malaria and other climate sensitive diseases) in order to benefit future generations who are more likely to be (a) richer, (b) have access to a broader and more effective set of technological options, (c) presumably would have greater human and social capital, and therefore (d) more able to fix the problems that afflict them than are current generations (Schelling 1995; Dowlatabadi 1997; Goklany 1992, 2000, 2003; Tol and Dowlatabadi 2001). In fact, since economic and technological development, are constantly accreting, it is conceivable that such a shift in resources would make both present and future generations poorer and less-technologically advanced, and make both generations worse-off, essentially defeating the whole purpose of using low(er) discount rates.. Accordingly eliminate this portion of the sentence. Citations: (1) Schelling, T.C.: 1995, ‘Intergenerational discounting’, Energy Policy 23, 395–401. (2) Dowlatabadi, H.: 1997, ‘Assessing the health impacts of climate change’, Climatic Change 35, 137–144. (3) Goklany, I.M.: 1992, ‘Adaptation and climate change’, paper presented at the Annual Meeting of the American Association for the Advancement of Science, Chicago, February 6-11. (4) Goklany, I.M.: 2000. “Potential Consequences of Increasing Atmospheric CO2 Concentration Compared to Other Environmental Problems.” Technology 7S (2000): 189-213. (5) Goklany, I.M.: 2003, ‘Relative contributions of global warming to various climate sensitive risks, and their implications for adaptation and mitigation’, Energy & Environment 14, 797-822. (6) Tol, R.S.J. and Dowlatabadi, H.: 2001, ‘Vector borne diseases, development & climate change’, Integrated	Noted

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						Assessment 2, 173-181. U.S. Government (Government of U.S. Department of State)	
2-495	A	49	16	49	21	As explained in my comment to page 20, lines 11-16, current uncertainties have no practical implications concerning near-term emission policy. All this fancy economic analysis is unnecessary; the underlying climate and impacts science (as summarized by WG1 and WG2) combined with generally accepted principles of moral behaviour when it comes to the imposition of involuntary risks on others, makes it very clear that several decades of increasingly stringent emission reductions are necessary. Again, the long-winded discussion in this chapter obscures (in fact, does not even give) the central message that needs to be given. (Danny Harvey, University of Toronto)	Accepted Look for other references
2-496	A	49	34	49	44	Burton's views are common sense and should have been supported by other authors. (Government of France)	Accepted
2-497	A	49	36	0	0	add comma before "i.e." and delete "and" (Grassl Hartmut, Max Planck Institute for Meteorology)	Accepted
2-498	A	50	6	0	0	put "NAPAs" into brackets (Grassl Hartmut, Max Planck Institute for Meteorology)	Accepted
2-499	A	50	9	51	22	competition with land-use for food production should be mentioned as well as threat to biodiversity (Hartmut Grassl, Max Planck Institute for Meteorology)	Accepted
2-500	A	50	11	0	0	substitute "less important" for "marginal" (Grassl Hartmut, Max Planck Institute for Meteorology)	Noted Check references
2-68	B	50	13	50	14	Add to this list of references the following: Goklany 1992, 1995. Citations: (1) Goklany, I.M.: 1992, 'Adaptation and climate change', paper presented at the Annual Meeting of the American Association for the Advancement of Science, Chicago, February 6-11. (2) Goklany, I.M., 1995. Strategies to enhance adaptability: technological change, economic growth and free trade. Climatic Change 30, 427-449. U.S. Government (Government of U.S. Department of State)	Accepted, are areas
2-501	A	50	33	0	0	delete "one of the" before "areas" (Grassl Hartmut, Max Planck Institute for Meteorology)	Reject, it is also a sink
2-502	A	50	36	0	0	The statement is wrong. If biomass is used for energy (on a sustainable basis), then it is not being used as (that is, built up as) a carbon sink. (Danny Harvey, University of Toronto)	Accepted
2-503	A	50	37	0	0	correct to: "creates" at the end of the line	Accepted

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						(Grassl Hartmut, Max Planck Institute for Meteorology)	
2-504	A	50	40	0	0	Change “contribute” to “contributing” (Danny Harvey, University of Toronto)	Accepted
2-505	A	50	46	50	46	The reference quoted as a "Moreira, 2005" should be changed to "Moreira et al, 2005" and added to the list of references as: "Moreira, J.R., L.A. Horta Nogueira, V. Parente, 2005. Biofuels for Transport, Development, and Climate Change: Lessons from Brazil in (eds. R. Bradley, J. Persking, L. Schipper and H. Winkler) Growing in the Greenhouse: Protecting the Climate by Putting Development First, Washington, USA, World Resources Institute. (Jose Roberto Moreira, Institute of Electrotechnology and Energy, University of Sao Paulo-IEE-USP)	Accepted
2-506	A	50	47	50	47	The reference quoted as a "Moreira, 2005" should be changed to "Moreira et al, 2005" and added to the list of references as: "Moreira, J.R., L.A. Horta Nogueira, V. Parente, 2005. Biofuels for Transport, Development, and Climate Change: Lessons from Brazil in (eds. R. Bradley, J. Persking, L. Schipper and H. Winkler) Growing in the Greenhouse: Protecting the Climate by Putting Development First, Washington, USA, World Resources Institute. (Jose Roberto Moreira, Institute of Electrotechnology and Energy, University of Sao Paulo-IEE-USP)	Accepted What we mean is that it is on 2012 that we know to which extent the Protocol will be implemented. Write if the original emission reduction targets envisioned in the Kyoto Protocol were to be achieved
2-69	B	51	22	51	22	An explanation of what the authors mean by "if the Kyoto Protocol is implemented" should be included (i.e. is it meant that the Protocol will be implemented if all Annex B countries meet their targets?). (Government of Australia)	Accepted
2-507	A	51	24	51	34	The interrelationships among mitigation, adaptation, and climate change impacts related to infrastructye is not very clear. Please clarify. (Debyani Ghosh, Global Energy Partners, LLC)	Reject, this is not relevant in relation to the infrastructure issues
2-508	A	51	28	51	28	Suggest adding ",especially with respect to the waste sector (Chapter 10)." after "GHG emissions and mitigation policies". (,)	Accepted
2-509	A	51	32	0	0	add comma after "climatic Changes" and "as" after this comma (Hartmut Grassl, Max Planck Institute for Meteorology)	Accepted
2-70	B	51	32	51	32	Delete "extreme climatic changes" and replace with "extreme weather events". (Government of Australia)	Rejected, this is too detailed
2-510	A	51	34	51	34	Ref Infrastructure: A recent World Bank report called 'Managing Climate Risk…August, 2006, states that as a 'rough estimate' about a quarter of the World Bank Group's portfolio is subject to a 'significant degree' of climate risk." (p5).	Accepted

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						Bank projects which may be at risk from climate change 'are estimated at about 40 percent of the total portfolio." The report goes on: "The impacts on investments, through increased costs or significant redirection, are estimated at 1to 2 percent of the investment portfolio, or about $200 million to $400 million per year within the World Bank Group and at least $1 billion for all official development assistance and concessional lending. The total costs of adaptation for all activities, including government and private investments, in developing countries will be at least an order of magnitude larger." (page 27). (Kirsty Hamilton, Chatham House; UK Business Council for Sustainable Energy)	
2-511	A	51	34	0	0	correct to: "the reverse matrix methodology" (Hartmut Grassl, Max Planck Institute for Meteorology)	Noted
2-512	A	51	34	51	35	World Bank/GEF has just produced an excellent report "Managing Climate Risk" on integating adaptation into its work. (Andrew Dlugolecki, University of East Anglia)	Noted
2-513	A	51	37	51	44	See my comment to page 48, line 48-50. (Danny Harvey, University of Toronto)	Rejected, it is extreme heating
2-514	A	51	40	0	0	substitute "heat waves" for "heating" (Hartmut Grassl, Max Planck Institute for Meteorology)	Accepted
2-515	A	51	40	0	0	Change “has” to “have” (Danny Harvey, University of Toronto)	Rejected, have is incorret
2-516	A	51	41	51	44	writing is not clear (Cohen Stewart, Environment Canada)	See 516
2-517	A	51	41	51	44	writing is not clear (Cohen Stewart, Environment Canada)	Accepted, will be edited
2-518	A	51	41	51	44	"Other studies conclude that heat warning……(Ebi et al, 2004)". This sentence seems to end up meaning opposite of what is intended. Do heat-warning systems increase or decrease heat-related mortality? Should phrase precisely. (Government of India)	Accepted
2-519	A	51	42	0	0	correct to: "a heat warning system" (Hartmut Grassl, Max Planck Institute for Meteorology)	Accepted
2-520	A	51	43	0	0	substitute "reduced" for "increased" (Hartmut Grassl, Max Planck Institute for Meteorology)	Accepted
2-521	A	51	43	0	0	Should be “decreased mortality” (Danny Harvey, University of Toronto)	See 520
2-522	A	51	43	51	43	Add for clarity between to and increased mortality a word such as temper or reduce (Government of France)	See 520

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
2-523	A	51	43	51	43	Replace "increased" with "decreased". (Government of Germany)	Accepted
2-524	A	51	46	0	0	delete "projection" (Hartmut Grassl, Max Planck Institute for Meteorology)	Accepted
2-525	A	51	46	0	0	Delete “projection” (Danny Harvey, University of Toronto)	Accepted
2-526	A	51	50	0	0	Change “will” to “may”. How much cooling energy increases depends on how intelligently (or not) new buildings are designed. (Danny Harvey, University of Toronto)	Accepted, will be edited
2-527	A	52	5	52	15	Does not read smoothly (Jean-Paul Ceron, CRIDEAU)	See 527
2-528	A	52	6	52	14	in parts poor language, strong editing necessary (Hartmut Grassl, Max Planck Institute for Meteorology)	Accepted
2-529	A	52	8	0	0	correct to: "heat waves and sea level rise. Adaptation options include" (Hartmut Grassl, Max Planck Institute for Meteorology)	Noted, the text will be checked
2-530	A	52	8	52	8	“and adaptation options i.e. include…” 1) please rewrite (see alternative text 'Jean-Paul Ceron ERSOD_Mitigation.doc') 2) add “snow making “ after air conditioning. (Jean-Paul Ceron, CRIDEAU)	Accepted
2-531	A	52	9	0	0	delete "and" after "protection" (Hartmut Grassl, Max Planck Institute for Meteorology)	Accepted, update
2-532	A	52	11	52	12	“and there is a potential…..Fiji (Becken2005)”. Meaning unclear and reference not found in biblio (Becken 2005) Becken, S. (2005). "Harmonising climate change adaptation and mitigation: the case of tourist resorts in Fiji." Global environmental change 15(4): 381-393. (Jean-Paul Ceron, CRIDEAU)	Accepted
2-533	A	52	12	0	0	correct to: "Even when host countries" (Hartmut Grassl, Max Planck Institute for Meteorology)	Accepted
2-534	A	52	12	52	13	correct to: "do not have" (Hartmut Grassl, Max Planck Institute for Meteorology)	See 533
2-535	A	52	12	52	14	Reword as: “Even FOR for host countries with key tourist activities THAT are not …. policies SUCH AS energy …” (Danny Harvey, University of Toronto)	Reject, they can have priorities in these areas but not main
2-536	A	52	13	0	0	delete "main" (Hartmut Grassl, Max Planck Institute for Meteorology)	Accepted

