IPCC Fourth Assessment Report

Expert Review of the First-Order Draft

Chapter 1

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
0-1	A	0	0			I limit my comments to a few overall observations. My major objection against the report is that the caveats have not been spelled out, which makes the report less than scientific.	Noted uncertainties are spelled out
						Its is based on the assumption that anthropogenic GHG, particularly CO2, represent major climate forcings. However, new doubts have arisen whether this is really the case.	Reject: WGI issue but is virtualy certain that Anth. GHGs are major climate forcing.
						The (‘peer-reviewed') literature which is sceptical of the man-made global warming hypothesis, has been growing quite impressively over de the last few years. It has been completely ignored.	Reject: WGI issue and attribution of anth signal now has very high confidence.
						Many observations (e.g. on temperatures and CO2 concentrations, and their development over time) do not match the man-made global warming paradigm. They offer a multitude of ‘anomalies' (in the vocabulary of Thomas Kuhn). This should be recognised. If not, the whole exercise runs the risk of being dismissed by critics as being biased by ‘cherry-picking'.	Reject: see above.
						Model-based attribution of the different forcings, influencing the (minor) rise in surface temperatures since the middle of the previous century, cannot be construed as proof of the anthropogenic greenhouse effect, because no single model has ever been validated.	Reject: see above
						The report posits that 450 ppmv CO2 concentration equals 2 degrees warming over the 21 century. In the light of the previous comments on the relationship between the two, this is not proven.	Noted. WGIII uses output from WGI for future projections and uncertainties are dealt with in WGI.
						It could be argued that these observations do not fit into the Report of Working Group III and that they should be addressed elsewhere. But as far as I know, this has not been done. Anyhow, the authors should make their assumptions explicit in the preamble of the document, so that the reader will be able to form his own opinion in the light of all available views and/or information.	Refer to WGI.
						Moreover, nowhere reference has been made of the critical report on ‘The Economics of Climate Change', which was issued, in early July 2005, by the British	Rejected as not relevant to Chapter 1 and could be discussed inter alia in Chapter 13.

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						House of Lords Select Committee on Economic Affairs, and the discussion ensuing therefrom.	
						Furthermore, at the recent G-8 Summit at Gleneagles and the Montreal Climate Conference, it has become clear that the first phase of the Kyoto (sort of European mini-Kyoto) will not get any follow-up. This is a crucial fact, which will drastically overturn the outlook presented in earlier IPCC reports. Somehow and somewhere, the authors should deal with this issue and its implications in the document.	Noted and the G8 and COP/MOP1 results and their implications are to be mentioned in Chapter 1. Does not affect any earlier IPCC reports as these are not policy prescriptive.
						At various places in the report, it is suggested that (man-made?) climate change (if any) will disproportionably hurt the poor (especially in Africa). However, the causal relationship between the two, has not been convincingly substantiated to my mind.	Noted that there is a discussion over this but is principally a WGII issue, will be mentioned in Chapter 1.
						It is, furthermore, suggested that mitigation and sustainable development can be realised without impairing the fight against poverty (in the traditional meaning of the words). Undoubtedly there are many examples where this is true. At the same time, there are many opposite examples, where this is not the case. The relationship is simply more complex than the text wants us to believe. Therefore, a more elaborate and balanced presentation of pros and cons is called for.	Noted that there is a discussion over this and it will be mentioned briefly in Chapter 1.
						Another element which is missing is the impact of Kyoto (plus, plus) on our (socio)economic system. It is true, this issue has - so far - hardly been addressed in the climate change literature. But it is nevertheless of utmost importance.	Noted but beyond scope of Chapter 1. Chapter 3 deals with economic implications of mitigation policies.
						Emission trading, which, according to the logic of Kyoto, should be progressively extended to more and more sectors of the economy, will fundamentally change the main features of our (socio)economic system: from a basically free enterprise system to an more centrally planned system, with heavy (international) government intervention. This aspect has, so far, been almost totally ignored in the climate change policy literature. For an elaboration of this line of reasoning, see: http://www.tcsdaily.com/article.aspx?id=120304A	Rejected as Kyoto is a market mechanism.
						As regards sea levels, no acceleration in sea level rise has been recorded, which is inconsistent with the statement that there is a discernable human influence on	Rejected. WGI issue and in any event SLR acceleration has been detected and in any

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						climate since the middle of the previous century. Only very rarely reference has been made to cost/benefit analysis. Where this has been the case, the relevant passages were on the whole overstating the benefits and understating the costs. The PPP approach concerning future real growth cum emissions, has not been covered (allegedly because of the fact that most of the literature is still based on market exchange rates). Let's hope that there is still sufficient time to include the outcome of new OECD work on that score which can be expected in the months to come. ---Leimuiden, 4 January 2006. (Hans H.J. Labohm, 0)	event its detection is not relevant to the discernable influence statement. Rejected as not relevant to Chapter 1 and is discussed in Chapter 2
0-2	A	0	0			It is very good indeed that in the report climate change is being placed in the context of sustainable development (SD) and the Millennium Development Goals (MDG). What has not been worked out to the full in this repect is the fact that SD and MDGs will not be reached in a reasonable time given the fact that there simply is not and will not be enough money available. In this respect the concept of Global Public Good, which has received a lot of attention of the last couple of years, could play a role (other than what has been denoted in e.g. chapter 1, paragraph 1.5.2.). It has been proposed as a new frontier of finance for international development. See especially Inge Kaul, Isabele Grunsberg, Marc A. Stern, Global Public Goods (International Cooperation in the 21st Century), UNDP and Oxford University Press, 1999, Inge Kaul, Pedro Conceicao, Katell Le Goulven, Ronald U. Mendoza, Providing Global Public Goods, UNDP, Oxford University Press, 2003. On the basis of the notion of Global Public Good innovative mechanisms for dealing with the climate change issue from a world-wide perspective; e.g. a CO2-tax, have been proposed. Through such a tax the environmental and development dimension of climate change could be clearly interlinked. This relates to the concept of the environmental footprint (Wackernagel and Rees, 1996; chapter 12, page 25, line 45) but is a more direct derivation of global warming. The CO2-footprint has been introduced by the World Wildlife Fund. The CO2-footprint of every inhabitant in the world could be related to the intrinsic capacity of the earth to absorb carbon dioxide from the atmosphere (about two tons of CO2 per year). Payment, in preferably an international fund, should start when this threshold is passed. The	

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						average emissions per year in most developing countries are still below 2 tons of CO2. They will receive money. Industrialized countries have to pay on the basis of their per capita footprint. Such a system could generate a lot of money for development and at the same time provide an economic incentive to reduce emissions. See in this respect: A, Sandmo, Environmental Taxation and Revenue for Development, in: A.B. Atkinson, 2005, New Sources for Development Finance, UNU-Wider Studies in Development Economics, Oxford University Press. See also D. Bradford, Improving on Kyoto: Greenhouse Gas Control as the Purchase of a Global Good, CEPS Working Paper No. 96, January 2004 (Gert de Gans, Kerkinactie)	
0-3	A	0	0			The units are different among the chapters. For example, the unit of CO2 emissions, GtC in fig.3.17, Mt-CO2 in Fig.5.28. The unit should be uniformed. (Toshihiko Masui, National Institute for Environmental Studies)	Accepted
0-4	A	0	0			In general, I found the quality of the report to be very uneven. The chapters that address mitigation potential in individual sectors that I managed to scan were far superior to the cross-cutting chapters 1, 12 and 13 that I reviewed in greater depth. The latter chapters generally do not constitute a systematic assessment of the state-of-the-art, based on publicly-available information, but are often anecdotal, reflecting only the view of the author or a very limited number of references or examples, even in cases where there is a rich literature on the subject. It will be crucial that these chapters are improved to meet the same standards of rigor that the WG1 report does, or the credibility of the IPCC as an independent assessment panel will be compromised. (Anne Arquit Niederberger, Policy Solutions)	Noted and will be taken into account in rewriting.
0-5	A	0	0			General comment: The level of detail of the draft text on co-benefits is uneven across chapters. Some discussions are relatively detailed, and some are very cursory. It would be better to have greater consistency across chapters and sections. (Mark Heil, U.S. Environmental Protection Agency)	accepted
0-6	A	0	0			GENERAL COMMENT: Good treatment of SD linkages. Developing country (DC) literature on sustainable development could be used more, since it provides a different viewpoint. Some recent publications have been left out: e.g., the most up-to-date and	

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						comprehensive reference is (MMRS 2005) = Munasinghe, M. and Swart, R. 2005. Primer on Climate Change and Sustainable Development, Cambridge Univ. Press, UK. (Mohan Munasinghe, Munasinghe Institute for Development (MIND))	
0-7	A	0	0			Innovation is present in the whole report, yet how to steer innovation in the desired direction is not clear. How succesfull are policies directed at innovation, when sustainability or CO2-emissions rather than financial succes is the most important criteria? Presently, I am preparing research on this issue, and would like to take topics around climate and energy as a special case. (Tineke van der Schoor, Sustainability Centre Lauwersoog/ RUG-Bedrijfskunde)	
0-8	A	0	0			In general, the importance of the public, of education, of changing behavior, could be more worked out as a separate issue. How to reach the public, how to involve consumers, what do consumers want, and then think again about technology, this is being overlooked. Many technological development paths as sketched in this report, but also in a lot of other publications (like the 'energy transition' in the Netherlands, are very technocratic in nature and fail to note people. Human beings seen as subjects, not as objects. As continually choosing, problemsolving, thinking individuals. The same comment goes for the integration of sustainable development in the curricula of schools. Not as a separate topic, but integrated in the normal courses. This issue is taken up in the Centre for Sustainability, mentioned above. (Tineke van der Schoor, Sustainability Centre Lauwersoog/ RUG-Bedrijfskunde)	
0-9	A	0	0	0	0	The developing world need energy for their development. Therefore denying them access to affordable energy sources through imposing policies that will make energy unaccessable will hinder their development and creat an unfair situation. (Mohammed Alfehaid, Saudi Aramco)	Noted and will be discussed in Article 2 and energy security issues.
0-10	A	0	0	0	0	In general, I found many of the chapters weak in providing references for key statements. While it is nice to save page length by not providing references and thus no bibliographic citations it does a dis-service to the reader. All chapter should take care to make sure that statements are bettere referenced and the TSU should be aware of this as well. Contrast this with WG2 who may have gone too far the other way in some cases.... (Jeff Price, California State University, Chico)	Noted
0-11	A	0	0			I have not made comments on references, since I assumed this is dealt with by the technical support unit. However, I just want to mention that there are citations	Noted

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						given in text here and there that does not appear in the list of references. (Göran Berndes, Chalmers University of Technology)	
0-12	A	0	0			Global climate change is a worldwide challenge and climate protection needs joint efforts by all countries. (James Bero, BASF Corporation)	Noted
0-13	A	0	0			To avoid misunderstandings and errors, it may be helpful to use both Ceq and CO2eq. In most plubications for public and policy makers, greenhouse gas emissions are given in units gCO2eq/kWh or gCO2/kWh, which in itself may be confusing. The chance of wrongly quoted numbers increases with the introduction of two additional units gCeq/kWh and gC/kWh. (Jan Willem Storm van Leeuwen, Ceedata Consulting)	Noted
0-14	A	0	0			Suggestion to use SI units and SI notation throughout the report. For example: 1 Gt (1 gigaton or gigatonne? Metric tonne, short ton, long ton?) is not a SI unit and introduces ambiguities. Suggestion: use 1 Mg = 1 megagram = 1 metric tonne, 1 Gg = 1 gigagram = 10E9 gram = 1000 metric tonnes 1 Tg = 1 teragram = 10E12 gram = 1 million metric tonnes. For example: 0.7 GtC/yr becomes in SI notation: 0.7 Tg(C)/a (Jan Willem Storm van Leeuwen, Ceedata Consulting)	Noted
0-15	A	0	0			General comment: The FAR is a comprehensive, massive and impressive piece of work. Due to its size and depth, however, it is not very easy to digest. (Jan Paul van Soest, Advies voor Duurzaamheid on request of International Gas Union)	Agree
0-16	A	0	0			There seems to have been little communication between the chapters. In particular, there is a good review of the issues of technological change in chapter 2, that is not reflected in chapter 3, where technological change is of vital importance. The material inchapter 2 is also not reflected in chapter 11, although the macroeconomic intersectoral analysis of chpater 11 requires an assessment of technology. (Jonathan Köhler, Tyndall Centre, University of Cambridge)	Noted
0-17	A	0	0			While the Fourth Assessment Report (AR4) of WG III contains a wealth of information, I think it lacks a clear and concise statement (a "vision" if you will) of the mitigation/stabilization problem. While, to be sure, there is much relevant and useful material regarding stabilization throughout the thirteen chapters, it is difficult to find a clear statement of what seems to me the crucial question: What will it take	Noted and will be taken into account in rewritting

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						to "stabilize climate" (by which I mean stabilize the atmospheric concentration of GHGs--or at least CO^2)? There are, of course, differing views regarding the answer to that question (the differences mainly centered on the importance, availability, and scaleability of carbon-emission free energy technologies--more on this later). It would be very helpful, therefore, if this question was explicitly posed up front, and, as well, explicitly acknowledged that among experts in the field there are different views and different approaches to answering this key question. I think the appropriate place to pose the "what will it take" question is in the Introductory Chapter (Ch 1), perhaps on p.5 after the conclusion of section 1.2 on article 2 of the FCCC convention. It might also be helpful to briefly set out the differing views about what it will take to "stabilize climate". For example, material in the last paragraph on p.68 of Chapter 2 could be usefully employed in Chapter 1. I think the AR4 report needs to acknowledge, from the outset, an important implication of the SRES emission scenarios, and scenarios that are similar to the SRES. The implication to which I refer is a general tendency to understate (perhaps greatly so) the costs and general difficulty of achieving stabilization. Because many of the 40 individual SRES reference scenarios have already built into them high long term (110 year) rates of global energy intensity decline (the main exception being the A2 family), and large amounts of carbon-free energy, their use in mitigation/stabilization analysis is likely to substantially understate the magnitude and cost of the stabilization task. Although, there is reference in Chapter 3 to other emission scenarios, it is not clear whether any other (than SRES) reference scenarios were used by the very large number of mitigation analyses that are reported in the chapter. Of particular interest here is whether the EMF-21 modelling scenarios used different baselines than those implied by the SRES. The reason for interest is that, as portrayed in chapter 3, including Figures 3.25 and 3.26, the EMF-21 appears to estimate much higher GDP costs of stabilization than do the great body of other mitigation scenarios. An obvious question is whether the difference in GDP costs of stabilization reflects the way in which the reference (or baseline) scenario(s) were constructed. (Another question is why Chapter 11 appears to have overlooked the EMF-21 findings.) To the Report's credit, it does include, in Chapter 2, a set of Figures (2.9.2) that reflect the excellent work, initially carried out by Edmonds for the IS92a scenario, demonstrating how much technology change is already assumed in reference emission scenarios. Figure 2.9.2 makes clear that the SRES reference scenarios incorporate a very large share of the	

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						emission-reducing "gains" from future technological change. What is unclear is the degree to which other parts of the Report take the reference scenarios as given (as if the embedded technological change were supplied as manna from heaven) and focus on what extra is needed for stabilization. For example, in Chapters 4-7, how much of the technological improvements from current practice will be required to meet the technological change incorporated in the reference scenarios? Arguably, most, if not all, will be. If so, then little or nothing is left over to achieve stabilization. The implications for interpreting the findings on the cost of mitigation reported in Chapter 11 are important. The relatively low costs estimates reported there for achieving stabilization (often generated by models assuming a carbon-free backstop technology) may be the result of effectively "double counting" the contribution of technological change, first in the reference scenario and second in the mitigation/stabilization scenario. Thus while the reader can find scattered statements about just how difficult it will be to achieve stabilization", the cost estimates reported in Chapter 11 make the economic (GDP) cost of stabilization seem small-and they do so in part because of a lack of clarity on the technology-mitigation issue in other parts of the report. One result is to continue to leave the false impression, initially generated in WG III TAR, that if we could only overcome socio-economic and institutional inertia, stabilization can be relatively easily achieved in the 21st century. One way to illustrate the nature and importance of reference scenarios for assessments of the difficulty of achieving stabilization is to contrast the paper by Pacala and Socolow (Science, 2004), which is frequently discussed as well as cited in AR4, with Hoffert et.al (Nature, 1998) which does not appear to be cited at all by AR4 (although there are a number of citations to a subsequent Hoffert et al paper (Science, 2002). Pacala and Socolow (P-S) conclude that (given the rate of growth of GDP) the technologies are available to stabilize emissions for the next 50 years (out to 2054), by assuming that energy intensity decline will automatically decline at a global average annual rate of 1.0%, and that the carbon intensity of energy will decline at a 0.5% rate. Thus, in considering the availability and scaleability of carbon-free energy technologies, P-S only consider what is needed over and above a 1.5% rate of decline in the carbon intensity of output. In contrast, Hoffert et al (Nature,1998) ask how much carbon free energy (power) is required to stabilize (given the rate of growth of GDP), and varying rates of decline in energy intensity, and find that the amounts are generally so large that major technological breakthroughs in the supply of carbon-free energy would	

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						almost certainly be required for stabilization. The Hoffert, et al, Science, 2002, article attempted to demonstrate that no individual or combination of carbon-emission-free technologies is up to the task. The Caldeira, et al (Science, 2003) article demonstrated the climate sensitivity implications for the speed and amount of carbon-free energy deployment. One disturbing implication, in my view, of the two Hoffert et.al and the Caldeira, et al, papers, taken together, is that if climate sensitivity is on the high side and if the threshold for acceptable temperature change is relatively low (say, 2 C), avoiding DAI may be, for all practical purposes, impossible. The possibility that energy technology cannot be changed fast enough, and in the required magnitudes, in time to avoid DAI should be recognized in the Report. It would be useful if the sector-based chapters (especially 4-7) provided a rough idea of the overall (within sector) increase in energy efficiency that is potentially achievable over the course of the 21st century. As the AR4 now stands, while estimates of energy efficiency are given for some individual users of energy, there is no indication of what these add up to on a global and cross-sectoral basis. But it is arguably very important to know something quantitatively about the overall potential for energy efficiency improvement, because that improvement, in combination with sectoral shifts in the share of economic activity, determine the overall decline in energy intensity. As Hoffert et al, (Nature, 1998) demonstrated (using the Kaya identity and a carbon cycle model), the rate of growth in GDP, and the rate of decline in energy intensity, determine the amount of carbon-free energy required for stabilization. Having some idea how much carbon-free energy is required for stabilization not only tells us how much technology change will be required on the energy supply side, but it may shed light on whether, as a practical matter, we can avoid a "dangerous anthropogenic interference" (DAI) with climate, given climate sensitivity and some estimate of how much warming is acceptable (say 2C). There is another reason why it would be useful to have some quantitative idea of what can be achieved on a sectoral basis (on a global scale) in terms of energy efficiency. It would help evaluate the plausibility of reference emission scenarios. In my view this is critical because three-quarters of the 40 SRES emission scenarios have pair-wise energy and GDP growth rates that imply 110 year (1990-2100) global average annual rates of energy intensity decline above 1.1%. Century-long, global average annual rates in excess of 1.1% seem implausibly high for the following reasons. The scope for energy efficiency increases in the electricity-generating sector are likely limited by thermodynamic	

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						factors to 100% or less. The same is almost surely the case for the heavy transport sub-sector (including boats airplanes railroads and heavy trucks). Together these sectors account for about 45% of energy consumed, and that share is likely to increase as more of the world is hooked up to the electric grid. While, 300% increases in energy efficiency are potentially achievable globally (more in the US), over the course of the 21st century, in the automobile/light truck and residential/commercial sectors, the scope for improvement in the industrial sector is more limited. Even if a 200% improvement in energy efficiency in the industrial sector is achievable, the weighted increase in energy efficiency across all sectors would, at most, be 200%.-and probably substantially less. Given the assumed increase in the relative importance of the electricity generating sector, it can be shown that these numbers imply that at best energy intensity in 2100 would be about 30% of the level in 1990. That works out to a 1.09% average annual rate of decline in energy intensity- a rate that we would have to work very hard to achieve. It is a rate that will require important advances in technology, ones that will require a long term commitment to well-funded R&D, and will not happen as if manna from heaven. Yet 30 of 40 SRES reference scenarios have imbedded within them 110 year global average annual rates of decline in energy intensity in excess of 1.09%. Moreover, 25 of the 40 SRES reference scenarios incorporate upward of 350 EJ/yr of renewable energy (including "new", but not old, biomass)-an order of magnitude above current levels. Arguably, the plausibility of most of the SRES emission is in doubt, yet they are used to carry out stabilization analyses. 4. In summary, while I would not quarrel with the chapter outline of the report, I believe that the manner in which the mitigation/stabilization issue is framed in the report could be substantially improved. So too, the individual components of the report need to be tied together in a more coherent and relevant manner-and related to what I believe should be the central theme of the Report, "what will it take to stabilize"? As Chapter 11 makes clear, it is now widely accepted that technology and technological change will be crucial to stabilization. How much technological change, and how to assure the necessary research, development and deployment, remains uncertain and in dispute. The answers to these questions are the key to successful stabilization and to whether stabilization can be achieved before the threshold of DAI is breached. The science of climate change, as reported by IPCC WG I, convincingly demonstrates that we face major problems from rising emissions and concentrations of GHGs, especially CO^2. Unfortunately, WG III in	

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						its TAR fumbled the ball in failing to make clear just how difficult achieving stabilization short of DAI will be, both technologically and economically. Based on my reading of the First Order Draft of WG III AR4, the fumble has not yet been recovered. It is to be hoped that recovery is still possible before final publication. (Christopher Green, McGill University)	
0-18	A	0	0			I am missing in the report the ugency of the geopolitical dimension of climate change in relation to energy provision. (Even more) serious conflicts could arise as a result of the increased demands for oil and other resources by countries like China en India. (Gert de Gans, Kerkinactie)	Noted and will be taken into account in rewritting.
0-19	A	0	0			Congratulations on such an excellent start! The emphasis on sustainable development hits the very heart of the GHG problem in the future. (Tao Ren, Utrecht University)	noted
0-20	A	0	0			There is much new literature about regional abatement costs of allocation schemes, which are not described in this report. Herewith a brief summary. Studies of energy system-models: Criqui, P. et al.: 2003. Greenhouse gas reduction pathways in the UNFCCC Process up to 2025; den Elzen, M.G.J. and Lucas, P.: 2005, 'The FAIR model: a tool to analyze environmental and costs implications of climate regimes', Environmental Modeling and Assessment 10(2), 115-134; den Elzen, M.G.J., Lucas, P. and van Vuuren, D.P.: 2005b, 'Abatement costs of post-Kyoto climate regimes', Energy Policy 33(16), pp. 2138-2151; Nakicenovic, N. and Riahi, K.: 2003. Model runs with MESSAGE in the Context of the Further Development of the Kyoto-Protocol. WBGU - German Advisory Council on Global Change, WBGU website, http://www.wbgu.de/, Berlin, Germany; Persson, T.A., Azar, C. and Lindgren, K.: 2006, 'Allocation of CO2 emission permits – economic incentives for emission reductions in developing countries', Energy Policy In Press. Also of macro-economic model analyses (although there are many others as well): Buchner, B. and Carraro, C., 2003. Emissions Trading Regimes and Incentives to Participate in International Climate Agreements. FEEM Working paper 104.03, Fondazione Eni Enrico Mattei (FEEM), Milan, Italy. Böhringer, C. and Löschel, A., 2003. Climate Policy Beyond Kyoto: Quo Vadis? A Computable General Equilibrium Analysis Based on Expert Judgements. ZEW Discussion Paper No. 03-09, Centre for European Economic Research, Mannheim, Germany.; Böhringer, C. and Welsch, H., 1999. C&C - Contraction and Convergence of Carbon Emissions: The Economic Implications of Permit Trading, ZEW Discussion Paper No. 99-13,	

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						Centre for European Economic Research, Mannheim, Germany; Bollen, J., C , Manders, A.J.G. and Veenendaal, P.J.J., 2004. How much does a 30% emission reduction cost? Macroeconomic effects of post-Kyoto climate policy in 2020. CPB Document no 64, Netherlands Bureau for Economic Policy Analysis, The Hague. (Michel den Elzen, The Netherlands Environmental Agency)	
0-21	A	0	0			The regional costs implications of post-2012 regimes for the allocation of emission allowances (future commitments) is not described in the overall report. Chapter 3 describes the regional costs of 4 IPCC SRES regions (based on EMF study), based on one (costs-based) regimes based on full IET and marginal costs. This seems rather ad-hoc choice, as there are many allocation schemes based on various equity principles and allocation schemes (i.e. Multi-Stage, Triptych, Contraction & Convergence, costs-allocation etc) (IIASA, WBGU, MNP-RIVM, Chalmers University/Gothenburg, CIRED, University in USA, MIT, etc. etc.). Chapter 13 describes part of these regimes (in fact not the costs-based regimes) as analyzed in the literature, but do not describe the regional costs implications (* see comment-block: in which I have included the some of the new literature in this field). In fact Chapter 11, discusses only one macro-economic study, i.e. Bollen et al. I would recommend discussing the regional costs in Chapter 3, and in Chapter 13 and Chapter 11. I can deliver some text on this issue. (Michel den Elzen, The Netherlands Environmental Agency)	
0-22	A	0	0			WGIII is not the competent IPCC Working Group to assess vulnerability of systems to temperature rise - that is principally the task of WGII and, to an extent, WGI. Throughout the WGIII report a figure of 2ºC for DAI is used, however, this has very little explanation or underpinning in the literature cited. For consistency the range of values expressed in the WGII report should be reflected in the WGIII report. (Spencer Edwards, Australian Greenhouse Office)	Noted, already considered.
0-23	A	0	0			Throughout the sectoral chapters there is no consistency in the dates used to report proportions of sectoral emissions (for example in Chapter 5 - Transport - figures for greenhouse gas emissions in 2000 are used; while in Chapter 6 - Residential and Commercial Buildings - 2004 figures are used). If there is no consistent use of dates/figures across sectors in the literature, this should be clearly explained and accounted for in a framework/consolidation chapter. (Spencer Edwards, Australian Greenhouse Office)	Noted.
0-24	A	0	0			Throughout the report, mitigation efforts are equated with political instruments	Noted, will be taken into account in the body

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						(particularly the Kyoto Protocol). For example in Chapter 1 at page 2 it is stated that "The entry into force of the Kyoto Protocol in February 2005 marks a first, though modest step, towards the implementation of Article 2". This statement fails to take into account the significant mitigation efforts already being implemented by Parties under the UN Framework Convention on Climate Change and the plethora of national mitigation measures that have been underway in a host of countries for many years. References in the WGIII report should concern specific mitigation activities rather than to compliance (or otherwise) with any particular political instrument. It is, therefore, submitted that a review be conducted of the report to ensure that references to the Kyoto Protocol are proportionate to its role in the body of mitigation literature. (Spencer Edwards, Australian Greenhouse Office)	of the chapter.
0-25	A	0	0			The use of 2006 references throughout the report, tends to obscure the transparency of the expert review process. If reviewers cannot obtain cited papers, it becomes difficult for an adequate assessment to be made of the literature used to constitute and support the assessment report. (Spencer Edwards, Australian Greenhouse Office)	noted
0-26	A	0	0			see my word paper on two proposed Common Methodologies for Priority Assessment of Mitigation Measures (PAMM) and for Priority Assessments of Adaptation (PAA) (Robbert Misdorp, PUM)	
0-27	A	0	0			Each of the sectoral chapters focuses on different regions to provide examples as to mitigation efforts. A more uniform treatment of the regions is necessary to provide a comprehensive summary of each mitigation sector. (Spencer Edwards, Australian Greenhouse Office)	noted
0-28	A	0	0			Considered as a FOD, the report is in reasonable shape, and may---given progress already made at this stage--be reasonably expected to be up to (if not actually even over) the high standard already set by previous AR's. As advised, comments below concentrate on attempting to add value to specific content in, and the general direction of, AR4 as specified in its TOR. As also advised, therefore, comments made here specifically exclude any grammatical, linguistic and/or syntactic errors (glaring or otherwise) still present in this draft. In view of the time available to me, unfortunately only selected chapters are reviewed here in detail (naturally, without prejudice to the remainder). That said however (based on an initial,	Noted and agree

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						somewhat abridged, reading) I have reservations that a number of the most crucial cross-cutting issues have themselves not been adequately synthesised in terms of an overall requirement to get to grips with a global mitigation challenge that many policymakers still appear to be at risk of failing if Article 2 of UNFCCC is to be ultimately fullfilled. The introduction of Art 2 itself as a cross-cutter provides--it seems to me at least--- an opportunity to situate the challenge more firmly (vis a vis previous reports) where it ultimately belongs---i.e. explicitly within the arena of UNFCCC. Therefore one of the biggest problems (familiar to us all) namely the Annex-1 vs NA1 configuration has unfortunately not been adequately tackled throughout the report in my view. This is unfortunate, as I believe it is certainly highly arguable that a synthesis of the decision and policy-making, sustainable development, regional issues and short vs long-term cross cutting drivers could reasonably be summoned up as a strong case to incorporate a much larger and wider-spread review of the plentiful literature concentrating on the A1 vs NA1 dialectic. Subsequent comments below are framed against this context. (Pat Finnegan, Grian)	
0-29	A	0	0			Confidence ranges that are used for mitigation technology development could be included. The Working Group II practice of including specific confidence ranges in brackets after a forecast is made (as is done to a small extent in the Executive Summary of Chapter 9) could provide a useful addition to the report. (Spencer Edwards, Australian Greenhouse Office)	
0-30	A	0	0			chapters 5-10 disregard generaly the social and regional differences when addressing the problems and solutions of these sectors as if these problems emanate from only one single society or region. (Mohammed Alfehaid, Saudi Aramco)	
0-31	A	0	0			As former Technical Secretary of the IPCC-WGII-Subgroup Coastal Zone Management 1989 - 1994 and present Netherlands Governmental IPCC Peer Reviewer WGII and III, I strongly suggest to the IPCC - Chair: do not shy away, do not introduce the word uncertainties" unnecessarily too much in the text of the FAR. Replace the word "uncertainty", because the cause you are fighting for is a right cause, and too much use of this word "uncertainties" will shy away the needed future investors. And I assume that that is not the intention of IPCC. Furthermore please come up with clear instructions on systematic mitigation and adaptation for each country so that all the 190 member countries will follow your leadership and enjoy the transfer of knowledge provided by IPCC in an harmonized and effective	

