WMO

INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE

UNEP

INTERGOVERNMENTAL PANEL
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Agenda item: 3c
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"CLIMATE CHANGE 2001: MITIGATION", THE CONTRIBUTION OF WORKING GROUP III TO THE IPCC THIRD ASSESSMENT REPORT

LIST OF ERRATA AND CHANGES

Changes proposed to be made to the underlying assessment, (except for the Technical Summary, which is separately submitted as IPCC-XVII/Doc. 3e, Add. 1) for consistency with the approved Summary for Policymakers (ref. IPCC-XVII/Doc. 3e), and accepted by the Working Group at its Sixth Session (Accra, 28 February-3 March 2001), are attached. The proposed changes will be made to the underlying assessment. The underlying assessment was distributed to governments prior to the Sixth Session (ref. WGIII-VI/Doc. 3). On this understanding, therefore, the underlying assessment is hereby submitted to the Panel for acceptance.

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IPCC WORKING GROUP III THIRD ASSESSMENT REPORT

MODIFICATIONS

ON TECHNICAL SUMMARY AND THE MAIN REPORT

3 March 2001, Accra, Ghana

Note:

1 These modifications include (a) changes made in the Technical Summary and underlying chapters to make them consistent with the final version of the SPM; (b) corrections of errors identified in the final draft of the Report that went for government distribution.

2 All the changes made during the process of reference editing have been made both in the text and in the list of references; including removal of those that were not cited in the text or not on the list; addition of reference entries to the reference list or citation to the text; and any update or change related to the reference entries or citations. These detailed changes are not listed here.

3 Format of this list: the changes in this list are given as follows: chapter (TS), page number, paragraph and line numbers; then the suggested changes.

4 A thorough check of these modifications will be under the responsibility of the Co-Chairs to ensure that all the changes are made before publication.

Technical Summary

Change co-benefit to ancillary benefit on the following places:

Page 2 and page 29: table of content and subsection title (7.2.1. Co-Benefits and Costs and Ancillary Benefits and Costs)

Page 2 and page 32: table of content and subsection title (8. Global, Regional and National Costs and Co-Benefits)

Page 2 and page 36: table of content and subsection title (8.6 Co-benefits of greenhouse gas mitigation)

Page 2 and 40: 9. Sectoral Costs and Co-benefits of Mitigation

Page 2 and 43: 9.3 Sectoral Co-benefits of Greenhouse Gas Mitigation

Page 6: replace the sentence starting Within this report … by "The term "ancillary benefits" is often used in the literature for the (ancillary, or secondary) effects of climate change mitigation policies on problems other than GHG emissions, such as reductions in local and regional air pollution, associated with the reduction of fossil fuels, and indirect effects on issues such as transportation, agriculture, land use practices, biodiversity preservation, employment, and fuel security. Sometimes these are referred to as "ancillary impacts", to reflect the fact that in some cases the benefits may be negative."

Page 6: delete footnote 3 on co-benefits.
Page 30: second bullet change ~~**Co-benefits and costs (or a**~~ **Ancillary impacts**
Page 31: as made above (~~Co-benefits and costs (or a~~ *Ancillary impacts*)
Page 33: change once
Page 36: change twice.
Page 43: change three times
Page 47: change once
Page 48: change twice
Page 69: note b, change once

Potential: in section 3, add a footnote as in the SPM clarifying the concept and usage of potential (??)

Page 6, par 3 3rd sentence: remove "respecting the insights from the three perspectives on climate policy analysis"

Page 9, final par. Replace "assume" ('post-SRES scenarios mostly assume') by project

Page 10, par. 1 Add to 5th line: if developing countries emissions would follow the baseline scenarios.

Page 11, paragraph 3, Line 3 (par. 2): redraft '...dwelling units and vehicles...'

Page 11: insert figure TS.5 Fossil Fuel Diagram

Page 12, para 2, line 2: redraft atmosphere, which along with land use change has raised atmospheric …

Page 14, paragraph 1: '...there is evidence that, ***other things being equal***, efforts...'

Page 15, section 3.3.5, 2nd sentence, add Switzerland after Germany.

Page 15, paragraph 3, 2nd sentence: *add: "intrinsically safe and" before "less expensive"*

Page 16, 2nd paragraph, Line 8: Insert equivalent after CO2..

Page 16, final line: change '...nevertheless the main conclusion drawn in the paragraph above can...'

Page 17, section 4.1, second par,1st sentence replaced by:
The mitigation costs through forestry can be
quite modest, US$0.1-$20 per tonne C in some tropical developing countries, and somewhat higher (US$20-$100/tC) in developed countries.

Page 18, 2nd paragraph, final sentence: *replace by "may lead to lower carbon storage over time(after 2010)*

Page 18 paragraph 4: *Change "budget and , hence, provide" by "budget. Enhancing these carbon pools provides"*

Page 19, final line: *replace "of " by "if"*

Page 21, delete (on the basis of a social rather a private rate of discount)

Page 23, section 5.3, para 3: Buildings. Delete last sentence. It is a repeat of the first sentence of the paragraph.

Page 23, paragraph 3, Line 4: Extend to read ' ...structure, slow stock turnover, administratively...'

Page 23, paragraph 6 (beginning Transport), Line 1: Redraft to read: '...be widely perceived...' The perception is not
universal, even in modern societies.

Page 23, paragraph 6, Line 3: Change 'road' to 'transport'.

Page 24, Insert par 3: line 16/7 between co-generation sentence and Yet….: The implementation of CHP is closely linked to the availability and density of industrial heat loads, and district heating and cooling networks.

Page 24, par. 3, 3rd line: Delete word "hostile"

Page 25, par 3, Line 3: Extend to read '...their implementation, and may be particular issues in developing...'

Page 26, Para 1. Revise to read : "Co-ordinated actions **could help** address competitiveness concerns, potential conflicts with international trade rules, carbon leakage, and hold down mitigation costs."

Page 26, paragraph 6, 1st bullet: Extend Line 3 to read '...infrastructure. They need updating to remain effective. The main...'

Page 27: "line 10: delete: while non-price based ….
Line 13: change to improve the efficiency of the tax structure to "to improve market efficiency.

Par 3: *Add "amongst others" behind "may depend*

Par. 5: the text of this paragraph be deleted and the text be simplified to read : "The extent to which developing country (non-Annex I) Parties will effectively implement their commitments under the UNFCCC may depend on the transfer of environmentally sound technologies (ESTs)."

Page 29, final line: Extend to read '...is worthwhile, though uncertainty about the nature and timing of impacts, including surprises, will constrain the extent to which the associated costs can be fully internalised'.

Page 31, replace "7.3.3" with "7.3.4." before "Development, Equity …"

Page 34, paragraph 6: Add sentence saying: 'These models do not generally include no-regrets measures or take account of the mitigation potential for greenhouse gases other than CO2.'

Page 34, footnote 16:

keep the 1st sentence of the footnote and delete the rest. The rest of the footnote moved to Table TS-4 and TS-5 as note, which should read as follows:

The results of the Oxford model are nt included in the ranges cited in the TS and SPM because this model has not been subject to substantive academic review (and hence is inappropriate for IPCC assessment), and relies on data from the early 1980s for a key parametization that determines the model results. This model is entirely unrelated to the CLIMOX model, from the Oxford Institutes of Energy Studies, referred to in Table TS-6.