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
2-537	A	52	13	0	0	add "increased" before "energy efficiency" (Hartmut Grassl, Max Planck Institute for Meteorology)	See 533
2-71	B	52	13	52	15	This sentence does not make sense and needs to be redrafted. (Government of Australia)	Reject
2-538	A	52	17	0	0	add "strongly" before "exposes" (Hartmut Grassl, Max Planck Institute for Meteorology)	Reject, this is too detailed
2-72	B	52	17	52	17	The authors should also point out that certain agricultural sectors in some developed countries are also rain-fed (e.g. grazing in Australia). It should also be made clear in this section that the capacity to irrigate is limited at root, to rainfall. (Government of Australia)	Accepted
2-539	A	52	25	52	26	delete "across regions" (Hartmut Grassl, Max Planck Institute for Meteorology)	This loop will be noted in 2.7.4
2-540	A	52	35	0	0	Section 2.7 It seems to me that there is a missing link between this section and the concept of sustainable development discussed in a previous section of this chapter. Sustainable development (at least in the broad definition assumed at the begining of Chapter 2) includes the social aspects of sustainability. I would like the authors to consider that, just as sustainable development reinforces adaptation and mitigation policies and options, unsustainable issues such as poverty and un-equity can endanger this very policies and options. It seems that the issue of equity is considered unidirectionaly in this section, from the point of view of the impacts of mitigation action upon equity. My point is that sustainable development implies considering the loop backwards: policy action directed towards equity and socioeconomic development could reinforce mitigation policies, whe sufficient coordination takes place. (Francisco Aguayo, El Colegio de México)	Noted
2-541	A	52	37	0	0	Section 2.7 is an excellent section! (Danny Harvey, University of Toronto)	Rejected Comments vary and this is the only one of this nature. Many have found it useful. We intend to keep the section.
2-73	B	52	37	0	0	Section 2.7 is very discursive in nature and provides few concrete findings for policy makers. The authors should review this section and distil their key findings more concisely. (Government of Australia)	Noted, in the editing we will sharpen the conclusions that are relevant for policy makers
2-74	B	52	37	55	7	Lost in the discussion on these pages is that absolute changes in income and other (more important) indicators of human well-being (e.g., education, mortality rates, access to safe water and sanitation, child labor) are just as important as the distribution within these indicators. Is, for example, a flat distribution coupled with	Accepted

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						a significantly lower income preferable to an unequal distribution where virtually every one is better off? Consider, for example, that the global income distribution in 1800 was virtually flat (Maddison 2003), at around $400 (in 1990 International dollars, adjusted for PPP). Today, it is skewed, inequalities abound, but most individuals have a higher income level. More importantly, human well-being, as measured by mortality rates, life expectancies, available food supplies (a surrogate for hunger), were all at abysmal levels (Goklany 2001). Improvements in each of these factors also contribute to enhancing mitigative capacity, not to mention sustainable development (Goklany (2006a). So it does not follow that a flatter distribution is necessarily better either from the narrow point of view of climate change or from the broader point of view of sustainable development. This should be noted on line 52 of page 52, and factored into Table 2.7. Citations: (1) Maddison, Angus. 2003. The World Economy: Historical Statistics (Paris, France: Development Centre of the Organisation for Economic Co-operation and Development, 2003). (2) Goklany, I.M. Economic Growth and the State of Humanity. Political Economy Research Center, Policy Study 21. March 2001. (3) Goklany, I.M. 2006a. Integrated Strategies to Reduce Vulnerability and Advance Adaptation, Mitigation, and Sustainable Development. Mitigation and Adaptation Strategies for Global Change, forthcoming. U.S. Government (Government of U.S. Department of State)	
2-542	A	52	44	0	0	use hyphen, "intra-generational" (Hartmut Grassl, Max Planck Institute for Meteorology)	Accepted
2-543	A	52	45	0	0	delete "the issue" (Hartmut Grassl, Max Planck Institute for Meteorology)	Rejected for language usage resons
2-544	A	52	45	0	0	correct to: "distribution" (Hartmut Grassl, Max Planck Institute for Meteorology)	Accepted
2-545	A	52	47	0	0	substitute "which" for "how" (Hartmut Grassl, Max Planck Institute for Meteorology)	Accepted
2-546	A	52	47	0	0	delete "different" (Hartmut Grassl, Max Planck Institute for Meteorology)	Accepted
2-547	A	53	10	53	10	Define 'Gini' coefficient. (Debyani Ghosh, Global Energy Partners, LLC)	Accepted We will note that different indexes can be used and they all have their strengths and limitations. No index can cover all aspects.
2-75	B	53	24	0	0	It should be noted that it is not clear that an all-encompassing indicator can be constructed or, if constructed, will be understandable or useful to either	Accepted

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						policymakers or the general public. Issues that would arise, to which there do not seem to be objective answers, are: How would one construct an index that touches on , say, infant mortality vs. all-cause mortality; how much weight should be given to, say, literacy on one hand to education vs. mortality, or to prevalence of hunger vs. child labor, or income vs. life expectancy? U.S. Government (Government of U.S. Department of State)	
2-548	A	53	26	53	28	I suggest to remove these three lines which are redundant with the paragraph just above (Jacques Rilling, CSTB Building Research Center)	Accepted
2-549	A	53	26	53	28	delete paragraph, it is a repetition (Hartmut Grassl, Max Planck Institute for Meteorology)	Accepted
2-550	A	53	26	53	28	"An important attempt to widen….literacy rate" Delete these lines as the sentence is repeated starting at line 30. (Government of India)	Accepted
2-76	B	53	26	53	28	Delete sentence - it is repeated immediately below. (Government of Australia)	Accepted
2-77	B	53	26	53	28	Repeated in next paragraph and should be removed. U.S. Government (Government of U.S. Department of State)	Accepted We will include some reference to the longer term trends as well but, we repeat the point, this is a section that is looking at equity, not at absolute levels of standard of living. We contend that both are important. WE also find the trends of the last 20 years or so interesting and relevant.
2-78	B	53	30	54	20	Examination of trends over 11-21 years (see table 2.6) can be misleading about the past because of its relatively short time horizon. Accordingly, add at line 20 on page 54, the following: "Based on an examination of various indicators of human well-being other than income, namely, available food supplies per capita (low levels of which are surrogates for hunger and malnourishment), infant mortality, the prevalence of child labor, and life expectancy from the 1950s to 1999, and the Human Development Index (HDI) from 1975 to 1999, Goklany (2002b) showed that, first, well-being of the vast majority of the world's population has improved over the last half century. Partly because of a combination of economic growth and technological change, compared to a half century ago the average person today lives longer and is less hungry, healthier, more educated, and more likely to have children in a schoolroom than in the workplace. Second, during that period, indicators of well-being improved for low, middle and high income groups, as well	Accepted We will include some reference to the longer term trends as well but, we repeat the point, this is a section that is looking at equity, not at absolute levels of standard of living. We contend that both are important. WE also find the trends of the last 20 years or so interesting and relevant.

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						as Sub-Saharan Africa. However, average life expectancies declined in many Sub-Saharan, Eastern Europe and the Former Soviet Union (FSU) since the late 1980s because of HIV/AIDS, malaria, and/or problems related to economic deterioration, although more recent data from the World Bank (2006) suggests a renewal of previous improving trends in most of Eastern Europe and parts of the FSU, perhaps aided by the reversal in economic fortunes, and possibly even Sub-Saharan Africa, probably due to greater efforts at disease control. Third, for every indicator examined, regardless of whether the rich are richer and the poor poorer, gaps in average human well-being between the rich countries and other income groups had for the most part shrunk in the last four decades of the 20th century. However, comparing averages in rich countries and Sub-Saharan Africa, although the gap in infant mortality between the two has continued to close, the gap in life expectancy has expanded in the past decade or so (but not enough to erase the large improvement made previously). Despite this, in aggregate, the corresponding gap in HDI had decreased." Citation: (1) Goklany, I.M. 2002b. "The Globalization of Human Well-being." Policy Analysis, No. 447 (Washington, DC: Cato Institute). (2) World Bank. 2006. World Development Indicators Online. U.S. Government (Government of U.S. Department of State)	
2-79	B	53	33	54	14	Add the following at line 13, page 54: "However, inequality between countries doesn't necessarily translate into inequality between individuals. Sala-i-Martin (2002), using each of nine separate indices of income inequality, also showed that global income inequality during the 1980s and 1990s was reduced substantially. Bhalla (2002) also looked at inequality within the global population rather than inequality between countries. He estimated that globally, inequality increased during the 1960s and early 1970s after which it shrank — slowly at first, but with increasing rapidity through the 1980s and 1990s. The Gini coefficient increased from 66.4 in 1960 to 69.3 in 1973, then declined to 68.5 in 1980 and 65.1 in 2000, which is the lowest level since 1910. The majority of this drop was due to economic growth and rising incomes in China and, to a lesser extent, India." Citations: Xavier Sala-i-Martin, The World Distribution of Income (Estimated from Individual Country Distributions), May 2002, online at www.columbia.edu/~xs23/papers/pdfs/WorldIncomeDistribution.pdf>. (2) Surjit S. Bhalla, Imagine There's No Country: Poverty, Growth and Inequality in the Era of Globalization (Washington, D.C.: Institute for International Economics, 2002). U.S. Government	Accepted

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						(Government of U.S. Department of State)	
2-551	A	53	42	0	0	Footnote 18, line 2: add "as it" before "excludes" (Hartmut Grassl, Max Planck Institute for Meteorology)	Accepted
2-552	A	53	42	0	0	Footnote 18, line 1: correct to: "is different from" (Hartmut Grassl, Max Planck Institute for Meteorology)	Accepted
2-553	A	53	43	53	0	Footnote 18: "The Gross…from abroad". Change "GDP different to GNI" to "GDP is different from GNI in that it" (Government of India)	Accepted
2-80	B	54	9	54	12	The inclusion of the formula is unhelpful for the general readership, and should be deleted unless a more detailed discussion of the formula is provided. (Government of Australia)	Rejected It was included precisely because it as asked for by some other reviewer
2-554	A	54	36	54	37	write "that the effects … will be particularly significant." (Hartmut Grassl, Max Planck Institute for Meteorology)	Accepted
2-555	A	54	36	54	37	Reword as "It is expected that impacts on health and social security will be particularly significant". (Danny Harvey, University of Toronto)	Accepted
2-556	A	55	1	0	0	Table 2.7, column 3, cell 7: substitute "developed ones" for "more well to do ones" (Hartmut Grassl, Max Planck Institute for Meteorology)	Accepted
2-557	A	55	1	0	0	Table 2.7, column 3, cell 7: delete "and" in first line (Hartmut Grassl, Max Planck Institute for Meteorology)	Accepted
2-558	A	55	1	0	0	Table 2.7, column 3, cell 6: substitute "larger" for "greater" (Hartmut Grassl, Max Planck Institute for Meteorology)	Accepted
2-559	A	55	1	0	0	Table 2.7, column 2, cell 6: add comma before "e.g." and after "wood fuel" (Hartmut Grassl, Max Planck Institute for Meteorology)	Accepted
2-560	A	55	5	0	0	In Table 2.7, 2nd column, what does "all sections" mean? Entry in last row, 3rd column should read "migration could be". (Danny Harvey, University of Toronto)	Noted We had in mind income groups, sections of society. Will clarify. Will correct the last row, 3rd column as suggested.
2-561	A	55	6	55	6	It is not intuitively obvious, at least to this reviewer, why climate change will increase economic disparity between genders across country lines. Some explanation should be added. Also, the phrase "Cuts in government expenditures to cope with climate change …" is unclear. It appears cuts in government expenditures are for activities other than coping with climate change. If this is the case, the wording needs to be made explicit. (Lenny Bernstein, L. S. Bernstein & Associates, L.L.C.)	Accepted, we will explain that the most vulnerable will be woman in DC's, but similar gender disparities do not exist in IC's. Government expenditures refer to cuts related to climate change
2-81	B	55	6	55	6	It is not intuitively obvious why climate change will increase economic disparity between genders across country lines. Some explanation should be added. Also, the	See 561