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						fashion. • I politely invite the chairman of IPCC to announce the introduction of the hereunder proposed Common Methodologies on PAMM and PAA in the IPCC-FAR, which in my view ought to be developed by IPCC. (Robbert Misdorp, PUM)	
0-32	A	0	0			Discussion(s) of carbon sequestration are difficult to identify in the outline of the entire report. There is a clear inclusion of sequestration in the agriculture and forestry chapters -- but it took me a while to find the discussion of sequestration related to fossil fuels. (Stan Bull, National Renewable Energy Laboratory)	
0-33	A	0	0			Throughout the whole draft report there is almost a total absence of gender analysis in relation to climate change and mitigation. From the limited research done it is clear that different energy and mitigation options have different impacts on men and women and this should be reflected in this report. See for example: Mainstreaming Gender into the Climate Change Regime 14 December 2004 COP10 Buenos Aires http://www.genanet.de/fileadmin/downloads/Stellungnahmen_verschiedene_en/Gender_and_climate_change_COP10.pdf and Lorena Aguilar (2004) Climate Change and Disaster Mitigation (IUCN) available on-line: http://www.iucn.org/congress/women/Climate.pdf (Lars Friberg, Climate Action Network (CAN) Europe)	
0-34	A	0	0			The sections on innovation and technological change in chapter 2, 3, 4 and 11 need a common view on how innovation processes work. All of them should include the perspective of the systems of innovation literature and the model of feedbacks between all phases of innovation. Chapters 3, 4, and 11 already imply that climate policies also have important feedbacks on generation of technologies. This view should be more thoroughly discussed in chapter 2, which lays out the foundations on how innovation processes work (see comment on chapter 2 below) (Rainer Walz, Fraunhofer Institute Systems and Innovation Research)	
0-35	A	0	0			My general impression is that the report should highlight the changes compared to TAR more specifically. In many chapters, the 'delta' to TAR is hard to conceive. (Fritz Reusswig, Potsdam Institute for Climate Impact Research)	accepted
0-36	A	0	0			It is noted that the terms are not used in a consistent manner throughout the whole report. It is strongly encouraged to better harmonize. (Radunsky Klaus, Umweltbundesamt)	

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
0-37	A	0	0			It is noted that the scope of the WG3 report should be to provide on a comprehensive, objective, open and transparent basis, the scientific, technical and socio-economic information relevant to understanding the scientific basis of climate change mitigation. However, in its current status not all subchapters of the FOD are consistent with that scope. This is because a) the scope has been interpreted too broad and information clearly goes beyond the scientific basis of climate change mitigation, covering e.g. issues of a primarily political nature as the scientific basis of climate change should be mainly limited to methodological and conceptual issues but clearly shall not include issues related to implementation; b) the literature to be addressed should in general be limited to literature published after 1999 as it has to be assumed that the TAR already covered all relevant literature until 1999, c) the report should also be limited to more robust findings that can be based on more than one publication; d) conclusions included in the TAR need not be replicated but providing detailed reference could also help to keep the report concise and short. (Radunsky Klaus, Umweltbundesamt)	
0-38	A	0	0			It is noted that the length of the FOD (about 1300 pages) is considerable above the envisaged length. However, there seems to be room to shorten the report, e.g. be limiting the text to the scope as specified by the IPCC plenary (see below) and by streamlining the text by avoiding addressing the same information more than once. (Radunsky Klaus, Umweltbundesamt)	
0-39	A	0	0			It is noted that the FOD includes whole paragraphs without any linkage to other parts of the report or to literature. This clearly is inconsistent with the requirement of providing information on an open and transparent basis but may be interpreted as an indication that the text reflects the views of the authors but not findings identified in the underlying literature. Any text, that cannot be linked to underlying literature therefore should also be deleted in the SOD. If there are gaps in literature that do not allow to provide information based on literature but that should be provided according to the agreed outline than such findings should also be clearly indicated as that could help to guide future research. (Radunsky Klaus, Umweltbundesamt)	
0-40	A	0	0			I am very concerned that the focus of the Report, and particularly Chapters 3 and 4, is predominantly on the next 50 years, and subdominantly on the remainder of this century. The reality illustrated by the analysis of Wigley, Richels and Edmonds (and later analyses provided for example on pages 223-224 of the TAR Climate Change 2001, The Scientific Basis) BUT IGNORED HERE, is that the problem is	

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						much longer term than this. Furthermore, the problem is 10x larger in the long term (~50,000 EJ / 50 years) than in the short term (~5000 EJ / 50 years). As part of the resolution of this problem, we need to introduce technologies in the present century that can almost fully replace carbon-emitting technologies in the next century. Thus we need to be advancing new energy technologies with very high total potential, and we need to be moving to energy uses that are consistent with very low CO2 emission. While it is important to pay attention to the near term, this report must absolutely also keep the much larger long term challenge in focus. It is critical that analyses looking to 2200 be included in this report, as they were in the TAR. See the attached analysis of future non-carbon energy needs, labeled "WRE Analysis.pdf". (Robert Goldston, Princeton Plasma Physics Laboratory)	
0-41	A	0	0			Preliminary Comments: My relevant areas of expertise are inverse integrated assessment modeling for climate change decision support and energy system modeling for energy policy support. The integrated assessment modeling is based on the tolerable windows approach (TWA) (other broadly equivalent terms include the guard-rail approach and safe-landing analysis). I have therefore concentrated on those parts of the WG III AR4 (principally chapters 2, 3, and the glossary), where the tolerable windows approach is discussed. As one of the lead developers of the TWA, I paid particular attention to the consistent usage of TWA-related terminology throughout the entire report. And as the AR4 is intended to provide a comprehensive assessment of scientific progress since the TAR, I took the liberty of adding two publications to the cited literature in order to highlight recent advances in the applicability of the TWA method. I have also proposed a substantial revision to the glossary entry for TWA. (Thomas Bruckner, Technical University of Berlin)	noted
0-42	A	0	0			IPCC, 2001 and the like are not valid references. The particular chapter of the assessment should be referenced using the lead authors' names. (Nick Campbell, ARKEMA SA)	
0-43	A	0	0			In many of the chapters there should be further reference to relevant sections from WG I and or II FOD report. This would be useful to ensure full consistency of the reported findings and to demonstrate the interactions between the WGs, which do not seem fully optimal at this stage. Such systematic linking work will be time	

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						consuming, it is though necessary. (Philippe Tulkens, TERI School of Advanced Studies)	
0-44	A	0	0			Do a clear distinction between "Biological carbon sequestration" involving the enhanced uptake of atmospheric CO2 by plants, forest, soils, and ocean fertlisation, and "Carbon dioxide Capture and Storage (CCS) involving the capture of CO2 from industrial and energy-related sources and its long-term storage. This disctinction is very clear in the IPCC Special Report on CO2 Capture and Storage. It never uses the term "sequestration" for the CCS technology, and mentions explicitely that it does not cover "biological carbon sequestration". Such distinction is for instance clear in Chapters 3, 7, 8, 12 but should be made in other Chapters such as Chapters 4, 5, 11 etc. (CZERNICHOWSKI-LAURIOL Isabelle, BRGM)	
0-45	A	0	0			Chapter "GLOSSARY": Page 21: Line 35-40: Please replace the old TWA definition by (see cell above): "The tolerable windows approach (TWA) seeks to identify the set of all climate protection strategies that are simultaneously compatible with (a) prescribed long-term climate protection goals, and (b) normative restrictions placed on the emissions mitigation burden. These constraints or guard-rails can include limits on the magnitude and rate of global mean temperature change, on the weakening of the thermohaline circulation, on ecosystem type loss, and on economic welfare losses originating from selected climate damages, adaptation costs, and directed mitigation efforts. For a given set of guard-rails, and assuming that a solution exists, the TWA outputs an emissions corridor which delineates all complying emissions paths. Safe-landing analysis is similar in concept and if no particular research line is indicated, then the term guard-rail approach covers both." (Thomas Bruckner, Technical University of Berlin)	
0-46	A	0	0			The Report do not include any section about reserves, resources and prices, as it was not planned, but now under present conditions and the important relation to mitigation and not conventional technologies I suggest to consider some assessment of latest trends. (Juan Llanes, Havana University)	
0-47	A	0	0			The integration of the whole report requires much more work. Particularly in the treatment of costs and benefits of mitigation and technology, there is a lack of integration over chapters 2, 3, 4-10 and 11. My suggestion as to how to divide up the costs literature over chapters 2, 3 and 11 is that concepts should be in 2,	

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						numbers for 2050 to 2100 should be in 3 and numbers for 2000 to 2050 in 11. However, Figures in chapter 3 may well need data over history and between 2005 and 2050 to make a point. Dividing up the technology literature is more difficult. My suggestion is that chapter 2 covers concepts and definitions, and explains the main ways that technology has been modelled (e.g. covering Clarke and Weyant, 2002) and later developments in the treatment as in Edenhofer, 2006), 3 covers baseline issues and effects of technology in cost-benefit studies which require a very long-term analysis and cost-effectiveness studies of stabilisation covering 2050 to 2100, and 11 covers technology in cost-effectiveness studies and attempts to integrate them with the technologies discussed in 4 to 10. When covering both cost-benefit and cost-effectiveness studies, it should be made clear in chapter 3 that there is a subsantial different between them as regards costs and effects of induced technological change as brought out in (Goulder and Matthai, 2000). There are so many estimates of GDP costs and carbon permit prices in recent literature that a meta-analysis is worth doing to supplement the tabulated comparison on models and qualitative discussion with some quantitative estimates to sort out the reasons for the differences. (Terry Barker, 4CMR Centre for Climate Change Mitigation Research, University of Cambridge)	
0-48	A	0	0			References: only 7.6 percent from developing countries in chapters 1,2,3,11,12.!!!!! (Juan Llanes, Havana University)	
0-49	A	0	0			Chapter 1, 2 and 12 dedicate more than 70 pages to Sustainable Development, suggest reviewing chapter 2 and 12 overlaps (Juan Llanes, Havana University)	noted
0-50	A	0	0			Also overlaps with regards to ancillary benefits within chapter 11 and 4-10 (Juan Llanes, Havana University)	noted
0-51	A	0	0			Almost all quotations to economic issues relays on the neoclassical approach, other approaches as ecological economics and bioeconomics both with well-known Journals are not included as alternatives to be assessed, specially on chapter 2,3, and 11. (Juan Llanes, Havana University)	
0-52	A	0	0			There is a general problem how to handle the TAR. Should it be summarized or just cited as a reference? THis issue is not dealt with in the same way in the different chapters.	noted

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						(Marco Mazzotti, Institute of Process Engineering)	
0-53	A	0	0			The whole present report gives a good updated material and captures as well new recent information. Chapters 2, 3, 11 and 12 will be in that regard very important, in the sense they are going to capture cross sectoral informations as well as long term perspective consequences of all the relevant informations. I recommend that particular attention is given to these chapters, which will be of added value, for the whole process. (Jean-Yves CANEILL, Electricité de France)	
0-54	A	0	0			Very comprehensive document, but from the Chapters I have carefully read, I would like to see more integration between Ch. 4 and the general aspects covered in Ch. 2, 12 and 13. Presume this also relates to the other sectoral chapters. (Oren Kjell, Norsk Hydro ASA)	
0-55	A	0	0			There are a number of practical consequences of taking such a view seriously. One is that distributional issues are much more important than commonly recognized. Mainstream economics acknowledges the existence of a “declining marginal utility of income”, but with limited exception it is not incorporated into economic analysis. Frankly, there is not - and I would argue cannot be - an “objective” measure of the declining marginal utility of income; in practice it is a choice of the analyst, and - as with the choice of a discount rate - it implies that costs are fundamentally indeterminate, and specifiable only by value choices of the analyst. The few studies (e.g., the work of Richard Tol and Christian Azar) that have taken this up have demonstrated that the conclusions of climate policy analyses are enormously dependent on these choices, but the consequences of this indeterminacy haven’t been widely acknowledged. (Paul Baer, Stanford University)	Noted, will be discussed.
0-56	A	0	0			One issue that seems to have fallen between the scope of chapter outlines is any analysis of the financial sector. I am not expert in this field but surely it plays an important role and the literature on this should be covered somewhere? (Michael Grubb, Cambridge University)	
0-57	A	0	0			Indeed, if I had one meta-level comment to make about all of the WGIII FOD, it’s that the draft needs to be more self-conscious about the deep controversy about values at the heart of the economic paradigm. In particular, the assumption that “utility” is something objective that can be measured through market or non-market valuation, and thus that economic analysis is a useful approximation of “true”	Noted, will be discussed.

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						values, is only one perspective, albeit the dominant one. What I would consider the primary alternative - that valuation is an ongoing a social process, and that the value of "outcomes" is a question of meaning and choice rather than utility - is not well represented in this document. (Paul Baer, Stanford University)	
0-58	A	0	0			Generally I am surprised there is not an element in the structure that identifies key weaknesses in literature/knowledge to assist future work (Andrew Dlugolecki, university of east anglia)	
0-59	A	0	0			A second practical consequence is that uncertainty becomes much more important. Subjective expected utility maximization requires a unique probability distribution for outcomes as well as a unique utility function. Such unique probability distributions do not exist for most parameters of interest (both "scientific" and "economic") in the climate policy debate (see Baer et al 2005 and Baer 2005). The consequences of this kind of multi-dimensional uncertainty for decision-making have barely begun to be explored, but again, it implies that most economic analyses which suppress this uncertainty through unexplained value choices of the analysts, do not provide the kind of "objectivity" that they are presumed to have. (Paul Baer, Stanford University)	Noted, will be discussed
0-60	A	0	0			Whenever data for the European Union are mentioned, it is important to make clear "which" EU it refers to. The EU has been enlarged from 15 to 25 member states in 2004, and it maybe further enlarged by 2007. Some data cannot be interpreted without the knowledge whether it refers to the EU-15, the EU-25 (and perhaps later the EU-27). (Diana Urge-Vorsatz, Central European University)	
0-61	A	0	0			All authors and lead authors must be commended for bringing a large amount of valuable material in this first order draft. There at this stage many redundancies, which should be reduced in the further development of the report. However, despite these redundancies, or perhpas because of them, there are several topics that are not addressed with sufficient scope and detail altogether - or presented in a misleading manner. I shall limit my general comments to two of them: renewables, and long term strategy (though a third one could be discounting, but I hope the detailed comments that follow will be sufficient). 1. RENEWABLE. It is hardly surprising that in a 1255 page draft renewables are only covered in a few pages, and with somehow misleadidng information. First, a global perspective could be given about the overall potential. Solar energy exceeds 8,000 times our primary energy supply.	

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						Although the technico-economic potential is certainly orders of magnitude lowers than the overall potential, it is still likely to ultimately cover a large percentage of our needs, if not all. Second, a fair assessment could be made of the "technico-economic potential" that could be reached, say, in 2050 and 2100, for all technologies. For example, table 4.3.1 narrows solar thermal to solar thermal electricity alone - and mixes estimates of overall technical potential, such as indicated for PV (1600 Ej/y), and assessments likely to be derived from technico-economic consideration, such as that for solar thermal (1.7 Ej/y). Although the confusion is in the source, IPCC role is to critically assess the information. What solar technology is more likely to provide more electricity in 2050 or 2100 is hard to guess, but they may end with comparable contributions: PV is handicapped by its costs and intermittent nature, CSP technologies being cheaper and more easily made guaranteed and even dispatachable, but limited to areas with strong direct insulation unless exported. In any case, both technologies may remain outweigthed by far, as they are today, by solar thermal contribution to heating and cooling needs (see comments on chapt'er 4). 2. LONG TERM STRATEGY.The report could perhaps more clearly make three points: 1) cooperative strategies oriented toward research and development, as useful they might be, are unlikely to produce sufficient results by themselves in the absence of carbon prices throughout the economy; 2 Economic instruments, as useful they might be, need to be complemented by other instruments to address market imperfections, including R&D support and some specific financing mechanisms for technologies in their infancy, in order to bring down their costs through learning by doing processes; 3 Uncertainties on both costs and benefits of climate policies conflict with inertia to create a dilemma on long term objective(s): it cannot be defined once for all, but its absence is detrimental to the process. An abundant literature showing firm targets do not really fit the long terme cumulative nature of the climate change problem in the context of uncertainties. Combined with periodic revisions of an educated guess on what we would like to pay for mitigating climate change, the most pragmatic way to drive action by all countries and all players would be set indicative ambitious long term targets while making their full achievement dependent on actual costs - ie a sustained use of price capping mechanisms to accompany tradable permit schemes. This and similar suggestions could be more extensively discussed, in particular, but not exclusively in chapter 13 (see detailed comments). (Cédric Philibert, International Energy Agency)	

hapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
1-1	A	0	0			There is confusion throughout this Report between concentrations of greenhouse gases and emissions of greenhouse gases.In Chapter 1 it is pointed out that the FCCC requires control of greenhouse gas concentrations. Yet the Chapter then proceeds with the problem of controlling emissions as if it were the same thing as concentrations. The Tables to Figure 1 are only of emissions. There is no mention of concentrations.They are not the same. Atmospheric concentrations of carbon dioxide have risen in an approximately linear fashion for the past 30 year whereas emissions have increased to a greater extent, but irregularly; to such a degree that there is no certainty that reduction in emissions will necessarily lead to a reduction in concentration. The situation with methane is even more confused. Atmospheric methane concentrations are currently stable, or even falling whereas emissions are thought to be increasing. Again. Ther is no guarantee that changes in emissions will affect concentrations. Table 3.4 states that it was “relatively easy” to relate emissions to concentrations. I do not agree. One consequence of this confusion is that there appears to be no serious attempt to find out whether emission reductions are influencing concentrations. (Vincent Gray, Climate Consultant)	Partially accepted: Remove confusion between emissions & concentrations in revised text – the rest of the comment is WG I stuff.
1-2	A	0	0			I have four general observations. 1. There is considerable overlap between the chapters I looked at, between WG2 and WG3, and even within chapters. A lot of material is simply duplicated, and should be cut to improve readability and reduce size.2. In a number of instances, authors mainly quote their own work. This is unworthy. In a number of instances, authors mainly quote other IPCC material. This is incestuous. The quoting of IPCC material is most pronounced in the scenario discussion, which can be summarised as "We, the	Noted : (1) – (4) Chapter will be restructured and non-prescriptive language used. (2) Additional reference will be added or cross-referenced to other chapters. (3) Rejected: Necessary for context – in relation to scenarios: plenary decision. References will be checked or cross-

hapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						IPCC, declare that all previous IPCC work is great." This is silly. 3. When cutting overlap, please concentrate the material in the chapters with experts among the authors. In many places, the authors are out of their depth; the selection of papers is haphazard, the assessment superficial. I also found too many references that are simply wrong; the authors cannot have read these papers. For a supposedly expert panel, this is very serious. 4. In a number of instances, the draft material reads like a political manifesto rather than a scientific document. In other instances, the authors have tried to hide their political message in pseudo-scientific language. For a supposedly independent panel, this is very serious. (Richard Tol, Hamburg University)	referenced to other chapters.
1-3	A	0	0			On the choice of currency (e.g. par. 1.7.3, p.13): I do not understand why the US$ is chosen as currency instead of the Euro. In the European Trading System CO2 has a real price. In the US there is no cap on CO2 emissions and thus the price for CO2 is derived from real transactions in the Euro-world and brings additional uncertainty from exchange rates. Substantive emission reduction measures are implemented in Europe connected with real costs and money transfers (they take place mainly in Europe and not in the US where these things happen mainly 'on paper'). Europe and not the US is the leading power in tackling climate change and implementing actions with real costs. Therefore the values in Euro map the economic reality, the values in US$ are hypothetical and map the academic expectations. (Manfred Treber, Germanwatch)	Rejected: TSU decision
1-4	A	0	0			Throughout the chapter, all references to "unimpeded sustainable economic development" should be removed when referring to Article 2; instead cite the UNFCCC directly: "enable economic development to proceed in a sustainable manner". (Anne Arquit Niederberger, Policy Solutions)	Accepted
1-5	A	0	0			I conclude that this chapter -- based on the first 8 pages -- is not yet ready for review. Just to give a few examples: The table of contents is incoherent and arbitrary. The text does not appear to be the result of a systematic literature review. And references to the UNFCCC misquote it. Because of all of these basic deficiencies, I feel a detailed peer review at this stage is a waste of time. Compared with previous assessments, this chapter is a disappointment, certainly not up to the	Noted - Chapter will be restructured Accepted: discussion of equity

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						standard required by the IPCC for it to maintain its legitimacy. It is more of a patchwork of random topics, addressed through limitied citations than a systematic assessment of the overall body of peer reviewed literature (e.g, Ikeme and Thompson et al are not the only publications on equity and climate change!) (Anne Arquit Niederberger, Policy Solutions)	
1-6	A	0	0			I believe that the main role of IPCC is presenting the scientific knowledge of climate change, not the social or political judgements. Therefore, the LAs should distinguish scientific base values from values with author's judgements. For example, although the upper limits of global mean temperature rise in literatures usually include the author's judge, the facts are not clearly mentioned in this report. If there are confusions of scientific values with judged values, this report may rose credit with readers such as policy maker. (Fuminori Sano, Research Institute of Innovative Technology for the Earth)	Noted - Chapter will be restructured
1-7	A	0	0			There is a lot of repetition of the same principles. For example, the sentence "The United Nations has set goals to eradicate poverty, raise living standards and encourage sustainable, economic and social development in its Millennium Declaration, (UN 2000)." appears repeatedly. (Lourdes Maurice, US Government)	Accepted
1-8	A	0	0			The quality of some of the figures is not very good and should be enhanced as captions are difficult to read in some cases. (Lourdes Maurice, US Government)	Accepted
1-9	A	0	0			A general comment for Chapter 1 is that it tends in numerous places to do its own assessment of topics that are already being assessed in other places. Suggest that these short assessments be replaced with references to the underlying chapters of all 3 working group reports. (Haroon Kheshgi, ExoonMobil Research and Engineering Company)	Accepted and will be taken into account in rewriting
1-10	A	0	0	0	0	Given the author team I was rather surprised that there was no explicit mention of biodiversity. There are plenty of references the author's could have linked to in WG2 chapters 1,4,5 and 19 on this topic. (Jeff Price, California State University, Chico)	Accepted
1-11	A	0	0	0		General on FOD: the report is an impressive compilation and assessment so congratulations. However, it would benefit from closer involvement of practitioners and decision-makers in this field throughout. Attention could be given in the next draft to addressing the considerable overlaps that exist as a result of the sectoral/	Accepted, will be partly resolved by rewriting, partly by transferring parts to Chapter 2

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						cross sectoral split (such as adaptation/ mitigation, and on which there is more conjecture than substance to comment anyway) but also give more attention to critical cross-cutting issues which have not yet been adequately addressed such as public acceptability of policies. General on chapter 1. Very succinct compilation of the context the rest of the report currently fails to provide a satisfactory dialogue with this material. Perhaps critical issues could be identified- that would enable other chapters to respond and make the task of summarising in due course easier. (HEDGER MERYLYN, Environment Agency)	
1-12	A	0	0			WGIII should assess mitigation of climate change. This chapter is the introduction to the mitigation assessments. If dangerous levels of climate change are described in this chapter, the dangerous levels of climate change "mitigation", e.g., cost increase depending on different CO2 stabilization targets, should be more discussed rather than the dangerous levels of climate change. (Keigo Akimoto, Resaerch Institute of Innovative Technology for the Earth (RITE))	Both issues will be addressed in a balanced way
1-13	A	0	0			There are a lot of confusions between science and value judgments. Even if the reviewed papers are referred, some of the papers could report the authors' value judgments for some sentenses. The LAs should write them with clear distinctions. For example, the literature of O'Neill and Oppenheimer (2002) is referred in manly palaces in Chapter 1, but the numbers of the thresholds reported in the literature include not only scientific-base value, but also include their value judgments. They "define" a limit at 3degC from today over 100 years to avert shutdown of the THC, and describe that a limit of 2degC above 1990 global average temperature is justified to protect WAIS "taking a precautionary approach", for example. These are the authors' value judgments. (Keigo Akimoto, Resaerch Institute of Innovative Technology for the Earth (RITE))	Accepted, resolved through restructuring
1-14	A	0	0			Copenhagen Consensus (Lomborg, 2005, "Global Crises, Global Solutions") is one of the remarkable endeavors and insights for value judgments of climate change within many other issues. The study indicates the difficulty for the climate change mitigation and the essence of climate change issues, although we should mitigate climate change. I think that this is a very useful literature particularly in Chapter 1. I strongly recommend referring the literature. (Keigo Akimoto, Resaerch Institute of Innovative Technology for the Earth	Reference can be found on page 8, line 13. Whether it will be moved within the chapter, will be decided in the rewriting

hapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						(RITE))	
1-15	A	0	0	0		A general note that being among the early movers may lead to strategic-economic opportunities for a country and its industries is lacking. This idea, however, seems to be increasingly appealing to captains of industry and policy makers. Why not use it in the FAR? (Jan Paul van Soest, Advies voor Duurzaamheid on request of International Gas Union)	Chapter 1 will allude to the issue in the SOD
1-16	A	0	0	0	0	There is considerable overlap between chapter 1 and 2. Especially in the of risks and uncertainities (1,7,2) and Equity (1,5,7). The chapter teams from both chapter need to discuss who will deal with these issues, to avoid duplication and increased pages. (Rutu Dave, IPCC WGIII TSU)	Accepted
1-17	A	0	0			One possible scene-setting graphic is that of "population vs per-capita emissions" in different regions, because it encapsulates several dimensions of the challenge including current inequalities, potential for future growth, relative scales of industrialised and developing country contributions, and divergence within each group. The most recent version of the graphic is published in M.Grubb, "Kyoto and the Future of International Climate Change Responses: From Here to Where?", International Review for Environmental Strategies, Vol. 5, No. 1. But if the authors were interested I could supply the data and package for generating the graphic, with or without attribution. (Michael Grubb, (a) Carbon Trust, (b) Cambridge University, (c) Imperial College London)	Accepted
1-18	A	0	0			This chapter is very poorly written,being ungrammatical, jargon-filled and with ideas very unclearly expressed.(Although the TSU indicated that grammar would be fixed later, this is so bad as to make sections unreadable).The chapter seems too long for the actual content. The whole chapter ignores the possibility (or even probability) that dangerous interference has already happened. (Ian Enting, MASCOS)	First part accepted, but second part rejected, no literature
1-19	A	0	0			The 1.4.2 section on sustainable development and section 1.7.1. seem to be on the same topic which is a confusing aspect to the structure. The same goes for 1.5.4 and 1.7.2. (Kenneth Möllersten, Swedish Energy Agency)	Accepted, resolved through restructuring
1-20	A	0	0			Chapter 1: The durrent draft gives the impression that the authors were not clear	Accepted, messages will be brought out more

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						what it is that they want to convey to their readers. What is the focus of the chapter, what are the key messages, how is this chapter related to the rest of the WG III report? Currently, the individual sections are not well linked, and a "leitmotiv" is missing. Ideally, the chapter should converge toward Section 1.9 ("road map"). The preceding sections should explain the scope of the WG III report, give a very brief overview of previous WG III / Mitigation reports, and present the main cross-cutting issues. Given that this is an introductory chapter, detailed discussions of specific topics should be avoided in favour of cross-references to other chapters (e.g. WG II Chapter 2 and 19, WG III Chapter 2 and 3), wherever possible. At the end of chapter 1, the reader should know what the WG III report is about, how it is structured, whether there are important differences to the WG III TAR, and what the most important cross-cutting issues in the following chapters are. The individual sections should be written with this goal in mind. (Hans-Martin Fuessel, Stanford University)	clearly
1-21	A	0	0			The Technical Summary is poorly written. (Richard Tol, Hamburg University)	Not yet an issue, space limitations likely
1-22	A	0	0			Overall, Chapter 1 is in a pretty bad shape. It starts with alarmist nonsense that has no place in the IPCC, and it continues with badly informed assertions. Chapters like this are hard to write, but I've seen better ones. (Richard Tol, Hamburg University)	"Alarmist nonsense" is not agreed to because statements are based on literature and are also linked to WG II. By the way, Chapter 1 has seen worse drafts
1-23	A	0	0			While I found Chapter 1 admirably short, and good as far as it goes, the Chapter could be strengthened in three ways. The first has already been adumbrated above: explicitly posing the key question, "what will it take to 'stabilize climate'" and the different views/approaches to answering this question. In addition, the chapter would be strengthened by recognizing two other important issues. The objective of avoiding a "dangerous interference with climate" (DAI) may be in conflict with other stated objectives. An obvious potential conflict is economic growth or development. As is made (repetitively) clear (on pages 2 and 3 of the chapter) the "obligation" to avoid DAI is conditioned by "unimpeded sustainable economic development" [my emphasis]. Although the concept of "sustainable economic development" is not pinned down (even in chapter 2), the reader must assume that avoiding DAI should not interfere with economic growth, at least not in the large part of the world which is still "less developed" or "developing". AR4 then discusses what might constitute DAI, leaving the impression that anything more than 2C warming may constitute just such "dangerous interference". The potential	Partially accepted, will be considered in the rewrite, where relevant.

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						conflict arises in the following manner. Suppose it is determined that avoiding DAI requires keeping the increase in global average temperature below 2 C. This is our obligation under section 2 of the FCCC. At the same time there is also an obligation not to impede economic growth over much of the world. Are these two objectives compatible, given: (1) evidence that we may be 60% of our way to 2 C warming when energy imbalances are accounted for (Hansen et al, Science, 2005); (2) the long time lags in energy capital turnover; and (3) the, as yet, undemonstrated scalability of carbon emission-free energy sources/technologies to levels capable of displacing, rather quickly, carbon-emitting energy? It seems to me that the jury is still out on an answer to this question. If so, then I think it incumbent on the IPCC to recognize the potential conflict and the predicament it poses-and to do so up front (in Chapter 1). At the very least, it should be mentioned/discussed in section 1.5 ("Characteristics of the Challenge"). As it stands now, the chapter leaves the erroneous impression that, irrespective of climate sensitivity", we are technologically in a position to both avoid DAI and maintain "unimpeded" economic development, that is, "to have our cake and eat it too". But it may not be so. And if it is not, and something must give, is there any doubt that it will be climate policy and objectives? Another issue that deserves attention up front is the problem of "time-consistency", or more accurately, the potential "time inconsistency" of climate policies. Mitigation raises two issues of time consistency, one is political, and one is economic in character. A) Policies to substantially mitigate GHG emissions now may require near term energy-use limits (until new carbon emission-free technologies are deployed/installed), that may for some period place costly constraints on an economy. If the time period for constraint is both longer than the election cycle, and is uncertain in length, the mitigation policy may not survive the next election. B)If new energy technologies need to be researched and developed before being deployed, then it may not be possible to induce (risky) investments in their R&D without some way of committing future governments to compensate past investors for their investments. Since, in general, current governments cannot commit future governments, and investors know this, the required up-front investments may not be undertaken. This important point is made and elaborated on by Montgomery and Smith, 2006. The Montgomery-Smith paper is cited and briefly discussed on page 81 of Chapter 2. The time consistency issue merits attention up front. Perhaps it, too, could be included in section 1.5 ("Characteristics of the Challenge").	