Page 35 last par line 1 to line 3: *Add "theoretical" before "case"*

Page 36: caption to TS-5 and paragraph 3, L1: 'GDP losses' should read 'reduction in projected GDP'

Page 37 line 2, after last sentence: *Add "According to the literature, ancillary benefits may be of particular importance in developing countries, but this literature is as yet limited."*

Page 38: Insert additional paragraph following bullets to read: 'These results do not take into account Sinks, use of the Kyoto Mechanisms, non-CO2 abatement opportunities, possible no-regrets measures, or ancillary benefits other than those arising from revenue recycling'.

Page 38, 1st bullet: 'a decline in GDP' should read 'reduction in projected GDP'

Page 38 paragraph 4 line 3, add "t" before "he following"

Page 38, final paragraph, Line 7: Should read '..reduction in projected GDP...'

Page 40, paragraph 6, Lines 3,4: replace but and Extend to read ' ...loose substantial proportions of their traditional output relative to the reference scenarios, though the impact of this on the industries will depend on diversification, and other sectors...'

Page 41, paragraph 5 (under 9.2.2): Extend to read ' ...electricity generation and the diversification of the industry into energy supply in general.'

Page 44, paragraph 4: Replace 1st sentence by 'Policy makers therefore have to grapple with great uncertainties in choosing the appropriate responses.'

Page 44, section 10.1, 5th par. Add clarification at the end of the 1st sentence, include both figures 10.1 and 10.2 as figure TS.10 (a) and (b) respectively. So the sentence will read:

.. (Figure TS. 10 (a)) Given these assumptions. Models which examine hedging explicitly in terms of an uncertain stabilisation target show that abatement over the next few years is economically valuable of (as) there is a significant probability of having to stay below ceilings that would otherwise be reached within the characteristic timescales of the systems producing greenhouse gases (Figures TS. 10 (b)), given these ssumptions.

Note: figure TS.10(b) will be from chapter 10, figure 10.1.

Page 45 paragraph 3 line 3, *Insert "theoretical" before "strategies"*

Page 45 paragraph 4, delete this paragraph starting "The relevant insights…

Page 45. 2nd par, 2nd sent: change "increases both its efficacy and its equity" to "is considered both efficient and equitable."

Page 46, paragraph 4: *Delete part of sentence starting with "where decisions…."*

Page 47, 5th bullet: Insert footnote to explain Pareto optimality. *"Pareto optimum is a requirement or status that an individual's welfare could not be further improved without making others in the society worse off."*

Page 50, Figure TS-1: *Add steep "A1FI" arrow, add "A1B"to current arrow, and add flat "A1T" arrow in environment/A1 box (see the revised figure from the SPM)*

Page 57, figure TS. 10: the line of late response needs to drop below early response curve at longer times to achieve stabilisation.

Page 58, make corrections to table TS. 1 as noted for table 3.36.

Page 65, Table TS. 2 replace text in halocarbon box with the following text:
Halocarbons. Emissions of HFCs are growing as HFCs are being used to replace some of the ozone depleting substances being phased out. Compared to SRES projections for HFCs in 2010, it is estimated that emissions could be lower by as much as 100 MtCeq at costs below $200/tCeq. About half of the estimated reduction is an artifact due to the SRES baseline values being higher than the study baseline for this report. The reminder could be accomplished by reducing emissions through containment, recover and recycle of refrigerants and through use of alternative fluids and technologies.

Other changes made in the SPM that will be reflected in the Technical Summary include"
Figure TS-2: figure and caption will be changed in accordance with figure SPM-1

Insertion of a box describing the IPCC Emissions Scenarios in the TS: use the text as approved in the WG II SPM.

Tables TS. 4 and TS. 5: add note to the two tables regarding the Oxford results:
The results of the Oxford model are nt included in the ranges cited in the TS and SPM because this model has not been subject to substantive academic review (and hence is inappropriate for IPCC assessment), and relies on data from the early 1980s for a key

parametization that determines the model results. This model is entirely unrelated to the CLIMOX model, from the Oxford Institutes of Energy Studies, referred to in Table TS-6.

Figure TS-5 together with the caption: comparison of cumulative carbon emissions: to be replaced with the new figure SPM - 2.

Figure TS-7 and caption: to be replaced with the revised SPM-3

CHAPTER ONE

replace "projection or projections" with "scenario or scenarios"
Page 3, twice.
Page 5: replace "projection" with "scenario" once
Page 8: replace "projection" with "scenario" twice
Page 18: replace "projection" with "scenario" once
Page 25: replace "projection" with "scenario" once
page 51, table 1.1, note: replace "projection" with "scenario" once

Page 3 paragraph 3 delete the sentences under the parentheses (or even infeasible, as could be the case if non-Annex 1 countries never participate).

Page 3, last par. The chapter closes with a discussion of preliminary attempts to integrate the information and insights that result from studies done from the three perspectives. Within this report the concept of "co-benefits" is used to capture dimensions of the response to mitigation policies from the equity and sustainability perspectives in a way that could be used to modify the cost projections produced by those working form the cost-effectiveness perspective although ancillary benefit has been more widely used in the literature. The concept of "mitigative capacity" is also introduced as a possible way to integrate results derived from the application of the three perspectives in the future.

Page4 paragraph 5 please replace "pursuein" with "pursue in"

page 7, last paragraph emphasises replace "It rather suggests a portfolio approach ….." by "Rather than a hierarchy of approaches, the evolution of perspectives suggests a portfolio approach…."

Page 8, 1st par under section 1.2.2: The benefits included in the calculus are estimated from avoided climate damages and other ~~co-~~ ancillary benefits that would have otherwise occurred if mitigation policies had not been introduced. The costs for mitigation and other side effects that result are estimated from economic sacrifices that might be required to mitigate climate change.

Page10 paragraph 6, please replace "parts of their assigned emissions right" with "parts of their assigned amount", according to the relevant provisions of the Kyoto Protocol.

Page11 paragraph1, the sentence of "Market failures refers to situations in which the price system does

not allocate resources efficiently to" **delete to at the end.**

Page 15 paragraph2 replace "industrialized" with "developed", according to the relevant provisions of the UNFCCC.

Page17 paragraph1, please add the words of "and regions" after the word of "countries". Hong Kong is a special administrative region of the People's Republic of China.

Page 17: change Bolin and Kheshgi (2000, unpublished) to Bolin and Kheshgi (2001, in press)

Page 19, line 21, add to end after opportunity: a number of perspectives on equity are discussed more fully in chapter 10.

Page 22, last paragraph: In the sentence "Similarly, some view …," change to "Similarly, the degree of substitution that is possible between kinds of capital -- for example, between natural and human capital -- is a subject of disagreement among researchers."

Page 23, first paragraph after Box 1.3: *to replace "much of development theory" by "some branches of development theory" to avoid "extreme view"*

page 31: to add at the end of 1.4.3 before "This subsection….": "Regional views on the need for or feasibility of decoupling wellbeing from production vary widely"

Page 31, Section 1.4.3.1: *add after "The maximum feasible": "These technologies are often more labour intensive."*

Page 32, Section 1.4.3.4: *ad, "with associated positive effects on climate change mitigation." to make the par discussion more relevant to climate change mitigation*

Page 33, 2nd par of section 1.5: One important preliminary step towards integration of the three perspectives that is developed in the body of this report is the use ~~idea~~ of ancillary and co-benefits, developed and assessed most fully in Chapter 7 and 8 and referred to in many of the other chapters, that could be used to augment mitigation cost estimates produced by the cost-effectiveness approach.