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						phrase "Cuts in government expenditures to cope with climate change …" is unclear. It appears cuts in government expenditures are for activities other than coping with climate change. If this is the case, the wording needs to be made explicit. U.S. Government (Government of U.S. Department of State)	
2-562	A	55	9	0	0	put date into brackets (Hartmut Grassl, Max Planck Institute for Meteorology)	Accept
2-82	B	55	9	55	16	This section is confusing and poorly drafted, and it assumes far too much on behalf of the reader. The terms "relative risk aversion" and "absolute risk aversion" appear only once in the entire report—here—and they are not defined or explained in any way. U.S. Government (Government of U.S. Department of State)	Accepted We will redraft and explain the terms
2-83	B	55	22	56	8	The discussion of Diamond (2004) assumes historical certainty of the causes of civilisation collapse, where no such certainty exists. In addition it seems sensationalist. Suggest deletion of this sentence, or the inclusion of a note that the causes of these civilisation collapse are highly uncertain. (Government of Australia)	Accepted We will add a comment that the causes are uncertain
2-84	B	55	22	0	0	Replace "has shown" with "suggests". It should be noted that Diamond's account of the Easter Island chronicle is disputed (Young 2006, Peiser 2005), and the Greenland saga indicates the importance not only of trade in sustaining marginal societies, and but also of being receptive to technological change, and the danger of rejecting available technologies to conform with established social norms (Goklany 1995). Citations: (1) Young, E. 2006. Easter Island: a monumental collapse? New Scientist, 31 July 2006, page 30-34. (2) Peiser, B. From Genocide to Ecocide: The Rape of Rapa Nui. Energy & Environment 16: 513-540. (3) Goklany, I.M., 1995. Strategies to enhance adaptability: technological change, economic growth and free trade. Climatic Change 30, 427-449. U.S. Government (Government of U.S. Department of State)	Accept
2-563	A	56	5	0	0	substitute "jointly with" for "met by" (Hartmut Grassl, Max Planck Institute for Meteorology)	Accepted
2-564	A	56	5	56	6	delete "from society to a coming disaster" (Hartmut Grassl, Max Planck Institute for Meteorology)	Accepted
2-565	A	56	5	0	0	add "societal" before "response" (Hartmut Grassl, Max Planck Institute for Meteorology)	Accepted
2-566	A	56	10	0	0	delete "even out"	Rejected

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						(Hartmut Grassl, Max Planck Institute for Meteorology)	
2-567	A	56	16	58	36	The sentence that begins on line 24 implicitly suggests that utility is a form of equity and is entitled as much respect as other definitions of equity. Although it is not clear that this is what was intended, it could be improved by adding on the first line of 24, 'Although it is disputed by philosophers that efficiency is a form of equity, Equity has traditionally been understood to require just distributions of harms and benefits and usually follows rules of distributive just which start with the assumption that any analysis of alternative distribution rules should start with the assumption that people are entitled to equal shares of burdens and benefits of any allocation unless alternatives to equal shares could be justified on moral grounds. Under distributive justice schemes, those advocating differences in results that differ from equality have the burden of showing a morally recognizable criteria that justifies less than equal allocations of benefits and burdens. There are several versions of distributional justice including Rawlsian distributions, yet no philosopher would assert that equity equals utility. Some utilitarians, such as later stated although incorrectly, Singer and Shraeder-Frachette, argue that utility requires meeting basic rights although they do this on a consequentialist basis, not a deontological basis. (Donald Brown, Pennsylvania Consortium for Interdisciplinary Environmental Policy)	Noted We will take account of the suggestion, but not necessarily using the suggested
2-568	A	56	18	0	0	delete "in a general sense" (Hartmut Grassl, Max Planck Institute for Meteorology)	Accepted
2-569	A	56	24	56	32	The fallacy here is that winners WILL compensate losers for their losses, or that government will do it. (Andrew Dlugolecki, University of East Anglia)	Noted
2-570	A	57	8	0	0	correct to: "that defines rights" (Hartmut Grassl, Max Planck Institute for Meteorology)	Noted We will take account of the suggestion, but not necessarily using the suggested
2-571	A	57	9	57	9	Kant and Hegel did not view that there programs on morality were derived from social contract theory nor do many asserting human rights theories. They claim that rights are derived from reason, not from contractual agreements. (Donald Brown, Pennsylvania Consortium for Interdisciplinary Environmental Policy)	Noted No they did not but their thinking influenced the social contract theorists and we will clarify that.
2-572	A	57	10	0	0	"century" without capital letter (Hartmut Grassl, Max Planck Institute for Meteorology)	Accepted
2-573	A	57	22	57	26	. Singer and Shraeder-Frechette support, your insert "do now support" suggests that at one time they did not support rights based upon utility. I think it is clearer to say	

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						"do support rules that acknowledge rights" (Donald Brown, Pennsylvania Consortium for Interdisciplinary Environmental Policy)	
2-574	A	57	23	0	0	add semicolon after date 2002 (Hartmut Grassl, Max Planck Institute for Meteorology)	Accepted
2-575	A	57	25	0	0	correct to: "deontologists" (Hartmut Grassl, Max Planck Institute for Meteorology)	Accepted
2-576	A	57	27	57	33	Giving so much space to Sen's rather extreme and idealistic views is unbalanced-since all individuals are unequal, and some are very weak indeed, the only fair approach is "rights-based". Who would judge "capability" etc etc? (Andrew Dlugolecki, University of East Anglia)	Rejected We take the position that his is an important thinker in this area and his views are very relevant. We will however, try and reflect the point which he is making, and which has some validity.
2-577	A	57	29	0	0	Better wording would be "options should be judged not only in terms of their consequences, but also in terms of procedures" (Danny Harvey, University of Toronto)	Accepted
2-578	A	57	36	57	43	I am not sure that Sen is against rights that are asserted by persons who are harmed. He is interested in process but does not say basic rights should be overruled by that process. He clearly is against a utilitarianism that basis its decisions on utility alone but I believe you mistake his position on rights. He has never, to my understanding, that the capability approach could be used to support actions that kill people for instance. (Donald Brown, Pennsylvania Consortium for Interdisciplinary Environmental Policy)	Accepted We will try and reflect this nuance
2-579	A	57	37	0	0	correct to: "for not taking into consideration" (Hartmut Grassl, Max Planck Institute for Meteorology)	Accepted
2-580	A	57	37	57	37	"Sen criticises the ….for not taken into……". Replace "taken" by "taking" (Government of India)	Accepted
2-581	A	57	47	57	47	"…..grand universialism…". Change "universialism" to "universalism" (Government of India)	Accepted
2-85	B	57	48	0	0	Insert "Arguably" after the period on line 48. U.S. Government (Government of U.S. Department of State)	Accepted
2-582	A	58	0	0	0	, despite the scientific truth that every molecule of greenhouse gases emitted in any time or geographical space is equal. The causal relationship of green house gases to climate change and its accumulation in the atmosphere continues. (Valentin Bartra, Instituto Andino y Amazónico de Derecho Ambiental)	Noted
2-593	A	58	0	0	0	, despite the scientific truth that every molecule of greenhouse gases emitted in any	See response on 2-582

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						time or geographical space is equal. The causal relationship of green house gases to climate change and its accumulation in the atmosphere continues. (Valentin Bartra, Instituto Andino y Amazónico de Derecho Ambiental)	
2-583	A	58	8	0	0	delete "right based" and write "an approach" (Hartmut Grassl, Max Planck Institute for Meteorology)	Accepted
2-584	A	58	8	0	0	add "to" before "entitle" (Hartmut Grassl, Max Planck Institute for Meteorology)	Accepted
2-585	A	58	8	58	8	"An example of a right based …would be entitle…". Insert "to" before "entitle" (Government of India)	Accepted
2-86	B	58	8	58	13	This needs to be discussed more fully. If every individual is entitled to an equal per capita share of the earth's sink capacity, why is he or she also not entitled to equal share of land, water, oil, and other natural resources? On the other hand, why shouldn't sink capacity be divided on the basis of who adds most value at present to the global well-being, however estimated? U.S. Government (Government of U.S. Department of State)	Noted The difference is that in this case we are dealing with a global public good. Other natural resources you cite are significantly privately owned. The division of sink capacity along the lines you suggest confuses efficiency with equity. The capacity should indeed end up with those who can make the best use of it but would happened through the market place. The initial allocation of rights require some other ethical principle to determine them.
2-586	A	58	12	58	13	The capability approach would argue against for both the loss of freedom and opportunities. This sentence is both unclear and inaccurate as it is currently written. (Donald Brown, Pennsylvania Consortium for Interdisciplinary Environmental Policy)	We will try and amend it
2-587	A	58	27	0	0	delete "is" before "remains" (Hartmut Grassl, Max Planck Institute for Meteorology)	Accepted
2-588	A	58	27	58	27	"…and this is remains a ugent part….studies". Replace "is remains a" by "remains an" (Government of India)	Accepted
2-589	A	58	29	0	0	Comma is needed after "methods" (Danny Harvey, University of Toronto)	Accepted
2-590	A	58	34	0	0	correct to: "reflected" (Hartmut Grassl, Max Planck Institute for Meteorology)	Accepted
2-591	A	58	34	58	34	"….beyond what is reflect in….". Replace "reflect" by "reflected" (Government of India)	Accepted
2-592	A	58	38	0	0	Section 2.7.4 contains reference to UNFCCC Article 3 as "the equity article" (in	Accepted We will try and account for this