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						(Christopher Green, McGill University)	
1-24	A	0	0			In the second part of the Introduction too much emphasis is laid on uncertainty of the future occurrence of CC. This will influence the reader in a not good manner, namely the decision-making community and other investors will then refrain from (mitigative & adaptive) actions. And that is not the meaning of contribution of the WGIII, I belief! The reasoning ought to be: no uncertainty about the vast amount of GHG emitted beyond what is know during one million years, most likely Temperature will increase, most likely many impacts will happen see IPCC FAR, SAR, TAR, what should be done now is that no-regret/precautionary measures both mitigative and adaptive, should be prepared by countries, industries and other direct stakeholders. Two examples of simple mitigation type of measures which will not hurt: i) analogue to the development of the Hybrid Toyota, more of those effective initiatives by industry should be highlighted and ii) capacity building on sustainable development, integrated management of coastal zones, of river basins, and on CC effects, impacts and measures in the LDC. Such no hurting measures should be promoted for immediate execution, while the development of more comprehensive measures is being prepared. Short, mid and long term actions are to be distinguished. Good examples of such measures should be also mentioned in the Introduction. (Robbert Misdorp, PUM)	Rejected, uncertainty is supported by literature. Timing of actions issue will be reflected in the SOD of Chapter 1
1-25	A	0	0			Fundamentally, the outcomes presented in the report must be drawn from the literature reviewed and cited. If conclusions are drawn in the body of the text that are not adequately supported by the literature, (as in the Executive Summary of Chapter 1) the objectivity of the IPCC may be questioned. (Spencer Edwards, Australian Greenhouse Office)	Agreed
1-26	A	0	0			EXECUTIVE SUMMARY of the Introduction provides a good overview of the entire (IPCCFARWGII1-) Report. Will the Executive Summary of the entire IPCCFARWGIII also be open for review? (Robbert Misdorp, PUM)	Humbly accepted
1-27	A	0	0			As a framing exercise, it is a good idea to include this chapter. Its general architecture is probably sound enough at Section level. However, I am less convinced that the same can be said for either the balance across or the content within, the sub-Section level, Given the (surely widely-recognised) tendency for policy makers---as much as other stakeholders---to only read and/or concentrate on the contents of the SPM, there is a particular onus in this regard for this chapter (in	Will be taken into account in rewriting

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						advance of the SPM) to both adequately put the case and fulfil the mission of AR4 as scoped. As mentioned above, specific comments on a (recommended) more synthesised approach to cross-cutting issues follow for this chapter, on the basis that this might be an appropriate chapter where cross-cutting issues could be more thoroughly integrated. (Pat Finnegan, Grian)	
1-28	A	0	0			3) The Executive Summary of the Introduction does provide a clear overview but does not show examples of mitigative measures. The present Chapter 1.4.4. touches on technology cooperation and transfer and should be followed up by a real detailed new Chapter on "Mitigating technology: developments of most promising mitigation techniques and results of demonstrations/pilots." More attention should be paid to concrete types of innovative measures, demonstrations of renewable projects possibly including CAB analyses. 4) I miss a clear overview about the essence of the whole report: MITIGATION. With other words, the essence of the mitigation measures of Chapters 4 - 10 should be reported in a cohesive way in this Introduction, possible illustrated by a graphs or table, supporting and providing an overview. (Robbert Misdorp, PUM)	Rejected since it is beyond the scope of Chapter 1
1-29	A	0	0			The structure of chapter 1 is appreciated; in particular subchapter 1.9 is welcomed. (Radunsky Klaus, Umweltbundesamt)	Agreed
1-30	A	0	0			I believe that for the sake of clarity and in order to smooth the arguing which is going on about global warming, it would be useful to introduce (or to end) the first chapter with some statements similar to the following: "This report assumes that there is a climatic variation in act of appreciable magnitude and not an occasional fluctuation with a rapid return to the average meteorological values of the last decades. The report also assumes that the principal cause of this variation is the increase of GHG in the atmosphere produced by anthropic activity, and that the natural climatic system does not have spontaneous feedback mechanisms that can stop global warming. Most researchers share these opinions, but consensus is not unanimous and a minority of researchers believes that global warming is mostly natural, and that there is not a correlation between GHG and global warming or that such a correlation is not demonstrated (cf., just for example, Lindzen and Emanuel, 2002; McIntyre and McKitrick, 2005). Some of these researchers believe that actions to diminish CO2 emissions are useless or even harmful, because these actions would strongly influence global economical growth and greatly increase	Rejected since it is beyond the scope of Chapter 1; it is a WG I issue

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						unrest with severe consequences. In this regard it has to be noted that the mitigation actions suggested in the present report are in any case necessary, because the temperature, no matter the reasons, is increasing as it is increasing the anthropic pressure on the planet. In other words even if the "minority group" is right (which is unlikely), these actions would minimize the impact of warming, would improve the standard of living in underdeveloped countries, would help in maintaining the standard of living in developed countries and would improve environmental conservation. As regards to actions for diminishing CO2 emissions , the necessary technology will soon be inevitable, considering the diminution of hydrocarbon reserves and so: the "sooner we prepare for that, the better it is." Lindzen R.S. and. Emanuel K (2002) The greenhouse effect. in Encyclopedia of Global Change, Environmental Change and Human Society, Volume 1, Andrew S. Goudie, editor in chief, pp 562-566, Oxford University Press, New York, 710 pp, McIntyre, S., and R. McKitrick (2005), Hockey sticks, principal components, and spurious significance, Geophys. Res. Lett., 32, L03710, doi:10.1029/2004GL021750.,Walter Dragoni - Dip. Scienze Terra, Perugia University, Italy, dragoni@unipg.it (Walter Dragoni, Perugia University)	
1-31	A	0	0			The Executive Summary does not appear to take into account the texts of the following sections of this chapter (Nick Campbell (Batch 2), ARKEMA SA)	Accepted
1-32	A	0	0			structure of the chapter does not work very well: in 1.2 art 2 UNFCCC is discussed, but many of the issues that are relevant in that context only appear in section 1.5 and 1.7. Also, the emission trends and the progress on the policy front are squeezed in between 1.2 and 1.5; it would be more logical to start the chapter with these trends, before dealing with the art 2 context (Bert Metz, IPCC)	Accepted, will be considered in the restructuring
1-33	A	0	0			chapter has a strong overlap with ch 2, particularly in sections 1.4, 1.5, 1.6 and 1.7; consider to merge the two chapters; when doing take into consideration that the material under several headings actually covers other issues: e.g 1.5.1 (irreversibilities) and 1.5.2 (public good) could very well be covered under "decision making" and "uncertainty"; 1.5.3 (inertia) is in fact about decisison making; 1.5.4 (risk of catatstrophic or abrupt chnage) belongs to "article 2"; 1.5.6 (complexity) is in fact about inertia and uncertainty (Bert Metz, IPCC)	Accepted, will be considered in the restructuring
1-34	A	0	0			I understand the enormous challenge of authors to write chapter 1 which intends to	Accepted, will be considered in the

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						give well organized introduction to the rest of the report. Having said this, I have general concerns on the current structure of Chapter 1 as the relation between different discussions in the chapter is not quite clear so are the relation with the similar discussions in the rest of the chapters, in particular the Chapter2, and WGII report. The discussion on greehouse gase emission trends is half-finished and appears better disccused in Chapter 3. Similar problem exists in the discussion on SD. Chapter 2 has much better discussion on this issue, and Chapter 1 may want to introduce the points of the discussion. The discussion on technology co-operation and transfer appears abrupt and half-finished as well. The discussion on Characteristics of the challenge appears better placed at the beginning of the chapter and may be better presented by referring to the (discussions of the) past assessment reports to explain clearly how discussions on each factor has evolved. Similar situation is found in the treatment of cross-cutting isseus. (Shigetaka SEKI, METI)	restructuring (in the SOD), if data available
1-35	A	0	0			I am puzzled with the function of the discussion of the Framing Issues since I considered that the issues would be discussed in Chapter 2. The discussion on the Article 2 is important and should be clear how WG3 report tries to discussed the issues compared with the way WG2 report does. However, the nature of discussion largely duplicate with that in WG2 Chapter 19, and the conclusion is not consistent. The Chapter 19 carefully describes the status of the current findings and does not make a judgement that "convergence exists in the literature towards an upper limit of 2 degree increase in global mean temperature above pre-industrial levels as a cap before entering the zone of dangerous interference". Instead, the Chapter 19 honestly states that lots of literature starts with the assumption of 2 degree increase and found possibilities of (statistically--I assume) significant impacts of various types. I read the chapter implying that what significant impacts should be addressed are subject to policy judgement. (Shigetaka SEKI, METI)	Accepted, consistency will be checked with WG II (inter alia Chapter 19)
1-36	A	1	1	23	35	see general comment attachment 1 in Word format..>>>>>>>>>>>>>>>>The purpose of this covering message is to draw to attention a body of work that was, in the main, communicated to the Secretariat on August 3rd last (Annex 1), but which appears not to have reached the authors of these Chapters. This work is mainly the peer-reviewed output, forthcoming in a Special Issue of Mitigation and Adaptation Strategies for Global Change, of an Expert Workshop to 'address the policy implications of potential abrupt climate change' that was funded	Agreed, will be considered in the rewriting

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						by the Better World Fund of the UN Foundation, and which I convened in Paris at the end of September 2004. Along with an additional paper (Greene et al, 2004) these provide substantiation for the practicability of the Workshop's conclusion, as stated in the Editorial Introduction to the Special Issue (Annex 2: also includes acknowledgements and contents page). Such practicability provides the basis for the first stage of a precautionary holistic strategy that is developed in my publications referenced below. These comprise an initial group dealing with the co-production of woody biomass and conventional timber, a second group that analyses the economic dynamics of proportional instruments for driving policy-desirable innovation, a third group that analyses BECS – Bio-Energy with Carbon Storage – as a negative emissions energy system, prima facie capable of achieving a return to pre-industrial CO2 levels in a few decades, and a final group that develops the science-based holistic strategy. Prima facie, because the basis of peer-reviewed publications to date has been illustrative calculations using plausible parameters for a small set of technologies that could contribute to the achievement of relatively ambitious greenhouse gas reductions (such as may be needed when the thresholds for abrupt climate change come to be better understood) and to the delivery of the multiple benefits (and hence potential international negotiability) of the holistic strategy. Clearly, as outlined towards the end of Annex 2, much further research is needed to establish better scientific certainty of the regional and sectoral aspects of the holistic strategy but, in relation to precautionary policy addressed at potential abrupt climate change under Article 3.3 of the Convention, this should not provide grounds for delay. Given the parallel between the Workshop's conclusion and the Action Plan adopted by G8, I suggest it is appropriate for AR4 to treat the holistic strategy as a framing issue, as defined at Chapter 1, p12, lines 15-18, citing Young (2002), i.e. "policy initiatives into which climate change matters may be tied in a synergistic fashion" . Also, given its prima facie implication that the policy community has been misled in its focus on reducing energy sector emissions rather than managing the carbon cycle holistically, I suggest it is also appropriate to treat it as a cross-cutting issue, or possibly as a special case of "the relationship between mitigation and adaptation and sustainable development". A draft for insertion in either Chapters 1 or 2 at suggested positions is at Annex 3. Also attached for convenience is the submitted draft of my article with A.	

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						Parshotam on the holistic strategy. Reviewers' comments to hand, with one outstanding, indicate the need for substantial presentational changes without challenging the main conclusion. I am hopeful it will be accepted for publication in revised form before the WG3 July citation deadline.<<<<<<<<<<<<< (Peter Read, MASSEY UNIVERSITY)	
1-37	A	1	13			here is a chance to define "major emissions reductions" in a really meaningful way, or even state bounds on emissions reductions that could make sense. If the proposed Kyoto reductions are too small, why doesn't IPCC take the lead and state what is the minimum for sensible reductions? Stated here, IPCC could use these bounds throughout the report (and beyond, presumably) to frame the whole reductions issue (as well as drive mitigation strategies, etc.) and make a huge difference. Without stating the bounds, the global community of emitters (i.e., all of us) is left to define what is meant to be reductions. Result: no standards, and probably only hit and miss reductions. (Michael Ebinger, Atmosphere, Climate & Environmental Dynamics (EES-2))	Agreed to addressing the "too small" issue; this will be discussed in the context of the rewrite of the Article 2 section (IPCC can never take the lead)
1-38	A	1	15			no reference to developing countries needed if no reference to the past. Such a trend is not due only to industrialization, but to improve welfare and eradicate poverty, goals subscribed by MDG (Juan Llanes, Havana University)	Accepted, will be referred to in the discussion on Article 2 ("common but differentiated.....")
1-39	A	1	0			Finally, I see the difficulties of making summary of the chapter since the chapter itself has a nature of summary. I would suggest that this part be carefully drafted once the above mentioned problems in the body part are addressed. (Shigetaka SEKI, METI)	Accepted
1-40	A	2	8			The Executive Summary is hard to read when you have not read the entire chapter. There is a lot of assumed knowledge and implicit assumptions. It is not easy to distill 60+ pages into a few pages, but explaining a few points or themes well is better than trying to be comprehensive. One could also think about reducing the length of the sentences and leave out some of technical terms. Both of these suggestions could make the summary easier to read. (Jensen Jesper, J-Consulting ApS)	Accepted
1-41	A	2	9	2	23	Would be better to refer to article 2 and of the UNFCCC and its meaning in the first para and then not repeat the menaing in the second para. (Kenneth Möllersten, Swedish Energy Agency)	Agreed, will be considered in rewriting
1-42	A	2	9			Prevention of dangerous climate change is an `objective', of the things required by	Rejected because it is not consistent with the

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						the FCCC, not a specific requirement. (Ian Enting, MASCOS)	Convention language
1-43	A	2	9			Executive Summary: The ES does not make clear what Chapter 1 is about -- describing the climate change problem, implementing UNFCCC Art. 2, outlining the WG III report? -- and what its role in the whole WG III report is. (Hans-Martin Fuessel, Stanford University)	Accepted
1-44	A	2	9	2	11	Change "The United Nations Framework Convention on Climate Change (UNFCCC) requires that dangerous climate change be prevented and hence the stabilization of atmospheric greenhouse gas (GHG) concentrations at levels that would achieve this objective. " to "The objective of the United Nations Convention on Climate Change is to avoid dangerous anthropogenic interference with the climate system, which requires the stabilization of atmospheric greenhouse gas (GHG) concentrations at levels that would achieve this objective." This more correctly reflects the wording of Article 2 and also focuses on anthropogenic climate change. Natural climate change, e.g. the onset on the next period of glaciation, could be dangerous, but is not addressed by the UNFCCC. (Lenny Bernstein, L. S. Bernstein & Associates, L.L.C.)	Accepted, with the caveat that “avoid” should be “prevent”
1-45	A	2	9	2	11	This sentence is not a full or accurate paraphrasing of Article 2. A general suggestion for this chapter is that Article 2 should be stated in full and that this chapter provide information to guide the reader to sections of this report, and those of WG1&2 that are relevant to the UNFCCC objectives. (Haroon Kheshgi, ExoonMobil Research and Engineering Company)	Accepted
1-46	A	2	9	2	9	The use of the word "dangerous" is ambiguous (albeit it is the word of the Convention), It is subject to the reader's interpretation as to what is "dangerous"; which in some cases might be nothing thus possibly implying there is no cause for action. Although this concept is further discussed, the inherent issues with the term (other than acknowledging that there are issues with the measures -- food supply and sustainable economic development). The document would be much more succint, and useful, if repetitive sections were eliminated. (Lourdes Maurice, US Government)	Noted
1-47	A	2	9	2	11	Executive Summary. Given the (aforementioned) particular importance of this chapter in terms of its readership, there is therefore a double onus on it to be as coherent, as balanced, as well-argued and as telling as it can possibly be----in my view at least. It is disappointing therefore that the very first sentence in this draft	Accepted

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						contains what amounts to a category mistake: The wording of UNFCCC Art 2 actually requires stabilisation as the first order objective. The words "at a level that will prevent dangerous anthropogenic interference with the climate system" (sic) follow as the qualifier, or metric. The wording in this draft not only reverses this order, but actually misquotes the qualifier---it is not "that dangerous climate change must be prevented" (sic) but, rather, "dangerous anthropogenic interference with the climate system". In my view, these are definitely two different categories; "interference" pre-dates climate change, The need to prevent this is both overwhelming and lexically prior. I suggest it is not helpful to alienate the issue in the first sentence (Pat Finnegan, Grian)	
1-48	A	2	9			Section: Executive summary. L. 23 to 25. I wonder if the IPCC should enter into such type of statement. There is no consensus on what “dangerous interference” means. Perhaps the assessment should focus only whether ecosystems and food production would adapt “naturally” or whether those systems are likely to be threatened (as defined in Art.2 of the UNFCCC) or if the pace of change is already to rapid for the natural adaptation to occur. In this way, scientists would assess whether this component of Article 2 is still relevant or not. Should the threshold for natural adaptation of the ecosystems have been already reached, it would implicitely mean that the “dangerous” interference has already begun. This approach would offer less scope for criticism than mentioning a “convergence in the literature” that is not evident. (Philippe Tulkens, TERI School of Advanced Studies)	Accepted, will be revised
1-49	A	2	9			Quote UNFCCC rather than paraphrase (use quotation marks) (Frédéric Ghersi, CNRS)	Accepted
1-50	A	2	9	2	11	This sentence paraphrases the text of UNFCCC and should be changed to reflect the actual text itself. See Chapter 2 page 66, line 10 for an example. (Nick Campbell (Batch 2), ARKEMA SA)	Accepted
1-51	A	2	11	2	11	What is meant by 'generally 'increasing'? This is very unspecific language. (Kenneth Möllersten, Swedish Energy Agency)	Accepted, more precise language will be used
1-52	A	2	11	2	13	Sentence is unclear, some word seems to be missing; concentrations are projected to continue increase GIVEN? or FOR? a development close to current trends (Kenneth Möllersten, Swedish Energy Agency)	Accepted
1-53	A	2	12			split sentence for readablility	Accepted (part will be rewritten)

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						(Ian Enting, MASCOS)	
1-54	A	2	12	2	13	Change "1.4% annual growth rate over the last 30 years" to 0.4% annual growth rate since 1958." The Mauna Loa data show atmospheric CO2 concentration increasing from 315 ppm in 1958, to 380 ppm in 2004, an average rate of 0.4%/year. Change "are projected to continue." to "Depending on the SRES scenario chosen, these growth rates are expected to continue or increase. (Lenny Bernstein, L. S. Bernstein & Associates, L.L.C.)	First part not accepted as 1.4% refers to the emissions growth rate; second part will be checked with WG I / WG III, chapter 3
1-55	A	2	12	2	13	I do not understand what 1.4 percent refers to? This is not CO2 in the atmosphere. Fix. (Haroon Kheshgi, ExoonMobil Research and Engineering Company)	See comment 1-54
1-56	A	2	12	2	12	Growth rate is wrong. In PPMv it is 0.45% per year over the last 30 years. In WG1 there is a coupled model intercomparison based upon models at 1.00% per year. Because of the linearity of temperature response to percent changes in carbon dioxide, this means that the consensus of climate models is for roughly twice as much warming to occur as will occur in at least the next fifty years. Somewhere WG3 needs to note this, because critics of the report (like me) will take great advantage of this overestimation unless it is noted. (Patrick Michaels, University of Virginia and Cato Institute)	See comment 1-54
1-57	A	2	13			"stabilisation is nowhere in sight" colloquial language apart, isn't the SRES B1 scenario supposed to be void of climate policy? (Richard Tol, Hamburg University)	Agreed, less colloquial language will be used
1-58	A	2	13	2	14	This sentence should give a clearer perspective on emission trends and scenarios than "nowhere in sight". In particular, SRES showed consistency with some CO2 levels for some scenarios for the next century. (Haroon Kheshgi, ExoonMobil Research and Engineering Company)	Agreed, will be checked with WG III, chapter 3
1-59	A	2	13	2	14	Sentence uses emotive language not in keeping with IPCC. Would suggest deletion as the text can be implied from the previous sentence. (Nick Campbell (Batch 2), ARKEMA SA)	Agreed
1-60	A	2	13	2	14	Replace sentence with "Although, it has seemed that, without major emissions reductions, stabilzation is nowhere in sight, a recently proposed holistic strategy that focuses on sustainable development through managing the whole carbon cycle, rather than simply on reducing energy sector emissions, may offer better prospects". (Peter Read, MASSEY UNIVERSITY)	See answer to 1-59

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1-61	A	2	13			after "reductions" insert "and/or increases in biotic fixation, hereafter referred to as 'reductions in net emissions' " (Peter Read, MASSEY UNIVERSITY)	Rejected, because it would require additional text, and is then beyond the chapter scope
1-62	A	2	14	2	17	Given the concerns expressed about conventional oil resource availability highlighted in Chapters 4 and 5, the peak oil problem etc., is it not worth qualifying the reference to global energy supply projected to grow? (Michael Jefferson, World Renewable Energy Network/Congresses)	Accepted, will be discussed in the body of the SOD chapter (trends section)
1-63	A	2	14	2	14	Energy demand is indeed a driver, but one may have doubts whether energy supply is a driver. Supply is a source that responds to drivers. (Kenneth Möllersten, Swedish Energy Agency)	Agreed
1-64	A	2	14			Global fossil energy supply results in GHG emissions, but the underlying drivers are things like demographic effects, end-use efficiency trends, income & wealth effects, shift in fuel mix, etc. (see also section 1.3.3) (Anne Arquit Niederberger, Policy Solutions)	Agreed
1-65	A	2	15	2	17	Delete "Regional differentiation is important - economic development needs, resource endowments and capacities - mitigative and adaptive - are too different across regions for a one-size fits all approach." It is not clear what regional differentiation is important for or what a one-size fits all approach is. It implies that there is no common ground for an international climate regime, which is not the case. (Anne Arquit Niederberger, Policy Solutions)	Rejected but more regional specificity in the trends sections
1-66	A	2	15	1	24	This paragraph misses what Article 2 actually says, namely, that the goal is to stabilize GHG concentrations at a level that prevents DAI. Thus, it is clear that "interference" is defined at the point of concentrations in the long cause-effect chain, not at the point of temperature change. A 2-C temperature change is dangerous temperature change, while GHG concentrations that have a non-neglible risk of provoking a 2 C temperature change are what constitute dangerous interference in the climate system. Given that the climate sensitivity to the radiative forcing of a CO2 doubling could be 4 C or larger (at least 10% odds), and given the convergence in the literature the 2 C is dangerous warming, it follows immediately that CURRENT concentrations constitute DAI because the current GHG forcing is already 2.5+-0.5 W/m2 while that for a CO2 doubling is about 3.7 W/m2. However, by simply shifting the definition of "interference" from concentrations (as in Article 2) to "temperature change", this fundamentally important point is lost!	Taken into account, will be ensured that the A 2 discussion includes the relevance of this interpretation

hapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						In fact, I don't think that this point - perhaps the single most important point following from all the work done by WGs I and II, is made anywhere in the entire 1200 page WG III report! (Danny Harvey, University of Toronto)	
1-67	A	2	16	2	16	In order to improve the readability the following wording is proposed: Regional differentiation is important - economic development needs, resource endowments and mitigative and adaptive capacities are too different across regions or one-size fits all approach. (Radunsky Klaus, Umweltbundesamt)	Issue will be taken into account in the SOD section on regional trends
1-68	A	2	19	2	19	Insert "anthropogenic" between dangerous and interference. If you are going to quote Article 2, do it correctly. (Lenny Bernstein, L. S. Bernstein & Associates, L.L.C.)	Accepted
1-69	A	2	19	2	21	This sentence paraphrases the text of UNFCCC and should be changed to reflect the actual text itself. Furthermore, why are the two issues chosen following the words "….. such as …"? (Nick Campbell (Batch 2), ARKEMA SA)	Will be taken into account in rewriting
1-70	A	2	21			Article 2 does not state that 'sustainable economic development' should be 'unimpeded', it states that economic development should be enabled to 'proceed in a sustainable manner'. The phrasing is too strong and could be understood as 'climate mitigation must not impact economic development'. (Frédéric Ghersi, CNRS)	Will be taken into account in rewriting
1-71	A	2	22			This seems to be confusing the concept of "risk". What we have is a risk of particular levels of dangerous interference. (I.e risk = impact x probability) (Ian Enting, MASCOS)	Will be taken into account in rewriting
1-72	A	2	22	2	22	Insert "anthropogenic" between dangerous and interference. If you are going to quote Article 2, do it correctly. (Lenny Bernstein, L. S. Bernstein & Associates, L.L.C.)	Will be taken into account in rewriting
1-73	A	2	23			There is very little convergence in the literature on the appropriate long-term target; there is convergence only in subsets of the literature; see Tol (forthcoming, Energy Policy) (Richard Tol, Hamburg University)	Will be taken into account in rewriting
1-74	A	2	23	2	25	lacks consistency between ranges and limits for "dangerous" (Ian Enting, MASCOS)	Will be taken into account in rewriting
1-75	A	2	23	2	25	Delete the sentence "There seems to be a convergence in the literature …" It is	Will be taken into account in rewriting

hapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						beyond the scope of WG III to make comments on what constitutes "dangerous anthropogenic interference." WG II is charged with assessing impacts and vulnerability. It would be appropriate to refer the reader to their contribution. (Lenny Bernstein, L. S. Bernstein & Associates, L.L.C.)	
1-76	A	2	23	2	25	Although there are the literatures and statements that argue 2degC as the upper limit, there is no convergence in the literature towards an upper limit of 2degC increase. I think that the dangerous level of temperature rise should be discussed as social and political problems and the judgement on the level is not the role of IPCC. Therefore, this sentence is not appropriate for this report and should be deleted. (Fuminori Sano, Research Institute of Innovative Technology for the Earth)	Will be taken into account in rewriting
1-77	A	2	23			Suggest to drop the sentence on "a convergence in the literature towards an upper limit of 2 degrees". No evidence is provided regarding such a convergence and it can be policy priscriptive since a "dangerous level" is to be determined by a political judgement. (Koji Kadono, Global Industrial and Social Progress Research Institute)	Will be taken into account in rewriting
1-78	A	2	23	2	25	WGIII claims (Chapter 1, page 4, line 22) that WGII supports a figure of 2ºC for DAI, however, WG II FOD is not conclusive on that point. It is concluded that the WGIII FOD is overstretching and indicating a dangerous temperature threshold (2ºC). (Spencer Edwards, Australian Greenhouse Office)	Will be taken into account in rewriting
1-79	A	2	23	2	25	Tol (2006, "Avoiding Dangerous Climate Change") argue that the aggregated harm or injury cannot be defined although an individual harm or injury can be defined, and that it may be impossible to agree on dangerous interference although perhaps it is possible to agree on climate policy. This is true. The description of "... to be a convergence in the literature towards an upper limit of 2degC increase in global mean temperature above pre-industrial levels ..." is an inappropriate one for the IPCC report, whose role does not agree on a climate policy. There is no convergence in the literature towards an upper limit of 2degC increase. This sentence should be deleted. (Keigo Akimoto, Resaerch Institute of Innovative Technology for the Earth (RITE))	Will be taken into account in rewriting
1-80	A	2	23			Comments about convergence in literature concerning a 2 degree limit (a) belong in WGII, and (b) should be better documented (See next point). Is this convergence political or scientific? From preceding sentence, seems political? Does this	Will be taken into account in rewriting

hapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						perspective exist in the U.S. literature? (William Pizer, Resources for the Future)	
1-81	A	2	25	2	25	To improve clarity it is proposed to delete either "but lower and higher temperature values have been argued as well" or "lower and". (Radunsky Klaus, Umweltbundesamt)	Rejected, because literature shows higher and lower temperatures
1-82	A	2	26			There are a number of papers that argue that the Kyoto Protocol stands in the way of effective climate policy. (Richard Tol, Hamburg University)	Will be taken into account by referring in the chapter to the debate in literature on the most appropriate policy instruments (see Ch 13)
1-83	A	2	26	2	27	Statement that "The entry into force of the Kyoto Protocol in February 2005 marks a first, though modest step, towards the implementation of Article 2". This statement fails to take into account the significant mitigation efforts already being implemented by Parties under the UN Framework Convention on Climate Change and the plethora of national mitigation measures that have been underway in a host of countries for many years. (Spencer Edwards, Australian Greenhouse Office)	Will be taken into account in the body of the chapter
1-84	A	2	27	2	28	It should be stated clearly that the commitments to date are inadequate to achieve the ultimate objective of the Convention, which is stabilization of atmospheric concentrations. (Anne Arquit Niederberger, Policy Solutions)	Accepted
1-85	A	2	27	2	34	State the amount of warming that the Protocol would prevent if fully enacted to show what an irrelevant instrument it is. As given by Wigley et al. (1998, Geophysical Research Letters), the reduction in temperature is 0.07 degrees per fifty years. (Patrick Michaels, University of Virginia and Cato Institute)	Rejected, because the calculation is not relevant (and this discussion is beyond the scope of the chapter)
1-86	A	2	27	2	27	The word "modest" is very subjective. (Nick Campbell (Batch 2), ARKEMA SA)	See 1-83
1-87	A	2	28	2	28	The words "…...will still be far from…." are very subjective and emotive. (Nick Campbell (Batch 2), ARKEMA SA)	See 1-83
1-88	A	2	29	2	30	"energy intensities" should be defined at first use (Ian Enting, MASCOS)	See glossary
1-89	A	2	30	2	34	What challenge does the reversal of emissions trends confront specifically in relation to ACC and climate irreversability? The risk of ACC and irreversability are rather to be considered when defining a 'safe level'. (Kenneth Möllersten, Swedish Energy Agency)	Noted, will be taken into account in redrafting