Page37 paragraph3 delete the sentence of " One consequence is that negotiations are hampered by an absence of trust between developing and developed nations".

Figure 1.1. *remove brackets in lower line, but retain lighter shade of colour to suggest less emphasis on equity.*

Reference: change Bolin and Kheshgi (2000, unpublished) to Bolin and Kheshgi, 2001: … in Proceedings of the National Academy of Sciences (PNAS).

CHAPTER TWO

Page 1: author list: Keywan and Alexander: "IIASA": add Iran/Austria

PAGE 6: LAST PAR. Last line of section 2.1 should read: "finally section 2.6 provides recommendations for future research".

Page 8, box 2.1 last sentence: Chapters 7, 8 and 9 discuss ancillary benefits of climate mitigation and the co-benefits of policies integrating climate mitigation objectives with other goals.

Page 16. The U.S. Government has questions regarding the conclusion drawn on this page that "parts of the AIM and ICAM2 scenarios show that the non-OECD regions may not need to significantly reduce emissions throughout the coming century." The word "significantly" is open to interpretation, but all the scenarios in figure 2.7 show that emissions have to be 40% below baseline before 2080, which does not seem "insignificant." Seven of the scenarios show that reductions do not have to go beyond 10% before about 2030. It would be more accurate to say that "some scenarios show that non-OECD regions may not have to significantly reduce emissions before 2030."

Page 44, paragraph 1, In the second bullet replace "developed" with "developing'

Page 5, paragraph 2, Replace "more strongly implemented" with "stronger"

Page 7, para. 3, Replace "there is … which" with "instead of a single "business as usual" scenario multiple baseline scenarios are needed to"

Page 8 Box 2.1 Para. 7 Replace "for purposes" with "implemented for reasons"

Page 20 Figure 2.7, After "stabilization scenario" add "divided by baseline emissions"

Page 35, Para. 2 Replace "can" with "is likely to be"

Page , 40, Para. 1 Replace "introduction" with "use"

Page 43, Para. 3 Replace "result in output for the" with "be effective in"

Page 44, Para. 1 In the third bullet insert "supply side" before options

Page 45, Para. 1 Replace "climatic" with "climate"

Page 45, Para. 2 Remove "achievement of"

Page 48, right, 8th reference, replaced by

Morita, T., N. Nakicenovic and J. Robinson, 2000b: The Relationship between Technological Development Paths and the Stabilization of Atmospheric Greenhouse Gas Concentrations in Global Emissions Scenarios, CGER Research Report (CGER-I044-2000), Center of Global Environmental Research, National Institute for Environmental Studies.

figure 2.13: to insert the shade for the SRES range >450, 550-650, <750 scenarios

CHAPTER THREE

Page 6 second paragraph, line 5, to replace "this decrease in growth" by "this decrease in growth rate"

Page 6 paragraph 4, line 12: *add "in many developing countries" at the end of the sentence*

Page 8, para 5, line 1: and, to much lesser extent,
Line 3, delivery systems, insulating plastic foams
Line 4: replace "one-half" with "one- tenth".

Page 12 Figure 3.3, make X and Y axis clearer.

Page 13 paragraph 2: *add reference*

Page 19 paragraph 2, explain the rationale to select B2 scenario from SRES, add *to the last paragraph on B2 (first sentence): "From the set of IPCC SRES scenarios, for the period covered in this chapter (up to 2020), scenario B2 most resembles baseline scenarios with low levels of technology introduction used in the literature assessed here.*

Page 14, para. 3, line 7: replace 96% with 98%

Page 14, para. 4, line 1: insert "or projected to be used" after "used"

Page 14, para 4 line 3, 4, delete from estimated through emissions. Replace with HFCs in the building sector were essentially zero in 1995, but are projected to grow as they replace ozone depleting substances.

Page 21, para. 2, line 4: insert excluding emissions from vehicle air conditioners (described in the Appendix), at the start of sentence 2.

Page 39, par 3, lines 1-4, creat a new bullet beginning with "Thermal…"

Page 40, para. 3: insert before "This para 3.5.4.8 Summary of Manufacturing Industry GHG Emission Reduction Options (check table of contents)

Page 55, in 3.7.4.5, add data source for China: *Li, 1999*

Page 57, before last para starting with "table 3.28 …", insert headline
"3.8.3 Historic Trends and Driving Forces"

Page 58, remove headline "3.8.3 Historic Trends and Driving Forces"

Page 65, In Finland, about 10 % of electricity generated is from biomass cogeneration plants using sawdust, forest residues, and pulp liquors (Pingoud *et al*., 1999; Savolainen, 2000). In other countries biomass cogeneration is utilized to a lesser degree as a result of unfavourable regulatory practices and structures within the electricity industry (Grohnheit, 1999; Lehtilä *et al*., 1997).

Page 66, first 2 lines, they are already at the end of page 65, delete.

Page 33, footnote 14, remove what is in brackets.

Page 78, par. 8 line 1, insert "some" before "fluorinated".

Line 2, delete 1st "and", insert "and recycling" after recovery.

Page 88, IEA, reference no 10, from top to bottom, make editorial change

Page 97, SAR II, refers to WG II SAR, chapter 22, Section 4.4.1

Page 98, Schnell, Ronald, 1999. Make editorial correction.

Page 102, WEA, 2000. World Energy Assessment: energy and Challenge of Sustainability, J. Goldenberg (ed) UNDP, UNDESA, and World Energy Council, New York, USA.

Page 111, table 3.9, need checking.

Page 134, replace table 3.36 with table TS. 1. Change ref to table 3.20 - 3.21 from right hand box 4 through 8. Change box 9 to 3.19. also, tick marks 12 column 1. Top box move to column 3.

Page 137, replace table 3.37 with table SPM. 1.

Page 144, figure 3.11 and 3.12, reverse background from black.

Page 107, table 3.2, replace 42 (2) with 0 Eliminate footnote 2.

Chapter 3 Appendix

Page 2, para. 5, lines 4/5, delete parenthetical phrase (and …).

Page 3, para. 6, lines 9/10, delete "zero ozone depleting potential (ODP)"

Page 9, para 9, line 3, delete "price"

Page 17, para 4, line 3/4, delete "this implies the necessity" add "is needed" after Training.
Line 3, insert "where " before emissions.

Page 21, table A3.1 change bottom box column 4 from 2550 to 3300.

Chapter four

Chapter title “Geo-engineering”, not “Reo-engineering”.

Page 1 content list, add 4.2.2.2 Driving Forces for Land-use Change.

Page 2, list of figures, replace the title of figure 4.7 by
Figure 4.7 Indications of the magnitude of the carbon sink in case study countries for a set of forest management measures

Page 2: change the first sent. In par 2 of the Executive summary: The mitigation costs through forestry

can be quite modest, US$0.1-$20 per tonne C in some tropical developing countries, and somewhat higher (US$20-$100/tC) in developed countries.