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						line 43) but only quotes the first sentence of Art. 3.1. The section neglects altogether the fundamental significance of the second sentence of Art 3.1 ("Accordingly, the developed country Parties should take the lead in combating climate change and the adverse effects thereof"). This principle sets up the differentiated equity framework subsequently established in Article 3.2. Taken together, these two articles directly establish the Annex-1 commitments laid out in UNFCCC Article 4.2 and hence also in the Kyoto Protocol. The strength and legal status of these principles and commitments require (at least) a description immediately following the second sentence in paragraph two in this section and, preferably at least some consideration of the vast amount of literature on the significance of Articles 3.1 and 3.2. (Pat Finnegan, Grian)	point although the discussion is not about UNFCCC
2-594	A	59	5	59	14	This shows a dangerously naïve view , that rich and poor countries do not interact. If poor countries suffer and perceive it is unfair, it will lead to international disorder, on the lines of terrorism , largescale migration (as is happening already into Spain and USA from Africa and Mexico) etc. (Andrew Dlugolecki, University of East Anglia)	Rejected We do not see that we are saying what the commentator says we are saying but we will look at it more carefully and reword, taking account of the comment.
2-87	B	59	5	59	22	It would help the reader if the drafting style made expressly clear that there are a number of schools of thought expressed in these 2 paras; and then to introduce a clear titling for each as they are arrived at in the text. (Government of Australia)	Accepted
2-595	A	59	7	58	14	It is disingenuous to call utility equity. Utility is a respected basis for making decisions about some distributive issues but it is not equity. Most philosophers see that utilitarian approaches can be criticized for their failure to deal with equity. Now, as you mention before some utilitarian philosophers support rights but base them on utility. (Donald Brown, Pennsylvania Consortium for Interdisciplinary Environmental Policy)	Rejected We are not saying they are the same. WE are simply tracing the implications of a particular line of reasoning using a utilitarian framework.
2-596	A	59	9	59	13	I can't see how one could justify assuming constant marginal utility, so I don't think that this counter example is even worth mentioning. However, if kept, the phrase would be better worded as "one would come to the conclusion that the costs of climate change mitigation that richer countries will face are …." (Danny Harvey, University of Toronto)	Accepted
2-597	A	59	10	0	0	substitute "come" for "lead" (Hartmut Grassl, Max Planck Institute for Meteorology)	Accepted
2-88	B	59	16	59	22	The paragraph on a rights basis to climate change mitigation is policy prescriptive	Rejected It is value laden. That is what any

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						and is value laden (e.g. "a sense of justice….would give more emissions rights to developing countries"). Suggest deletion of this paragraph. (Government of Australia)	equity discussion has to be. We are not proposing this but it is clearly and strongly a strand of the literature. We can amend the phrase sense of justice.
2-89	B	59	16	59	21	Recommend that the IPCC as a scientific body should not be making statements about values such as what a "sense of justice" would suggest. These are normative statements, not appropriate in this report. This entire section should be edited to ensure that such value statements are extracted. U.S. Government (Government of U.S. Department of State)	Accepted We are not proposing this but it an equal allocation of rights is clearly and strongly a strand of the literature. We can amend the phrase 'sense of justice'.
2-598	A	59	21	59	22	With regard tot he remark that also the developing world has to undertake some emission reductions; this all depends on the starting point of how this is caculated. If we start from the intrinsic capacity of the atmosphere to absorb CO2 and divide this volume equally among all world inhabitants it means a sustainability level of roughly 2 tons of CO2 per person. The emissions of most of the developing countries, like India or Brazil, are still below this quantity. This is one of the reasons that they are not inclined to take measures. (Gert de Gans, Kerkinactie / ICCO)	Accepted In some form we will reflect this.
2-599	A	59	22	0	0	Replace "emissions reduction" with "net emissions reduction" (Peter Read, Massey University)	Accepted
2-600	A	59	22	59	22	Replace "emissions reduction" with "net emissions reduction" (Peter Read, Massey University)	Accepted
2-601	A	59	29	59	35	I cannot accept that you should just let Mueller stand- what one individual thinks, wrongly, about what is so obviously the case, is irrelevant.Or at the least should be noted as incorrect. In the longrun everyone must have equal rights to the global commons like our atmosphere and climate. Why should anyone be free to discharhge into it more than another?because they are richer, or colder, or older- where does it stop? (Andrew Dlugolecki, University of East Anglia)	Rejected The governments of the US and Australia seem to think otherwise. We are expressing the range of views here.
2-602	A	59	30	0	0	put date into brackets (Hartmut Grassl, Max Planck Institute for Meteorology)	Accepted
2-603	A	59	37	0	0	see: above (Hartmut Grassl, Max Planck Institute for Meteorology)	Accepted
2-604	A	59	44	0	0	correct to: "focus" (Hartmut Grassl, Max Planck Institute for Meteorology)	Accepted
2-605	A	59	44	59	44	"Studies that focuses on …". Replace "focuses" by "focus" (Government of India)	Accepted

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2-606	A	59	46	59	46	"….atmosphere, basis human living….". Replace "basis" by "basic" (Government of India)	Accepted
2-607	A	60	10	0	0	Comma after "implications" (Danny Harvey, University of Toronto)	Accepted
2-608	A	60	11	0	0	Change "to" to "for" (Danny Harvey, University of Toronto)	Accepted
2-609	A	60	13	0	0	Comma after "policies" and change "runs" to "run" (Danny Harvey, University of Toronto)	Accepted
2-610	A	60	13	60	13	"…climate change policies runs into a …..". Replace "runs" by "run" (Government of India)	Accepted
2-611	A	60	17	0	0	use hyphen, "inter-generational" (Hartmut Grassl, Max Planck Institute for Meteorology)	Accepted
2-612	A	60	19	60	23	The use of the phrase "direct costs" is problematic: this is not defined in Chapter 2 or the glossary. The paragraph goes on the discuss costs from CGE models, but these include many indirect costs. (Government of UK)	Noted We cannot find this reference to direct costs. Suggest this is out of place and refers to some other section
2-613	A	60	23	60	23	It is not clear that grandfathering is an equity based approach or that people asserting it have made the case for grandfathering as a type of equity. Instead they base grandfathering on property rights usually referring to John Locke. For so many reasons, too long to go into hear, Lock's support of grandfather does not work in the context of climate change. As Singer has shown in reaction to a Lockian justification for grandfathering.: The idea of recognizing property rights in natural resources that have gained higher value through labor is not applicable to the atmosphere because this line of thinking is based on assumptions that: i. there will be sufficient quantities of the natural resource left over for others for their use, which is not true of the atmospheric GHG sinks, ii. the persons claiming property rights to natural resources have increased their value through their labor; however, in the case of atmospheric sinks they have rather diminished it, iii. international law prohibits the use of resources in one country in such a way that it will harm people in other countries, and iv. the nations of the world have already agreed that they must reduce the use of atmospheric sinks on the basis of "equity."	Accepted Interesting discussion we will try and reflect the essence in a few words

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						(Donald Brown, Pennsylvania Consortium for Interdisciplinary Environmental Policy)	
2-614	A	60	24	0	0	delete "which" (Hartmut Grassl, Max Planck Institute for Meteorology)	Accepted
2-615	A	60	36	60	43	. It is misleading to assert that energy intensive industries have made equity arguments. They have asserted property rights arguments that support grandfathering. These are not "equity arguments' nor do they conform to the preconditions of Locke for finding property rights in initial allocations. (Donald Brown, Pennsylvania Consortium for Interdisciplinary Environmental Policy)	Accepted
2-90	B	61	8	61	26	Economic efficiency is discussed only in terms of an emissions trading instrument. Is there a need to create some sense that economic efficiency may relate to other instruments too (e.g. access to technology and know-how)? (Government of Australia)	Rejected We are not aware of any research that proves access to technology is an economically efficient instrument.
2-616	A	61	20	61	23	. It is misleading to assert that energy intensive industries have made equity arguments. They have asserted property rights arguments that support grandfathering. These are not "equity arguments' nor do they conform to the preconditions of Locke for finding property rights in initial allocations. (Donald Brown, Pennsylvania Consortium for Interdisciplinary Environmental Policy)	See 615
2-617	A	61	22	0	0	delete "is" before "seemed" (Hartmut Grassl, Max Planck Institute for Meteorology)	Accepted
2-618	A	61	27	0	0	2.7.6 Equality as a metric to value unchecked emissions. Under a broader view equality is incorporated to the resources endowed to human beings (Dworking , 2000). The concept can be bradened to include naturals resources and the naturals wellness entittled as human beings (UN, 1948). (Valentin Bartra, Instituto Andino y Amazónico de Derecho Ambiental)	Noted We have tried to make this point in the section
2-619	A	61	27	0	0	2.7.6 Equality as a metric to value unchecked emissions. Under a broader view equality is incorporated to the resources endowed to human beings (Dworking , 2000). The concept can be bradened to include naturals resources and the naturals wellness entittled as human beings (UN, 1948). (Valentin Bartra, Instituto Andino y Amazónico de Derecho Ambiental)	See 618
2-620	A	61	28	0	0	Section 2.8. With regard to technological change in this century, I suggest mentioning impacts of information and communication technologies (ICT) on GHG	Rejected—in principle we would be happy to include along with other examples of

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						emissions. According to a simulation study by Hilty et al. (2006), ICT is expected to have a decreasing effect on the future GHG emissions as well as energy consumption mainly by ICT-supported facility management. For more details, see L. M. Hilty, P. Arnfalk, L. Erdmann, J. Goodman, M. Lehmann and P.A. Wäger: "The relevance of information and communication technologies for environmental sustainability–A prospective simulation study," Environmental Modelling&Software, 21(11), 1618-1629, 2006. (Takanobu Kosugi, Ritsumeikan University)	technology interactions with ghg emissions, but space limitations do not allow discussions of specific technology interactions with ghg emissions.
2-621	A	61	28	0	0	Section 2.8. The issue of intelectual property rights and patents is discussed at several point in this section and in other chapters of the report. It is reasonable to deduce from the literature that a strong patent system can harm diffusion of relevant technologies and subsequent technological learning, thereby hindering mitigation objectives. Detailed patent design can, on the contrary, foster mitigation policies. See attached file IPRs_SOD.doc for the complete argument and references. (Francisco Aguayo, El Colegio de México)	Rejected—this claim is not made in the chapter. What we do in the chapter is actually highlight the importance without claiming that one effect dominates the other.
2-622	A	61	28	0	0	Section 2.8 is a nice discussion of technology and the process and importance of technological change. However, many important things have been left out (a point that I raised in my comments on the ZOD and FOD). First, the issues of population and the growth of GDP/person in the already-rich countries should surely count as "framing" issues and therefore ought to be discussed in this chapter (but the authors of this and other relevant chapters seem to be avoiding these topics). Second, and pertaining directly to technology itself, the following should be discussed: 1. Urban planning and transport infrastructure, which are the dominant factors in determining personal transportation emissions. 2. The need to make much better use of EXISTING technology – this needs to be highlighted, with reference to Chapter 6 as far as buildings (responsible for 1/3 of OECD emissions) are concerned, because it is not just an issue of waiting for better technology to arrive. This point is made in the Executive Summary to Chapter 6. (Danny Harvey, University of Toronto)	Rejected—We agree with the argument that technology is not the only influence on greenhouse gas emissions. However the section on technology focuses primarily on the role of technology. We take note of the comment and modify the text.
2-623	A	61	28	0	0	There is a considerable overlap between chapter 2.8 and sections in chapter 3. Please try to minimize overlap (Rutu Dave, IPCC WGIII TSU)	Noted—Coordinated with Chap 3.
2-624	A	61	32	0	0	use full stop after "technologies" (Hartmut Grassl, Max Planck Institute for Meteorology)	Accepted. Text has been changed.
2-625	A	61	33	0	0	after "scales" insert "generally assumed to be"	Rejected. There are many characteristics of