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1-90	A	2	30	2	34	This is an extremely confusing sentence. The Article 2 referred to earlier in the Executive Summary is Article 2 of the UNFCCC, which says nothing about sustainable development, equity or any of the other conditions mentioned in the sentence. Article 2 of the Kyoto Protocol refers to some, but not all, of the conditions mentioned in the sentence. Not being able to understand the intent of the sentence, it is not possible to suggest a rewrite. (Lenny Bernstein, L. S. Bernstein & Associates, L.L.C.)	Accepted
1-91	A	2	30	2	30	Suggest removing "and decarbonization". Recent trends and projections of IEA show an increase in C/PE. (Haroon Kheshgi, ExoonMobil Research and Engineering Company)	Noted, will be taken into account in rewriting
1-92	A	2	30			before "emissions" insert "net" (Peter Read, MASSEY UNIVERSITY)	Rejected, see comment to 1-61
1-93	A	2	31			before "emissions" insert "net" (Peter Read, MASSEY UNIVERSITY)	Rejected, see comment to 1-61
1-94	A	2	36	2	37	"inseparable" is a desirable objective, not a statement of fact. (mitigation could occur in a non-sustainable way). the above sort of "disconnect" occurs frequently in the chapter, with outcomes desired by the authors being stated as facts. (Ian Enting, MASCOS)	Accepted
1-95	A	2	36	2	37	Change this sentence to the sentence that appears on Pg. 7, lines 46-47, "Climate change mitigation is part and parcel of sustainable development and the two are mutually reinforcing." It is simplistic to say that climate change mitigation and sustainable development are inseparable. The sustainable development characteristics of mitigation technologies and practices have to be evaluated on a case-by-case basis. For example, more energy efficient production will reduce the cost of goods, as well as reducing CO2 emissions. As has been demonstrated in both theory and practice, lowering the cost goods leads to more consumption. This increased consumption could be sustainable, if it is used for poverty alleviation, or unsustainable, if it only leads to increased waste. Chapter 12 on sustainable development makes this point clearly in its Executive Summary, Page 12-3, lines 22-25. (Lenny Bernstein, L. S. Bernstein & Associates, L.L.C.)	Noted, relevant section will be redrafted
1-96	A	2	36	2	39	"Sustainable development" has different meaning to different people/societies. What constitutes sustainable development in the context of this report? (Lourdes Maurice, US Government)	Rejected, see chapter 12

hapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
1-97	A	2	36	2	37	There are three issues in this sentence, CC, SD and MDG, which 2 are reinforcing? (Nick Campbell (Batch 2), ARKEMA SA)	Accepted, section will be redrafted
1-98	A	2	37	2	37	Is the statement "climate change exacerbates poverty" supported by literature ? The opposite has been argued by Henderson in the literature. (Nick Campbell (Batch 2), ARKEMA SA)	Accepted, literature will be checked
1-99	A	2	38			"mainstreaming" is jargon (Ian Enting, MASCOS)	Accepted, will be defined in glossary
1-100	A	2	45			"F gases" should be defined at first use (Ian Enting, MASCOS)	Accepted, will be defined in glossary
1-101	A	2	45	2	45	The term "F-gases" has no place in a scientific document. It is imprecise, ambiguous (see later where it is used in this report for materials that are not normally regarded as "F-gases". It was coined in Europe to encompass HFCs, PFCs and SF6. It does not include CFCs and HCFCs; these are ODS (Ozone Depleting Substances). The correct description would be "fluorochemical greenhouse gases" which is unambiguous and not imprecise jargon but if you must use "F-gases" the definition should be included in the Glossary and the reader referred to that in a footnote. (Nick Campbell, ARKEMA SA)	Accepted, will be defined in glossary
1-102	A	2	51	2	53	Change "The United Nations Framework Convention on Climate Change (UNFCCC) requires the prevention of dangerous climate change with this being achieved through the stabilization of atmospheric greenhouse gas (GHG) concentrations. " to "The objective of the United Nations Convention on Climate Change is to avoid dangerous anthropogenic interference with the climate system, which requires the stabilization of atmospheric greenhouse gas (GHG) concentrations at levels that would achieve this objective." This more correctly reflects the wording of Article 2 and also focuses on anthropogenic climate change. Natural climate change, e.g. the onset on the next period of glaciation, could be dangerous, but is not addressed by the UNFCCC. (Lenny Bernstein, L. S. Bernstein & Associates, L.L.C.)	Accepted, with the caveat that “avoid” will be replaced by “prevent”
1-103	A	2	51	2	53	This sentence paraphrases the text of UNFCCC and should be changed to reflect the actual text itself. As a minimum the word "requires" probably should be changed. (Nick Campbell (Batch 2), ARKEMA SA)	Accepted
1-104	A	2	52	2	52	The use of the word "dangerous" is confusing. It lacks an associated quantity and is	Rejected, official language is referred to

hapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						subject to interpretation. (Lourdes Maurice, US Government)	
1-105	A	2	53			What does "harmonizing co-evolution" mean? Why are humans ignored? (Richard Tol, Hamburg University)	Noted, will be reworded
1-106	A	2	53			replace the word "means" by something more appropriate (implies, requires, etc depending on what the authors actually intend -- this is not a definition of stabilization) (Ian Enting, MASCOS)	Accepted, will be considered in rewriting
1-107	A	2	53	2	55	(Please note that the Excel file used to report the macros does not allow entering line numbers above 55. Hence, whenever line number 55 is used, the authors should assume that a comment also refers to text with line numbers above 55.) The system description is confusing. GHG are not emitted by the biosphere (in its normal meaning) but by the anthoposphere, which together with the "ecosphere" and the "global subject" forms the Earth system (Schellnhuber & Wenzel, Earth System Analysis, 1998 (Hans-Martin Fuessel, Stanford University)	Noted, the correct wording will be checked
1-108	A	2	53	3	10	In practice, stabilization requires that net emissions of long-lived GHG be reduced to near zero. (Wigley, T.M.L.,R. Richels and J. Edmonds, 1996: Economic and environmental choices in the stabilization of atmospheric CO2 concentrations. Nature, 379: 240-243.) Since this report is about mitigation, this section would be far more understandable if it focused on the mitigation challenge, which is to reduce GHG emissions to near zero in the long term. (Lenny Bernstein, L. S. Bernstein & Associates, L.L.C.)	Accepted
1-109	A	2	53	2	55	Section 1.1 The idea that the climate system is composed of 2 subsystems---the physical climate subsystem and the biosphere subsystem is a totally new one to me. I suspect I am not alone. Subsequent (attempted) clarification of the composition of the biospheric subsystem while omitting clarification of just what exactly comprises the "physical climate subsystem" does not furnish any further overall clarity. At a minimum, a reference is needed. That said---and nevertheless---the framework as described appears to be thoroughly at odds with the description of the climate system as provided in TAR (WG1 1.1.2 p.87). If the definition has since been changed by WG1 for the purposes of AR4, then this obviously needs referencing. (Pat Finnegan, Grian)	Accepted

hapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
1-110	A	2	54			insert "some" before "have" (Danny Harvey, University of Toronto)	Accepted, will be considered in rewriting
1-111	A	2	54	2	55	It is strange that the biosphere subsystem should include also the socio-economic subsytem. Other subchapters of the report use those terms in a different meaning (see subchapter 1.5.6, page 11, line 5, or subchapter 2.2.2 on page 7, line 49). (Radunsky Klaus, Umweltbundesamt)	Accepted, will be considered in rewriting
1-112	A	2	55			Rewrite as "The respons of the climate system to …." (Danny Harvey, University of Toronto)	Accepted, will be considered in rewriting
1-113	A	2	55			insert "decades to" before "centuries" (Danny Harvey, University of Toronto)	Accepted, will be considered in rewriting
1-114	A	2	0	17		This Introduction does not do justice to the rest of the report. Clearly, the text has been written by individuals, with resulting jumps in content (as well as presentation). It is full of jargon, which might be acceptable in the bodies of the Chapters, but has no place in an introduction, where it simply serves to confuse. The Executive Summary bears little relationship to the rest of the text. The chapter needs to be rewritten, with a very clear focus on what the reader will want, not on what the authors wish to tutorialise about. (Nick Campbell, ARKEMA SA)	Noted, will be considered in rewriting
1-115	A	3	4	3	10	This whole sentence was hard to comprehend. (Kenneth Möllersten, Swedish Energy Agency)	Accepted, will be considered in rewriting
1-116	A	3	5	3	6	please add to 'drastic emission reductions' 'and thus reduction in use of fossil energy' (Manfred Treber, Germanwatch)	Rejected, the issue is “emission reductions”, not how
1-117	A	3	5	3	5	The word "drastic" seems very subjective. (Nick Campbell (Batch 2), ARKEMA SA)	Rejected, drastic is considered the appropriate term
1-118	A	3	5			replace "emissions reductions" with "reductions in net emissions" (Peter Read, MASSEY UNIVERSITY)	Rejected, see above
1-119	A	3	6	3	7	the terminology 'climate and non-climate relevant behaviour' need an explanation. (Kenneth Möllersten, Swedish Energy Agency)	Noted
1-120	A	3	6	3	7	Logical contradiction: If behaviour influences GHG emissions, it is by definition "climate relevant". (Hans-Martin Fuessel, Stanford University)	Noted
1-121	A	3	6	3	10	needs rephrasing and explanation of "capital stocks". ""Achieving this quickly (time scale of decades) requires rapid changes of both climate and non-climate	Accepted, needs rephrasing (related to glossary issues)

hapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						relevant behaviors laden with cultural significance (Shove et al., 1998); of capital stocks which are costly (socio-economic inertia), if only because of their interactions with the technological sub-systems affected by the need to replace carbon emitting technologies with cleaner and climate friendly technologies (technological inertia) (IPCC, 2001)."" (Robbert Misdorp, PUM)	
1-122	A	3	7			"of capital .." is gramatically disconnected from anything. (Ian Enting, MASCOS)	Noted
1-123	A	3	7			"capital stocks are costly" what does this mean? (Richard Tol, Hamburg University)	Noted
1-124	A	3	8	3	8	What is meant by socio-economic inertia? Specifically, what constitutes socio-economic in the context of this report? (Lourdes Maurice, US Government)	Rejected, accepted language
1-125	A	3	12	3	44	Section 1.2.1 is biased in favour of an interpretation of Article 2 in terms of making sure that whatever emission reductions are undertaken do not impede economic growth. First, no discussion of ecosystem impacts is found in the paragraph elaborating on the 3 conditions in article 2, second, "enabling" becomes "unimpeded", and 3rd, "sustainable economic development" becomes transformed into simply "economic development". SInce Article 3 has 3 conditions, a balanced discussion would provide roughly equal weight in the elaboration of all 3 conditions, rather than dropping the first (ecosystems) altogther. Second, Article 2 states "to enable economic development to proceed in a sustainable manner", but somehow this gets broken into two separate conditions, one of which is simply to enable economic development. Then, there is a sudden jump, with no justifcation, from climatic change hindering economic development, to efforts to limit climatic change (mitigation) hindering economic development. This section should stick to what Article 2 says, and not try to transform it into something else that serves purely economic interests. It is quite clear that climatic change itself is a major threat to sustainable socio-economic systems (see WG II), and Article 2 is quite clear in saying that GHG concentrations should be kept below levels that threaten sustainable socio-economic systems (which most parts of the world, including so-called "developed" countries, have yet to achieve), as well as being kept below levels that threaten ecosystems and food production. Thus, this whole section should be re-written in a more balanced, showing the consistency between the three conditions.	Accepted

hapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						(Danny Harvey, University of Toronto)	
1-126	A	3	12			A general comment on the Art2 section is that it tends to drift into interpretation of Art2, and its own assessment of the issues. As an introductory chapter it is important that this chapter aids the reader to those chapters relevant to the various issues of Art2, and not present an alternate assessment of those issues. It may also be helpful to include a figure or table that links or lists relevant issues and where they may be found in the 3 WG reports. (Haroon Kheshgi, ExoonMobil Research and Engineering Company)	Rejected, no specific assessment done. The idea of the table may be worth to pursue
1-127	A	3	12	5	21	section 1.2 only discusses art 2 itself, some of the suggested interpretations of what is dangerous and some limited observations regarding timing and the relation between mitigation and adaptation. That is not very comprehensive. There are many other relevant issues that play a role in applying art 2 on the mitigation question that deserve discussion in ch 1, such as development vs sustainable development, distributional issues, inertia and social change, differences and similarities between adaptation and mitigation (see also TS draft), global cooperation, uncertainty. So strongly suggest to elaborate this section and integrate other elements here that are now coveredd in section 1.5 or 1.7. It is important to refer to chapter 19 of WG II and focus on the mitigation aspects. (Bert Metz, IPCC)	Accepted
1-128	A	3	21		23	Inconsistency about times." Within" implies some upper limit on the time, while "sufficient for adaptation" implies a lower limit on the time , I.e. change slow enough to allow adaptation. (Ian Enting, MASCOS)	Rejected, Convention language
1-129	A	3	29			Same comment as above 1-2-21 (Frédéric Ghersi, CNRS)	Agreed
1-130	A	3	29	3	30	Why are only two of the three criteria in the extra sentences listed here? (Paul Baer, Stanford University)	Accepted, will be considered in rewriting
1-131	A	3	30	3	34	As alluded to above, this paragraph makes leaps in reasoning that have no logical basis. What you can (and perhaps should) do is point that, in order to comply with the 3 conditions in Article 3, mitigation measures may have to have to be taken so rapidly that there could be great cost to the world economy, and therefore, it is important to begin as early as possible in order to minimize these costs. (Danny Harvey, University of Toronto)	Rejected, statement as such is not always correct
1-132	A	3	31			what is missing here is a more in-depth discussion on the issue of local vs global	Partially accepted (linked to WG 2, Ch 19

hapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						impacts/ vulnerabilty, in other words, what is the literature saying about this? (Bert Metz, IPCC)	etc.)
1-133	A	3	34	3	37	I do not see how the statement that any "climate change that adversely affects economic development" would violate the sustainable development criterion of Art.2. In fact, the main difficulty in interpreting Art.2 is to establish at which scale it is relevant (community, national, global, ...) and what level of impacts (of climate change or climate policy) would violate one of the interrelated provisions. (Hans-Martin Fuessel, Stanford University)	Agreed
1-134	A	3	34	3	37	It is certainly the case that to satisfy Article 2 mitigation measures should ensure economic development to proceed in a sustainable manner in ensuring climate change is not too costly and in ensuring that they are not too costly either. But if one is to distinguish two criteria here, one related to economic development only, the other related to "economic development in a sustainable manner", it seems that it might be the very costly mitigation measures that could violate the first criterion, and unsufficient climate mitigation that could wiolate the second criterion - and not the reverse, as the text suggests. The reason for that is that mitigation measures will have immediate and short term costs, while climate damages are more likely to be long term, so the "sustainability" criterion relates to damages more than to measures. (Cédric Philibert, International Energy Agency)	Noted, will be rewritten in a balanced way
1-135	A	3	34	3	37	Article 2 does not make reference to criteria for sustainable development. It refers to stabilization of atmospheric concentrations at a safe level WITHIN A TIMEFRAME that would "enable economic development to proceed in a sustainable manner". The statement in AR4 that Art. 2 "sustainable development criteria" are not met, if climate change adversely affects economic development has no foundation in the text. Economic development can proceed in a sustainable manner, while still suffering some adverse climate impacts. (Anne Arquit Niederberger, Policy Solutions)	Rejected, but reference added
1-136	A	3	34	3	37	GHG mitigation policies should drive innovations that reduce energy and capital intensity of industry, while stimulating economic activity. It is recognized that increased economic activity may result in increased energy usage; however, GHG mitigation policies should favor low-carbon emissions so that the economic stimulation results in lower overall carbon emissions. (James Bero, BASF Corporation)	Rejected, capital intensity reduction does not imply reducing emissions

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1-137	A	3	34	3	37	This paragraph is quite puzzling. (1) The two criteria are not for 'sustainable development' to satisfy (??), but rather economic criteria for stabilization. (2) The cutting in half of 'enable economic development to proceed in a sustainable manner' is very debatable--arguably, it should rather be understood as 'enable sustainable economic development to proceed'. The political consequences are the same as those commented about 1-2-21 and 1-3-29, i.e. tending to reject any policy that would have some impact on economic growth. Article 2 does definitely not say 'should not impact on economic growth' !!, the whole mitigation debate being precisely on a trading off between economic costs of mitigation, adaptation and laisser-faire (3) The 'example' starting at the end of line 36 does not seem to make sense: there is very little connection, if any, between the 'very costly' nature of a mitigation policy (compared to what?) and its sustainability. (Frédéric Ghersi, CNRS)	Agreed
1-138	A	3	34	3	38	not clear (Marco Mazzotti, Institute of Process Engineering)	Rejected, not clear why
1-139	A	3	35			The first criterion is part of the second. (Richard Tol, Hamburg University)	Agreed
1-140	A	3	35	3	50	The report is not precise enough as to definitions of the concept of sustainable development. The common definition is Brundtland's, where the report says 'to enable economic development' and '(…) to proceed in a sustainable manner'. Which is still unclear. Why not use the common idea of three objectives people, planet, profit that have to be balanced, realising that these objectives can be conflicting to some extent, and can be conflicting on the longer and shorter term. Furthermore, it is not clear what is meant by 'economic development': are we talking about the narrow concept of GDP growth or income growth? Or is a broader welfare economics perspective being used, the idea of 'satisfaction to be derived from the use of scarce goods', which includes loss of human capital, nature and so on. This is highly relevant when it comes to analysing whether certain objectives (people, planet, profit where 'economic development' seems to refer to 'profit') in a specific case are compatible or conflicting. (Jan Paul van Soest, Advies voor Duurzaamheid on request of International Gas Union)	Rejected, there is no and will not be a unique definition
1-141	A	3	35			repitition of " to enable economic development" is confusing: suggest "and second for it "to proceed in a sustainable manner" " (Peter Read, MASSEY UNIVERSITY)	Agreed

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1-142	A	3	36			very strong assumptions, (any literature on this assumption?). Climate change affects already SD? (Juan Llanes, Havana University)	Agreed, add references
1-143	A	3	41			"naturally" : almost all ecosystem adjustment will be by natural responses -- what matters is what type of adjustment (Ian Enting, MASCOS)	Agreed, add references
1-144	A	3	43	3	48	Section 1.2.1 The second sentence proposes that Art 2 could be defined by "either….climate system". But no alternative ("or") is proposed. Yet the next sentence starts "Either way….". What is the other way ?? (Pat Finnegan, Grian)	Agreed, will be considered in rewriting (add reference to Ch 13)
1-145	A	3	43	3	48	The first sentence of the paragraph seems to equate 'dangerous interference with the climate system' to threatening food production and sustainable economic development, whereas article 2 seems to differentiate them--on the one hand a criterion placed on the level of stabilization to be aimed at, on the other hand a criterion on the pace at which this stabilization should be achieved. It should be left to section 1.1.2 to define 'dangerous interference with the climate'. This remark questions the rest of the paragraph (unclear, esp. the 'either' at the beginning of line 46?). (Frédéric Ghersi, CNRS)	Noted, picked up in redrafting
1-146	A	3	44	3	46	"concentration" is not a "climatic target". The "or" part of the "either" statement is missing. (Hans-Martin Fuessel, Stanford University)	Noted, picked up in redrafting
1-147	A	3	44	3	46	Statement is and either-or without the or. Reconstruct the sentence to be more grammatically sound. (Michael Ebinger, Atmosphere, Climate, & Environmental Dynamics (EES-2))	Noted, picked up in redrafting
1-148	A	3	45	3	45	One would expect this 'either' to be followed by an 'or'. (Kenneth Möllersten, Swedish Energy Agency)	Noted, picked up in redrafting
1-149	A	3	45	3	45	please add after 'climatic target, such as 'maximum tolerable warming or' and continue 'concentration stabilisation' (Manfred Treber, Germanwatch)	Noted, picked up in redrafting
1-150	A	3	45	3	45	There is an "either" in the sentence, but where is the "or"? (Cédric Philibert, International Energy Agency)	Noted, picked up in redrafting
1-151	A	3	45			"either" not followed by an "or" . Suggest "either by some climate target that is deemed to be non-dangerous (and which would definitionally preclude abrupt	Noted, picked up in redrafting

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						changes) or by concentration at a certain level which is deemed to prevent dangerous interference with the climate system (but which, in the absence of better information about abrupt climate change mechanisms and thresholds, might not preclude such abrupt change)." (Peter Read, MASSEY UNIVERSITY)	
1-152	A	3	46			What does "either way" refer to? (Anne Arquit Niederberger, Policy Solutions)	Noted, picked up in redrafting
1-153	A	3	46	4	45	As indicated in my comment on the Executive summary (pg 2), DAI involves CONCENTRATIONS that run the risk of dangerous climatic change, rather than being dangerous climatic change itself. Of course, one has to know what levels of climatic change are dangerous (that is, possibly harmful), and I agree that 1-2 C is the likely threshold. Dangerous concentrations (i.e, DAI) are concentrations that have a non-negligible possibility of provoking dangerous climatic change. Since the climate sensitivity has anywhre from a 10-30% change of being 4 C or larger, it immediately follows that current GHG concentrations represent DAI. This crucially important points are missing altogether because you have equated DAI with dangerous climatic change rather than dangerous concentrations. (Danny Harvey, University of Toronto)	Rejected, this is just one interpretation
1-154	A	3	46			The sentence ending with "….climate system" needs to continue with " or ……; sentence is not complete now (Bert Metz, IPCC)	Noted, picked up in redrafting
1-155	A	3	50	4	49	The executive summary states that the decision is necessarily a political one. This judgement is not at all reflected in this discussion conserning scientific vs 'political' views. (Kenneth Möllersten, Swedish Energy Agency)	Rejected, has been made clear in the existing text
1-156	A	3	50			It seems to me that "dangerous" needs to be evaluated from the perspective of the most vulnerable parts of the population, which are least able to adapt and that therefore there is a need to involve marginalized voices in its determination (see p. 8, lines 18-20). There is plenty of literature on this topic. (Anne Arquit Niederberger, Policy Solutions)	Noted, picked up in redrafting (part of the literature)
1-157	A	3	52	4	12	This paragraph is difficult to follow. Many different terms are used, but not distinguished: dangerous, vulnerability, unacceptable impacts. Also, the discussion of external vs. internal, top-down vs. bottom-up and expert vs. individual or institutional is not clear.	Accepted, picked up in redrafting

hapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						(Anne Arquit Niederberger, Policy Solutions)	
1-158	A	3	52	4	12	delete paragraph as it detracts from what follows (Stephen Perkins, European Conference of Ministers of Transport (ECMT))	Rejected, thought to be important for the description of Article 2
1-159	A	3	53	3	53	Why the concept danger is not automatically perceived as such? For the uncertainty of danger. To include a note? (FÉLIX HERNÁNDEZ, IEG-CSIC)	Rejected, “danger” is a social construct
1-160	A	3	0			figure 1: It would be welcome if this figure would include also more recent emission data (until 2003?). Furthermore it seems strange that the figure for "Other" ends in the year 1995. (Radunsky Klaus, Umweltbundesamt)	Accepted
1-161	A	4	7			"methodologies" This seems to be confusing the objects of the study with the techniques used. (Ian Enting, MASCOS)	Will be picked up in redrafting (techniques is a wrong definition)
1-162	A	4	7			insert "sustainable" before "economic" (Danny Harvey, University of Toronto)	Noted, picked up in redrafting
1-163	A	4	9			Continuing confusion between the criteria on the level of stabilization, and the criteria on the pace of stabilization. They should be more clearly distinguished when interpreting Art. 2, even if it is to conclude that they very significantly overlap--although 'dnagerous inteferences' might be broader than the three requirements on the pace of sabilization. The first paragraph of section 1.1.2 would be the place for that. (Frédéric Ghersi, CNRS)	Agreed, picked up in redrafting
1-164	A	4	15	4	23	WG II, Chapter 19 of the TAR was careful not to make sweeping conclusions as are presented in this section. It defined a small temperature rise as up to 2 C. The systems most sensitive to climate change were unique and threatened ecosystems, such as tropical glaciers, coral reefs etc. In its Executive Summary, the Chapter said "There is medium confidence that several of these systems will be affected by small temperature increase ..." Several is not many. Similar language was included in WG II's SPM and in the TAR Synthesis Report. It would be more appropriate to quote the TAR than to rewrite its conclusions. (Lenny Bernstein, L. S. Bernstein & Associates, L.L.C.)	Rejected, chapter will be working with WG II AR4 conclusions
1-165	A	4	15	4	25	This section might best be served discussing not only WG2 Ch. 19 but also WG2 Chapter 4 which contains an extensive amount of information on what happens at different temperature thresholds. Chapter 19 deals mostly with key vulnerabilities	Accepted

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						yet the material in Ch. 4 shows that siginificant anthropogenic influence occurs in other systems as well. (Jeff Price, California State University, Chico)	
1-166	A	4	15			References to dangerous temperature change should be better documented. The comment about 1 degree warming makes no sense--it talks about the possibility of "rapid" responses without considering the time over which the 1 degree warming occurs. (William Pizer, Resources for the Future)	Partly accepted, references will be added
1-167	A	4	19	4	20	I quite agree with this sentence that points out the great risk from climate change by rising above 2-degrees because it is evaluated accurately from the viewpoint of current scientific knowledge. The papers below evaluate to be important to stay below 2 degrees. See two papers. - Kriegler, E., 2005: Imprecise probability analysis for integrated assessment of climate change.University of Potsdam, Germany. - EU, European Union: 2005, Communication from the Commission to the Council, the European Parliament, the European Economic and Social Committee and the Committee of the Regions, COM(2005) 35 final. (Masatake Uezono, Citizens' Alliance for saving the Atmosphere and the Earth)	Noted
1-168	A	4	20	4	23	Although I do now know the descriptions in Chapter 19 WG II, this description should be revised discretely, as described the above cell. (Fuminori Sano, Research Institute of Innovative Technology for the Earth)	Rejected, not clear what is meant
1-169	A	4	20	4	21	The authors should look at Burkett et al 2005 article in Ecological Complexity for many examples of potential nonlinear impacts to ecosystems. I can provide a PDF on request. (Jeff Price, California State University, Chico)	Agreed (Bill Hare has the pdf)
1-170	A	4	20	4	23	I am not a reviewer for the WGII, and therefore do not know the descriptions in Chapter 19 WGII. However, as described above, the upper limit of aggregated harm or injury cannot be defined. In addition, there is almost no literature to show the threshold for some of the catastrophic and discontinuous events, i.e., THC, WAIS, at 2degC limit from pre-industrial levels excluding some authors' value judgments. The description of "A 2degC increase was determined to be an upper limit beyond which the risks of grave damage to ecosystems, … (see Chapter 19 WGII AR4) ..." should be revised cautiously. (Keigo Akimoto, Resaerch Institute of Innovative Technology for the Earth	Noted, picked up in redrafting, will be checked with WG II, chapter 19

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						(RITE))	
1-171	A	4	20		25	Rather than a specific CO2 level as a threshold, the trigger could be rates of change and the multiple changes occurring in the components of the climate system. See: Epstein PR, McCarthy JJ. Assessing Climate Stability. Bulletin of the American Meteorological Society. December 2004;1863-1870. (Paul Epstein, Harvard Medical School)	Accepted
1-172	A	4	21	4	22	Citing another WG as seen here ("see Chapter 19 WGII AR4") is inappropriate because the mentioned chapter is currently being reviewed and not yet completed. Thus, suggest to drop the first part of the sentence starting with "Research since that time---". (Koji Kadono, Global Industrial and Social Progress Research Institute)	Rejected, will be (continuously) checked
1-173	A	4	22			It is of course acceptable to refer to Chapter 19, WG2; but the authors of this chapter should be aware that that chapter got severely clobbered in review for being exceedingly alarmist. (Richard Tol, Hamburg University)	Noted, will be checked with Ch 19 WG II
1-174	A	4	23	4	25	The use of a single reference (that was already used in the TAR) seems inappropriate here. The cross-ref to Ch. 19 WGII AR4 is sufficient. A similar comment applies to lines 31-35. (Hans-Martin Fuessel, Stanford University)	Agreed
1-175	A	4	23	4	25	Delete this sentence. Stocker et al (1997) is correctly quoted, but it does not reflect the consensus, which is more accurately portrayed by the following quote from the Executive Summary of TAR, WG I, Chapter 7 (pg 419-420): "The Atlantic THC is likely to change over the coming century but its evolution continues to be an unresolved issue. While some recent calculations find little change in the THC, most projections suggests a gradual and significant decline of the THC. A complete shutdown of the THC is simulated in a number of models if the warming continues, but knowledge about the locations of thresholds for such a shut-down is very limited." Given this uncertainty, it is unreasonable to cite a single study as the definitive statement on this complex system. (Lenny Bernstein, L. S. Bernstein & Associates, L.L.C.)	Noted, picked up in redrafting (will be taken up with WG II and I)
1-176	A	4	23	4	25	The description should be changed to "For example, Stocker et al. (1997) argue that the thermohaline circulation could shut down once atmospheric GHG concentration exceed 600 ppmv if climate sensitivity is assumed to be 3.7 degC, which means that the threshold is the global mean temperature change over 4 degC."	Noted, picked up in redrafting (coordinated with WG II)