Change of co- ancillary benefit:

Page 2, page 21, 22:

4.4 Environmental Costs and Co-Benefits

4.4.1 Environmental Costs and Co-Benefits in Forests

4.4.2 Environmental Costs and Co-Benefits in Agricultural Land

Page 15: last par, replaced by: Nabuurs *et al*. (2000) also estimate the potential of a broad range of forest related activities (including protection from natural disturbance, improved silviculture, savannah thickening, restoration of degraded lands, and management of forest products) at 0.6 GtC/yr over six regions in the temperate and boreal zone (Canada, US, Australia, Iceland, Japan, and EU, *Figure 4.7*). . According to their estimates, alternative forest management for C sequestration is technically feasible on 10% (on average) of the forest area in each region examined. *Figure 4.8* shows that the relative importance of the different practices for the various regions depends on the current situation in the respective regions.

Page 15, figure 4.7 figure caption, replaced by: Figure 4.7 Indications of the magnitude of the carbon sink in case study countries for a set of forest management measures (Mton CO_2eq, adapted after Nabuurs et al. 2000). The values for the three bars for Iceland are 2.6, 2.8, and 2.9 resp. The figure is based on the forest part of the model “Access to Country Specific Data” (ACSD). It was designed to provide insight into the potential magnitude of carbon sequestration that may be achieved with alternative sets of management measures are to be adopted. Therefore the exact numbers provided in this figure are the result of the choice of the assumption of a certain set of measures. The estimates in this figure are tentative and only illustrative. In the case of Figure 4.7 all forestry activities under discussion were included, but applied on average on some 10% of mostly the exploitable the forest area

Page 16, figure 4.8 caption replaced by: Figure 4.8 Relative importance of each of the 10 forest management alternatives in the total potential sequestration as given in Figure 4.7. These data give an indication of opportunities and do not necessarily represent national plans. For example, silvicultural practices in Japan generally do not accompany fertilization and the figure for Japan is probably an over-estimate. Nevertheless it shows that opportunities vary among countries because of both the national situation, the mix of current forestry practices and/or the historic management. One common recommendation of which measures would yield the largest carbon sequestration can therefore not be given (adapted after Nabuurs et al., 2000).

Page 20 paragraph 3: *Add at the end: “For more information on CH4 and N2O emissions from land-use see Section 3.6.”*

Page 25: para 4.5.2.; check per tC of carbon and delete "of carbon".

Fig 4.9 costs change

US$ per ton CO2 to tC; translate cost for 100 US$ into 28 US$ and 400 US$ into US$1120 ~~US$~~ per ton C which covers the range.

The reference to Masere et al., 2000 on page 47 in the caption of table 4.2 should be deleted as we deleted this reference from the list.

Page 25, last paragraph in the text is BASS et al., in press; change this in BASS et al., 2000 (already done so in the reference list)

Bhatti et al., 2000 and Conant et al., 2000 are still inpress;

Figure 4.7: remove one bar (Kyoto bar) and modify figure caption (see figure at the end of the list)

Figure 4.8: modify figure caption as indicated in the change as given above.

Figure 4-9: use tC to replace tCO2. Also Check the text to change wording of tCO2 into tC.

Chapter Five

Underneath the Table 5.1 insertion: replace "For this reason, policies to mitigate the market and institutional imperfections separating market and economic potential constitute “no regrets” policies, i.e., policies that societies would not regret implementing no matter what is learned later about the severity of the GCC problem."

by "The barriers to the achievement of socioeconomic potential include social and cultural constraints, as well as economic forces that cannot be characterized as imperfections of markets or of other institutions. Policies to mitigate the market and institutional imperfections separating market and ~~socio~~economic potential constitute “no regrets” policies, i.e., policies that societies would not regret implementing no matter what is learned later about the severity of the GCC problem."

Page 31, Include Box 5.4 on Kenya cookstoves.

Page 31, in “misplaced incentives”, add: *“Also, in the buildings sector compensation to architects and engineers based directly or indirectly on a percentage of the costs of the building provides perverse incentives.”*

Chapter Six

Page 4, para 3: remove ‘effectively’ in first line of the first bullet;

Page 4, modify para 4 to: A growing literature demonstrates theoretically, and with numerical simulation models, that the economics of addressing GHG reduction targets with domestic policy instruments depends strongly on the choice of those instruments. The interaction of abatement costs with the existing tax structure and, more generally, with existing factor prices is important. Policies that generate revenues can be coupled with policy measures that improve the efficiency of the tax structure.

page 4, page 11, 52: Delete: Price-based policies tend to lead to positive marginal and positive total

mitigation costs, while non-price policies typically lead to positive marginal but negative total costs.

Page 5, par 2: Delete "individual entities" in the 3rd line and their replaced by "the".

Page 6, box 6.1. first bullet replaced by

- An emissions tax is a levy imposed by a government on each unit of emissions by a source subject to the tax.

Page 7, box6.2 eighth bullet

Change ‘sources’ into ‘entities’.

Page 8, second full para, line 2: ‘Annex I’, becomes ‘Annex B’

Page 8 paragraph3 line2 “among Annex I Parties” be changed as “among Annex B Parties”,

Page 9, bullet 7, change ‘co-benefit’ into ‘ancillary benefit’.

Page 10, para 3, line 6

Change ‘the largest producer of CFCs’ into ‘those’.

Page 10. para 6, first line:

delete ‘positive’.

Page 12. footnote 12:

from EIT text becomes ‘EITs, see Chandler (2000)’.

Page 13, third line from the bottom: change ‘co-benefit’ into ‘ancillary benefit’.

Page 15, second line from the bottom:

delete ‘and important’;

Page 16, line 3, add before “McMaon, 1992” “for an early estimate, see”.

Page 16, end: add after ‘information failures’ (first line)

“ , and can yield net benefits to society if the costs associated with the regulation are less than the losses due to informational barriers”. Delete the rest of para until 6.2.2.2;

Page 19, para 2, line 7:

delete "mostly" and 'off the' the next line becomes 'unilateral policies raise competitiveness concerns. In most…"

Page 21,para 5, line 3: Add after Jochem (1998), "Mazurek (1998), and Storey et al. (1999).

Page 21, line 3. Replace the sentence: "How the cost … predict" by "To answer how the costs are

shifted to these different groups requires a comprehensive model of the economy with accurate values for relevant price elasticities".

Page 23. para replace by

Voluntary provisions also may accompany mandatory policies. The Substitution Provision of the US Acid Rain (SO_2 Emissions Trading) Program is the first example of a voluntary compliance provision within an emissions trading regime.[1] Voluntary compliance was characterized by adverse selection; units that "opted in" to the program tended either to have low emissions below their permitted allocations, or to have low costs of abatement (Montero, 1999). While the VA kept aggregate costs low, the adverse selection increased aggregate emissions (Montero, 1999). This inevitable trade-off between adverse selection and cost-savings means that the design of voluntary programs will influence their net emissions impact (Montero, 2000a).

Page 24, line 1: replace 'industry sectors' by 'industries'.

Page 25. Title 6.2.2.5.1 becomes "Education programs"

Page 26. Title of 6.2.2.6 becomes "Subsidies and Other Incentives"

Page 27. Footnote 60 change into "For some additional remarks see also section 6.5.3."

Page 28. Box 6.6. first sentence: change 'promote' into promoting'

Page 28. Box 6.6. second para, first sentence starts with "The RPS has received ….".