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						(Peter Read, Massey University)	climate change that have century to millennial time scales.
2-626	A	61	33	61	33	after "scales" insert "generally assumed to be" (Peter Read, Massey University)	Rejected. See above.
2-627	A	61	33	0	0	delete "term" (Hartmut Grassl, Max Planck Institute for Meteorology)	Accepted.
2-628	A	61	38	61	43	This is a key section in setting how technology will be dealt with in following chapters, therefore its important to get definitions clearly and consistently used. From an investment perspective, as alluded to in line 39, there will be a different set of risks, expectation of returns, availability of capital and types of investors involved depending on which stage of the 'technology' development and deployment spectrum is being considered; and a different set of relevant policies. From a definition point of view the difference between R&D, and deployment meaning commercialisation process, needs to be clearly made from the outset - this differentiation is made clearly on page 71 (lines 28-32) In this regard the term 'new technologies' (line 43) should be clarified, the word 'new' deleted, or the form 'new and existing' technologies used . One suggestion is to use 'new' or 'innovate' technology to describe options in the R&D&D stage; 'existing' or 'current' technology could refer to options at the venture (commercial demonstration/early commercial) and commercial stages, where deployment and diffusion are the main issues. Perhaps a term like 'future technology' needs to be used where there is not yet R&D activity. Consistency of terminology needs to be ensured throughout this, and other chapters to make the technology discussion useful and relevant for policymakers, including clarifying terms like 'technology policy' (e.g. Chapter 2, page 64, line 50), 'innovation policy' and how that differs or overlaps with 'energy policy' for example. (Kirsty Hamilton, Chatham House; UK Business Council for Sustainable Energy)	Rejected—In principle, a clean clear technology terminology would be highly desirable. However, there is no standardization in the literature that allows a common vocabulary to be applied across all different sectors, all different technologies and all different bodies of literature. As a consequence, the creation of such a standardized terminology would constitute a value, new contribution to the literature requiring peer review and debate.
2-629	A	62	9	0	0	delete "automobiles" (Hartmut Grassl, Max Planck Institute for Meteorology)	Accepted.
2-630	A	62	12	62	17	it is written: …following phases:(1)…. And then no (2), (3) ; might need to be adjusted. (Jacques Rilling, CSTB Building Research Center)	Accepted.
2-631	A	62	12	62	17	Provide a diagrammatic representation for 'technological change' as described here. (Debyani Ghosh, Global Energy Partners, LLC)	Accepted. Diagrammatic representation is provided in Figure 2.5 below.
2-632	A	62	19	62	33	There are three views of the role of technology outlined here, in the rest of WGIII there seems to be a rather heavy focus on the R&D 'innovation' part of the	Noted—However, this is about chapters other than Chapter 2.

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						spectrum, rather than the deployment of what is already available. (Kirsty Hamilton, Chatham House; UK Business Council for Sustainable Energy)	
2-633	A	62	24	62	28	Pacala and Socolow's thesis ignores cost considerations, as the following sentence indicates- ie their idea has to be strongly qualified- technical feasibility is different from competitive. (Andrew Dlugolecki, University of East Anglia)	Accepted. Thank you.
2-634	A	62	26	62	33	The ideas here – that the technologies already exist in order to make large initial reductions in CO2 emissions, and that the main role of technological development will be in the final push to reduce emissions (to near zero) in the second half of the century, and to reduce costs – is supported by the discussion in Chapter 6 (Sections 6.4 and 6.8.3.7). However, this very important point needs to be made in the Executive Summary (in the paragraph on page 4, lines 20-31) and possibly also in the introduction (in the paragraph on page 5, lines 37-44). (Danny Harvey, University of Toronto)	Rejected—severe space limitations do not allow the duplication of text in two places.
2-635	A	62	28	62	28	Linked to the preceding comment investment is not well dealt with throughout WGIII, and yet is directly relevant to technology discussion (ref SPM para 6 on page 7), and particularly chapter 13 consideration of policies. A paragraph on technology and investment would be useful in Chapter two, making the link with both the RDDD&D spectrum/Induced Technology Change factors and the importance in the short and medium term of stimulating investment in each stage, framing the matter for ch 11 and 13. It may be useful to note that authors from the Basel Agency for Sustainable Energy, and UNEP's Sustainable Energy Finance Initiative provide an illustrative 'Financing Continuum' showing the different needs and sources of capital need to take a renewable energy project or enterprise through to implementation (reference: O'Brien, V.S. and Usher E., 2004. Mobilising Finance for Renewable Energies, Thematic background paper' for the International Conference for Renewable Energies, Bonn. (Available from URL: http://www.renewables2004.de/en/cd/default.asp). (Kirsty Hamilton, Chatham House; UK Business Council for Sustainable Energy)	Rejected—We feel that we have already made these points in the text. For example the discussion surrounding Figure 2.5. We have not included the reference because it is not a paper from the peer-reviewed literature.
2-636	A	62	28	63	33	The third viewpoint is presented without supporting references from the literature. References should be supplied, or the viewpoint identified as the assessment of the authors. (Lenny Bernstein, L. S. Bernstein & Associates, L.L.C.)	Accepted. References have been added.

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
2-91	B	62	28	62	33	The third viewpoint is presented without supporting references from the literature. References should be supplied, or the viewpoint identified as the assessment of the authors. U.S. Government (Government of U.S. Department of State)	Accepted—See above.
2-637	A	62	37	0	0	before "long" insert "assumed" (Peter Read, Massey University)	Rejected—See response to comment 625 above.
2-638	A	62	37	62	37	before "long" insert "assumed" (Peter Read, Massey University)	Rejected—See response to comment 625 above.
2-639	A	62	39	62	40	The second half of this sentence is not entirely accurate. On the R&D end of the spectrum companies with R&D departments, or large technology developers, will respond to 'climate policy' but they need to know that 1. Governments are committed to tackling climate change, reflected in medium term policy and, related, 2. There will be a market for new products in 20 years time - for climate/energy security/other reasons. For example, the G8-related conference report 'Business Insights, Climate Change the Business Forecast' (Defra, DTI, The Climate Group, November 2005) finds that: "Technological innovation and R&D create shareholder value by developing business strengths for future markets – from high efficiency gas and wind turbine development, to carbon capture technology and fuel cells. However new technology R&D may take 10-15 years; plant investment and return may take 20-30 years, but the current Kyoto phase ends in 2012, only 7 years. Stronger alignment between policy timeframes and technological development and innovation is required." On the deployment side, it may be worth emphasising that this uncertainty works both ways - deployment of existing or future technologies will depend on the policy framework and availability of capital - very high year on year growth rates have been clearly demonstrated in wind and solar markets where there are attractive conditions. (Kirsty Hamilton, Chatham House; UK Business Council for Sustainable Energy)	Accepted. Text changed to acknowledge the importance of reducing policy uncertainty.
2-640	A	62	39	62	40	"the response of technological innovation and deployment to climate policy signals, e.g. In the form of carbon taxes, is also highly uncertain". Is this really so? Anyhow the response and deployment to a policy of low carbon/commercial energy prices can be observed clearly over the last 50 years. That period of low prices was disturbed a few times by short hook-ups (73-75, 79-82, etc.) and it seems that there was a response in the direction of efficiency, etc... The effect of these responses were at least that all the expansion plans had to be revised. David Popp (AER, march 2002, pp.160-180) 'Induced Innovation and Energy Prices" sees a clear response. The statement here supports the unwarranted claims that the (almost	Accepted. Text changed and clarified.

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						only) "law" in economics would not work, i.e. the law of demand (higher prices result in lower demand). It also contradicts the arguments that we should develop low-cost technologies and solutions; when "prices/carbon taxes don't matter", why should we make such efforts? (Aviel VERBRUGGEN, University of Antwerp)	
2-641	A	62	43	62	46	The terms 'silver bullet' and 'backstop' technologies imply quite different things. Shoule be clarified in a footnote. Also it may be more appropriate to use 'and' rather than 'or' in between the two terms. (Debyani Ghosh, Global Energy Partners, LLC)	Accepted. The term "backstop" was dropped.
2-642	A	63	15	0	0	delete "model inter comparison project" (Hartmut Grassl, Max Planck Institute for Meteorology)	Accepted. Text changed.
2-643	A	63	16	0	20	This repeats an observation in chapter 1 and seems not necessary in a framing chapter. (Peter Bosch, IPCC TSU)	Noted
2-644	A	63	22	70	41	This part duplicates largely with the corresponding text in ch 3. E.g. ch2, p. 63 l. 43 and further states the same as ch 3,. p 83 l. 22 and further. Ch2 fig 2.3 has the same message as the slightly different Ch 3, fig 3.4.3. In this place in Chapter 2 a reference to the outcomes in ch3. would be sufficient. (Peter Bosch, IPCC TSU)	Noted.
2-645	A	63	31	0	0	"concludes with open research issues…and…." I could not find this in 2.8 (Peter Bosch, IPCC TSU)	Accepted—Good point. We have revised the initial text accordingly.
2-646	A	64	50	64	50	As per comment above, I'm not sure this is very clear, given that there are clear drivers required for both R&D and deployment of technologies, and importantly systems underpinning them. (Kirsty Hamilton, Chatham House; UK Business Council for Sustainable Energy)	Rejected. We are simply continuing a discussion of a particular illustration that does not include emissions mitigation policies. Hence, the role of emissions mitigation policies in shaping technology does not arise at this point in the discussion.
2-93	B	65	0	0	0	This is a key point and should be included in the SPM and TS: The point is that distribution "optimal" (cost-minimizing) emission scenarios are bimodal, illustrating that technological lock-in into either high or low emissions futures respectively that arise from technological interdependence and spillover effects. U.S. Government (Government of U.S. Department of State)	Accpeted—We agree.
2-647	A	65	16	0	0	correct to: "satisfying" (Hartmut Grassl, Max Planck Institute for Meteorology)	Accepted.
2-92	B	65	20	65	21	The authors should provide further information on how they (or others) adapted	Rejected—Happy to provide the details which

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						Figure 2.2 from the work of Gritsevskyi and Nakicenovic. (Government of Australia)	are as follows: Panel A and B of figure 1 in the GN reference have been combined into a single figure with a common y-axis scale. Following standard scientific practice, we will not document the changes we have made in the figure caption.
2-648	A	66	10	0	0	correct to: "categories" (Hartmut Grassl, Max Planck Institute for Meteorology)	Accepted.
2-649	A	67	10	67	15	One could also note that the NEMS model used extensively by the U.S. government produces similar results -- the alternative policy scenarios almost always result in reduced costs, but the conventional scenarios are very conservative. (Kelly Sims Gallagher, John F. Kennedy School of Government, Harvard University)	Noted. However no change has been made because no peer-reviewed reference has been provided.
2-650	A	67	14	67	18	This may be true, but it should be emphasized that the technologies already exist to undertake significant (50% or more) reductions in energy use at little or no net cost. This is amply demonstrated in the buildings sector, where there are many examples of buildings that have achieved 50% or more savings at no net upfront cost. This is discussed thoroughly in Harvey (2006, Chapter 13). 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. (Danny Harvey, University of Toronto)	Accepted—New paragraph added to discuss the deployment of existing technology.
2-651	A	67	19	67	20	This statement is too strongly negative, as there are some studies, that look at the effect of carbon prices/carbon taxes on induced technological change, Reyer Gerlagh and Bob van der Zwaan (Energy, 2006 Volume 27 Number 3 "Options and Instruments for a Deep Cut in CO2 Emissions: Carbon Dioxide Capture or Renewables, Taxes or Subsidies?) explicitely look at different policy instruments to bring about deep CO2 cuts. Proposal: full stop after "scenarios" and begin next sentence with "There is, however, an increasing number of studies looking at the" and continue with "mechanisms...".	Accepted. Text changed and reference added.