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						(Keigo Akimoto, Resaerch Institute of Innovative Technology for the Earth (RITE))	
1-177	A	4	23	4	25	Stocker at al (1997) seems a rather old reference, considering the availability of recent research (for example that presented by M Schlesinger; by R Wood at the Exeter Conference in Feb 2005) (Claire Parker, Environmental Policy Consultant)	Noted, picked up in redrafting
1-178	A	4	23	4	25	Stocker et al. (1997) is a single selective citation designed to alarm people. Cite other papers showing little disturbance of the thermohaline circulation. Otherwise IPCC will be accused of alarmist bias here. (Patrick Michaels, University of Virginia and Cato Insitutute)	Rejected, will be coordinated with WG II Ch 19
1-179	A	4	25			However, more recent work (e.g. Schlesinger, 2004 [ref not to hand]) suggests possible lower thresholds with potential for irreversibility and empirical studies (Bryden, 2005 [ref Nature], Wadham 2005[ref not to hand]) suggest that a slowing process has already begun. (Peter Read, MASSEY UNIVERSITY)	Noted, picked up in redrafting
1-180	A	4	26			The SAR has FOUR reasons for concern, not FIVE. Please read the chapter. (Richard Tol, Hamburg University)	Rejected, please read the TAR
1-181	A	4	33	4	35	WHAT climate policies? The world can't even come close to meeting the Kyoto Protocol! (Patrick Michaels, University of Virginia and Cato Insitutute)	Rejected, the UNFCCC shows that countries are on target (press release 15/2/06)
1-182	A	4	37	4	49	Suggest to drop the two paragraphs as they would give the wrong impression that the 2-degree target is becoming the mainstream standard. The Japanese government, for example, has a different view in developing a long-term target (see pp 23-24of "Sustainable Future Framework on Climate Change Interim Report" by the METI, available at http://www.meti.go.jp/english/information/data/cFramework2004e.pdf). (Koji Kadono, Global Industrial and Social Progress Research Institute)	Rejected, however, larger regional context will be inserted (coordinated with Ch 13)
1-183	A	4	37	4	43	Elected officials seeking to define acceptable levels of climate change appears to be characterized as somehow separate from scientific input, which is inaccurate. The more appropriate point is that elected officials have paid heed to scientific advice. (Lourdes Maurice, US Government)	Agreed, will be picked up in redrafting
1-184	A	4	37	4	49	Not only EU council statements but also United States statements, for example, should be described to be fair. (Keigo Akimoto, Resaerch Institute of Innovative Technology for the Earth	See comment 1-182

hapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						(RITE))	
1-185	A	4	45	4	49	The fact that there are little publicly available documentation detailing the reasoning behind the views adopted by the EU Cuncil is not the weakness of the views themselves but the characteristic of the EU Council's documentation. As explained from line 19 of the same page, research has tended to confirm the assesment that 2 degree increase may be upper limit and already there are many documents to explain EU council's views. Therefore, it should be deleted as an example of weakness. (Kimiko Hirata, Kiko Network)	Rejected, it is a factual reflection
1-186	A	4	47	17	48	the resources of these energies are more important, in particular in Europe (MICHEL PAILLARD, IFREMER)	Rejected, not clear
1-187	A	4	50			This literature review is very selective. It omits, for instance, the large body of literature on economic, legal and ethical approaches to target setting, some of which, by the way, argues against a 2 degree target. See Tol (forthcoming, Energy Policy). The literature review is fine for a political manifesto, but not for the IPCC. (Richard Tol, Hamburg University)	Will be taken into consideration
1-188	A	4	54			"human socioeconomic" as opposed to ant and bee economies? (Richard Tol, Hamburg University)	Accepted, Tol's contribution to ant and bee economies will be reviewed (soon)
1-189	A	4	55	4	55	The reference "Hooss, 2001" is missing from the references list at the end of the chapter. Furthermore, Hooss' work on impulse-response climate models reveals the decadal time scales of the atmospheric response as well as the century-long time scales of the oceanic response. (Hans-Martin Fuessel, Stanford University)	Agreed, will be added
1-190	A	4	55			Hare and Meinshausen, the well-known climatologists? (Richard Tol, Hamburg University)	Rejected, not clear what is meant
1-191	A	4	55	4	56	Reference missing in REFERENCE section (Leo Schrattenholzer, IIASA)	Agreed
1-192	A	4	55	5	5	"global mean temperature will soon also stabilize-" should be modified to "global mean temperature will also stabilize relatively soon". (Koji Kadono, Global Industrial and Social Progress Research Institute)	Rejected, no clear differences
1-193	A	4	55	5	5	Line 56 contradicts line 58. The last sentence of this paragraph is a non-sequitor as the delay in sea level rise response is to do with the inertia of the Antarctic ice cap, not "oceanic response". (Stephen Perkins, European Conference of Ministers of Transport (ECMT))	Rejected, no contradiction observed

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1-194	A	4	55	4	55	It is not clear what it the meaning of "temperature will soon stabilize-". "soon" means decades or years or centuries? It should be better specified. (Walter Dragoni, Perugia University)	Agreed
1-195	A	4	58			replace " - " with ", though a further " (Peter Read, MASSEY UNIVERSITY)	Agreed
1-196	A	4	0			Figure 1.3 of Tables & Figures could usefully spell Fluorinated in full. (Michael Jefferson, World Renewable Energy Network/Congresses)	Agreed
1-197	A	5	1	5	9	WG2 chapter 1 had far more data on this and should be referred to. It is also covered in ch 4 and 19. Not only polar and mountain top but also coral reefs are being impacted, although coral is a bit more controversial. Authors are encouraged to consult chapter 1 for more information. (Jeff Price, California State University, Chico)	Noted, will be checked
1-198	A	5	5			Meehl et al (2005) is about sea level rise (Claire Parker, Environmental Policy Consultant)	Rejected, has been checked, it is not only about sea levels, but also on global warming
1-199	A	5	10	5	11	Section 1.2.3. The reference to inertia in the energy system is crucial for the purposes of the whole report. Introducing it at an early stage in this section is very welcome. A reference to inertia in political systems might be apposite (TAR Synthesis, p.18) (Pat Finnegan, Grian)	Accepted
1-200	A	5	11			Suggest add "However, beneficial land use change may be implemented more quickly and achieve a temporal decoupling of net emissions reductions from energy sector re-investment (Read, 1996) (Peter Read, MASSEY UNIVERSITY)	Rejected, would require substantial discussion (space limitations)
1-201	A	5	12			"Adaptation shorter time-scales" I doubt that this is true. It would be interesting if you could back this up with references. (Richard Tol, Hamburg University)	Noted, will be checked with WG II relevant chapters
1-202	A	5	13	5	21	This paragraph gives the adaptation perspective on mitigatiton, rather than the mitigation perspective on adaptation. It could thus be interpreted as 'adaptation in the short run, mitigation in the longer term', with the danger of misleading to 'no mitigation in the short run'. It should be rephrased along something like (1) mitigation has a greater potential than adaptation in the longer run (Jones 2004), (2) to ripe this potential, mitigation must start in the short run because of inertia (3) but, because of inertia again, it won't have short-run impacts, and adaptation is thus necessary in the short run.	Accepted

hapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						(Frédéric Ghersi, CNRS)	
1-203	A	5	14	5	15	Replace with "Over the next two decades, mitigation can do little to avoid warming already 'loaded' into the system unless a holistic approach to managing the carbon cycle (Read 1992, Read and Lermit, 1993/5, Read 1995, Read 1996 (in print, MITI), Read, 1996 [under review]) is adopted on an ambitious scale, with futher benefits from avoided climate change in the following decades. (Peter Read, MASSEY UNIVERSITY)	Noted, will be checked
1-204	A	5	15	5	21	Poorly written. What is the point? I think the message is that we are already committed to some climate change and that not only mitigation, but also adaptation are needed, particularly since the potential to avoid damages in the short-term through mitigation is limited due to the lag time in the climate system between emission reductions, stabilization of concentrations in the atmosphere and re-equilibration of temperature. Right now, it reads as if one should adapt now and mitigate later. (Anne Arquit Niederberger, Policy Solutions)	Noted, will be checked
1-205	A	5	15	5	15	Why "20 years" and not "30 or 10 or 40"? It should be explained or some reference should be given. (Walter Dragoni, Perugia University)	Accepted, references will be supplied
1-206	A	5	16	5	16	two is not several. what does "robust" mean in this context? (Marco Mazzotti, Institute of Process Engineering)	Accepted, “robust” will be deleted
1-207	A	5	16	5	21	These conclusions are called "robust"; shouldn't they be quantified with confidence levels described in such detail in chapter 2? (Paul Baer, Stanford University)	See above
1-208	A	5	18	5	18	What is the criterion for "feasible" mitigation options? The TAR distinguished five levels of increasing mitigation poitential: market, economic, socio-economic, technical, and physical. In a different context, comparative risk assessment in human health distinguishes four alternative "counterfactual distributions of exposure": theoretical, plausible, feasible and cost-effective (Murray, C. J. L. and Lopez, A. D. (1999). On the comparable quantification of health risks: Lessons from the global burden of disease study. Epidemiology, 10:594–605.) (Hans-Martin Fuessel, Stanford University)	Noted, reference added (and this means technically and economically feasible)
1-209	A	5	18	5	19	Even during the next one to three decades these effects can only be dealt with PARTIALLY. Effects such as coral bleaching and species extinction (see Thomas et al (nature 424, 2004)) will begin to bite and no adaptation measures could	Agreed

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						completely halt those. (Kenneth Möllersten, Swedish Energy Agency)	
1-210	A	5	19	5	21	The comparison of the long-term potential of mitigation compared to adaptation seems to be very relevant and therefore should be addressed also in the executive summary. (Radunsky Klaus, Umweltbundesamt)	Agreed
1-211	A	5	20	5	20	I see the danger that this could be understood as waiting with mitigation. To prevent I suggest to add another sentence:"But due to the inertia of the energy and the transport system it is necessary to begin with mitigation immediately so that emissions reductions are possible and effects can be seen in some years" (Manfred Treber, Germanwatch)	Agreed
1-212	A	5	23	7	9	The trends section should also refer to trends in atmospheric concentrations of GHGs (to be taken from WG I). Section should also incluse reference to climatic changes and impacts registered so far (to be taken from W G I and II) (Bert Metz, IPCC)	Checking with IPCC WG III Co-Chairs
1-213	A	5	23	7	9	The emission trends section misses information on the distribution of emissions. Add information on ermissions per capita, for instance fig 1 from Bolin and Kheshgi PNAS, Apr 24, 2001 (vol98, no 9, page 4850-4854). Add also country comparison expressed as CO2/ GDP (PPP) (Bert Metz, IPCC)	Agreed but not necessarily this graph
1-214	A	5	24			This section on greenhouse gas emission trends seems quite arbitrary: Why only refer to past 30 years? Why not mention large differences in absolute emissions, emissions sources and emissions per capita among countries? The point should be made that there are three basic types of emissions: (i) emisisons for basic needs satisfaction; (ii) collective consumption (e.g., emissions associated with public infrastructure); and (iii) luxury emissions (Pan, Jiahua: Meeting human development goals with low emissions, IISD Bulletin 35(3): 90-97, July 2004). Or at least in a general way explain that developing countries have a different starting point and capacity to reduce emissions than Annex I countries do. (Anne Arquit Niederberger, Policy Solutions)	Rejected, lack of data
1-215	A	5	25	6	10	Section 1.3.1 It is regrettable that the figures in the section and the corresponding graphs and tables do not refer to the same 'emissions', preferably that of all GHGs rather than that of CO2 alone (fig. 1.2), or an even more narrow CO2 from fossil fuel	Agreed

hapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						combustion only (fig. 1.4). Appropriately compiled figures are probably available in the abundant literature--or could be derived from EDGAR or the UNFCCC database. (Frédéric Ghersi, CNRS)	
1-216	A	5	25	6	11	section should also cover aerosol emissions, also in figures (Bert Metz, IPCC)	Agreed
1-217	A	5	28			Why Edgar? (Richard Tol, Hamburg University)	Why not?
1-218	A	5	28	5	55	The use of the sector breakdown in Table 1.1 and associated figures and discussion is poorly defined and detracts from the logic of the report. Suggest using a sector breakdown that is consistent with the sectors of chapters 4-10, and consistent with chapter 11 (e.g. Table 11.4.3). If there is reason to also retain the existing breakdown, then suggest that it be made clear how the different sector breakdowns interrelate, and what are the contributions for each sector by gas. (Haroon Kheshgi, ExoonMobil Research and Engineering Company)	Agreed in principle, depends on easy access
1-219	A	5	28	5	29	EDGAR is in capital letters. Pls. also refer to the following references: Olivier, J.G.J., Van Aardenne, J.A., Dentener, F., Pagliari, V., Ganzeveld, L.N. and J.A.H.W. Peters (2005) Recent trends in global greenhouse gas emissions: regional trends 1970-2000 and spatial distribution of key sources in 2000. Env. Sc., 2 (2-3), 81-99. DOI: 10.1080/15693430500400345. Olivier, J.G.J., T. Pulles and J.A. van Aardenne (2005) Part III: Greenhouse gas emissions: 1. Shares and trends in greenhouse gas emissions; 2. Sources and Methods; Greenhouse gas emissions for 1990 and 1995. In: "CO2 emissions from fuel combustion 1971-2003", 2005 Edition, pp. III.1-III.37. International Energy Agency (IEA), Paris. ISBN 9 92-64-10891-2 (paper) 92-64-10893-9 (CD ROM) (2005). (Jos Olivier, Netherlands Environmental Assessment Agency (MNP))	Agreed
1-220	A	5	30			fig.1.1 In order to combat, to mitigate GHG emissions it is wise to know where the sources of GHG are? Where are the sources? About 65% of the GHG emissions are unspecified as Fossil Fuel Combustion in Fig.1.1. Fossil Fuel Combustion is a too general category, which are the real GHG emission sources? As long we do not know which sources are underlying these combustions, it will be difficult to combat them! (Robbert Misdorp, PUM)	Noted, will be picked up in redrafting

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1-221	A	5	32			Specify 'CO2 emissions specifically' (not all GHG) (Frédéric Ghersi, CNRS)	Accepted
1-222	A	5	33	5	36	Note that Methane concentrations in the atmosphere began to stabilize about 20 years ago and have actually been in decline in two of the last four years (Dlugokenky, 2004) (Patrick Michaels, University of Virginia and Cato Insitutute)	Rejected, no concentrations considered in chapter
1-223	A	5	35			add semi colon: "…and use of fossil fuels; agricultural …" (Michael Ebinger, Atmosphere, Climate, & Environmental Dynamics (EES-2))	Agreed
1-224	A	5	38	5	38	Explain what the "F-gases" are. (Hans-Martin Fuessel, Stanford University)	Agreed
1-225	A	5	38	5	40	"F-gases" again. Furthermore, the imputed growth in these greenhouse gases is misleading. In fact their contribution remained more or less constant during the period 1990 to 2000 because a reduction in emissions of byproduct HFCs was almost balanced by a growth in emissions from fluorinated greenhouse gases used as ODS substitutes. (Nick Campbell, ARKEMA SA)	Noted, to be checked
1-226	A	5	40			the 6% for deforestation cannot be right. Recent assessments of deforestation emissions are 1-3 Gt C/yr, vs 6-7 for fossil fuels. There should be an update in WG 1. Revise all the numbers to be consistent with whatever WG 1 says. (Danny Harvey, University of Toronto)	Noted, will be checked with WG I and II (full range to be added)
1-227	A	5	41	5	41	Figure 1.1 - 10 exp 12 kg is an unusual measure of emissions. The vertical axis should be relabelled Gigatonnes CO2-eq. (Lenny Bernstein, L. S. Bernstein & Associates, L.L.C.)	Noted, whatever the final units will be, they will be used
1-228	A	5	41	5	41	It would be very useful to also have the numerical information of the graph as a table. (Leo Schrattenholzer, IIASA)	Agreed, but space limitations may be prohibitive
1-229	A	5	43			is this 70% in CO2-equivalents (ie. Scaled by 100-year GWP) ? (Ian Enting, MASCOS)	Will be clarified in the text
1-230	A	5	43	5	49	It is noted that the UNFCCC has meanwhile also published emission data of Non-Annex I Parties. It is proposed to build on this information and to include another paragraph highlighting the structure of emissions from Non-Annex I Parties. (Radunsky Klaus, Umweltbundesamt)	Noted
1-231	A	5	43	5	45	Same comment as 1-24-Table 1.1 above. Some fossil fuel combustion is happening in agriculture. Precise perhaps CH4 and NO2 emissions from agriculture?	Noted, will be considered in redrafting

hapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						(Frédéric Ghersi, CNRS)	
1-232	A	5	43			Text (and figures) should describe distribution by gas and sector more clearly and separate (Bert Metz, IPCC)	Noted, will be considered in redrafting
1-233	A	5	44			F-gases should be explained as fluorinated first time around, and listed in abbreviations/acronyms. (Michael Jefferson, World Renewable Energy Network/Congresses)	Noted, will be considered in redrafting
1-234	A	5	44	5	44	the number for deforestation seems dramatically understated here, by as much as 2 or 3 times, with particular reference to: Houghton R.A. (2005) Aboveground Forest Biomass and the Global Carbon Balance. Global Change Biology. 11, 945–958 Houghton, R. A.: 2003, 'Revised estimates of the annual net flux of carbon to the atmosphere from changes in land use and land management', Tellus 55, 378–390. DeFries, R. S., Houghton, R. A., Hansen, M. C., Field, C. B., Skole, D., and Townshend, J.: 2002, 'Carbon emissions from tropical deforestation and regrowth based on satellite observations for the 1980s and 1990s', PNAS 99, 14256–14261. Achard, F., Eva, H. D., Stibig, H. J., Mayaux, P., Gallego, J., Richards, T., and Malingreau, J. P.: 2002, 'Determination of deforestation rates of the world's humid tropical forests', Science 297, 999–1002 (Steve Sawyer, Greenpeace International)	See response to 1-226
1-235	A	5	45			Should refer to industrial process emissions rather than "industry"? (Anne Arquit Niederberger, Policy Solutions)	Noted, should be "industrial processes"
1-236	A	5	48			Table1.1. the National Communications of all member states of the UNFCCC provide much more information per nation which could be analysed and lead to more in depth information than table 1.1. provides. USA and the Netherlands have supported more than 70 developing countries in formulating National Communications according to a logical frame. So use more UNFCCC data. (Robbert Misdorp, PUM)	Noted, will be clarified in text why which data were used (UNFCCC data are not as geographically complete)
1-237	A	5	51	5	51	Since Figure 1.2 shows only CO2 emissions, the vertical axis should be relabelled	See response to comment 1-227

hapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						Gigatonnes CO2. (Lenny Bernstein, L. S. Bernstein & Associates, L.L.C.)	
1-238	A	5	51			Figure 1.2: Only from this figure, it is difficult to understand the differences between developed countries and developing countries. In addition to this figure, other figures related to both the developed region and the developing region can be displayed separately? (Toshihiko Masui, National Institute for Environmental Studies)	Noted, quality will be improved
1-239	A	5	55			In table 1.1 there is a confusing sector distribution: F gases is no sector; what does fossil fuel combustion mean? (transportation also covers that; probably meant electricity production); check with TAR and ch 11 to ensure full consistency in how sectoral emissions are reported (Bert Metz, IPCC)	Noted, will be checked and considered in redrafting
1-240	A	5	56			Pls. replace link by: http://www.mnp.nl/edgar/ (Jos Olivier, Netherlands Environmental Assessment Agency (MNP))	Agreed
1-241	A	5	0			Table 1.1: Information up to 2003 is now available on the UNFCCC website. (Hans-Martin Fuessel, Stanford University)	Noted
1-242	A	6	6			Delete "on a geographic basis" .. It adds nothing to the sentence about differences between regions (Ian Enting, MASCOS)	Agreed
1-243	A	6	7			Regarding "Asia" in line 7 and in Figure 1.4. The figure is cited from IEA(2005) and the original figure has a footnote clarifying that "Asia" refers to Asia including Korea and excluding China and Japan. This should be mentioned. (Koji Kadono, Global Industrial and Social Progress Research Institute)	Agreed, only regions will be given in Table 1.4
1-244	A	6	9			Precise that the decline in FSU emissions is due to the collapse of the Soviet Union. (Frédéric Ghersi, CNRS)	Accepted
1-245	A	6	11			Figure 1.4. Concerning Asia** - What is the meaning of the asterisk? (Matti Melanen, Finnish Environment Institute)	See response to 1-243
1-246	A	6	11			Figure 1.4: Unit of the vertical axis is missing. (Toshihiko Masui, National Institute for Environmental Studies)	Agreed
1-247	A	6	12			Section 1.3.2.: The recent trend of oil price is not mentioned. Why? (Toshihiko Masui, National Institute for Environmental Studies)	Accepted, fuel prices will be mentioned
1-248	A	6	13		36	Citing a single projection does not reflect the available literature, and the text provides no information on the model assumptions, structure, etc., so that the results are essentially meaningless	Accepted, analysis will be included

hapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						(Anne Arquit Niederberger, Policy Solutions)	
1-249	A	6	15	6	35	IEA's scenarios are not realistic, they are not based on any credible price perspectives. This paragraphe should be delted; at least, it should be detailled something as "the iea reference case does not take into account any significant price" (Antoine-Tristan Mocilnikar, Délégué Interministériel au Développement Durable)	Noted
1-250	A	6	15	6	35	"increase. It corresponds therefore to a demand scenario for energy". (Antoine-Tristan Mocilnikar, Délégué Interministériel au Développement Durable)	Noted
1-251	A	6	15			Section 1.3.2 This will be a vital section in terms of both readership and potential influence. So it is baffling to me why, having introduced it with "There are a variety of projections of the energy picture for the coming decades…", only one projection (IEA WEO 2004) is either quoted or described. There should be (at the very least) a description of at least one alternative (less BAU) projection included (e.g IEA Alternative Energy Scenario). A table outlining the various ranges of the various projections in play would be even more useful. (Pat Finnegan, Grian)	See response to comment 1-248
1-252	A	6	15	6	21	It seems that the IEA's 'World Alternative Policy' Scenario merits inclusion here, which is outlined in Ch. 11 of the 2004 WEO (IEA 2004); more work on this has beend one this year (although I'm not sure if published) esp. at the workshop in June, and there are important new variations being readied for publication early this year, which may not meet your deadline. However, this new work reflects, among other things, the reality of current fossil fuel prices, rather than the 28 USD/bbl oil and other ca. year 2000 fossil fuel prices...since which time coal has doubled, oil has almost triped, and gas has at least tripled... (Steve Sawyer, Greenpeace International)	See response to comment 1-248
1-253	A	6	15	6	36	It should be noted that projections, almost by definition, are often wrong. Unexpected events can come across, that may alter future choices. Think, e.g. about the recent developments Russia - Ukraine, related to gas security of supply. Also current oil prices are much higher than were projected byu IEA some time ago. These developments may change future energy choices, the fuel mix, the introduction of new or the revival of older energy sources, etc. It may therefore be better to, instead of referring to trends, use background scenarios or storylines that offer a variety of possible futures. The International Gas Union is now working on a storyline project, to be presented at the Wold Gas Conference in June 2006. The	See response to comment 1-248

hapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						project is carried out by IIASA (Nebojsa Nakicenovic) and Groningen University (Catrinus Jepma). Please don't hesitate to contact the IGU secretariate, mrs Geja Popken for further details and (interim) reports: Office of the International Gas Union Presidency Phone number +31 50 521 2296 Fax number +31 50 521 1977 Mail address g.popken@gasunie.nl (Jan Paul van Soest, Advies voor Duurzaamheid on request of International Gas Union)	
1-254	A	6	17	6	21	The IEA's 2005 World Energy Outlook also contains information of relevance, and it would be appropriate to make some critical comments on the assumptions therein as no hint is given there of resource shortages. (Michael Jefferson, World Renewable Energy Network/Congresses)	See response to comment 1-248
1-255	A	6	22	6	36	To be absolutely clear, it should be mentioned again that these numbers all refer to the reference scenario of the World Energy Outlook (IEA 2004); For example, it cold say (in line 22): "According to IEA projections in the reference scenario……." (Joachim Schleich, Fraunhofer Institute Systems and Innovation Research)	See response to comment 1-248
1-256	A	6	26	6	26	Suggest using the definition of 'new renewables' in Martinot (2005) (Steve Sawyer, Greenpeace International)	Accepted
1-257	A	6	28	6	28	replace 'will' with 'is currently projected' (Steve Sawyer, Greenpeace International)	Accepted
1-258	A	6	30			1.3.1 and 1.3.2 the sections and tables do not give a full comprehensive approach to the problem but assure that p.6, r 30-31 tow- thirds of energy related emissions will come from developing countries, and r 36, emission growth will be dominated by developing countries. As we know, industrialized countries are responsible for about 83% of the rise of cumulative emissions since 1800, and developed countries were responsible for 61.5% of global carbon dioxide emissions in 1996. Are developing countries going to save the world? I suggest this is the place where the information is needed as just to clarify the situation. (Juan Llanes, Havana University)	Partly accepted, will be picked up in redrafting (in the regionalisation approach)
1-259	A	6	34	6	36	I couldn't resolve the 1.7% growth with the 62% growth—please add clues on how to do this for future readers. (Michael Ebinger, Atmosphere, Climate, & Environmental Dynamics (EES-2))	Accepted, will be made more clear

hapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
1-260	A	6	37			I miss here a section on the trend in sectoral energy consumption, e.g. that transport, in particular road transport, and electric power generation are dominating the energy consumption trend in both industrialised and developing regions. And, the trend in non-electrical energy consumption in manufacturing and households is nearly constant, also at global level. (see IEA data and http://www.mnp.nl/mnc/1-nl-0166.html). (Jos Olivier, Netherlands Environmental Assessment Agency (MNP))	Rejected, part of sectoral chapters 4, etc.
1-261	A	6	40		55	There is a substantial body of literature on decomposing energy use and carbon emissions, mostly published in Energy Economics and Energy Policy. None of that literature is referred to here. The simple-minded decomposition attempted here pales in comparison to the professional standard. The population numbers can't be right. (Richard Tol, Hamburg University)	Accepted
1-262	A	6	40	7	10	The Kaya identity has two faces: it gives insight in the key factors leading to trends in CO2 emissions on the one hand, but may be seen as a guide to policy interventions on the other hand. In a politically neutral report like the IPCC reports are/should be, it can not be defended to make political choices and assumptions. The conclusion NOT to use two of the four Kaya identity factors as steering factor for policies (namely population and GDP growth) is a normative/political conclusion, which should be avoided. In the IPCC reports these factors should be elaborated as possible factors that can be influenced, and how that can be done, the choice to do so or not is a political one. It is in our view that these factors, population and GDP growth, are addressed in the FAR report. (Jan Paul van Soest, Advies voor Duurzaamheid on request of International Gas Union)	Rejected, because it is not an instrument for policy evaluation
1-263	A	6	40	6	45	Also mention the two main causes of increase of energy use in society over the last 3 decades: 1) the electrification trends of societies, both in developed and developing countries; 2) the growth of transport, in particular local (road) but also at international level (ship/air). (Jos Olivier, Netherlands Environmental Assessment Agency (MNP))	Noted, will be analysed whether a more detailed description can be given
1-264	A	6	43			Figure 1.5: the caption of the figure is not clear as the text (Marco Mazzotti, Institute of Process Engineering)	Accepted, figure and caption will be changed
1-265	A	6	44			The relevance of the decreasing Energy intensity and CO2 (Carbon??? = line 54) intensity is not clear. These two decreasing intensities (Fig 1.5) may suggest that	Rejected, but comment for clarification will be made

hapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						the future might be bright under the decreasing intensities, but that is fake and only due to the definition of these two intensity parameters. It creates confusion! My suggestion: skip these two parameters. (Robbert Misdorp, PUM)	
1-266	A	6	50	6	50	Suggest including a discussion of the recent increase in C/PE and projected (e.g. IEA) increasing trends in carbon per unit primary energy. The sign is opposite that mentioned in this section. (Haroon Kheshgi, ExoonMobil Research and Engineering Company)	Partly accepted, will be improved through better presentation of analysis
1-267	A	6	50	6	51	Mention part of decarbonization is illusionary, linked to leakage of heavy industries to non-OECD countries? (Frédéric Ghersi, CNRS)	Rejected, at global level it is no issue
1-268	A	6	55			Therefore the task at hand is formidable: global GHG emission reductions in absolute terms. This presupposes a reduction of energy and carbon intensities at a faster rate than income and population growth together. Bravo, yes that is a good statement by IPCC. I fully agree with this statement. Yes that is indeed one of the major tasks to be undertaken by a conscious UN agency! My question is what results of the proposed measures by which (UN) organization striving to reach population growth reduction, can be mentioned here? (Robbert Misdorp, PUM)	Rejected, this is not the issue (however, precise analysis will be presented)
1-269	A	6	0	6		It could be added, that the basic conclusions of IEA (2004) also hold in the more recent "World Energy Outlook 2005 - Middle East and North Africa Insights" (IEA 2005) (Joachim Schleich, Fraunhofer Institute Systems and Innovation Research)	Noted, will be dealt with
1-270	A	7	4	7	5	recognizing that population is a factor in future emissions, and therefore that promoting lower population scenarios can be part of a strategy to eventually stabilize climate, is not a question of "controlling" population development. Rather, it is more a question of giving people CHOICE - namely the ability to choose to have smaller families if they want to. Check the population and demographic literature - it is known that there is large unmet demand at present (probably several hundred million couples) for contraceptive and family planning services. Thus, it does not at all follow that the last two terms in the Kaya identity have to bear the main burden. This paragraph should be re-written and expanded to present a more balanced perspective. (Danny Harvey, University of Toronto)	Agreed, will be considered in redrafting

hapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
1-271	A	7	4			Article 2 most emphatically does not call for unimpeded sustainable economic development. It calls for GHG concentrations and resulting climatic change low enough to ENABLE sustainable economic development. Economic development could, for example, be slowed down but still be enabled, but it would not be unimpeded in that case. (Danny Harvey, University of Toronto)	Accepted
1-272	A	7	5			after "intensities " insert "or an increase in net biotic fixation" (Peter Read, MASSEY UNIVERSITY)	Rejected
1-273	A	7	7		7	Reference to "unimpeded sustainable economic development" unacceptable (UNFCCC says that GHG concentrations must be stabilized at a level and within a timeframe that "enables economic development to proceed in a sustainable manner") (Anne Arquit Niederberger, Policy Solutions)	Agreed
1-274	A	7	7			Debatable interpretation of Art. 2 again (cf. 1-2-21, 1-3-29, 1-3-34 above). (Frédéric Ghersi, CNRS)	Agreed
1-275	A	7	7	7	7	This is a somewhat misleading characterization of Article II - it doesn't say that "sustainable economic development shall be unimpeded"; it says "economic development shall proceed in a sustainable manner." Particularly since all countries will claim that their development is sustainable, this amounts to an interpretation that "economic development (growth) shall be unimpeded, which is a very problematic reading of Article II. (Paul Baer, Stanford University)	Agreed
1-276	A	7	8			The issue of controlling population may alternatively be considered as a simple numbers X resource demand problem, where increased numbers can already be seen in many parts of the World to have imposed severe pressures. Thus % ghg emissions targets which do not reflect projected population growth are of limited value (e.g the UK officially projects a 7 million plus increase in its population by 2030, which makes a nonsense of 'aspirational' 20% electricity generation from new renewables by 2020 and path to a 60% reduction in CO2 emissions by 2050). This highlights the need for fully-integrated strategic thinking and responses which could usefully be covered more fully and directly in this WGIII submission. (Michael Jefferson, World Renewable Energy Network/Congresses)	Accepted, will be considered in redrafting
1-277	A	7	10			I miss here a par. on the trends of the non-CO2 GHGs. This has been summarised e.g. in Part III of the annual IEA book 'CO2 from fuel combustion 1971-2003',	Accepted

hapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						based on EDGAR data, of which the methodology is also described, as are emissions per country provided for 1990, 1995 and 2000, or in 'The Climate System' and in Olivier, J.G.J., Van Aardenne, J.A., Dentener, F., Pagliari, V., Ganzeveld, L.N. and J.A.H.W. Peters (2005) Recent trends in global greenhouse gas emissions: regional trends 1970-2000 and spatial distribution of key sources in 2000. Env. Sc., 2 (2-3), 81-99. DOI: 10.1080/15693430500400345. I will send you FYI a copy of this IEA book Part III and the Env Sc. Paper; further details on sources and regions can be found at the EDGAR website http://www.mnp.nl/edgar/. (Jos Olivier, Netherlands Environmental Assessment Agency (MNP))	
1-278	A	7	14		42	This is not a good overview of the stipulations of these two agreements (e.g., all countries have an obligation under the UNFCCC to implement programs to mitigate climate change). For a more systematic overview, refer to Fact Sheets 18 and 21 at http://unfccc.int/resource/docs/publications/infokit_2002_en.pdf (Anne Arquit Niederberger, Policy Solutions)	Noted
1-279	A	7	19		23	Throughout the text, when referring to specific UNFCCC texts, these should be cited directly (e.g., Art. 3.1 refers to the concept of "common but differentiated responsibilities and respective capabilities", not just "differentiated responsibilities") (Anne Arquit Niederberger, Policy Solutions)	Agreed
1-280	A	7	20	7	20	It would be very useful to have a formulation of the precautionary principle (if it exists in a generally accepted form) referenced here or formulated here. Maybe even better, you could simply say sth. like "…the adoption of precautionary measures…". (Leo Schrattenholzer, IIASA)	Partially accepted, use Convention language (Article 3.3)
1-281	A	7	23	7	23	Ch 1 page 7 line 23 - There should be an explanation of the obligation (Kirsty Hamilton, retainer to UK Business Council for Sustainable Energy; Associate Fellow, Chatham House.)	Rejected, this is not a review of the Convention
1-282	A	7	23			the parallel track negotiations. It should be made clear what UNFCCC parties must do to meet the objectives of Art 2. It has become much more important since Montreal with in Arts 4(2)(a)(b) and (d). The IPCC must set out the meaning of the obligation here. (Kirsty Hamilton, retainer to UK Business Council for Sustainable Energy; Associate Fellow, Chatham House.)	Rejected, this cannot be a review of the Convention
1-283	A	7	25	7	29	It should pointed out whether the United States and Australia are the only countries	Noted – will be reflected

hapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						that have signed but not ratified the Kyoto Protocol, or why they are named explicitly here. (Hans-Martin Fuessel, Stanford University)	
1-284	A	7	25	7	42	Most of the information in this paragraph is technically correct but incomprehensible to anyone not intimately familiar with the Kyoto Protocol. It is unclear what message the authors are trying to convey. If it is to summarize the important features of the Kyoto Protocol, then a more thematic approach should be used. For example, the Kyoto Protocol has been characterized as having three major features: 1) a set of mandatory emission reduction targets for developed nations, 2) a set of flexibility mechanisms to reduce the cost of meeting those targets, and 3) a set of procedures for determining whether the targets have been met. There are three errors in the paragraph: on line 26, it is 55% of 1990 Annex I CO2 emissions, not GHG emissions. On line 28, the countries that have ratified Kyoto represent 61.6% of 1990 Annex I CO2 emissions, not 61.6% of 1990 emissions. On line 34, the phrase used in Articles 6, 12, and 17 of the Kyoto Protocol is that the use of the flexibility mechanisms shall be "supplemental to domestic action." The phase "significant element of effort" is not used and should not be in quotation marks. (Lenny Bernstein, L. S. Bernstein & Associates, L.L.C.)	Accepted
1-285	A	7	25	7	30	61.6% of the 1990 CO2 emission of Annex 1 countries only less Ukraine. So 153 should be changed. (Alexander Golub, Environmental Defense)	Accepted – to be che cked
1-286	A	7	25	7	25	Technically, after adoption by consensus at COP3 it was signed by countries mostly during 1998 (Michael Grubb, Cambridge University)	Noted – to be checked
1-287	A	7	27	7	27	Article 25.1 of the Kyoto Protocol refers to CO2 emissions not to greenhouse gas emissions (Joachim Schleich, Fraunhofer Institute Systems and Innovation Research)	Accepted
1-288	A	7	27	7	27	The threshold is not 55% of Annex I 1990 emissions, it is 55% of 1990 Annex I CO2 emissions only. (cfr. Article 25.1 of the Kyoto Protocol) (Philippe Tulkens, TERI School of Advanced Studies)	ccepted
1-289	A	7	28			"61.6% of the 1990 emissions" => "61.6% of the 1990 emissions from the Annex I countries" (Koji Kadono, Global Industrial and Social Progress Research Institute)	Accepted

hapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
1-290	A	7	28			Non-ratified parties to the Kyoto Protocol are not just only Australia and the United States. So, those quote should be deleted. (Kimiko Hirata, Kiko Network)	Noted – will be rephrased
1-291	A	7	28			61.6% of the 1990 emissions from Annex I countries and ….. (Claire Parker, Environmental Policy Consultant)	Accepted
1-292	A	7	29	7	32	The phrase "are expected to" fails to take account of the fact that the original 5.2% figure has been whittled away in subsequent UNFCCC negotiations. Similarly, very few of the Annex B Parties (except for economies in transition) made demonstrable progress by 2005 - very much the reverse. (Michael Jefferson, World Renewable Energy Network/Congresses)	Partially accepted: Part 1 accepted, part 2 irrelevant
1-293	A	7	30	7	30	The reduction of 5.2% relative to 1990 level is an estimate computed by compiling all individual targets of Annex I countries. As such, the overall target is not a commitment. Moreover, the figure of 5.2% was published prior to the finalization of the rules in the Marrakesh accords. The figure should be checked against all the additional concessions on sinks for instance given to some Parties. Recomputing the aggregate of all targets taken into account the final decisions is likely to change the figure of 5.2%. Dr. den Elzen from the Netherlands published on the Kyoto objective as assessed after the Marrakesh accords, his paper may help in reassessing the figure. The reference is http://www.mnp.nl/en/publications/2002/The_Bonn_Agreement_and_Marrakesh_Accords__an_updated_analysis.html (Philippe Tulkens, TERI School of Advanced Studies)	Noted – will be tried to do
1-294	A	7	33	7	33	a significant element of the effort, being placed between quotation marks, looks like an exact quote of the Kyoto Protocol Article 6.1 d) or Article 17, but isn't. The text says :"The acquisition of emission reduction units shall be supplemental to domestic actions for the purposes of meeting commitments under Article 3." I suggest a wording closer to the actual text, or supress the quotation marks. (Cédric Philibert, International Energy Agency)	Accepted
1-295	A	7	33	7	42	The key feature of the Kyoto Protocol is explained only in view point of developed countries(Annex B). One of the objective of the CDM is to contribute to the sustainable development of developing countries(Article 12 of Kyoto Protocol). The CDM can contribute to the sustainable development mainly through by technology transfer. This is important point to developing countries considering that some Annex I countries tried to get CER only, not to transfer technology. So, I	Accepted & but phrased diffeerently

hapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						recommend to add the sentence "The CDM can contribute to the sustainable development of developing countries through by technology transfer" in line 39, page 7. The alternative way is to insert this sentence in line 13, page 8. (Dong-Woon Noh, Korea Energy Economics Institute)	
1-296	A	7	34	7	34	Section 1.4.1 Again, it seems to me vitally important that when UNFCCC and the KP are cited, as a minimum one would expect them to be quoted correctly. The quoted reference to supplementarity appears to be drawn from the wording used in the EU Linking Directive, not the quoted KP Articles (6.1 d & 17). (Pat Finnegan, Grian)	Accepted
1-297	A	7	34			the statement on domestic action also pertains to the project based mechanisms, either because of Art 6.1 (d) or because of subsequent decisions of the Parties (Claire Parker, Environmental Policy Consultant)	Noted – to be checked
1-298	A	7	36			Replace "purchase" with "acquire," since some Kyoto transactions are in the form of investments (which is a relevant point with respect to technology transfer, taxation, etc). See Arquit Niederberger, A., and R. Saner, Exploring the relationships between FDI flows and CDM potential, Transnational Corporations, 14(1), 1-40, April 2005. (Anne Arquit Niederberger, Policy Solutions)	Accepted
1-299	A	7	36	7	39	Why are the common terms "emission trading" and "Joint Implementation" avoided here? (Leo Schrattenholzer, IIASA)	Accepted
1-300	A	7	37		38	too many "from" 's. Suggest …." (ERU's) form other Annex B Parties for project activities under Article 6…" and similarly for CER's and CDM Art 12 (Peter Read, MASSEY UNIVERSITY)	Accepted
1-301	A	7	39	7	40	relatively intrusive' is rather pejorative and could be considered subjective. (Frédéric Ghersi, CNRS)	Rejected – it is a feature of the system
1-302	A	7	39	7	42	This sentence seems very subjective, in particular, the use of the word "instrusive". (Nick Campbell (Batch 2), ARKEMA SA)	Rejected – it is a feature of the system
1-303	A	7	40	7	43	Should be updated to represent MOP decisions better. (Alexander Golub, Environmental Defense)	Agreed
1-304	A	7	44			Section 1.4.2: This section as well as Section 1.7.1 lacks coordination with Section 2.2., which addresses the same topic. (Hans-Martin Fuessel, Stanford University)	Accepted
1-305	A	7	45	8	20	The attempt to place climate change in an overall sustainability framework did not	Noted – there are three dimensions but will be

hapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						succeed. The devolution of sustainability into "environmental sustainability," "social sustainability" and "ecomomic sustainability" is problematic, since sustainability is a holistic concept generally defined so as to address all three dimensions in relation to one another (i.e., "environmental sustainability" -- without regard for economic and social considerations -- is a contradiction in terms). (Anne Arquit Niederberger, Policy Solutions)	made more factual
1-306	A	7	45	7	46	Good overview. First sentence should be made more general, to cover two-way SD-CC links -- e.g., "Climate change responses (including mitigation) should become part and parcel of sustainable development, and the two made mutually reinforcing (MMRS 2005)." Note that MMRS is a good general reference with extensive analysis of SD-mitigation linkages. (Mohan Munasinghe, Munasinghe Institute for Development (MIND))	Noted – rephrased to include “can be”
1-307	A	7	45	7	50	Climate change mitigation had the potential to harm ecosystems as often as help (see WG3 ch 9, WG2 ch 4) so a statement that "mitigation conserves or enhances natural capital" is simply not correct. It CAN conserve or enhance but it can also damage or reduce. (Jeff Price, California State University, Chico)	Accepted
1-308	A	7	45	8	20	"Climate change mitigation is part and parcel of sustainable development and the two are mutually reinforcing"; therefore, it is necessary to have standardized metrics and methods to measure sustainability. There is a need to adopt a unified, global, approach(s) to assessing sustainability. (James Bero, BASF Corporation)	Noted
1-309	A	7	46	7	49	Is this a scientific statement (reference?) or a political wish? I can envision several sustainable development measures that would contribute to climate change (e.g., switching from high-polluting traditional biogenic fuels for indoor cooking to fossil fuels or electricity). (Hans-Martin Fuessel, Stanford University)	See comment 1-307
1-310	A	7	46			insert "reduce" before "GHG" (Danny Harvey, University of Toronto)	Accepted
1-311	A	7	46	7	52	Mitigation may also be directly beneficial for human capital ('people'), eg energy saving may lead to lower fossil fuel production (or lower growth of fossil fuel production), transport and use, which may have a lower impact on e.g. local communities, conflicts etc.	Noted

hapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						(Jan Paul van Soest, Advies voor Duurzaamheid on request of International Gas Union)	
1-312	A	7	47			Replace "Mitigation..." with "This is particularly the case with a holistic carbon cycle management strategy addressed at potential abrupt climate change, of which the first stage involves the development of a large-scale global bioenergy market, with South-North trade in bio-fuels, based on a redirection of energy sector investment in primary energy production towards land improvement, particularly in many land rich but otherwise impoverished developing countries, leading to raised soil productivity and the co-production of biomass as primary energy raw material with food and forest products within a framework of enforceable sustainable development criteria. Such mitigation... ". (Peter Read, MASSEY UNIVERSITY)	Rejected – too long and not always correct
1-313	A	7	52	7	52	Section 1.4.2 A reference to UNFCCC Art 3.2 would support the text on the special circumstances of developing countries. (Pat Finnegan, Grian)	Accepted
1-314	A	7	54	8	13	See my comment re. p. 7, l. 46. (Hans-Martin Fuessel, Stanford University)	Noted -
1-315	A	7	54	8	10	--- as with P2L36, the authors are presenting as consequential facts, things that are their ideas of what is desirable. (Ian Enting, MASCOS)	Noted – will be accounted for
1-316	A	7	54	7	54	First sentence refers to the well-known "SD triangle", which was comprehensively covered in TAR and earlier. An appropriate reference would be useful to readers who seek more details: "Sustainable development has environmental, economic and social dimensions (MM 1992, IPCC 2000, IPCC 2001 SYR)". Cited refs are: (1) Munasinghe, M. 1992. Environmental Economics and Sustainable Development, World Bank, Wash. DC, USA; (2) IPCC 2001, Synthesis Report, Figure 8.3, pp.132-133, IPCC, Geneva; & (3) IPCC 2000, "Development, Equity and Sustainability", Cross Cutting Issues Guidance Papers, pp.69-113, IPCC, Geneva. (Mohan Munasinghe, Munasinghe Institute for Development (MIND))	Accepted
1-317	A	7	54	7	54	What is meant by social dimensions? Does this include poverty, problems with illiteracy, discrimination against women, etc.? If yes, then this point should be explained or clarified when first mentioned on page 7. (Lourdes Maurice, US Government)	Rejected – included in definition
1-318	A	7	55			"Climate change will exacerbate poverty" please delete or substantiate; my last	Noted – literarture will be reviewed

hapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						reading of the literature is that one cannot make this statement with any confidence (Richard Tol, Hamburg University)	
1-319	A	7	0			1.5.2, is climate a public good or a global common? is climate consumed by humans or used?, is climate a resource like most public goods or a condition ?. What kind of public good is Climate with regard to Calculus or National Defense, a special one where humans can change the quality so drastically? Public goods theory is an economic theory linked to game theory and I can't see how this section contributes to the purpose of the chapter. Later on the Report there is no reference to public good theory. (Juan Llanes, Havana University)	Noted– definition of public good needs clarification plus references
1-320	A	8	1	8	2	There is no evidence that existing climate is "ideal", and therefore this should not be a component of "sustainability" (Patrick Michaels, University of Virginia and Cato Insitutute)	Rejected – no aspects of "ideal" in public goods
1-321	A	8	5	8	13	Discussion of economic value (or aggregate capital) value could be more explicit about the tendency for the anthropocentric nature of much discussion on sustainable development in more recent times to undervalue landscape, 'natural' habitat, and related amenity values. This lies at the root of growing conflicts about wind energy developments, where concerns about ever higher turbines (125 m plus) in areas of low average wind speed with high landscape value are rising, schemes promoted by subsidies and unbalanced policy initiatives. The discussion as presented allows for inclusion of this, given its references to natural capital. This is an issue which most developed countries may consider 'more affordable' than developing ones, but social sustainability can encompass many different levels of economic development. (Michael Jefferson, World Renewable Energy Network/Congresses)	Rejected – beyond scope of chapter
1-322	A	8	5	8	8	I suggest refering the reader to Neumayer (1999) for a definition and a discussion of the strong and weak substainability concepts. Neumayer, Eric, 1999, Weak versus Strong Sustainability: Exploring the Limits of Two Opposing Paradigms. Cheltenham and Northampton. Edwar Elgar publishing (Cédric Philibert, International Energy Agency)	Accepted
1-323	A	8	5	8	13	This paragraph appears unbalanced by only mentioning the benefits, saying nothing about potential cost. (Leo Schrattenholzer, IIASA)	Noted – well be taken on board
1-324	A	8	8	8	8	Change "Mitigation satisfies social sustainability as well …" to "Mitigation can	Accepted

hapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						satisfy social sustainability as well …" Mitigation does not automatically pay heed to socio-economic development rather than growth. It can be implemented without proper consideration of these aspects. (Lenny Bernstein, L. S. Bernstein & Associates, L.L.C.)	
1-325	A	8	9			This is an assertion that depends on the type of mitigation. Suggest replace "satisfies" with "can satisfy" and "by paying" with "if it pays". (Peter Read, MASSEY UNIVERSITY)	Accepted
1-326	A	8	12	8	13	The final part of this sentence is somewhat controversial. All Parties have recognized the priority for developing countries to develop economically. However, Parties to the Convention should not simply state that they have other priorities than climate protection. Their commitment is in a way to integrate, in accordance with their capacity, climate protection within their development priorities. A ranking of priority that would simply put climate protection in low priority does not seem much in line with the Convention's objective. (Philippe Tulkens, TERI School of Advanced Studies)	Accepted
1-327	A	8	12	8	13	Lomborg (2004) is not suitable paper to quote on the sentence because it describes a general thing. It is unworthy of quoting Lomborg (2004). It is necessary to delete Lomborg (2004). (Masatake Uezono, Citizens' Alliance for saving the Atmosphere and the Earth)	Noted – Reference is misplaced & other references will be provided
1-328	A	8	13			Lomborg should probably not be as bluntly quoted: the reader should be aware that his work on climate change (if not the precise book referred to) is very polemical and has triggered much contradiction. Anyway the point made would be better sustained through quoting some DC expert. (Frédéric Ghersi, CNRS)	See comment 1-327
1-329	A	8	13	8	13	whilst recognising that failure to prevent climate change leads to huge economic costs in one generation (Kirsty Hamilton, retainer to UK Business Council for Sustainable Energy; Associate Fellow, Chatham House.)	Noted – see comment 1-318
1-330	A	8	14			Lomborg is not a serious author on the issue of priorities of development. One suggestion of an respected source is the Brazilian economist Ignacy Sachs in Sachs. (I.), 1998, "La logique du développement", Revue Internationale des Sciences Sociales, Paris 50ème année, in English under "The Logic of development", International Social Science Journal, Oxford, 50th year, N 157, september 1998, pp.361-365.	Noted – Part I irrelevant and Sachs literarture will be reviewed

hapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						(Antoine BONDUELLE, E&E_Consultant)	
1-331	A	8	19	8	20	Vulnerability is defined differently in the climate change context and by other scientific and policy communities, but never as "degree of exposure" (selected publications discussing the conceptualization of `vulnerability' in climate change research include Adger (1999), Kelly and Adger (2000), Olmos (2001), Downing et al.(2001), Moss et al. (2001), Brooks (2003), Downing and Patwardhan (2003), and O'Brien et al. (2004a)). (Hans-Martin Fuessel, Stanford University)	Noted – to be checked with WG II
1-332	A	8	22			Section 1.4.3. There seem to be an assumption in this section that economic growth is a sufficient criterion to describe progress in poverty alleviation or eradication. This criterion is necessary but it is not sufficient. The redistribution of wealth is as essential to poverty eradication as much as the overall growth of an economy. Could this be clearly mentionned somewhere? (Philippe Tulkens, TERI School of Advanced Studies)	Rejected, not directly pertinent
1-333	A	8	40			Short of explanation as to why the Marrakesh Accord is referred to in the context. (Koji Kadono, Global Industrial and Social Progress Research Institute)	Marrakesh Accord will be deleted here and text on Marrakesh Accord and developing countries will be added
1-334	A	8	47			Section 1.4.4. A reference to the chapter elaborating on technology transfer should be given. (Philippe Tulkens, TERI School of Advanced Studies)	Noted, will be done once it is known where the technology transfer will be located
1-335	A	8	49	8	50	The use of this acronym (RDDD&D) is childish and holds this document up to ridicule. (Patrick Michaels, University of Virginia and Cato Insitutute)	Rejected, irrelevant
1-336	A	8	50			P.8, r 50 and Induced Technological Change (ITC) (Juan Llanes, Havana University)	Accepted
1-337	A	8	52	8	52	While the development and deployment of some technologies may take a century, there are many examples of technologies (e.g. cell phones) that have been developed and deployed on much shorter time scales, often driven solely by market forces. Leaving this statement without further discussion presents an unduly negative outlook for technology transfer. (Lenny Bernstein, L. S. Bernstein & Associates, L.L.C.)	Rejected, some technology may have a short time scale, in the energy sector timescales are generally longer
1-338	A	8	52	8	54	While technology development and diffusion is a lengthy process,a century seems excessive. What are some examples of technology development and diffusion that take a century?	See response above (1-337)

hapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						(Lourdes Maurice, US Government)	
1-339	A	8	52	8	55	diffusion of new technologies MAY indeed take a century, but there are many examples that it can be done much faster. The introduction of mobile phones e.g. went incredibly fast. In the energy realm, the shift from coal to gas for heating, in western europe, was a transition that was completed in 10 - 30 years (depending on the country, its gas resources, the infrastructure and policies). (Jan Paul van Soest, Advies voor Duurzaamheid on request of International Gas Union)	See response above (1-337)
1-340	A	8	53			"global interest" please delete or substantiate (Richard Tol, Hamburg University)	Rejected, factually incorrect
1-341	A	8	54			"early action" this sentence entirely ignores the timing debate which has raged for 10 years now; Azar is just one of many authors, and typically found at the extreme end of the debate (Richard Tol, Hamburg University)	Rejected, not relevant in this section because it is related here to R&D
1-342	A	8	55	9	8	Suggestion:"There are various types of technologies under development including----" should be changed to "There are various types of low carbon technologies including---." Reason: "Under development" tends to imply that the technology has not been established. But the examples of "various types of technologies under development" provided here are in various stages as described in the last sentence of the paragraph. (Koji Kadono, Global Industrial and Social Progress Research Institute)	Noted
1-343	A	8	55			Development and diffusion of new technological systems may take a century: I do not agree with this rather negative world vision on transfer of technology. Transfer of technology from the west to the east and from the north to the south ought to take shorter. No …I think that even in the interest of the western societies, selective transfer/export of knowledge is imperative. Export of the "bulk technology from west to east from north to south" should be accelerated, but on the other hand proper arrangements for high intellectual, tech. developments originated in the west and north should be arranged in a sustainable manner. So the transfer of the most important technologies concerning (1) The abatement - pro-active measures and to (2) The re-active, adaptive measure to climate change ought to increase in the coming years, in favor of north and the south. The transfer of both the pro-active and adaptive measures should be initiated and their execution assisted on an equal footing by the northern and western countries in close	Partially accepted, because it may go faster when there is determined policy action

hapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						cooperation with the vulnerable southern (coastal) countries providing their increased knowledge on CC, impacts and responses. This is possible as shown during the nineties, namely the 1) The Governments of USA and the Netherlands gave assistance to more than 70 UNFCCC- countries contributing to their National Communications ; 2) The executing of IPCC-Common Methodology on Vulnerability Assessments of coastal zones to accelerated sea level rise, in about half of the total number of coastal countries. I was personally involved in both activities (Robbert Misdorp, PUM)	
1-344	A	8	55			Nuclear fusion technology is still far from "infancy" level, so that it should be deleted in this context. And as well as nuclear fission and fusion, carbon capture and storage is controversial technologies, so that it should noted that there are concerns to pursue these technologies and be dealt differently from other technologies. (Kimiko Hirata, Kiko Network)	Noted, part one of the text mentions “some” technologies and not “all”. In the second part a sentence will be added that all technologies have some deployment issues involved
1-345	A	8	55	9	20	it may be helpful to characterise energy options following the energy 'chain' from exploration and production of energy sources via transport, one ore more conversions to useable energy carriers to sometimes further conversions, and finally end use and energy functions. Using these chains as an analytical tool gives better insights in links in the chain that can be best used for policy measures. (Jan Paul van Soest, Advies voor Duurzaamheid on request of International Gas Union)	Accepted, sentence on efficiency improvements at end-use side will be added
1-346	A	9	1	9	4	These are all supply-side technologies. There are also many technologies and practices on the end-use side where cooperation and transfer is needed (i.e., efficient applicance, heating and cooling equipment, advanced practices for creating low-energy buildings). Add some references to end-use side for balance. (Danny Harvey, University of Toronto)	Accepted, sentence on efficiency improvements at end-use side will be added
1-347	A	9	1	9	10	Results of the hereunder mentioned types of technologies and RDDD&D cooperation should be mentioned and used as illustrative material in a box.""There are various types of technologies under development including but not limited to: solar, wind, nuclear fission and fusion, geothermal, biomass, fuel cells, clean fossil technologies including carbon capture and storage, hydrogen production from non-fossil energy sources and energy efficiency improvements throughout the energy system (Pacala and Socolow, 2004, Neuhoff 2005, Grubb 2005). Some of them are in their infancy and require public RDDD&D support, while others are more	See response to 1-345

hapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						mature and need only market incentives for their deployment and diffusion. To share information and development costs internationally, there exist several examples of international cooperation for RDDD&D, such as the Carbon Sequestration Leadership Forum (CSLF), the International Partnership for Hydrogen Economy (IPHE), Generation IV International Forum (GIF), the Methane to Markets Partnership and the Renewable Energy & Energy Efficiency Partnership (REEEP). Their fields range from basic R&D and market demonstration to barrier removals for commercialization/diffusion."" (Robbert Misdorp, PUM)	
1-348	A	9	5	9	5	add cryogenic energy storage (Kirsty Hamilton, retainer to UK Business Council for Sustainable Energy; Associate Fellow, Chatham House.)	Rejected, too specific
1-349	A	9	6			please also quote some real experts of the energy system, such as Edmonds and Richels (Richard Tol, Hamburg University)	Noted, further references will be added
1-350	A	9	6	9	7	“Nuclear fission and fusion” and “Carbon capture and storage” are uncompleted technologies. Then there are arguments for and against them (it is necessary to clarify that there are arguments for and against them.) It should be added to describe them on this sentence clearly. (Masatake Uezono, Citizens' Alliance for saving the Atmosphere and the Earth)	See response to 1-351
1-351	A	9	8	9	8	some technologies do not need subsidy but do need coherent regulatory frameworks (Kirsty Hamilton, retainer to UK Business Council for Sustainable Energy; Associate Fellow, Chatham House.)	Noted, will be dealt with in redrafting
1-352	A	9	10	9	14	This is a very limited list. There are many, many other examples of international collaboration, and some of them are as much, if not more, relevant than those quoted here. At a minimum, the text should mention the more than 35 'Implementing Agreements' under the IEA auspices, which includes all kind of renewables, energy efficiency in end-use sectors (industry, transport, buildings, etc.), fossil fuels (including clean coal and carbon capture and storage), hydrogen, fusion and others (see IEA 2005, energy technologies at the cutting edge, IEA/OECD, Paris). A reference could be made to more comprehensive assessments of international cooperation in the field of technology: Philibert 2004 and Justus and Philibert 2005 (Philibert, Cédric (2004): International Energy Technology Collaboration and Climate Change Mitigation, OECD/IEA; Justus, Debra and	Agreed to mention IEA implementing agreements