Page 29. Add to the end of the last line at Bottom:

"of DSM programs find that a large proportion of the reported conservation impacts are statistically observable after accounting for economic and weather effects (Parfomak and Lave, 1997)."

Page 31. footnote 64. Delete last sentence, starting with 'Other…'.

[1]The SO_2 emissions trading regime has been implemented in two phases. The first phase (beginning in 1995) imposed annual emissions caps (with trading) on the 263 dirtiest large electricity-generating units. The Substitution Provision allowed units regulated only by the second phase (beginning in 2000) to voluntarily "opt in" in the first phase. Owners of the first-phase plants could use these "substitution" units to lower the compliance costs.

Page 32. para 1: replace by

"It has also been argued that constraints on the use of the Kyoto mechanisms might accelerate technological innovation in Annex-I countries by increasing the relative price of alternative options for carbon mitigation. Limited analytical studies are inconclusive whether such constraints will induce significant innovation, but do suggest that they could reduce the flow of technology to other countries."

Page 33, para 6. first line: change 'in 2000' into 'upon ratification of the Kyoto Protocol'

Page 39. Title 6.3.4.4: Delete 'the'

Page 39, para 5, line 2: Change 'free rider deterrence' into 'increasing participation'.

Page 41, para 2, line 3: Insert after 'by the' : 'operational entity or the'.

Page 41, para 3, lines 1/2, insert after "if": compliance by; and replace "found … provisions of " by questioned under… ".

Page 43, para 5, line 6: Delete text from 'This problem….' until 'Thus' at the beginning of the last para. New sentence becomes 'If access to ….'.

Page 44. para 3, line 1: Add "the Convention on International Trade and Endangered Species" before (CITES) {now in brackets}.

Page 47, para 2, line 1: Delete 'Generally speaking', and start sentence with "Early empirical…".

Page 49, first full para, line 3: becomes "Europe and Eastern Europe. Both of these…"

Page 49, first full para, line 6, 7, and 9 twice: add "European" before "countries".

Page 50, last para, line 2: Delete "and' and insert after 'technology standards' ', and voluntary agreements'.

Page 52, first full para becomes:

Finally, recent research investigates the combined effect of the pollution externality and the positive externality that results from learning-by-doing with mitigation technologies. Since the benefit from learning is after the learning takes place, a dynamic analysis is needed. Some analysis shows that dynamic efficiency (discounted least cost, aggregated over time) requires that the incentive for emissions-mitigating innovations be set higher than the penalty on emissions, especially if account is taken of "leakage"). This is in contrast with the conclusions of comparative static analysis upon which most environmental policy analysis is grounded (*e.g.*, Baumol and Oates, 1988), under which the two incentives should be equal in all time periods (for a formal analysis, see Read (1999, 2000)).

Page 52, para 4, and following two paras become:

In a study of residential conservation investment tax credits, Hassett and Metcalf (1995) also found that tax credit or deductions were many times more effective than "equivalent" changes in energy prices—about eight times as effective in their study. They speculate that one reason for this difference is that energy price movements may be perceived as temporary. The findings by Jaffe and Stavins and by Hasset and Metcalf are consistent with other analyses of the relative effectiveness of energy prices and technology market reforms in bringing about the adoption of lifecycle cost-saving technologies. Up-front subsidies can be more effective than energy price signals (see, *e.g.*, Krause *et al*., 1993; Howarth and Winslow, 1994; IPSEP, 1995; Eto *et al*., 1996; Golove and Eto, 1995; IPCC, 1996, Executive Summary, p. 13). A disadvantage of such non-price policies relative to administered prices is that they have to be implemented on an "end-use by end-use" or "sector by sector" basis in a customized fashion. Also, an effective institutional and regulatory framework needs to be created and maintained to evaluate and ensure the continued cost-effectiveness of such policies.

This and other research on energy efficiency programs also highlights a major difference in the way energy price signals and technology subsidies function. The technology adoption response to taxes may include a secondary increase in the demand for energy services. This secondary effect takes two forms: a direct effect that results from the increased utilization of energy-using equipment and capital stocks, and an indirect effect from increased disposable income. Studies of such demand effects suggest that the combined effects are generally not sufficient to offset more than a minor portion of emissions reductions.

Page 53. para 3, line 3: Poppe becomes Popp.

Page 53. para 3, line 6: 'in' become 'on'.

Page 53. para 4 and 5 "Limited….policies" can be deleted.

Page 53, Titles of 6.6 and 6.6.1. are now combined into only 6.6. Climate policy evaluation

Page 53, footnote 112: change into "It may be possible to reduce the number of free-riders through subsidy program design".

Add to the reference list:

Mazurek, J., 1998: The Use of Voluntary agreements in the United Sates: An Initial Survey, OECD ENV/EPOC/GEEI (98)27/FINAL, Paris

Storey, M., G. Boyd, and J. Down. 1999: Voluntary Agreements with Industry, in "Voluntary Approaches in Envoronmental Policy, Edited by C. Corraro and F.Leveque, Kluwer Academic Publishers, 187-207.

Chapter Seven

Co-benefit: in the chapter, the term of co-benefit is used extensively. In most cases, it is used together with ancillary benefit in the form as "ancillary and/or co-benefit" and therefore confusion is avoided although few literatures are specified. However, in a few places, the term is referred to as the generic term for WG III TAR. As this is not the case anymore due to the change made in the SPM, related changes have been proposed.

Page 10, par 4: TAR acknowledges the relevance of ~~specifically wants to make the case for~~ an integrated approach, linking climate change mitigation to the achievement of sustainable development and other policy objectives. However, ~~Therefore,~~ in this report, the term "co-benefits" is used only when speaking generically about the issue due to the limited availability of literature~~; for example, in general introductions, the Summary for Policymakers, and the Technical Summary, and when addressing class (3) literature.~~

Page 11 paragraph 1: Change "…true public cost" to "…social cost"

Page 11 paragraph5: "two conceptual issues, …First…" delete "Two conceptual issues… First"

Page 13, section 7.2.3.3: insert "**there is often no suitable alternative and**" behind "problems" in 1st sentence 2nd para of section.

Page 17: Change 4th para of 7.2.6 to read "Similar to income and substitution effects, adaptation can have two effects on the costs of mitigation. First, more adaptation can lower mitigation costs because policymakers choose to move to another point on the same mitigation cost curve - adaptation does not alter the marginal productivity of mitigation, it induces a shift along the cost curbe. Second, adaptation acting as a technical substitute or complement shifts the mitigation cost curve. **For example, flood defences change land use and thereby change costs and prices in an area, which impacts on mitigation costs**. Whether adaptation causes a shift along the mitigation cost curve **or a shift** of the entire curve itself, or both, then becomes a modelling question, and an empirical one to determine the magnitude of the shift along and to a new cost curve.

Page 22, section 7.3.3, bulleted list : Change 2nd para to read "**In Section 7.2 it is stated that cost assessments should include, in principle, all costs and benefits related to the policies as well as any ancillary benefits and costs.** The actual…."

Page 23 paragraph 5: Insert Goulder before (1995 a and 1995 b).