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						(Government of Germany)	
2-652	A	68	16	0	0	Replace "emissions reduction" with "net emissions reduction" (Peter Read, Massey University)	Accepted. Change made.
2-653	A	68	16	68	16	Replace "emissions reduction" with "net emissions reduction" (Peter Read, Massey University)	Accepted. Change made.
2-654	A	68	20	69	8	This is an excellent point, and an important paragraph. Assumptions about the pace of technological change can have huge effects on the estimate costs of policies when modeled. (Kelly Sims Gallagher, John F. Kennedy School of Government, Harvard University)	Noted with thanks.
2-655	A	68	24	0	0	add "be" after "could" (Hartmut Grassl, Max Planck Institute for Meteorology)	Accepted. Change made.
2-656	A	69	6	0	0	in footnote 27 before "very)" insert "assumed". At end insert new sentence "However, where scenarios embody biosphere carbon cycle management to provide large scale biomass-based renewable carbon fuels, largely compatible with existing infrastructure, this effect is reduced and may be minimal - further research is required on this issue". (Peter Read, Massey University)	Rejected—see comment 2-625. Rejected—not relevant to the discussion.
2-657	A	69	6	69	6	in footnote 27 before "very)" insert "assumed". At end insert new sentence "However, where scenarios embody biosphere carbon cycle management to provide large scale biomass-based renewable carbon fuels, largely compatible with existing infrastructure, this effect is reduced and may be minimal - further research is required on this issue". (Peter Read, Massey University)	Rejected—see comment 2-625. Rejected—not relevant to the discussion.
2-658	A	69	9	69	12	The first sentence of this paragraph should be deleted for two reasons: (1) the rest of the paragraph does not depend on it; and (2) and it is no longer a valid statement, in the sense that present uncertainty concerning the science of climate change and its impacts have no implications for near-term emission policy (we need to begin strong emission reductions now, irrespective of any plausible outcome of present uncertainties, as shown in Harvey (2006)). 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	Rejected—the subsequent discussion depends on the first statement. The second reason is clearly the belief of the commenter, but is not a position held without debate in the research community.

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						(submitted). (Danny Harvey, University of Toronto)	
2-94	B	69	11	69	19	This is a key point and should be included in the SPM and TS: "Differences in the cost of meeting a prescribed CO2 concentration target across alternative technology development pathways that could unfold in the absence of climate policies are more important than cost differences between alternative stabilization levels within a given technology-reference scenario. In other words, the overall "reference" technology pathway can be as, if not more, important in determining the costs of a given scenario as the stringency of the ultimate climate stabilization target chosen. (cf. Figure 2.4)" U.S. Government (Government of U.S. Department of State)	Noted
2-659	A	69	27	0	0	Change "are" to "is" (Danny Harvey, University of Toronto)	Accepted. Text corrected.
2-660	A	70	15	0	0	Insert "well as" after "as" (Danny Harvey, University of Toronto)	Accepted. Text corrected.
2-661	A	70	21	0	0	Comma after "calculations" (Danny Harvey, University of Toronto)	ACC Text corrected
2-662	A	70	29	70	33	"The results from …to stabilization levels". The last few pages from page 63 onwards are written in a very condensed manner using a lot of jargon making them unintelligible to an informed lay reader. This sentence here is indicative of the difficulty faced by such a reader to understand this section. (Government of India)	Accepted—text modification to reduce use of jargon as recommended.
2-663	A	70	38	0	0	correct to: "decline" (Hartmut Grassl, Max Planck Institute for Meteorology)	Accepted. Text corrected.
2-95	B	71	18	71	26	In this introduction to section 2.8.2 the authors should include a sentence on the role of intellectual property rights as both a barrier and an aid to technology change. (Government of Australia)	Accepted. Text changed to bring forward the dual nature of intellectual property rights.
2-664	A	71	20	0	0	correct to: "spill" (Hartmut Grassl, Max Planck Institute for Meteorology)	Rejected. Grammar is correct.
2-665	A	71	22	0	0	delete "up" after "used" (Hartmut Grassl, Max Planck Institute for Meteorology)	Accepted—text changed to make the ideas clearer.
2-666	A	71	23	0	0	see: above (Hartmut Grassl, Max Planck Institute for Meteorology)	Accepted—text changed to make the ideas clearer.
2-667	A	71	26	71	26	The authors could consider to add a third defining feature of technological change stressed in the literature, namely its cumulativeness. I'm sure the authors are well	Accepted. Text changed to add this third characteristic.

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						aware of this feature, and that it was a question of space: the cumulative nature of innovation means that technical advance builds upon previous success and failures (the classical footnote refers to the work of Nathan Rosenberg, 1976, 1982, 1994; another widely quoted reference on the issue is Enos, 1962). Cumulativeness is important not only because it leads to path-dependent development (correctly pointed at in the chapter), but also because it highlights the importance of inter-firm spillovers. I have the impression that this point is not adequately positioned in the report. References: Enos, J. L. (1962), Petroleum, progress and profits, The MIT Press, Cambridge, MA; Rosenberg, N. (1976), Perspectives on technology, Cambridge, Cambridge University Press; Rosenberg, N. (1982), Inside the Black Box: Technology and Economics, Cambridge University Press, Cambridge UK; Rosenberg, N. (1994), Exploring the Black Box: Technology, Economics, and History, Cambridge University Press, Cambridge UK. (Francisco Aguayo, El Colegio de México)	
2-668	A	71	26	71	26	The "public good" nature of technological knowledge is a debatable issue that may require more specification; unlike any other public good, not everyone is equally able to exploit economically any piece of knowledge. It is true that some technical knowledge has a "generic" nature, but additional investment of effort is needed to understand and use it (Nelson, 1996). This is recognized in this report a few rows below, when it is stated that "spillovers are not necessarily free" (page 63, line 33). It is also questionable to assert that the threat of imitation is such a fundamental barrier to technological development and innovation. Innovation is not only driven by an amount of "market value" to be appropriated advantageously but, most of the time a problem-solving activity for which active dissemination is highly efficient. Imitation and knowledge exchange is intrinsic to innovation. This "social nature" of innovation expresses itself in the fact that, together with the clear-cut market-driven activities of firms (like patenting and technology-sharing joint ventures) there is a strong flow of knowledge exchange among firms, universities, and technical societies. In any case, my suggestion to the authors is to consider that "spillovers," highlighted later on, also feedback into R&D and "learning-by-doing." The implication of both cumulativeness and social nature of innovation is not	Noted.

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						trivial: the deployment and diffusion of mitigation technologies cannot be assured simply by enhancing property rights and reducing "free-riding." On the contrary, enhancing spillovers reinforces R&D-output and learning at a social level. Both sides of the coin should be adequately addressed. References: Nelson, R. (1990), "Capitalism as an engine of progress," in Research Policy, pp. 193-214. (Francisco Aguayo, El Colegio de México)	
2-669	A	71	43	0	0	Add "However, more rapid take-up and reduced trans-national lags can occur where new technology is largely compatible with the existing capital structure, e.g. with absorption of ethanol into the transportation system where most modern (i.e. uncarburetted) vehicals can be easily modified to become flexi-fuelled." (Peter Read, Massey University)	Accepted—we have added a sentence to note the interaction between the nature of the capital stock and the technology innovation can also affect the timing of technology dissemination.
2-670	A	71	43	71	43	Add "However, more rapid take-up and reduced trans-national lags can occur where new technology is largely compatible with the existing capital structure, e.g. with absorption of ethanol into the transportation system where most modern (i.e. uncarburetted) vehicals can be easily modified to become flexi-fuelled." (Peter Read, Massey University)	Accepted—we have added a sentence to note the interaction between the nature of the capital stock and the technology innovation can also affect the timing of technology dissemination.
2-671	A	71	45	76	18	The discussion under 'The Sources of Technological Change' should be made more applicable to the climate change mitigation and adaptation context, instead of leaving the entire discussion at a very broad level. (Debyani Ghosh, Global Energy Partners, LLC)	Rejected—this is the framing issues chapter. All of the other chapters apply this general material to specific instances.
2-672	A	71	47	71	48	What's the basis for classification into these three drivers? Can any studies be quoted from existing literature? (Debyani Ghosh, Global Energy Partners, LLC)	Accepted—citations added.
2-673	A	72	27	72	27	"These concepts highlights….". Change "highlights" to "highlight" (Government of India)	Accepted—change made.
2-674	A	72	51	72	0	Footnote 31:"For an applied analysis …". What is "an applied analysis"? (Government of India)	Noted. An applied analysis is not a theoretical analysis. It relies on real-world observations.
2-675	A	73	35	73	45	While one cannot object to the parsing of the innovation process into R&D, learning-by-doing, and spillovers, the only problem with "spillovers" is that the term connotes a somewhat spontaneous automatic "spilling" over of the technology once it is developed in what many call the "deployment" or "diffusion" phase (diffusion is similarly problematic). Of course this happens, but more often than not, incentives are needed to push or pull the technology into the marketplace, or barriers to the technology need to be removed. (Kelly Sims Gallagher, John F. Kennedy School of Government, Harvard University)	Noted.