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						Cédric Philibert, International Energy Technology Collaboration and Climate Change Mitigation: synthesis report, OECD/IEA). (Cédric Philibert, International Energy Agency)	
1-353	A	9	10	9	19	This section seems to be advocating international collaboration in research and development. Perhaps it should be more clearly stated. (Lourdes Maurice, US Government)	Rejected, otherwise policy prescriptive
1-354	A	9	10	9	14	A reference to the work of the UNFCCC EGTT should be made. (Nick Campbell (Batch 2), ARKEMA SA)	Rejected, already mentioned
1-355	A	9	17	9	19	It is proposed to substitute "a more" by "an". (Radunsky Klaus, Umweltbundesamt)	Agreed
1-356	A	9	19	9	19	"more effective" than what? (Hans-Martin Fuessel, Stanford University)	Agreed
1-357	A	9	19	9	19	either replace "may be a more effective tool" by "may be an effective tool" or name the policy instrument to what these sector-based initiatives are compared to. (probably the more general RDD&D cooperations mentioned in the paragraph before (Joachim Schleich, Fraunhofer Institute Systems and Innovation Research)	Agreed
1-358	A	9	19			"more" should be deleted, because it is not clear if it is "more than what". (Kimiko Hirata, Kiko Network)	Agreed
1-359	A	9	21	9	40	One might note that Thomas C.D. et al (Nature 424, 2004) predict that even for conservative assumptions, predicted GHG concentration increase would lead to a substantial share of land-living species being committed to extinction by mid century. This is an example of a likely environmental irreversibility that is highly relevant in the light of Article 2's message that ecosystems should be able to adapt. Loss of species is irreversible. (Kenneth Möllersten, Swedish Energy Agency)	Rejected, not relevant to this section
1-360	A	9	21	9	21	Suggest including a section on provision of energy to satisfy demand, since this is a key characteristic of the challenge. (Haroon Kheshgi, ExoonMobil Research and Engineering Company)	Rejected, issue is about energy services
1-361	A	9	23			Sect. 1.5.1: This section is far too technical to be meaningful in an introductory chapter. Furthermore, it confuses irreversibility and uncertainty. (Hans-Martin Fuessel, Stanford University)	Noted, will be dealt with in redrafting
1-362	A	9	23			delete the sentence "Therefore …. Irreversible" (it is redundant) (Danny Harvey, University of Toronto)	Accepted

hapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
1-363	A	9	23	9	23	Combine the headings for sections 1.5.1 and 1.5.3. Keep first three sentences of Irreversibilities section. Delete rest. And Continue with the Inertia paragraph. (Stephen Perkins, European Conference of Ministers of Transport (ECMT))	Rejected, cannot be combined
1-364	A	9	25	9	40	very confused. What is the take-home msg? (Marco Mazzotti, Institute of Process Engineering)	Noted, will be picked up in redrafting
1-365	A	9	25	9	40	This section on "irreversibility" is quite misleading. Without specifying what is being discussed, it has framed the problem of "irreversibility" completely within the mainstream economic paradigm, in which the concern about "irreversibility" is reduced to a problem of maximizing expected value. While this reflects at least some aspects of the decision problem, it is hardly a comprehensive discussion of what is involved in avoiding "irreversible" damages. The number of controversial assumptions that have to be made in order to fit the problem into this model is very large (including the same controversies that underly cost-benefit analysis of climate change in general, which I assume are discussed later), but that controversy is invisible here. Additionally the statement that its unclear a priori "which irreversibility will tend to dominate" literally refers only to "dominate in economic optimzation models", and the conclusion that "economic uncertainty seems to matter more" is based as far as I can tell only on Pindyck's model, which again takes a very narrow view of the problem. (Paul Baer, Stanford University)	Noted
1-366	A	9	27			add Schlesinger ref 2004/5 [not too hand] (Peter Read, MASSEY UNIVERSITY)	Noted, picked up in redrafting
1-367	A	9	28		30	This sentence is a mess. Uncertainty has no necessary link to irreversibility, and the second part has irreversibility as a condition for irreversibility. (Ian Enting, MASCOS)	Noted, picked up in redrafting
1-368	A	9	31	9	32	What does "flexible course" mean in this context? (Alexander Golub, Environmental Defense)	Noted, picked up in redrafting
1-369	A	9	33			Baker is not representative for the abatement cost literature, he is on either extreme depending on who pays the bill (Richard Tol, Hamburg University)	Rejected, no action needed
1-370	A	9	34	9	36	To whom does economic uncertainty seem to matter more than environmental incertainty? Probably only the people that are cited, not a representative sample of the human race and especially not those potentially affected by collapse of environmental systems.	Noted, picked up in redrafting

hapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						(Danny Harvey, University of Toronto)	
1-371	A	9	35			You cannot quote Cline without quoting Manne and Mendelsohn in the same volume. Nordhaus, Tol and others also wrote about catastrophes, and reached different conclusions. (Richard Tol, Hamburg University)	Noted, additional references will be added
1-372	A	9	36	9	40	These studies all carry same error of not representing irreversibility in carbon intensive capital stock. Unless there is a reason to assume that non-carbon stock is more irreversible than carbon intensive stock, these cancel, leaving the environmental irreversibility as the relevent consideration. See WGIIII FOD, Chapter 11; also Grubb M. J.C.Hourcade, O.Edenhofer and N.Nakicenovic, Submission to Stern Review, Dec 2005, downloadable from http://www.econ.cam.ac.uk/faculty/grubb/publications.html; submitted in revised form to Cambridge Journal of Economics. (Michael Grubb, Cambridge University)	Accepted
1-373	A	9	39	9	40	The statement that "economic uncertainty seems to matter more than environmental uncertainty" seems a bit abrupt: what justifies it? (Cédric Philibert, International Energy Agency)	Agreed
1-374	A	9	40			add "despite the requirement of the Convention's Article 3.3 for precautionary action in response to threats of environmental irreversibility" (Peter Read, MASSEY UNIVERSITY)	Noted
1-375	A	9	44	9	45	It would be preferable if the discussion in this paragraph would go about the atmosphere (instead of climate) as a 'global public good'. Related to this is its capacity to absorb CO2 from the air. This intrinsic capacity is to a large extent already being used by industrialised countries (free riding) which means that a fair share of this common good is not anymore available to developing countries. If the UNFCCC-principle 'the polluter pays' is applied to this situation, a large amount of money would flow to developing countries (compensation payments [page 10, line 8]). With a high market price of 1 ton CO2, it would serve the goals of generating new money for international development and reduction in emissions because of comparable costs. See remark 2. (Gert de Gans, Kerkinactie)	Noted (should be pointed out that this UNFCCC principle does not exist)
1-376	A	9	44	9	44	The sentence that states climate is a "public good" is good. However, it would be quite helpful to include a more detailed definition of a public good in the glossary section of the report for non-economists. Although the key characterisitics of a	Accepted

hapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						public good are shown on page 9, a simpler definition with some examples would be helpful to non-economists. (Lourdes Maurice, US Government)	
1-377	A	9	44	9	55	The first para of 1.5.2 says "climate is a global public good" but the last sentence of the second para says "the public good, i.e., GHG stabilization". It is not clear if GHG stabilization is a public good. The word should be dropped or for consistency, it should be changed to "climate". (Koji Kadono, Global Industrial and Social Progress Research Institute)	Noted
1-378	A	9	44	9	45	Climate is not necessarily a public good nor desirable. There are some very inhospitable climates that people would rather modify if they could. Ask africans crowded into an arid sahel if they would like more rain, for example. (Patrick Michaels, University of Virginia and Cato Insitutute)	Noted, picked up in redrafting
1-379	A	9	44	10	14	The analysis of climate as a global public good is adequate, but unfortunately the consequence of that analysis, the insight that some form of 'forced' co-operation (through governments, agreements, etc.) is inevitable to overcome the prisoner's dilemma is not mentioned. Is that consequence too politically sensitive? If so, that should not play a role in the analysis. (Jan Paul van Soest, Advies voor Duurzaamheid on request of International Gas Union)	Noted, picked up in redrafting
1-380	A	9	47	9	48	In context of WG2 report benefits from climate change appear questionable. Reily et al, 2003 is sort of controversial. The benefits identified there resulted from modeling assumptions. (Alexander Golub, Environmental Defense)	Noted, literature will be checked
1-381	A	9	48			Climate benefits are usually associated with Maddison, Mendelsohn, and Tol; not with Reilly. (Richard Tol, Hamburg University)	Noted, literature will be checked
1-382	A	9	50	12	10	The view is "individual mitigation efforts (costs) decrease with efficient mitigation actions undertaken by others" may not be the most compelling reason for cooperation amongst collaboration. Here is a summary of the "public good argument": "Climate stability is a public good. As such, it would be undersupplied by agents and countries acting in isolation, for countries would aim at equalising their marginal abatement cost with the marginal benefit they derive from their action alone. Provided free-riding can be avoided, collective or “integrated” action would drive higher level of mitigation, for countries would aim at equalising their	Noted, picked up in redrafting

hapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						marginal abatement cost with the (greater) marginal benefit they derive from the action of all countries (Philibert, Cédric, 2005, Climate Mitigation: Integrating Approaches for Future International Co-operation, OECD and IEA Information Paper, OECD/IEA, Paris). (Cédric Philibert, International Energy Agency)	
1-383	A	9	50	9	56	I think that one should either assume that readers know what "free riding" means (and shorten the paragraph) or explain it in a language that is both understandable and theoretically correct (complete). (Leo Schrattenholzer, IIASA)	Noted, picked up in redrafting
1-384	A	9	53	9	53	"efforts" and "costs" are not synonymous. Usually, efforts to do something increase when the costs (per unit) of doing so decrease. (Hans-Martin Fuessel, Stanford University)	Agreed
1-385	A	9	54	9	55	….Without cooperation among all climate beneficiaries, mitigation is not cost-effective and the market fails to allocate mitigation costs efficiently. Taken at face-value, does this statement mean those mitigation efforts to be adopted by participants in the Kyoto accord (which does not include the U.S. and Australia) are not cost-effective? If yes, then what is the point of adopting such mitigation measures? (Lourdes Maurice, US Government)	Noted, picked up in redrafting
1-386	A	9	0	9		There seems to be little (or no) difference between economic irreversibilities mentioned in chapter 1.5.1 and inertia in 1.5.3 (Joachim Schleich, Fraunhofer Institute Systems and Innovation Research)	Accepted
1-387	A	9	0			Section 1.5.1 Irreversibilities. I'm afraid I find this paragraph almost totally incomprehensible. Given its importance ---not to mention potential readership--- this is a very serious matter. While there are plenty of references to support the case (one assumes is) being made, there is, unfortunately, a distinct lack of clarity as to what this case actually is. (Pat Finnegan, Grian)	Accepted
1-388	A	10	1			The statement that impacts are skewed towards least developed countriesis no longer true. The dramatic (50-fold) rise in catastrophe-related damages from $4 billion to $200 billion per year in three decades has stunned financial leaders. Insured losses have also tripled: from 10% in the 1980s to an average of 30% in recent years, as more extreme weather events affect Europe, the US and Japan. (Paul Epstein, Harvard Medical School)	Accepted

hapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
1-389	A	10	2			"least well off net beneficiaries" could be rephrased or at least hyphenated (Ian Enting, MASCOS)	Accepted
1-390	A	10	5	10	6	It is questionable that stable climate benefits are scewed towards the least-developed countries. According to WG2 Europe will benefit a lot if Gulf Stream current change will be prevented. (Alexander Golub, Environmental Defense)	See 1-388
1-391	A	10	5	10	9	This sentence is unclear, but it clearly omits an obvious point: the skewed distribution of benefits and costs discourages participation of even very wealthy countries like the US. Standard game theoretic models imply that the US would have to be compensated to particpate, which is prima facie inequitable and will never happen. (Paul Baer, Stanford University)	Accepted
1-392	A	10	8			Before ". These", add reference to Schelling (1992) 'some economics of global warming [presidential address to the AEA] (Peter Read, MASSEY UNIVERSITY)	Accepted
1-393	A	10	9			See previous comment about costs (Ian Enting, MASCOS)	Accepted, see 1-389
1-394	A	10	12			It is logically unclear or short of explanation why mitigative and adaptive capacities are considered public goods. (Koji Kadono, Global Industrial and Social Progress Research Institute)	Noted, picked up in redrafting
1-395	A	10	13	10	13	I would add the following to the last phrase: "It is important to understand that the distinction between private and (global) public goods is not given by nature, but depends on societal choices and political decisions (Kaul et al. 1999). Climate policy may profit from the wide array of institutional arrangements and financial mechanisms that are available today in managing global public goods (Kaul et al. 2003)." References: Kaul, I., I. Grunberg and M.A. Stern (Eds.): Global Public Goods. International Cooperation in the 21st Century, Oxford, New York: Oxford University Press 1999. Kaul, I., P. Conceição, K. Le Goulven, and R.U. Mendoza (Eds.) (2003). Providing Global Public Goods. Managing Globalization. Oxford, New York: Oxford University Press). (Fritz Reusswig, Potsdam Institute for Climate Impact Research)	Accepted
1-396	A	10	15	10	19	The classification used here into 'climate friendly techs' and 'end-of-pipe techs' is not logical. Properly functioning CCS is just as 'climate friendly' as renewables. CCS may have other disadvantages in that it relies on finite resources, but this has	Accepted, change or to and

hapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						nothing to do wih climate friendliness. (Kenneth Möllersten, Swedish Energy Agency)	
1-397	A	10	15			Chapter 1.5.3: This chapter should be redrafted. It is not based on literature - the only linkage is to chapter 1.4.1 that informs about the UNFCCC and the Kyoto Protocol but does not include any findings based on literature on inertia. (Radunsky Klaus, Umweltbundesamt)	Accepted
1-398	A	10	16	10	22	Is it true that there are uncertainties about the future policy towards GHG emission reduction targets? The Kyoto Protocol is clear and not uncertain in its targets until 2012! There is no uncertainty about the direction of the target development, for the period after 2012, is not it? The sheer fact that the present 360 ppm CO2 is never been observed during large part of the Pleistocene and the entire Holocene, will be enough to determine the direction of the mitigation measures, the precise detailing is another question. The direction is without uncertainties, and this should not be the reason for not undertaking no-regret/precautionary investments! My suggestion is skip the sentence here-under: ""Therefore, in the presence of uncertainty concerning future policy towards GHG emission reduction or stabilisation targets, investors are reluctant to undertake irreversible investments (sunk costs) and investments in carbon-free technologies are postponed (see 1.4.1). (Robbert Misdorp, PUM)	Rejected, because there are uncertainties about greenhouse policies
1-399	A	10	17	10	22	The inertia discussion is appropriate. However, efficiency improvements, which have a cost benefit, should not be grouped with opetions that do not offer opportunities to recoup costs. (Lourdes Maurice, US Government)	Noted
1-400	A	10	17			"climate friendly"=> "low carbon": more accurate (Koji Kadono, Global Industrial and Social Progress Research Institute)	Accepted
1-401	A	10	17			Ambitious …goals require …climate friendly technologies as well as end-of-pipe technologies (not ; or) (Claire Parker, Environmental Policy Consultant)	Accepted
1-402	A	10	18			add "or 'start-of-pipe-technologies to sustainably increase biotic fixation (e.g. co-production of biomass energy raw material with food and/or fibre". (Peter Read, MASSEY UNIVERSITY)	Rejected, because it is too specific for this chapter
1-403	A	10	24		36	This section should be combined with the section about irreversibility (Ian Enting, MASCOS)	Rejected, sections will be deleted
1-404	A	10	25			What follows is a comment and a speculative scenario:	Noted, reference to WG I

hapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						Recent work (Bryden et al. 2005) suggests that Atlantic currents, like other aspects of the climate system (e.g., ice cover), are changing faster than previously projected. While aspects of this study deserve greater scrutiny, it re-raises the specter of a shutdown of the Ocean Conveyor Belt or thermohaline circulation (THC). While no IPCC models project a shutdown of THC, ice core data depicts such cold reversals after warming and polar ice thawing. The ice core data thus provide a plausible pathway of mechanisms for envisioning the shutdown scenario. But, is there a positive scenario embedded in this alarming one? It is an overriding principle that systems seek equilibriums. But a shutdown (in the coming years or decades) may also be a climate shockwith some positive dimensions. The amount of global warming in the system and the diminished North Polar ice cap now (compared to that coincident with the last cold reversal, prior to the Holocene) could moderate the impacts. This is a relatively hopeful scenario -- albeit one with widespread consequences, especially for the Northern Hemisphere, SW Asia and the Middle East. Perhaps this relatively stable cooling-off periodwill allow a modicum of predictability and adaptatability, and provide a window in which to accelerate the collaborative effort needed for mitigation. Work on tipping points (Schellnhuber et al.2006 and referenced in Nature, fall 2005) needs to be included. (Paul Epstein, Harvard Medical School)	
1-405	A	10	26	10	36	Nor can one rule out a strike by an asteroid. When using shoddy, loaded language like this, you have to qantify the probabilities and state the magnitude of changes. As an example, this paragraph cites Knutson and Tuleya (2004). In fact, that paper only projects a 6% increase in tropical cyclone winds IF the entire Atlantic Hurricane basin exceeds 28 degrees. The amount would be too small to measure, given year-to-year noise in hurricane intensity. (Patrick Michaels, University of Virginia and Cato Insitutute)	Noted, cross checked with WG I and II
1-406	A	10	26	10	36	Why is the Greenland Ice sheet left out of this, particularly since there is plausible evidence that it has the lowest threshold (you know all the citations)? (Paul Baer, Stanford University)	Noted, picked up in redrafting
1-407	A	10	31			will NEED TO adopt ---- there can be no pre-knowledge of what decision makers will actually do (Ian Enting, MASCOS)	Rejected, no indication where
1-408	A	10	32			You missed the paper of Link and Tol (2004, Portuguese Economic Journal); it reaches the opposite conclusion, and in contrast to the papers you do cite, it is	Noted, Link and Tol reference will be checked

hapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						actually based on an impacts model. (Richard Tol, Hamburg University)	
1-409	A	10	32			are these the unspecified "other factors" from line 29? (Ian Enting, MASCOS)	Rejected, cannot be found in the existing FOD text
1-410	A	10	33	10	36	The main source of methane would be soils (in particular permafrost soils), which are not generally categorized as part of the "terrestrial biosphere". (Hans-Martin Fuessel, Stanford University)	Noted, picked up in redrafting
1-411	A	10	33			Tropical cyclones: Also reference Webster et al. 2005 Science309: 1844-46. (Paul Epstein, Harvard Medical School)	Agreed
1-412	A	10	36			"Abatement may take the form of sunk costs" what does this mean?? -- Abatement may result in sunk costs? (Ian Enting, MASCOS)	Rejected, no indication found in text
1-413	A	10	40			Describing uncertainty as a "steadfast companion" is a ridiculous metaphor. Uncertainty could equally-well be described as an insideous cancer. (Ian Enting, MASCOS)	Agreed
1-414	A	10	40	11	50	a paragraph on 'how to deal with critics' could be quite helpful. There is a variety of critics to the climate change who may even hold completely different theories and concepts. Often, they cause a lot of turmoil in the media and they can be quite influential in the policy debate. A clear procedure as to how to include (or exclude) these critics and their ideas, and transparency as to how their critique has been incorporated in the proces would strengthen the credibility of IPCC reports. (Jan Paul van Soest, Advies voor Duurzaamheid on request of International Gas Union)	Rejected, not relevant for the chapter
1-415	A	10	42	10	42	The statement about the "explosion of uncertainties" is meaningless and potentially misleading, if it is presented without further qualification what exactly it refers to. (Hans-Martin Fuessel, Stanford University)	Agreed, sentence will be deleted
1-416	A	10	44			An excellent, and more widely known, discussion of types of uncertainty is given in the book "Uncertainty" by Morgan and Henrion (CUP) 1990. (Ian Enting, MASCOS)	Rejected, reference too old
1-417	A	10	44	10	48	Disagreement about the valuation of impacts or the appropriate discount rates or equity weights to attach is also often referred to as "uncertainty", although "controversy" would be a better description since there is not any "true" or "correct' value for such parameters. (Paul Baer, Stanford University)	Rejected, too specific

hapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
1-418	A	10	47	10	48	The statement about the "unpredictability" of a model is meaningless and potentially misleading, as it does not qualify which aspects of the complex climate system are inherently unpredictable. (Hans-Martin Fuessel, Stanford University)	Agreed, sentence will be deleted
1-419	A	10	50	10	54	The statements on lines 50 through 54 have questionable logic. The use of projections and scenarios as an attempt to overcome unpredictability. The creation and adoption of any projection or scenario must be bound by some likelihood of occurrence. Without such bounds, any projections made or scenarios created and adopted would be nothing more than "Best Guesses" without any apparent links to reality. In other words, such scenarios and projections would have little added value in the real world. This is why confidence intervals are chosen, based on observations using empirical data (small or large), as a means of capturing some idea of likelihood of occurrence. The use of the "precautionary principle" only compicates this matter because it relies more on personal judgement than empirical data. (Lourdes Maurice, US Government)	Accepted, last sentence will be deleted
1-420	A	10	53			This discussion of additivity is confused. Mitigation efforts by one party can easily increase mitigation costs for another party in an open trading environment. (Ian Enting, MASCOS)	Rejectede, cannot be found
1-421	A	10	54	10	54	I would add: "Risk and uncertainty are, both on a conceptual and a measurement level, deeply connected to the underlying understanding of rational action, the nature of the decision making process, and the weight and role of knowledge in decision making (Jaeger et al. 2001). It is worth noting that decision making under various kinds of uncertainty is by no means a prerogative of climate science or climate policy, but an integral part of everyday action and virtually all policy fields." (Reference: Jaeger, C.C., O. Renn, E.A. Rosa, T. Webler. 2001. Risk, Uncertainty, and Rational Action. London: Earthscan.) (Fritz Reusswig, Potsdam Institute for Climate Impact Research)	Referred to chapter 2
1-422	A	11	1	11	2	I don't think it is a good idea to define the climate system so broadly that it includes "scocio-economic" and "technical subsystems". (Hans-Martin Fuessel, Stanford University)	Agreed
1-423	A	11	5	11	8	This paragraph appears quite tautological (and therefore superfluous). (Leo Schrattenholzer, IIASA)	Noted, picked up in redrafting
1-424	A	11	5	11	28	It is confusing that the term 'climate system', well defined earlier as the geo-	Agreed, use UNFCCC language

hapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						physical system, now includes even socio-economic and technological sub-systems. Please reserve climate system for the physical part only. (Jan Paul van Soest, Advies voor Duurzaamheid on request of International Gas Union)	
1-425	A	11	10	1	11	The climate models are remarkably linear, projecting constant-rate warming for the 21st century; they just project different rates. These are models of the "climate system". What you really mean to say is that certain aspects of local or regional climate may change disproportionately to the global change. (Patrick Michaels, University of Virginia and Cato Insitutute)	Rejected, part of the work for WG I (reference will be added for local and regional changes)
1-426	A	11	10	11	22	it should be noted that also social systems (politics, economics) often are non-linear, which in interaction with a non-linear geophysical system may lead to even stronger amplitudes. (Jan Paul van Soest, Advies voor Duurzaamheid on request of International Gas Union)	Rejected – too detailed for purpose of the chapter
1-427	A	11	13	11	15	Again, where perceptions vary, there is not "uncertainty" but "disagreement" or "controversy" (although variability through time implies true uncertainty - including uncertainty about future controversy. (Paul Baer, Stanford University)	Noted, picked up in redrafting
1-428	A	11	14	11	15	This sentence falsely suggests that variability always implies uncertainty. I can be very certain about the maximum altitude in each country even though there is a wide variety of this figure across countries. (Hans-Martin Fuessel, Stanford University)	Rejected, variability has an uncertainty component
1-429	A	11	15	11	16	This sentence falsely suggests that a time lag always implies uncertainty. (Hans-Martin Fuessel, Stanford University)	See above, 1-428
1-430	A	11	18	11	18	Isn't it frankly impossible, not merely difficult, to predict "exact changes in the global and regional climate systems?" (Paul Baer, Stanford University)	Noted
1-431	A	11	19	11	24	How the precautionary principle can serve as a useful tool in reducing risk as a means of addressing mitigation concerns is not clear. Please provide rationale that explains how this works. How do you reduce risks without the aid of empirical data? The use of the precautionary principle in this context has implications about the analytical integrity. Are the authors implying that this concept be used any analytical work on climate change by the IPCC? What are the implications to a policy maker?	Rejected, precautionary principle implies the reduction of risk

hapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						(Lourdes Maurice, US Government)	
1-432	A	11	19		23	I would add a citation to Mastrandrea and Schneider 2004 here as well. (Paul Baer, Stanford University)	Accepted
1-433	A	11	23			This paragraph should be linked back to (or better-still merged with) earlier discussion (Ian Enting, MASCOS)	Rejected, not clear what is meant
1-434	A	11	25	11	28	Are there other reasons for using scenarios? (Hans-Martin Fuessel, Stanford University)	Noted (yes, there are)
1-435	A	11	30	11	50	This is the kind of gibberish that gives the UN a bad name and makes it politically desirable for the U.S. to withhold financial support. Delete it. (Patrick Michaels, University of Virginia and Cato Insitutute)	Noted (1.5.7 will be shifted to chapter 2, and this may be rewritten anyhow)
1-436	A	11	30	11	49	This whole subsection on ethics is extremely weak; it falsely characterized both the ethical systems involved and the relationship of ethical principles to negotiating positions. I suggest that it needs to be either completely revised or eliminated. (Paul Baer, Stanford University)	See above, 1-435
1-437	A	11	31	11	49	This should be better put into context. What is North and South? (Marco Mazzotti, Institute of Process Engineering)	See above, 1-435
1-438	A	11	32		49	This is a very poor representation of a very rich literature. I don't think there is any reason to belief that the South is interest in procedure, and the North in outcome. I suggest deleting this subsection entirely. If not, please read the literature. (Richard Tol, Hamburg University)	See above, 1-435
1-439	A	11	32	11	49	The equity/ethics discussion, which attributes specific behavior to "North" and South" tries to simplify a deep and complex phenomena. Would suggest that differences in ethical perspectives be discussed without attribution to specific regions. (Lourdes Maurice, US Government)	See above, 1-435
1-440	A	11	32			Section 1.5.7 Equity and Ethics. Again, a potentially vital section is unfortunately neither particularly clear nor particularly comprehensive. The issue is covered very well in Sections 13.3.3.4.1 and (particularly) Sec 2.7.2 - 2.7.6. It would be a better idea to include here a precis of the case being made in these sections as opposed to the text proposed here, in my opinion. Furthermore the view in this section that deontological approaches can be considered as individualistic while consequentialism expresses more of an interest in society would not necessarily be a view that would be widely supported amongst the academic community, I	See above, 1-435

hapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						suggest. A better description might be that deontological approaches are generally considered to be normative (capable of extension to others), while consequentialist approaches are generally considered to be instrumental (self-centred) (Pat Finnegan, Grian)	
1-441	A	11	32	11	33	This is a bad characterization of the distinction between deontological and consequentialist ethics. It is not part of the definition of deontological ethics that it is concerned with individuals, nor of consequentionalist ethics that it is concerned with aggregated social well being. The latter in particular conflates utilitarianism with consequentialism more generally. Furthermore, it's not even obvious that this distinction is exhaustive of relevant systems, since a crucial one (Rawlsianism) isn't straightforwardly either deontological or consequentialist. (Paul Baer, Stanford University)	See above, 1-435
1-442	A	11	40	11	49	Is it possible to provide such abrupt and broad judgments about "the South, more deontological" and "the North, more consequentialist"? (Cédric Philibert, International Energy Agency)	See above, 1-435
1-443	A	11	40	11	50	It seems too simplistic to characterise monolithic groups ('north'/'south' - which are political terms, not scientific terms) as holding singular, differentiated views on equity (etc). This seems more of a political assertion than a scientific assessment. (Spencer Edwards, Australian Greenhouse Office)	See above, 1-435
1-444	A	11	40	11	50	The description of the prevalent positions in the South and in the North is somewhat a caricature. The deontological approach in the South is specific to the issue of GHG emissions and this is not at all an approach that is being advocated for sharing other natural resources such as water or fossil fuels for instance. The positions in the North reflect the current situation and the fact that industrialized countries are indeed responsible for the GHG accumulation to date but that prior to the ninetees, little was known on the consequences of that situation. I would suggest to write these to paragraph differently or at least to specify that the positions given are relevant to GHG emissions case only. (Philippe Tulkens, TERI School of Advanced Studies)	See above, 1-435
1-445	A	11	40	11	45	Characterizing "the south" and "the North" as "more deontological" or "more consequentialist" and explaining their positions on that basis is extremely misleading. In most of the relevant cases, narrow national interest is being put forward with equity-based arguments, which makes it non-sensical to refer to the ethical frameworks as being the basis for the arguments.	See above, 1-435

hapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						(Paul Baer, Stanford University)	
1-446	A	11	42	11	45	Saying that procedural equity may lead to "unequal outcomes" is misleading. What is clearly meant is "unequal allocations of emissions rights." But pretty much every proposed allocation scheme will lead to unequal allocations of emissions rights, and those which allocate emissions rights equally will be allocating something else unequally! (Paul Baer, Stanford University)	See above, 1-435
1-447	A	11	47	11	49	This is plainly false. To the extent that one can refer to "The North" at all, it does not favor a sharing of costs and benefits to minimize global costs and maximize global welfare; it favors minimizing its own costs. Given the declining marginal utility of income, Minimizing global welfare losses would actually imply that the richest should pay all the costs or at a minimum that the more of the costs paid by rich, the greater the overall welfare (Baer and Templet 2001). (Paul Baer, Stanford University)	See above, 1-435
1-448	A	11	48	11	49	Instaed of what is stated resource transfers to the South are nowadays often viewed as repayment of ecological debts (or payment for environmental services), also because the legal basis is gaining more ground as a result of increasing consequential evidence. See: Andrew Simms, Ecological Debt (The Health of the Planet & the Wealth of Nations), London, Pluto Press, 2005. (Gert de Gans, Kerkinactie)	See above, 1-435
1-449	A	11	51	11	55	Section 1.5.8, it is unclear what is this section trying to say. (Rutu Dave, IPCC WGIII TSU)	Noted, picked up in redrafting
1-450	A	11	53	11	55	Population growth is confirmed here as a key driving force, reinforcing the desirability of confronting the issue more directly and firmly than is done at the top of page 7. (Michael Jefferson, World Renewable Energy Network/Congresses)	See response to 1-276
1-451	A	11	53	11	54	Comment on the reference number. Section number should be changed from 1.2.3 to 1.3.3. (Shigeo Murayama, The Federation of Electric Power Companies)	Accepted
1-452	A	11	55	11	55	"moderate" and "strong" in l.5.6 should refer to change (presumably growth) rather than to absolute values. (Hans-Martin Fuessel, Stanford University)	Noted, picked up in redrafting
1-453	A	11	55			The population growth is not likely to have been the lowest in the US. According to World Bank's World Population Prospects the 2004 revision, the population growth	Noted, to be checked

hapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						over the last three decades (1975-2005) was highest in Africa(2.60%p.a.) and lowest in Europe(0.25% p.a.) by major areas, and highest in least developed countries(2.53%p.a.) and lowest in more developed regions(0.49%) by development groups (see p55 of the report: http://www.un.org/esa/population/publications/WPP2004/2004Highlights_finalrevised.pdf) (Koji Kadono, Global Industrial and Social Progress Research Institute)	
1-454	A	11	55	11	55	Wrong about the U.S., where there is substantial growth because of immigration from the south. Don't you mean GDP "growth" in Latin America, etc….? (Patrick Michaels, University of Virginia and Cato Insitutute)	Noted, to be checked
1-455	A	11	55	11	55	It is proposed to improve the logic of the sentence: Over the last three decades ....In order to improve clarity one sentence should describe the trend over the past 30 years by region and another sentence should compare the current absolute values. (Radunsky Klaus, Umweltbundesamt)	Noted, picked up in redrafting
1-456	A	12	10	12	10	References in footnotes (here and elsewhere) should be included in the main text. (Hans-Martin Fuessel, Stanford University)	Accepted
1-457	A	12	12			Section 1.6 Framing issues is difficult to understand. Suggest to drop the section or rewrite clearly keeping consistency with Ch 2. (Koji Kadono, Global Industrial and Social Progress Research Institute)	Noted, will be kept consistent with chapter 2 contents
1-458	A	12	12	12	12	I recommend to define what precisely is to be understood under "framing issues". (Leo Schrattenholzer, IIASA)	Rejected, it has been defined in the text
1-459	A	12	12			This section on framing issues does not have a clear role; it could be introductory text to the issues covered in ch 2 (Bert Metz, IPCC)	Accepted
1-460	A	12	14		31	this seems to be defining the meaning (and importance) of the term "framing issues" rather than identifying the framing issues for climate change and mitigation (Ian Enting, MASCOS)	Rejected, thye definition is important for chapter 1, issues are further elaborated in chapter 2
1-461	A	12	14			"demands" rather than "commands" (Ian Enting, MASCOS)	Accepted
1-462	A	12	14	12	15	The sentence "An authoritative assessment of climate change mitigation options commands not only clear and unambiguous definitions, …" contradicts the ambiguous definitions described in this chapter. Suggest using less prescriptive language. (Lourdes Maurice, US Government)	Accepted

hapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
1-463	A	12	14	12	14	"commands" should be "demands" or "requires" (Nick Campbell, ARKEMA SA)	Accepted
1-464	A	12	16	12	18	This is a very confusing definition, and it's not at all clear what "an above average probabiltiy to obtain stakeholder support" has to do with something being a framing issue. (Paul Baer, Stanford University)	Rejected, is defined by the reference (definition will be clarified)
1-465	A	12	19			After "at hand" insert new sentence. "For instance the development of a large scale global bioenergy industry may, as evidenced by the G8's adoption of an action plan that includes the promotion of a global bioenergy partnership, be motivated by energy security concerns and the issue of 'peak oil' , by the need for WTO-compatible farm-support policies in the 'North' and by prospects of sustainable rural development in the 'South', particularly sub-Saharan Africa, as well as by climate change issues." Suggest paragraph break before "The perception...." (Peter Read, MASSEY UNIVERSITY)	Rejected, it is beyond the scope of the chapter
1-466	A	12	22	12	22	The previous argument suggests that framing issues are advanced more-or-less stragegically by actors to advance their interests; this suggests that they "require surfacing hidden assumptions." These are very definitions with contradictory implications. (Paul Baer, Stanford University)	Rejected, because this is precisely the reason (this goes to chapter 2 anyhow)
1-467	A	12	22	12	22	obscure sentence (Marco Mazzotti, Institute of Process Engineering)	Accepted
1-468	A	12	30		31	What does "the proposed action" mean in this context? (Paul Baer, Stanford University)	Accepted (needs clarification)
1-469	A	12	31	12	31	I would add: "There is evidence in the years since the publication of TAR that it may be justified to contextualize climate change mitigation activities as well as the integration of mitigation and adaptation no longer in an 'individual sacrifice/social cost' framework exclusively, but in an 'individual and social opportunities' framework." (Fritz Reusswig, Potsdam Institute for Climate Impact Research)	Rejected for space limitation reasons
1-470	A	12	32			Section 1.7: The consumption pattern change or lifestyle change seems to be also important issue, but in this section, there is no description about this. Why? (Toshihiko Masui, National Institute for Environmental Studies)	Rejected, CCTs were imposed on chapter 1 (will go to chapter 2)
1-471	A	12	35	13	7	The links between adaptation and mitigation are well described, but the relationship of these with SD is not given enough attention. A practical tool applied in several	Accepted

hapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						countries called Action Impact Matrix (AIM) has proved very useful to identify, prioritise, and address mitigation-adaptation-development synergies (MIND 2004, MMRS 2005). (MIND 2004) = MIND. 2004. Action Impact Matrix - Application to Climate Change and Sustainable Development in Sri Lanka, Munasinghe Institute for Development, Colombo, Sri Lanka. (Mohan Munasinghe, Munasinghe Institute for Development (MIND))	
1-472	A	12	37		40	Adaptation and mitigation can also be conflicting, most notably in the demands for resources. Again the authors seem to be presenting their hopes as necessary consequences, but overall the sentence doesn't actually really say anything much. (Ian Enting, MASCOS)	Accepted
1-473	A	12	38	12	40	obscure sentence (Marco Mazzotti, Institute of Process Engineering)	Accepted, needs rewording (goes to chapter 2 anyhow)
1-474	A	12	40			After 2000) insert "or the opposite (e.g. if large scale hydro-electric projects lead to loss of cultivable land that may be needed if populations adapt by relocating)"+K37 (Peter Read, MASSEY UNIVERSITY)	Accepted
1-475	A	12	43	12	45	The reason given why mitigation and adapation are "never perfect substitutes" is not convincing. Basically, some climate impacts cannot be avoided by mitigation (e.g. impacts in the next few decades), and some impacts cannot be avoided by adaptation alone (e.g. many impacts on natural ecosystems or coastal/island communities). (Hans-Martin Fuessel, Stanford University)	Accepted
1-476	A	12	45			Yohe and Tol write about something entirely different. (Richard Tol, Hamburg University)	Noted, reference needs to be checked
1-477	A	12	45	12	45	The term should be dangerous anthropogenic climate change. None of the discussion is about dangerous natural climate change, e.g., the onset of the next period of glaciation. (Lenny Bernstein, L. S. Bernstein & Associates, L.L.C.)	Accepted
1-478	A	12	50		51	"Social Capital" is a theoretically controversial category; if you're going to use it you should at least give a definition and a citation. (Paul Baer, Stanford University)	Partially accepted (needs to be defined)
1-479	A	12	51	12	52	Comment on the reference number. Section number should be changed from 1.3.2 to 1.4.2. (Shigeo Murayama, The Federation of Electric Power Companies)	Accepted

hapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
1-480	A	12	53			after "hedging" insert "insurance" [I think this is what is meant?] (Peter Read, MASSEY UNIVERSITY)	Rejected, this is not the same
1-481	A	13	8			additional paragraphs provided as Annex 3 in the covering message herewith (Peter Read, MASSEY UNIVERSITY)	Rejected (space limitations)
1-482	A	13	9	13	9	It is confusing that there are two subsections focussing on "uncertainties": 1.5.5. and 1.7.2. In addition, Section 2.4 is devoted to the same topic. I suggest coordination with the Chapter 2 writing team, with the aim of shifting the detailed discussion to Chapter 2. (Hans-Martin Fuessel, Stanford University)	Accepted
1-483	A	13	11	13	20	This paragraph is very weak. Not all factors determining future emissions are "inherently unpredictable"; scenarios are not the only useful approach in the presence of uncertainties; and Manning et al. (2004) never suggest that quantification of uncertainties about climate change is "entirely subjective". (Hans-Martin Fuessel, Stanford University)	Accepted
1-484	A	13	11	13	12	There are two major sources of uncertainty in projecting future climate change: scientific and economic. Scientific uncertainty derives from the inherently chaotic nature of the climate system and the limitations in our knowledge of climate science. Economic uncertainty derives from our inability to forecast population and economic growth and technology development, the drivers of GHG emission. The TAR indicates that these two sources of uncertainty are of the same order of magnitude. Both should be introduced at this point. A full discussion of scientific uncertainty is the responsibility of WG I, but economic uncertainty is one of the topics of this report. (Lenny Bernstein, L. S. Bernstein & Associates, L.L.C.)	Noted, but the climate system is not inherently chaotic
1-485	A	13	11	13	32	The status of this section is unclear: it seems to focus on uncertainties regarding future GHG emissions, while at the end it rightly says "the fact that future emissions are uncertain is less important than the fact that they are, to a large extent, a matter of economic choice." Instead, uncertainties on climate changes given any GHG emissions scenarios (resulting concentrations, climate sensitivity, local consequences), and uncertainties on future mitigation costs (uncertain technological developments, uncertain evolution of relative price of different energy sources, and uncertain emissions scenarios) should be spelled out here. (Cédric Philibert, International Energy Agency)	Accepted
1-486	A	13	12			replace "GHG emissions released to" with "net flows of GHG's into and from"	Rejected, refer to earlier discussion on Read's

hapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						(Peter Read, MASSEY UNIVERSITY)	comments
1-487	A	13	17	13	20	The early Shell scenario work [certainly the period 1974-1979] explicitly recognised that subjective probablilites were involved, and sought to encourage all parties involved to multiply the perception of a subjective probability of a scenario occurring by a 'co-efficient of seriousness'. (Michael Jefferson, World Renewable Energy Network/Congresses)	Rejected, still a matter of debate
1-488	A	13	19	13	20	I think what is meant here is not that quantification "can be entirely subjective" (which leaves the possibility that it could also be entirely objective", but "can never be entirely objective." (Paul Baer, Stanford University)	Accepted (insert “never”)
1-489	A	13	31			"rationale" not "rational" (Ian Enting, MASCOS)	Accepted
1-490	A	13	32	13	32	Surely this should be "economic and political" choice! (Paul Baer, Stanford University)	Accepted
1-491	A	13	36	13	36	here is the place where the general comment above fits in the text (Manfred Treber, Germanwatch)	Noted, picked up in redrafting
1-492	A	13	36	13	37	why not year 2005 (many things have changed in these five years, including oil prices)? (Marco Mazzotti, Institute of Process Engineering)	Rejected, data availability
1-493	A	13	38	13	38	The term "overnight" cost is not common and therefore should be explained in the glossary. It is noted that that term is also not used in chapter 2. The better option therefore might be to avoid that term at all and to use a consistent terminology throughout the report. (Radunsky Klaus, Umweltbundesamt)	Accepted, glossary issue
1-494	A	13	48			after "policy" insert "and the realities of technological competition, with unstable lock-in and bandwagon effects (Arthur, 1994) influenced by shifting managerial vision (Fransman, 1998) - experience with new technologies both lowers their costs and raises the projected costs of competing technologies no longer sustained by R and D." (Peter Read, MASSEY UNIVERSITY)	Noted
1-495	A	13	52	13	53	Barrriers also include the lack of policy certainty into the future. The need for greater alignment between timeframes covered by policies, and the length of time required for technological R&D and development, is identified in Defra, 'Business Insights' (report of business conference proceedings October 2005).	Accepted

hapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						(Kirsty Hamilton, retainer to UK Business Council for Sustainable Energy; Associate Fellow, Chatham House.)	
1-496	A	13	54	14	11	As a CLA for this report, I expected to see a discussion of the change in definition of potential between the TAR and AR4 in this section. Why is the discussion limited to what was done in the TAR? (Lenny Bernstein, L. S. Bernstein & Associates, L.L.C.)	Noted
1-497	A	13	54	14	11	The whole part explaining the various types of mitigation potentials can be substituted by a reference to chapter 2.5.5 as the latter chapter includes an even more comprehensive description of mitigation potentials. (Radunsky Klaus, Umweltbundesamt)	Accepted (issue will be dealt with by chapter 2 anyhow)
1-498	A	14	7	14	8	Do the authors feel that cost is the only barrier to making "technological potential accessible." ? (Lourdes Maurice, US Government)	Noted (no)
1-499	A	14	10			after "prices" replace rest of sentence with "influenced by managerial behaviour towards research and innovation investments, in the context of changing perceptions of policy and their business environment". Following sentence may be somewhat hubristic? -- suggest "....aim to specify the category and temporal scope of the potential unambiguously." (Peter Read, MASSEY UNIVERSITY)	Noted, picked up in redrafting
1-500	A	14	13			Section 1.7.4: This section (and some other parts of Section 1.7) has considerable overlap with Section 2.3, in particular 2.3.2. (Hans-Martin Fuessel, Stanford University)	Accepted (will be moved to chapter 2 anyhow)
1-501	A	14	15	14	38	The text is a bit too general and vague. Why not clearly analysing the key policy debate, which is in my view: is relative decoupling of GDP and GHG emissions enough (economics first, climate risks accepted as a possible consequence of this priority), or should we aim at absolute decoupling (avoiding climate risks as the highest priority, accepting economic risks as a consequence of that choice). What are pro's and con's of these perspectives? (Jan Paul van Soest, Advies voor Duurzaamheid on request of International Gas Union)	See above, 1-500
1-502	A	14	20	14	21	A further criteria would be effectiveness, of policy or regulation, to induce investment or investment change, unless that notion is embodied in the phrase 'impact on technological change'. This is a comment picked up again several times below.	See above, 1-500

hapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						(Kirsty Hamilton, retainer to UK Business Council for Sustainable Energy; Associate Fellow, Chatham House.)	
1-503	A	14	25	14	26	Delete "and trade restrictions (sticks)." Most MEAs do not include sticks of any sort, especially not trade restrictions. For climate change specifically, at present neither the UNFCCC nor the Kyoto Protocol contains sticks. The UNFCCC is a voluntary agreement that cannot contain sticks. The Kyoto Protocol sets legally binding targets for Annex I countries, but at present contains no sticks for their enforcement. The Protocol states (Art. 18) that any penalties for non-compliance with "binding consequences" will have to be approved as an amendment. At the recent COP/MOP Saudi Arabia proposed such an amendment, which will be discussed starting in May, 2006, but given the amendment approval procedure in the Protocol (Art. 20) it is highly unlikely that an amendment will enter into force by the time AR4 is published. The COP/MOP did approve a decision with a set of indicative penalties that might be applied by Kyoto Protocol's Compliance Committee, but it is far from clear how this decision will be implemented, particularly since one country (Japan) has argued strongly against any punitive measures. (Lenny Bernstein, L. S. Bernstein & Associates, L.L.C.)	See above, 1-500
1-504	A	14	28	14	29	What is the basis for asserting that Kyoto is "a powerful emission monitoring, verification and compliance system …"? This assessment seems premature. (Lourdes Maurice, US Government)	Rejected, Kyoto is in force and it is legally binding
1-505	A	14	28	14	28	It is proposed to substitute "trading" by "flexible mechanism" because "emissions trading" is only one of three flexible mechanisms. (Radunsky Klaus, Umweltbundesamt)	Accepted
1-506	A	14	31			(policy to be undertaken as long as costs are commensurate with benefits)? (Claire Parker, Environmental Policy Consultant)	Rejected, is necessary but not sufficient
1-507	A	14	32	14	38	The description of decision-support tools is inaccurate and provides little orientation to those readers who aren't already familiar with these tools. (Hans-Martin Fuessel, Stanford University)	Rejected, it is too prescriptive
1-508	A	14	32	14	38	This paragraph covers decision-making tools, but skips any framing of the decision-making problem. Clearly, as highlighted in the TAR, sequential decision-making under uncertainty is a central strategy to deal with the decision-making problem and should be introduced. (Haroon Kheshgi, ExoonMobil Research and Engineering Company)	Noted, picked up in redrafting

hapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
1-509	A	14	32			The explanation of cost-benefit analysis, "policy to be undertaken as long as benefit exceeds cost" is not precise. Need change, for example, to "comparison between costs and benefits associated with a certain policy or measure". (Koji Kadono, Global Industrial and Social Progress Research Institute)	See response to comment 1-506
1-510	A	14	32	14	32	These are "decision support" tools rather than "decision-making" tools (or "decision-analytic tools in the terms of Ch. 2) (Paul Baer, Stanford University)	Agreed
1-511	A	14	37			uncertain and POTENTIALLY catastrophic (Ian Enting, MASCOS)	Accepted
1-512	A	14	37	14	37	Suggest qualifying "catastrophic" with "potentially". (Lourdes Maurice, US Government)	See above
1-513	A	14	37			before "catastrophic" insert "potentially". (Peter Read, MASSEY UNIVERSITY)	See above
1-514	A	14	40	14	53	Section 1,7,5, is very bare at this stage. It needs to have much more information regarding the interplay between various regions. Also there are the extent of the regions mentioned should be elaborated, for example nations in Africa and South America can be included to give a more wholestic view. (Rutu Dave, IPCC WGIII TSU)	Accepted, picked up in redrafting
1-515	A	14	42	14	44	The data on energy use are correct, but wouldn't it make more sense to present data on per capita GHG emissions. Such data is available from a recent UNFCCC Secretariat publication, Key GHG Data, available on the UNFCCC website, www.unfccc.int.ication, (Lenny Bernstein, L. S. Bernstein & Associates, L.L.C.)	Accepted
1-516	A	14	42	14	42	Which energy? Primary energy? Final energy? (Leo Schrattenholzer, IIASA)	Accepted (needs clarification, it is primary)
1-517	A	14	42			Section 1.7.5 Regional Issues. Again, as arguably one of the most crucial issues (as per general comments above regarding the need to synthesise cross-cutting issues) this section is, most unfortunately seriously inadequate. In my view, a mere 10 lines on, arguably, one of the most contentious issues in the entire process, is seriously disappointing, particularly given the huge amount of literature available. Just to take an example, this section only alludes to regional differences in per capita energy use---and even these are treated exceptionally coarsely. Just as important, in terms of the problem to be solved, are (obviously, to all involved in the UNFCCC process) regional (also intra-regional) and both inter and intra-Annex	Accepted

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						differences in per capita GHG emissions, income and historic responsibility. This is not even to mention inter-regional national differences in impacts, terms of trade or even cultural attitudes to climate change or even climate itself. The key case is made in lines 53-56. I agree absolutely that solving all these probelms will "to a large extent depend on technology innovation and diffusion". Yet this is, arguably, one of the single most important regional issues of all, I would submit. Most, unfortunately for the sake of the overall report, these issues are again most inadequately considered (both seperately and combined) in Section 2.8, where (ostensibly) they ought to be comprehensively covered. (See below) (Pat Finnegan, Grian)	
1-518	A	14	42	14	42	The text "is still fractions of….." does not read well, would suggest "considerably lower than…" (Nick Campbell (Batch 2), ARKEMA SA)	Noted, picked up in redrafting
1-519	A	14	43	14	44	Better to put all amount bracket off with one decimal number only. To homogenize. (FÉLIX HERNÁNDEZ, IEG-CSIC)	Accepted
1-520	A	14	43	14	44	sorry, what is toe? (Marco Mazzotti, Institute of Process Engineering)	Glossary (tonnes oil equivalent)
1-521	A	14	45	14	48	"...developing countries need and will take active measures towards the implementation of their national sustainable development objectives, i.e., to coordinate and integrate economic development, energy supply based on their national resource endowment and accessibility of energy resources, and environmental protection." This is a generic issue which has been covered more comprehensively in the past literature -- e.g., (MM 1995), (PMMM 2005) and (MMRS 2005) (MM 1995) = Munasinghe, M. 1995. Sustainable Energy Development (SED), World Bank, Wash. DC, USA. (PMMM 2005) = Meier, P. and M. Munasinghe. 2005. Sustainable Energy in Developing Countries, Edward Elgar Publ., London, UK. (Mohan Munasinghe, Munasinghe Institute for Development (MIND))	Noted, more references will be added
1-522	A	14	48	14	52	No evidence that technology is made accessable to developing countries without severe conditions that limit its effectiveness to alleviate poverty and provide affordable energy services. Hence the sentence should be translated into a more indicative and realistic description of the relationship etween developing and developped worlds, where the latter has benefit largely of the affordable cheap	Rejected, no evidence reports this claim

hapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						resources and cosequentl was capable of building the required technology, while on the other side the other world is denied that chance. (Mohammed Alfehaid, Saudi Aramco)	
1-523	A	14	50			"reducing the population…." may have unfortunate connotations - suggest "increased access to electricty for currently deprived populations" (Peter Read, MASSEY UNIVERSITY)	Accepted
1-524	A	14	52	14	52	What is the concept of "energy-income elasticities"? (Lourdes Maurice, US Government)	Rejected, this is not a textbook
1-525	A	15	5	15	18	As a CLA for this report, I was surprised to see air pollution listed as one of the cross-cutting issues, while water was omitted. My list of cross-cutting issues include water, but not air pollution. I suggest you insert a section on water and move the discussion on air pollution elsewhere in the Chapter. (Lenny Bernstein, L. S. Bernstein & Associates, L.L.C.)	Noted, unfortunately CCTs are defined elsewhere (defined by plenary)
1-526	A	15	5	15	29	Discussion on ancillary benefits is not sufficient. At least some references to TAR WG3 Chapter 8 should be made. (Alexander Golub, Environmental Defense)	Rejected, introduction is by definition never sufficient
1-527	A	15	5	15	28	The relationship between air pollution and climate can and should be analysed in greater detail. This will complicate the matter, but that is what reality sometimes does. Mitigation of GHG may well be conflicting with air pollution goals, e.g. in the case of using biomass for energy production leading to an increase of NOx, PM, and/or toxics. There is a need for evalution tools (e.g. overall cost - benefit analyses) to clarify what concrete actions are indeed steps forward. (Jan Paul van Soest, Advies voor Duurzaamheid on request of International Gas Union)	Rejected, cannot be as such in introduction
1-528	A	15	5			Air Pollution: Suggest citing: Cifuentes et al. Science 2001: 293:1257-1259. (Paul Epstein, Harvard Medical School)	Noted
1-529	A	15	5			I miss here a remark that: The Kyoto Protocol only addressses direct GHGs, not ozone precursors nor aerosols (or precursors of them), and ODPs, which also have a global and regional impact on climate and weather. (Jos Olivier, Netherlands Environmental Assessment Agency (MNP))	Rejected, not relevant (will be picked up in the redrafting earlier on in the chapter)
1-530	A	15	5			Add the names of the air pollotants referred to: ozone precursors CO, NOx and NMVOC and aerosols such as black carbon and organic carbon and SO2, a main aerosol precursor. (Jos Olivier, Netherlands Environmental Assessment Agency (MNP))	Rejected, not necessary and space limitations

hapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
1-531	A	15	7	15	7	please don't use the words 'energy production' but instead 'energy transformation'. We have learnt from the First law of Thermodynamics and from Einstein that energy is conserved and cannot be produced. (Manfred Treber, Germanwatch)	Rejected, good that somebody knows the difference
1-532	A	15	13			recently publicised results from P Cox and co-workers (Guardian Weekly 6.12.06, p19) suggests "others act to increase it" may be a so-far seriously underestimated effect -- this should be noted in table 1.2 or in the text. (Peter Read, MASSEY UNIVERSITY)	Rejected, refernce unknown
1-533	A	15	20			the material covered in table 1.2 is far too detailed for an introductory chapter; would fit better in ch 11 (Bert Metz, IPCC)	Accepted (nneds to be taken up with chapter 11, Rogner)
1-534	A	15	20			Table 1.2 Air Pollution and Climate change. Include work on CO2, pollen and asthma. For text and references: Please see www.climatechangefutures.org, pp48-52. (Paul Epstein, Harvard Medical School)	Noted, see response to 1-533
1-535	A	15	22		29	It is simply not true that climate policy automatically has ancillary benefits for air pollution. I know that there are a bunch of papers out there that claim this, but these are just wrong. In developed economies, these papers go wrong by assuming simplistic behaviour in energy use; in developing economies, primary and secondary concerns are swapped, and climate should be seen as an ancillary cost of air quality policy. (Richard Tol, Hamburg University)	Rejected, no citation provided and, moreover, this is not claimed in the text
1-536	A	15	25			On China it seems natural to even refer to Vennemo, Haakon , Kristin Aunan, Fang Jinghua, Pernille Holtedahl, Hu Tao and Hans Martin Seip, 2006, Domestic environmental benefits of China's energy related CDM potential, forthcoming, Climatic Change (Haakon Vennemo, ECON)	Noted, reference will be checked
1-537	A	15	35	15	35	Am I right that there is a refrigerator on the market which works without fluorinated gases? If so, the fluorinated gases have interesting and useful properties, but they are not 'unique'. (Manfred Treber, Germanwatch)	Noted (unique will be deleted)
1-538	A	15	47	15	49	"Use of replacements may have a lower climate impact than the use of fluorinated gases, if considered together with energy related CO2 emissions, assuming all gases are fluorinated gases, if considered together with energy related CO2 emissions,	Rejected, proposal reduces clarity

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						assuming all gases are eventually emitted." only makes sense in the context of the other sentences in this paragraph if replacements may have a higher climate impact (Nick Campbell, ARKEMA SA)	
1-539	A	15	53			Don't say "IPCC study" but "IPCC report" (Bert Metz, IPCC)	Accepted (Yes BOSS)
1-540	A	16	5	16	21	Whether 'lock-ins' are being created or not, and whether short term actions conflict with long term perspectives and the need for flexibility, largely depends upon the policy instruments that are chosen. Highly specific instruments, such as subsidies for certain technologies, prescriptions, means oriented regulation etc. indeed have a higher lock in risk. But more generic instruments, such as carbon trading, flat rate carbon taxes and the like, direct markets in a general sense towards low C futures, but leaving specific choices as to what options/measures are 'best' to market players. (Jan Paul van Soest, Advies voor Duurzaamheid on request of International Gas Union)	Rejected, too specific (the discssion is moved to chapter 2)
1-541	A	16	7			Comment to chapter 1.7.8: It is noted that chapter 3.6 includes a quite comprehensive discussion on timing of mitigation. The sentence beginning with: "The reality of effective and efficient GHG mitigation …" does not really provide new information to policy makers because all countries will and can claim that they are already mitigating climate change. It is proposed to add at the end of chapter 1.7.8 a reference to chapter 3.6 that includes a much more comprehensive discussion on the timing issue. (Radunsky Klaus, Umweltbundesamt)	Noted (discussion in chapter 1 will be reduced)
1-542	A	16	7	16	8	The text "that action is needed now…" seems to be policy proscriptive and could be re-worded, for example, "many actions can be taken now and….". What is meant by "public discourse"? (Nick Campbell (Batch 2), ARKEMA SA)	Rejected, action is not specified and therefore not prescriptive
1-543	A	16	13			add "Thus precautionary investments with multiple uses are needed, for instance investments in creating a large buffer stock of standing forest as a strategic stock of biomass raw material (Read, 1996, Read and Lermit 2003/5) serve also to co-produce timber, with the balance of outputs determined by the evolution of relative market prices and later decisions on rotation length (i.e. date of felling). This also provides a long run sustainable supply of forest products in lieu of continued de-forestation, thereby serving the purposes of the Biodiversity Convention. Similarly,	Rejected, too specific and too long

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						investments such as terra preta soil improvement both stocks biochar permanently in the land and serve to enhance future supplies of agricultural and/or biomass energy raw material, depending on the evolution of relative prices and future decisions on crop selection (Lehmann, 2005/6, Ogawa et al, 2005/6) . Such precautionary investments serve to de-couple short term GHG reductions from longer term capital replacement decisions and ease the short-term versus long-term tensions." (Peter Read, MASSEY UNIVERSITY)	
1-544	A	16	19	16	21	The issue is not only to find the right balance between short-term and long-term solutions but also with regard to allocation of resources to climate change issues compared to other issues. The exercise organised by Lomborg in Copenhagen might reflect that later issue but other efforts might have also been made to assess that topic. (Radunsky Klaus, Umweltbundesamt)	Noted (will be put more upfront in chapter 1)
1-545	A	16	22	16	53	Suggestion to move section 1.8 to the beginning of the chapter, as this information should be provided at the start of the chapter (which also start of the report) rather than at the end. (Rutu Dave, IPCC WGIII TSU)	Noted, will be considered in the rewrite
1-546	A	16	23			Section 1.8. I do not think that this section addresses the point. The point is not to remind the reader on how IPCC reports are prepared and approved. It is to summarize the most significant change in AR4 in comparison with TAR. (Philippe Tulkens, TERI School of Advanced Studies)	See above, 1-545
1-547	A	16	23	16	53	This section contains general description of IPCC and its organisation; that does not seem useful. The rest is not very informative (no reference to the descriptions in Ch 1 of TAR on evolution of assessment) and wrong in not mentioning the strong sectoral focus of AR4 compared to TAR (for reasons of making assessment more user friendly) (Bert Metz, IPCC)	See above, 1-545
1-548	A	16	24			suggest "relation to previous assessments' --- changes are actually a very small part of this section (Ian Enting, MASCOS)	See above, 1-545
1-549	A	16	29			"these scientists are selected by their governments" => "The authors are nominated by their governments and participating organizations and selected by the relevant working group/Task Force Bureau." It is more accurate and relevant. Also, the	Agreed (to be checked)

hapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						reference to an academic paper (Jasanoff et.al. 1998) seems irrelevant as the sentence just states the rule of the organization of the IPCC (see p 5 of the IPCC document: http://www.ipcc.ch/about/app-a.pdf) (Koji Kadono, Global Industrial and Social Progress Research Institute)	
1-550	A	16	29	16	53	Last sentence of paragraph is incorrect in the way it describes selection of IPCC authors. The IPCC selects authors; not individual governments. (Spencer Edwards, Australian Greenhouse Office)	Accepted
1-551	A	16	40			Where is cost-benefit analysis convered in AR4? (William Pizer, Resources for the Future)	Noted (chapter 2 issue)
1-552	A	16	40			between "1966" and ")" insert " - though these findings were controversial in relation to comparisons of the value of a statistical life - as between, for instance, Bangladesh and the USA. This consideration invalidates the application of CBA in the area of climate change since its theoretical basis includes an assumption of equitable, or at least politically mediated, income distribution. It may be noted that the Convention refers to cost effectiveness." (Peter Read, MASSEY UNIVERSITY)	Rejected, too specific an issue
1-553	A	17	5	17	41	Section D covers chapter 11-13 (was change made at approval of AR4 outline) (Bert Metz, IPCC)	Accepted
1-554	A	17	19	17	19	Miscounted: Replace 'eight' by 'nine' and 'six' by 'seven'. (Leo Schrattenholzer, IIASA)	Accepted
1-555	A	17	26	17	26	Miscounted: Replace 'six' by 'seven'. (Leo Schrattenholzer, IIASA)	Accepted
1-556	A	17	28			suggest "is available" (Peter Read, MASSEY UNIVERSITY)	Accepted
1-557	A	18	0	23	0	It is worrying that the Executive Summary of the report requires so many pages of references. The Executive summary should be directly taken from the text of the other chapters of this report and could be directly referenced from where it has originated n these chapters. The appearance of references in the Executive Summary clearly suggests that many references have been ignored whilst a few chosen. (Nick Campbell (Batch 2), ARKEMA SA)	Rejected, chapter 1 is not the summary (references should be pertinent to Article 2)
1-558	A	19	15	19	15	Refs list. Note that the reference to my paper should reflect that this is now published as Grubb, M. J. (2004). "Technology Innovation and Climate Change Policy: An Overview of Issue and Options." Keio Economic Studies 41(2): 103-	Accepted

hapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Considerations by the writing team
						132. (Michael Grubb, Cambridge University)	
1-559	A	21	17	21	18	The report with the authors stated cannot be found. Should it be instead Interim Report IR-01-051, 'Managing Climate Risk' by Obersteiner, Azar, Kossmeier, Mechler, Möllersten, Nilsson, Read, Yamagata, and Yan? (Kenneth Möllersten, Swedish Energy Agency)	Rejected (reference exists)
1-560	A	21	23	21	23	'data', not 'date' (Leo Schrattenholzer, IIASA)	Accepted
1-561	A	23	34	23	34	'farewell society' sounds a bit funny. How about 'good-buy society'? (Leo Schrattenholzer, IIASA)	Rejected, not clear
1-562	A	24	0			Table 1.1 Unit should be clearer (% of total CO2e emissions). The aggregation is puzzling, mixing energy sources (fossil fuel combustion), activities and gases ?? 'Transport' and 'fossil fuel combustion' obviously overlap. Anyway the table does not give more general information than Fig. 1.2 (perhaps derive a Table from it and substitute?) (Frédéric Ghersi, CNRS)	Accepted (will be redone anyway)
1-563	A	27	0			Figure 1.3 Should mention area concerned (presumably world) (Frédéric Ghersi, CNRS)	Accepted
1-564	A	28	0			Figure 1.5 Title should not repete legend, must mention the figures are global, base 1 in 1971 (if it is the case indeed). Legend could be sorted according to the identity (CO2, POP, GDP/POP, PE/GDP, CO2/PE). (Frédéric Ghersi, CNRS)	Accepted