Page 30, section 7.4.2.2: First sentence should start: "As noted in section 7.2.4"

Page 30, section 7.4.2.2: 2nd paragraph, insert after "tax revenue": "In general there will not be one figure for this cost for the whole tax system. Each source of finance will have its own marginal cost." With footnote at the end: "It remains true, however, that if the system is optimally designed, the marginal costs of different fiscal instruments will be equalized."

Page 30, section 7.4.2.2: 3rd paragraph: replace "Worldbank, 1997" by "Ruggeri, 1999"

Pages 30/31, section 7.4.2.3 change first para: "This section deals with the valuation of employment impacts on a project basis. If a project creates jobs, it benefits society to the extent that the person employed would otherwise not have been employed or would have been employed doing something of lower value. **Conversely, if the project reduces employment there is a corresponding social cost.** These benefits…"

Page 32, section 7.4.2.5, 1st paragraph: replace "of which the World Bank (1998) and others have made estimates" by "for the estimation of which the World Bank (1991) and others have made estimates."

Page 31, par 4: Change the bullet points in the middle of the page into (a), (b) and (c)

Page 33, last par. Change 2 to subscript; delete ")"after competitors; change A paper by (Goulder and Schneider, 1999) to A paper by Goulder and Schneider (1999)…

Page 47 para 2. insert "**which**" behind "gases".

Page 39, last par, last sentence: Similar studies for EIT's reveal large value of ancillary ~~great co-~~ benefits in the form of reduced air pollution and increased employment, especially for carbon sink projects.

Reference: change refs Markandya et al (2000) to Markandya et al (2001)

Chapter Eight

Change of co-benefit to ancillary benefit: only the chapter title, the executive summary and introduction section use the term co-benefit exclusively without giving references. In the specific sub-section where the issue is addressed, the term ancillary is used instead. Therefore, changes are necessary only for the chapter title, the executive summary and the introductory section. They are listed in this list.

Chapter title: change co- to Ancillary

Author list: add Zhongxiang Zhang (Netherlands) to the list of contributors.

Page 2, 1st par of the Executive Summary: change co- to ancillary once.

Page 3, par 7, change co- to ancillary once.

Page 5, 2nd par under section 8.1.2, change co- to ancillary twice.

Page 13, 1st par. change co- to ancillary once.

Page 15, the use of co-benefit refers to section 8.2.4. So change co- to ancillary once.

Page 22, 2nd par:

The term co-benefits is used ~~throughout~~ in this report despite limited literature ~~as much as possible~~ because it shows the case for an integrated approach, linking climate change mitigation to the achievement of sustainable development. However, there appear to be three classes of literature regarding the impacts of climate change mitigation: (1) literature that primarily looks at climate change mitigation, but that recognizes there may be benefits in other areas (illustrated in the top panel of *Figure 8.8*); (2) literature that primarily focuses on other areas, such as air pollution mitigation, and recognizes there may be "ancillary benefits" in the area of climate mitigation (illustrated in the centre panel of *Figure 8.8*), (3) literature that looks at the combination of policy objectives and examines the costs and benefits from an integrated perspective (illustrated in the bottom panel of *Figure 8.8*). In this report, the term "co-benefits" is used when speaking generically about this latter perspective~~, for example in general introductions, in the Summary for Policymakers and Technical Summary,~~ and when reviewing class (3) literature. The term "ancillary benefits" is used when addressing class (1) and (2) literature. This section covers primarily class (1) literature, which is the most extensive.

Figure 8.16 and 8.17 to be replaced with the figures attached.

Page3 line7, replace "decline rate of energy use per unit of output, which depends on structural change in the economy" by "which depends both on structural change in the economy and on technological development."

Page19 line1 from bottom, after "the only existing study for China reviewed here suggest that this may be the case". *Ad caveat: "but further research is needed to confirm this more generally."*

Page 30, last par, last sentence, delete: [after the title and the footnote in the beginning of the section, there is a need for some revisiting of the co-benefits issue]

Page 31, par. Change: This means that Kyoto targets are likely to be unequitable. This risk is confirmed by uncertainty analyses based on existing models which provide a pretty wide range of outcomes that can be interpreted as covering the uncertainties prevailing in the real world. This can be shown in the results of domestic cost of carbon~~:~~ from US$85 to 410 in the US, US$20 to 966 for the EU, US$122 to 1074 for Japan, US$46 to 423 for CANZ. The variance remains significant if the extreme values:

- from US$76 to 236/tC for the US if one excludes GTEM, Merge 3, and Oxford;
- from US$159 to 276/tC for the EU and from US$145 to 250 for CANZ if one excludes Worldscan, GTEM, and Oxford; and
- a continuum from US$122 to 645/tC for Japan if Oxford is excluded.

In terms of GDP loses, the ranking of impacts differs because of the various pre-existing structures of the economy and of the energy supply and demand in various countries and because these studies do not consider the domestic policies targeted to tackle with these pre-exisiting conditions; the GDP loses are from 0.45 to 1.96% for the US, from 0.31 to 2.08 for the EU, from 0.25 to 1.88 for Japan. This dispersion is reduced under emissions trading; 0.31 to 1.03 for the US, 0.13 to 0.73 for the EU, from 0.05 to 0. 52 for Japan.

page 32, footnote 14 on "hot air": change

A few countries, notably those with economies in transition, have assigned amount units that appear to be well in excess of their anticipated emissions (as a result of economic downturn). This excess is referred to as hot air.

By

The wording "hot air", which is the expression currently used in the overwhelming majority of studies, refer to the difference between the assigned amount of GHG emissions and emissions in the baseline, no policy, scenario when it is positive. This occurs in countries experiencing an economic downturn (*e.g*. during a transition process between alternative economic systems). This word may have a negative connotation, however, from a strict point of view, what matter for climate is the absolute decrease of emissions, whatever it is due to lower economic level or to decarbonisation of the economy (as a consequence of a structural change or of a modification in the structure of the energy supply and demand).

Page 39 line7, there are two successive “scenario”, delete one of them.

Page 41, the term environmental co-benefit is used. In this case, no change is made.

Page 42 line15, delete “its”.

Page 79 there is no unit for vertical coordinate in Figure 8.11, Add “1990 US$/tC” add to figure caption: “Marginal abatement costs”

Figure 8.16 and 8.17 should be replaced with the figures attached.

Exchange rate: add exchange rate of Euros, Chinese RMB, Japanese Yuan, Swedish Krone to the US dollar based on IMF 1998/9 rages.

Chapter Nine

Change of co-benefit:

Chapter title: once,

Page 2 and page 9: twice (9.2.2.2. Co-benefits for Coal Production and Use of Mitigation Options)

Page 2 and 14, twice (9.2.3.3. Co-benefits of GHG Mitigation in the Oil and Gas Industry*)*

Page 2 and 16: 2.4.3 Co-benefits Associated with Mitigation in the Electricity Industry

Page 2 and 17: 9.2.4.4 Co-costs Associated with Mitigation in the Electricity Industry

Page 2 and 17: 9.2.5.1 Co-benefits for Agriculture from Reduced Air Pollution

Page 2 and 18: *9.2.5.2 Co-benefits from Carbon Sequestration*

Page 2 and 22: 9.2.8.4 Co-benefits from Reduced Road Traffic

Page 2 and 24: 9.2.10.4 Co-benefits for Households

Page 4: once
Page 5: twice
Pages 8 & 9: once on 8 and twice on 9
Page 14: twice
Page 17: four times
Page 22: three times
Page 24, 27, 28, 31: once or twice
Page 42, Table 9.4, note

Page 8 paragraph 1 under subtitle "9.2.1.3 Sectoral Impacts of the Kyoto Mechanisms", Line 8, Add "or Certified Emission Reductions (CERs)" between "to generate these AAUs" and "through either reduction of GHG emissions or enhancement of sinks."