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
2-676	A	73	38	0	0	correct to: "innovations" (Hartmut Grassl, Max Planck Institute for Meteorology)	Rejected—grammar is correct as written.
2-677	A	73	40	73	40	"There are also socalled rent…..". Change "socalled" to "called" (Government of India)	Accepted—change made.
2-678	A	73	43	73	43	Replace "industrial espionage" with "reverse engineering." While there are instances of industrial espionage, reverse engineering is a far more common way of obtaining information about competitive products and processes. (Lenny Bernstein, L. S. Bernstein & Associates, L.L.C.)	Accepted---we have added "reverse engineering."
2-96	B	73	43	73	43	Replace "industrial espionage" with "reverse engineering." While there are instances of industrial espionage, reverse engineering is a far more common way of obtaining information about competitive products and processes. U.S. Government (Government of U.S. Department of State)	Accepted---we have added "reverse engineering."
2-679	A	74	29	74	39	An additional reference that is relevant to this discussion, is that an IEA Committee on wind energy development quoted findings that R&D accounts for about 40% of technology cost reductions (performance and design improvement), with commercial installation/market experience the other 60% (economies of scale). IEA R&D Wind Executive Committee, 2001, "Long-term research and development needs for wind energy for the time frame 2000 to 2020", October 2001. (Kirsty Hamilton, Chatham House; UK Business Council for Sustainable Energy)	Noted. However, severe space limitations do not allow the additional discussion.
2-680	A	74	37	0	0	correct to: "MacDonald" (Hartmut Grassl, Max Planck Institute for Meteorology)	Accepted—change made.
2-681	A	74	38	74	40	There is indeed an irrefutable relationship or correlation, but there are other important inputs that can cause declines in unit costs (e.g. raw material inputs) - see Nemet 2006. Learning curves tend to mask the specific causes and sources of technolgoical change, a point made in the next paragraph. (Kelly Sims Gallagher, John F. Kennedy School of Government, Harvard University)	Noted.
2-682	A	75	9	75	42	This is an important discussion which needs to be preserved in future drafts. There are often misconception about learning curves, with the implication that the improvements they generate are "automatic." This text correctly shows a far more complicated situation. (Lenny Bernstein, L. S. Bernstein & Associates, L.L.C.)	Accepted—this will be communicated to higher powers.
2-97	B	75	9	75	42	This is an important discussion which needs to be preserved in future drafts. There are often misconceptions about learning curves, with the implication that the improvements they generate are "automatic." This text correctly shows a far more	Accepted—this will be communicated to higher powers.

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						complicated situation. U.S. Government (Government of U.S. Department of State)	
2-683	A	75	17	75	17	"Hence the casual relationship …..". Change "relationship" to "relationships" (Government of India)	Accepted—change made.
2-684	A	75	35	75	35	"…drivers of advance and and the need. Delete the second "and" (Government of India)	Accepted—change made.
2-685	A	75	42	75	42	"……..see e.g. Otto et al., 2005). Delete ")", as there is no "(" (Government of India)	Accepted—change made.
2-686	A	76	5	76	18	This is paragraph opens with a very important area for policymakers - linkage between regulation and technology innovation; however it is dealt with very summarily, and the linkage between that and the following section, 2.8.2.2, which gives a much clearer message about the place of government policy and incentives. (Kirsty Hamilton, Chatham House; UK Business Council for Sustainable Energy)	Noted.
2-687	A	76	6	76	7	Delete the phrase beginning with "implying", as the statement in the first part of the sentence implies quite the opposite. (Danny Harvey, University of Toronto)	Accepted—change made.
2-98	B	76	13	76	18	possible inconsistencies with Ch2 P78/L12-15, P80/L8-19, Ch4 P108/L8 and P109/L1-2, and Ch11/P6/L35-38 (Government of Netherlands/Ministry for the Environment)	Rejected—we have checked the cited references and find that the noted sections are not in conflict.
2-688	A	76	20	78	6	This subsection (Section 2.8.2.2) discusses important issues on technological change, which is appreciated. However, there are few references. It refers only three references (Flannery & Khesghi: 2005, IPIECA: 1995, IPCC: 2000), two of which are done by IPCC itself. In light of the aim of the assessment reports, more objective and external references must be cited. One example may include a series of reports published by OECD on the topic of national innovation systems and technology policy. In particular, OECD (2006) presents a synthesis of case studies on the innovation of energy technologies across several countries. These studies examine the drivers of energy innovation; the processes of knowledge creation, diffusion and exploitation; and the roles of public/private partnerships, intellectual property rights and globalization in the innovation process. This report and related OECD studies are worth being referred. OECD (2006). Innovation in Energy Technology: Comparing National Innovation Systems at the Sectoral Level. OECD Publishing. (Akira Maeda, Kyoto University)	Accepted—reference added.

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
2-689	A	76	21	76	24	True, but policy can shape those market incentives in very important ways. (Kelly Sims Gallagher, John F. Kennedy School of Government, Harvard University)	Noted.
2-690	A	76	22	76	23	This sentence is not true. Public sector investment is more relevant in the early stages of development- in the R&D stage. As commercialization approaches, private sector endeavour becomes more relevant. (Debyani Ghosh, Global Energy Partners, LLC)	Accepted—a clarifying sentence has been added.
2-691	A	76	41	0	0	use hyphen, "know-how" (Hartmut Grassl, Max Planck Institute for Meteorology)	Accepted—text changed.
2-692	A	76	52	0	0	Should read “and the discussion below provides” (Danny Harvey, University of Toronto)	Accepted—text changed.
2-693	A	77	5	77	50	A major omission on this page about barriers and/or hurdles is technological capabilities -- weak technological capabilities can make it difficult for technology transfer or diffusion to occur, and thereby serve as a barrier. If a company in a developoing country, for example, does not know which technologies to purchase (assuming they are affordable) and then how to use the technologies they purchase, they cannot be uitilized effectively. Firms may not bargain for the right technologies when negotiating joint ventures because they don't know what to ask for, and they might not know how to use the technologies even if they purchase them. Weak technological capabilities also hinder the ability of the firm or country to innovate to create new technologies (or to find cheaper alternatives to existing technologies). (Kelly Sims Gallagher, John F. Kennedy School of Government, Harvard University)	Accepted—this point has been added to the discussion.
2-694	A	77	8	77	12	definitions, ref starting comment on Chapter 2, this is a very important section - does 'advanced energy technologies' line 8, cover everything from wind and solar to CCS? (Kirsty Hamilton, Chatham House; UK Business Council for Sustainable Energy)	Noted. Yes.
2-695	A	77	14	77	23	This list should include ability to attract finance (risk and return profile - which is linked both to the 'technology' itself and factors such as energy policy - if it is an energy technology. Linked with this - the "Incentive structures" bullet point (line 21) appears to deal specifically with the 'technology' itself, not the enabling environment for its deployment which might be renewable energy policy incentives, planning regulations etc.	Accepted—we have added policy environment and financial risk to our discussion.

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						(Kirsty Hamilton, Chatham House; UK Business Council for Sustainable Energy)	
2-696	A	77	25	0	0	delete "of" before "above" (Hartmut Grassl, Max Planck Institute for Meteorology)	Accepted—text changed.
2-697	A	77	30	0	0	Insert “that” after “is” (Danny Harvey, University of Toronto)	Accepted—text changed.
2-698	A	77	42	0	0	Should read “required to prematurely” (Danny Harvey, University of Toronto)	Accepted—text changed.
2-701	A	78	0	0	0	Footnote 32, line 1: correct to: "subject of" (Hartmut Grassl, Max Planck Institute for Meteorology)	Accepted—text changed.
2-699	A	78	18	78	22	Demand has the function not only of stimulating further technology improvement but also production scale up based on confidence in future demand growth. (Kirsty Hamilton, Chatham House; UK Business Council for Sustainable Energy)	Noted.
2-700	A	78	28	78	29	correct to: "discussing" (Hartmut Grassl, Max Planck Institute for Meteorology)	Accepted—text changed.
2-702	A	79	6	80	34	given that this is the key section of government in technology development and deployment, it is particularly important - ref comment above (Ch2, line 61) - to be clearer on definitions - most importantly whether it is technology development (R&D) or deployment (existing/pre-commercial technology); the terminology is confusing as to what is being referred to. This is further important as precision in policy is needed if investment is to flow. (Kirsty Hamilton, Chatham House; UK Business Council for Sustainable Energy)	Rejected, see 628.
2-703	A	79	6	79	24	The discussion of incentives for technology development in this paragraph, and indeed in the whole section seems to me biased to the proprietary forces behind innovation, displacing the role of inter-sectoral, inter-firm, and inter-organizational learning. Empirical evidence, by the way very scarce, has shown that firms have many other incentives outside patents to appropriate the returns from innovations: first-mover advantages, secrecy, firm-specific assets, market power, exclusive use of complementary assets (Levin, et al. 1987). These measures act as leverage against imitation, delaying inter-firm diffusion. But more important is that property rights are not a necessary, nor a sufficient condition for innovation. Focus on “rewards to innovators” blurs many other important dimensions of the “black box.” Reference: Levin, R., C. A. Klevorick, R. Nelson, and S. Winter: 1987. Appropriating the returns to industrial R&D. Brookings Papers on Econimic Activity, 3, 783-820. (Francisco Aguayo, El Colegio de México)	Accepted—We have added this point and reference.

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
2-704	A	79	15	79	15	You may want to insert here: "For example, Philibert (2005) states that "Technology-focussed policies will be necessary, in particular to bring about the new technologies needed in the future, but comprehensive instruments aimed at providing direct incentives for emission reductions will be required to (i) price carbon and speed diffusion of existing low carbon-emitting technologies, thus allowing comparatively lower concentration stabilisation levels to be achieved; (ii) allow newly emerging technologies to benefit from learningby-doing and become competitive." (Cédric PHILIBERT, International Energy Agency)	Rejected—the proposed text does not add to the point of the discussion. In addition, the reference was not provided.
2-705	A	79	27	80	19	While the section provides an entry into the debate over the efficacy of emissions-based policies on 'technology innovation', it does not directly reflect other key deployment/commercialisation policy matters; its not even clear that it deals with scaling up deployment (unless that is implicit in 'learning by doing'). Policymakers need to understand their role in accelerating deployment of technologies - and systems - that will produce the kind of energy and transportation transformation (ref for example Chapter 3, page 90 line 21). At present this section is more orientated towards the R&D/innovation end of the spectrum. Some sentences need to be added to reflect that other policy choices are critical to scaling up deployment. The IEA's 2003 World Energy Investment Outlook says of renewable energy "Financing investment in renewable electricity plants....will be very much subject to the pace of the future decline in their capital coss, relative to those of fossil fuel-based power plants, and to the electricity price. Governments almost certainly have to intervene to ensure adequate returns to investment through pricing measures and various incentives...." (p92). Financiers consulted over characteristics of renewable energy policy needed to accelerate investment, concluded they should be 'loud, long and legal' ('loud' - make a difference to the bottom line; 'long' - reflect project horizons, 'legal' - enforceable policy to build confidence).	Accepted—we have changed the text to increase emphasis on our point that other policy choices are critical to scaling up deployment. Reference also added.