Page 9 paragraph 3 under subtitle "9.2.2.1.
Change "could" into "might"

Page 15, section 9.2.4.1, last paragraph: insert ", http://www.iiasa.ac.at/cgi-bin/ecs/bookdyn/bookcnt.py" after WEC, 1998; replace "a range of 0.52 to 1.77 GTOE in 2050" by "a range of 2,227 to 11,840 TWh in 2050 under six possible future energy scenarios", and replace "(mtoe)" by "(MW)" and replace Figure 9.2 by the figure attached.

Page 27 paragraph 1 under subtitle "9.4 Why Studies Differ", Line 2~3,
The literature information for Hourcade *et al.*,to be added to the list of Reference.

Page 30 paragraph 2 under subtitle "9.4.2.9 International Environmental Policy", line 4-7, After the first bullet *"High transaction costs derived from inadequate information;"*

Page 43, Table 9.5: delete row "IEA (1993)", and change in footnoted "0.16" into "0.26" and "0.92" into "0.64".

Figure 9.2: Projection of world nuclear capacity to 2050 in TWh (WEC, 1998): replace the figure as attached.

Chapter Ten

Page 2 in "Contents", in order to be consistent with other titles and sub-titles, two lines under 10.4.3 should be deleted or listed as "10.4.3.1" and "10.4.3.2". In later case, change "Uncertainty with respect to the stabilisation target" to "Uncertainty with Respect to the Stabilisation Target". Correspondingly, the same changes are also for the sub-title in Page 59.

Page 2 in "Contents" Line "10.4.7", in order to be consistent with other titles and sub-titles, "Emerging conclusion with respect to policy-relevant scientific question" should be "Emerging Conclusion with Respect to Policy-relevant Scientific Question". Correspondingly, the same changes are also for the sub-title in Page 49.

Page 2 in “Contents” Line “Figures 106”, some spaces should be inserted between the word and the page number to avoid misunderstanding. In addition, for all 5 figures, it would be better to change, for example, “Figure 10.1: Optional ---” to “Figure 10.1. Optional ---” to be consistent with the format of Tables above.

Page 2 in “Content”, the page numbers of 5 figures change to 105, 106, 107, 108, and 109.

Page 23 in Paragraph “Second, the Kyoto agreement” Line 2 *add “theoretically” between “can” and “be”*

Page 25 paragraph 4: *Replace “the climate agreement” by “a climate agreement”*

Page 31 in Paragraph “The first two phases” Line 1, “above” is unnecessary here and should be deleted.

Replace “industrialized countries” with “developed countries” in full text:
Page 39: once,
Page 40, once,
Page 41, 42, 43, 50 and 54, once on each page,
Page 63, twice,
Page 64: twice,
Page 68, once.

Change of co- to ancillary benefit:
Page 43, twice, page 59: once

Page 21 Paragraph, In Section 10.2, “The result” Line 8 “10.3.4” to “10.2.4”

table 10.2, last column: heading should be: “Flexibility mechanisms with monopoly power”

Glossary
Add to the glossary:
Alternative paths: refer to a variety of possible scenarios for societal values and consumption and production patterns in all countries, including but not limited to a continuation of today's trends. These paths do not include additional climate initiatives which means that no scenarios are included that explicitly assume implementation of the United Nations Framework Convention on Climate Change or the emissions targets of the Kyoto Protocol, but do include assumptions about other policies that influence GHG emissions indirectly (from SPM footnote 4)

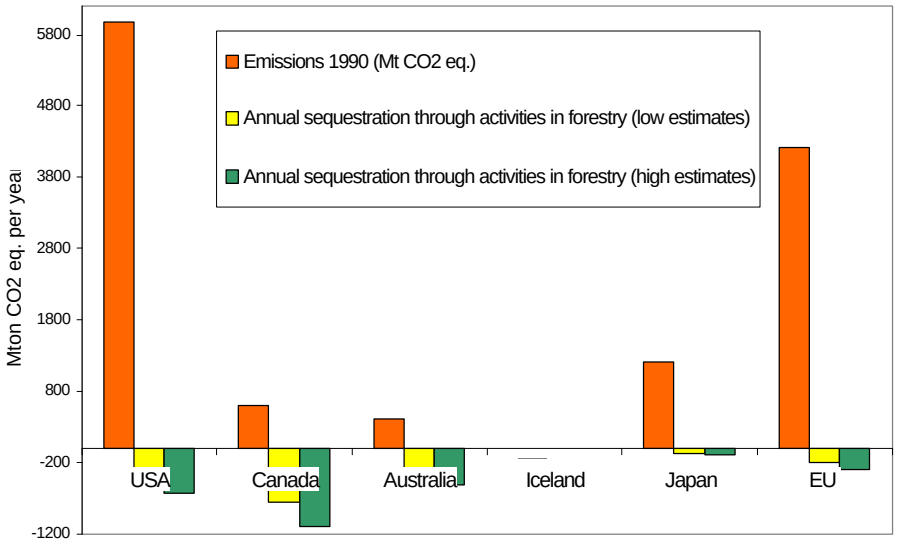


Figure 4.7 Indications of the magnitude of the carbon sink in case study countries for a set of forest management measures (Mton CO_2eq, adapted after Nabuurs et al. 2000). The values for the three bars for Iceland are 2.6, 2.8, and 2.9 resp. The figure is based on the forest part of the model "Access to Country Specific Data" (ACSD). It was designed to provide insight into the potential magnitude of carbon sequestration that may be achieved with alternative sets of management measures are to be adopted. Therefore the exact numbers provided in this figure are the result of the choice of the assumption of a certain set of measures. The estimates in this figure are tentative and only illustrative. In the case of Figure 4.7 all forestry activities under discussion were included, but applied on average on some 10% of mostly the exploitable the forest area

Figure 8.16. Reductions in Carbon Emissions for A1B 550 Case (Source: see Chapter 2)

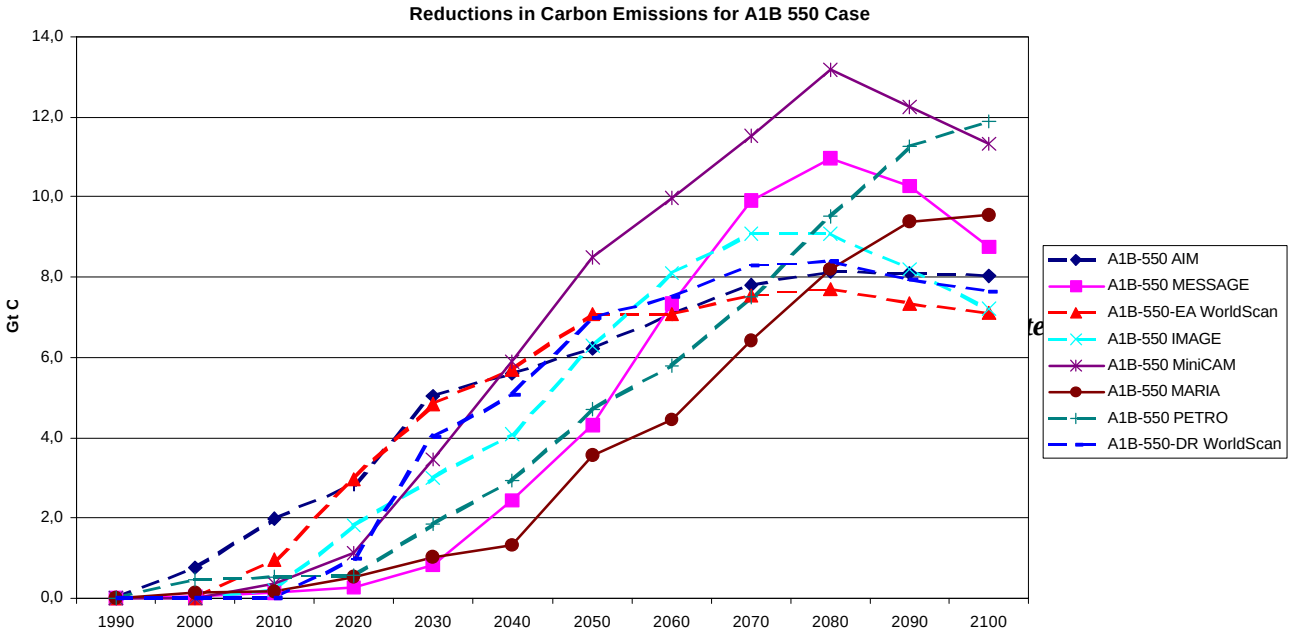
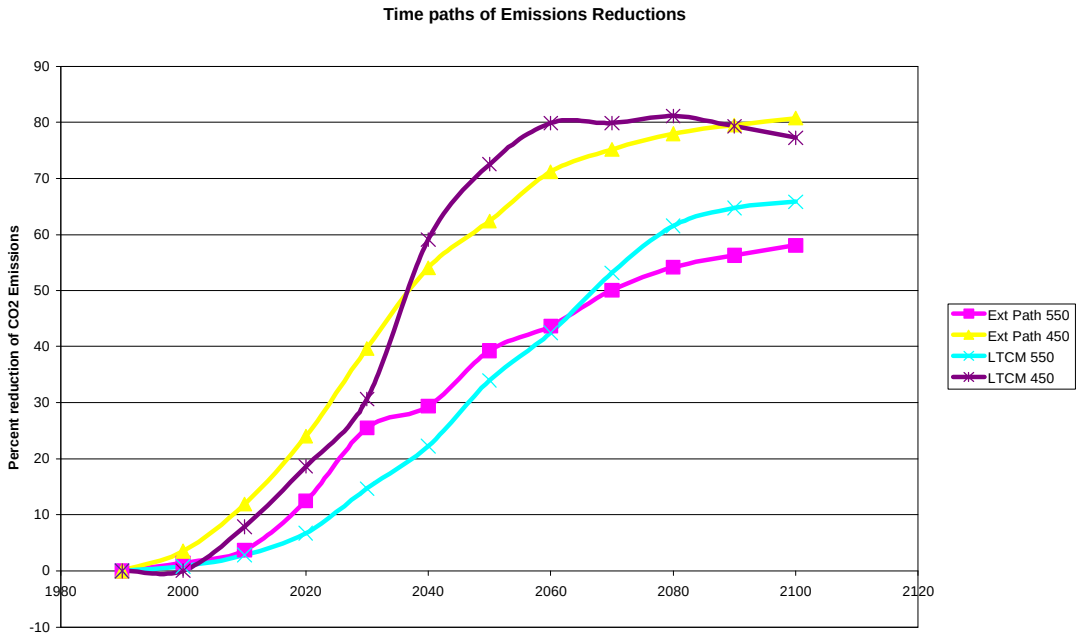
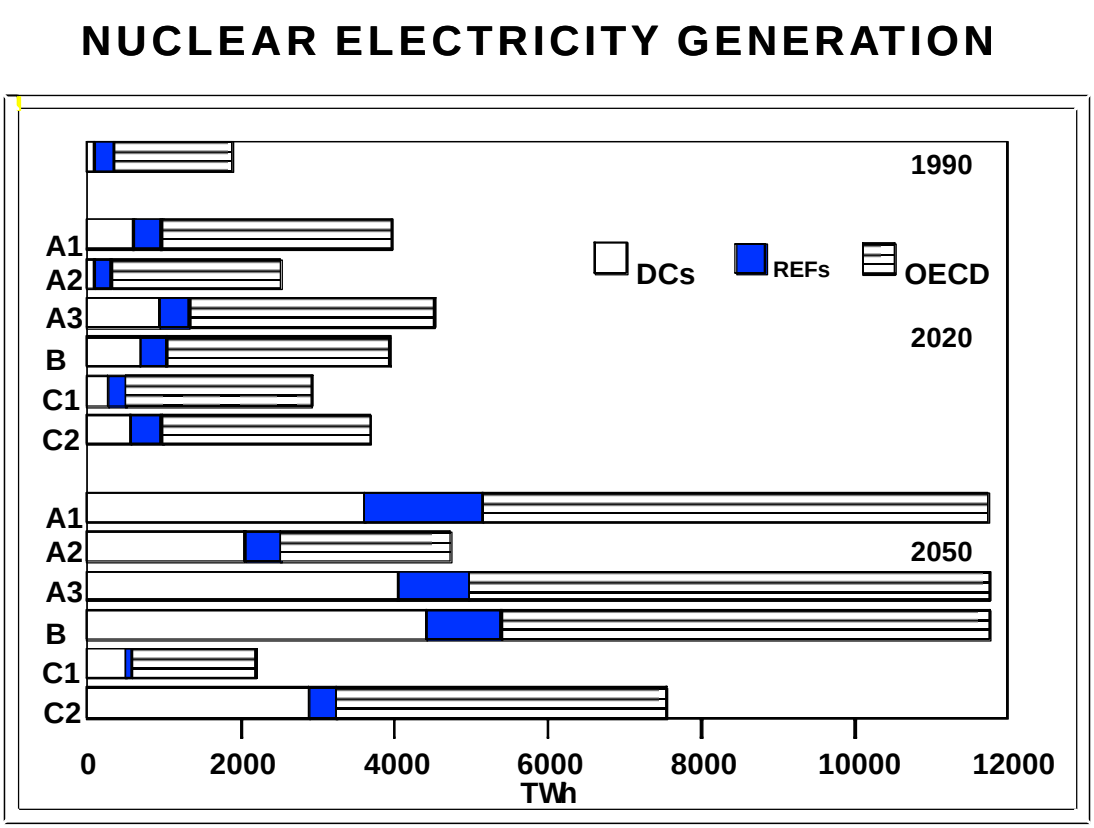


Figure 8.17. Time Path of Emission Reductions (Source: see Chapter 2)





Scenario Definition
B Middle Course
A1 High growth, Ample oil and gas
A2 High growth, Return to coal
A3 High growth, Fossil phaseout
C1 Ecologically driven, New renewables with nuclear phaseout
C2 Ecologically driven, Renewables and new nuclear

Figure 9.2: Projection of world nuclear capacity to 2050 in TWh (WEC, 1998)