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						Carbon pricing - as yet - is not 'firm' enough, and over a long enough horizon, to add into business models for renewable energy, today, without being a risk (this would also be the case for e.g. CCS). The 'loud, long and legal' indicates the importance of policy design - this is true for both emissions policy and 'energy policies'. Grid, infrastructure and planning regulations are obviously also central to shifts in systems, but its not clear how these are dealt with under 'technology'. [References include: , including the 'Business Insights' (2005) report mentioned above which contained a section on investment, and Hamilton, K., 2005. 'The Finance-Policy Gap: Policy Conditions for Attracting Long-Term Investment', In Tang, K, ed., 2005. The Finance of Climate Change. London: Risk Books. (Kirsty Hamilton, Chatham House; UK Business Council for Sustainable Energy)	
2-706	A	79	33	0	0	correct to: "gases" (Hartmut Grassl, Max Planck Institute for Meteorology)	Accepted—text changed.
2-707	A	79	35	79	35	how is "affordable" defined? (Aviel VERBRUGGEN, University of Antwerp)	Accepted. Text on affordability deleted.
2-708	A	79	46	79	46	Is there no place here to refer to David Popp (AER, march 2002)? (Aviel VERBRUGGEN, University of Antwerp)	Accepted—reference added.
2-709	A	80	13	80	14	".....governments have poor track record when picking technical winners or losers....". It might be true that governments have a poor track record when picking winners or losers, but is it any worse than the track record of the private sector which periodically bets on technologies that also lose out in the marketplace (e.g., 8-track tapes, betamax, etc.) (Government of India)	Accepted—text changed.
2-710	A	80	21	80	22	"Inherent in technology innovation…..efficiently manage". This assertion needs to be supported. Public sector funds new R & D all the time. (Government of India)	Accepted— text changed.
2-711	A	80	33	80	33	replace "that might be" by "when" (Aviel VERBRUGGEN, University of Antwerp)	Accepted— text changed.
2-712	A	80	40	86	15	There is a smaller sub-literature about the incentives for and limits to technological leapfrogging in an energy context that might be worth reviewing here (e.g. Goldemberg, Gallagher, and others) (Kelly Sims Gallagher, John F. Kennedy School of Government, Harvard University)	Accepted— point and references have been added in a footnote as suggested.

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
2-713	A	81	10	81	10	Suggest to add the following sentence/paragraph in the start of this paragraph: "The international transfer of technologies for protection of global climate as public goods is of importance and may encounter some difficulties because of market failure. Government should play roles in overcoming these difficulties by cooperation with private sectors. A delay of transfer of technologies to developing countries, which are deploying infrastructure construction, may lead to a lock-in effects for developing countries to keep high emission in the coming decades. (Zou Ji and Xuyan, 2005. Transfer and Development of Technologies: an Important Measure to Response to Climate Change, Environmental Protection-in Chinese, No. 1, 2005)" (Government of China Meteorological Administration)	ACC. Literature added and text inserted linking infrastructure development and possible lockin effects.
2-714	A	81	18	81	28	In addition to the IPCC Special Report, under the UNFCCC process a workshop was run on the financing aspects of technology transfer, with a background paper (same title as workshop): Van Aalst, Paul, 2004. Innovative Options for Financing the Development and Transfer of Technologies, Background Information Paper (the workshop, of the same name, took place 27-29th September, Montreal, Canada; with a subsequent note by the secretariat FCCC/SBSTA/2004/11). This important component should be reflected earlier on in this section. (Kirsty Hamilton, Chatham House; UK Business Council for Sustainable Energy)	ACC reference added. 2-713
2-715	A	81	33	81	33	"…communciation, and labour studies". The quotation needs to be closed. (“) (Government of India)	ACC
2-716	A	81	48	0	0	delete "the" after "about" (Hartmut Grassl, Max Planck Institute for Meteorology)	ACC
2-99	B	81	52	82	5	The authors should confirm that (over the past 15 years) FDI has not always been a stronger flow from OECD countries to developing countries than ODA. (Government of Australia)	Noted. The last sentence of the paragraph is addressing the point raised.
2-717	A	82	11	0	0	correct to: "country" (Hartmut Grassl, Max Planck Institute for Meteorology)	ACC
2-718	A	82	17	82	17	"….host countries develop". Insert “economically” after "develop" (Government of India)	ACC
2-719	A	82	18	82	19	content? (Hartmut Grassl, Max Planck Institute for Meteorology)	ACC
2-720	A	82	18	0	0	add "the" before "technically" at the end of the line (Hartmut Grassl, Max Planck Institute for Meteorology)	ACC
2-721	A	82	20	0	0	delete bracket before name and add bracket before date (Hartmut Grassl, Max Planck Institute for Meteorology)	ACC

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
2-722	A	82	23	0	0	delete "the" before "most demonstration programs" (Hartmut Grassl, Max Planck Institute for Meteorology)	ACC
2-723	A	82	26	82	26	"While the demonstration….anymore". Change "the demonstration programs played the roles in the history" to "demonstration programmes played historical roles" (Government of India)	ACC
2-724	A	82	31	0	0	correct to: "For all forms of" (Hartmut Grassl, Max Planck Institute for Meteorology)	ACC
2-725	A	82	34	0	0	add semicolon at the end of the line (Hartmut Grassl, Max Planck Institute for Meteorology)	ACC
2-100	B	83	1	0	0	Fig2.6 - What's the relationship between the circle and the rectangle. U.S. Government (Government of U.S. Department of State)	TIA Figure modified.
2-726	A	83	31	83	32	"Of the 22 barriers … IPCC Report (2000)." incomplete (Hartmut Grassl, Max Planck Institute for Meteorology)	ACC text modified, sentence completed.
2-727	A	83	31	83	32	"Of the 22 barriers…of the IPCC Report (2000)." This sentence is incomplete; insert missing words. (Government of India)	ACC text modified
2-101	B	83	31	83	32	possible inconsistencies with Ch7 P55/L40, Ch11 P59/L52 and P60/L8 (Government of Netherlands/Ministry for the Environment)	ACC/REJ. Th Ch7 P55/L40has a wrong reference (2.9.2) which should read 2.8.2. will contact chapter 7 to make sure correction is implemented, The authors recognize no inconsistency with Ch11 P59/L52 and P60/L8
2-102	B	83	32	83	35	possible inconsistencies with P84/L5-7 and Ch7 P58/L20-23 (Government of Netherlands/Ministry for the Environment)	REJ The authors recognize no inconsistency
2-728	A	83	39	0	0	add "is" after "power" at the end of the line (Hartmut Grassl, Max Planck Institute for Meteorology)	ACC
2-103	B	83	42	83	42	Authors should explain what they mean by a "Technology Denial Regime". (Government of Australia)	ACC explanation added in footnote
2-729	A	83	43	0	0	use hyphen, "super-computers" (Hartmut Grassl, Max Planck Institute for Meteorology)	ACC
2-730	A	83	48	0	0	delete "so" after "way" (Hartmut Grassl, Max Planck Institute for Meteorology)	ACC
2-731	A	83	49	0	0	correct to: "proper" (Hartmut Grassl, Max Planck Institute for Meteorology)	ACC

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
2-732	A	84	31	0	0	put full stop at the end of the sentence (Hartmut Grassl, Max Planck Institute for Meteorology)	ACC
2-733	A	84	33	86	15	Section 2.9 can be dropped. The contents is not used anywhere in the report. (Peter Bosch, IPCC TSU)	Rejected, we will keep it but in a shorter form since this has been requested by the IPCC plenary and by many reviewers
2-734	A	84	35	86	15	uncertain as to the purpose of this section; is this only meant to be an inventory of different schemes for expressing spatial classifications? Is this a barrier to linking results of adaptation and mitigation studies, or climate and development studies? Perhaps a concluding statement on this point (that different spatial representations hinder the transfer of information between various types of studies for specific regions/scales) would be helpful here, and would also serve to (partly) provide a more definitive ending to the chapter (as it stands now, the chapter really does not have a conclusion). (Cohen Stewart, Environment Canada)	Noted, will be edited
2-735	A	84	35	86	15	uncertain as to the purpose of this section; is this only meant to be an inventory of different schemes for expressing spatial classifications? Is this a barrier to linking results of adaptation and mitigation studies, or climate and development studies? Perhaps a concluding statement on this point (that different spatial representations hinder the transfer of information between various types of studies for specific regions/scales) would be helpful here, and would also serve to (partly) provide a more definitive ending to the chapter (as it stands now, the chapter really does not have a conclusion). (Cohen Stewart, Environment Canada)	Noted, will be edited
2-736	A	84	44	0	0	correct "decisions" (Hartmut Grassl, Max Planck Institute for Meteorology)	Accepted
2-737	A	84	49	0	0	correct to: "trade" (Hartmut Grassl, Max Planck Institute for Meteorology)	Accepted.
2-738	A	84	49	84	49	"….organisational structures, trdade…". Replace “trdade” by “trade” (Government of India)	Accepted.
2-739	A	85	20	0	0	delete "of" before "two types" (Hartmut Grassl, Max Planck Institute for Meteorology)	Accepted.
2-740	A	85	32	0	0	delete "solar" (Hartmut Grassl, Max Planck Institute for Meteorology)	Accepted.
2-741	A	85	33	0	0	add "a", "a socio-economic criterion" (Hartmut Grassl, Max Planck Institute for Meteorology)	Accepted.
2-742	A	85	41	0	0	correct to: "the example of"	Accepted.

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						(Hartmut Grassl, Max Planck Institute for Meteorology)	
2-743	A	86	7	0	0	correct "In" (Hartmut Grassl, Max Planck Institute for Meteorology)	Accepted.
2-744	A	86	7	86	7	"IN relation to ….". Replace “IN” by “In" (Government of India)	Accepted.
2-745	A	86	10	86	11	Replace 'socioeconomic' for 'social and economic' (Government of Spain)	Rejected, the word is deleted.
2-746	A	86	13	0	0	correct to: "GHGs" (Hartmut Grassl, Max Planck Institute for Meteorology)	Accepted.
2-747	A	86	13	86	14	add comma after "GHGs" and after "emissions" (Hartmut Grassl, Max Planck Institute for Meteorology)	Accepted.
2-748	A	86	14	0	0	substitute "according to" for "in order to present" (Hartmut Grassl, Max Planck Institute for Meteorology)	Accepted.
2-749	A	87	10	0	0	Spell out “D.B>” and “A.D.” and others where the meaning is not likely to be clear. (Danny Harvey, University of Toronto)	Accepted.
2-750	A	88	45	0	0	reference incomplete, where? (Hartmut Grassl, Max Planck Institute for Meteorology)	Accepted.
2-751	A	93	44	0	0	write "Panel" with capital letter (Hartmut Grassl, Max Planck Institute for Meteorology)	Accepted.
2-752	A	94	47	0	0	correct to: "Thesis" (Hartmut Grassl, Max Planck Institute for Meteorology)	Accepted.
2-753	A	96	24	0	0	use new paragraph for reference Messner (Hartmut Grassl, Max Planck Institute for Meteorology)	Accepted.
2-754	A	98	24	0	0	reference has to be updated (Hartmut Grassl, Max Planck Institute for Meteorology)	Accepted.
2-755	A	99	5	0	0	delete "Ma." (Hartmut Grassl, Max Planck Institute for Meteorology)	Accepted.
2-756	A	100	39	0	0	correct to: "Climate" (Hartmut Grassl, Max Planck Institute for Meteorology)	Accepted.