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Analysis of possible means to reach emission reduction targets and of relevant methodological issues

Technical paper

Summary

This paper analyses ways to enhance the effectiveness and the contribution to sustainable development of the means that may be available to Annex I Parties to reach their emission reduction targets, as well as relevant methodological issues, including methodologies to be applied for estimating anthropogenic emissions and the global warming potentials of greenhouse gases. The options analysed have been identified on the basis of views of Parties, as contained in annexes II, IV, V and VII to the report of the resumed fifth session of the Ad Hoc Working Group on Further Commitments for Annex I Parties under the Kyoto Protocol. This paper describes each option and provides a brief analysis of the following aspects of each: rationale, key elements to be decided, necessary follow-up actions, potential challenges, implications for the emission budgets of Annex I Parties, possible impact on the carbon market, implications for domestic mitigation, links to other options, and ancillary benefits and costs.

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I. Introduction

A. Mandate

1. At its resumed fourth session, the Ad Hoc Working Group on Further Commitments for Annex I Parties under the Kyoto Protocol (AWG-KP) agreed to adopt, at the first part of its sixth session, conclusions on the tasks set out in paragraph 17 (b) (i) and (ii) of its work programme.¹ It requested the secretariat to prepare, by July 2008, a technical paper on these matters.

B. Scope of the note

2. In line with paragraph 17 (b) (i) of the work programme, this paper analyses ways to enhance the effectiveness and contribution to sustainable development of the means that may be available to Annex I Parties to reach their emission reduction targets (hereinafter referred to as the means). These means include emissions trading and the project-based mechanisms under the Kyoto Protocol; the rules to guide the treatment of land use, land-use change and forestry (LULUCF); the greenhouse gases (GHGs), sectors and source categories to be covered; and possible approaches targeting sectoral emissions. In line with paragraph 17 (b) (ii) of the work programme, relevant methodological issues, including the methodologies to be applied for estimating anthropogenic emissions and the global warming potentials of GHGs (hereinafter referred to as methodological issues), are considered.

3. Substantive discussions on the matters referred to in paragraph 2 above were initiated at the first part of the fifth session of the AWG-KP. At this session, the AWG-KP held a thematic workshop on the means. At its resumed fifth session, the AWG-KP held a round table on the means and a workshop on methodological issues. At the same session, the Chair of the AWG-KP compiled views expressed by Parties on the means and on methodological issues. These views are contained in annexes II, IV, V and VII to the report of the resumed fifth session of the AWG-KP² and, together with paragraph 17 (b) (i) and (ii) of the work programme, form the basis for identifying the options analysed in this paper (see annex VI).

4. Chapter II of this paper describes the methodological approach followed in the analysis of the different options. Chapters III to VI identify specific options for enhancing the effectiveness and contribution to sustainable development for each of the means, on the basis of the views expressed by Parties at the resumed fifth session of the AWG-KP. A brief description of the current rules governing the means as well as an analysis of each option is presented in these chapters. Chapter VII does the same in relation to the methodological issues raised at the resumed fifth session.

C. Possible action by the Ad Hoc Working Group on Further Commitments for Annex I Parties under the Kyoto Protocol

5. The AWG-KP may wish to make use of the information contained in this technical paper in its work leading to the adoption of conclusions referred to in paragraph 1 above.

II. Methodological approach to the paper

6. This paper analyses the options identified on the basis of the views of Parties referred to in paragraph 3 above. In some cases, the options are based on several such views; in others, it was evident that the options could be implemented in a number of different ways. The options identified here

¹ FCCC/KP/AWG/2006/4.

² FCCC/KP/AWG/2008/3.

therefore do not constitute an exhaustive list; they are intended to help to clarify key aspects on which decisions would need to be taken. The range of possible variants also means that, in the absence of further guidance, it has not always been possible to analyse the implications of the means in great depth.

7. The analysis of the options contained in chapters III to VII addresses the following the aspects:
- (a) **Current situation:** Key current rules relating to the options are noted;
 - (b) **Description:** Each option is briefly described. For options with a number of possible variants, the descriptions seek to clarify key distinguishing features;
 - (c) **Rationale:** Key arguments made during the fifth session of the AWG-KP in favour of the options are listed;
 - (d) **Key elements to be decided:** In the case of emissions trading and the project-based mechanisms, some issues are listed that would need to be addressed if the option in question were to be further considered;
 - (e) **Necessary follow-up actions:** Many options, if adopted, would require follow-up actions or decisions by the Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol (CMP); such possible actions are identified;
 - (f) **Potential challenges:** Each option may introduce new potential challenges, either from developing policies at the international level or from implementing them. These are listed together with potential solutions, where evident;
 - (g) **Implications for the emission budgets of Annex I Parties:** This refers to the allowable emissions of Annex I Parties, as recorded in their emissions inventories. Implications for these emission budgets arise via impacts on their assigned amounts as a result of changes in the total emissions or removals covered by the commitments of Annex I Parties, their use of the Kyoto mechanisms and their LULUCF activities (or the way in which any of these are calculated). All such implications are considered on the assumption that no other rules are changed by the option in question. Where possible, implications are assessed and presented in relation to the total GHG emissions of Annex I Parties in 1990 (hereinafter referred to as 1990 Annex I emissions). Such calculations exclude LULUCF and international aviation and marine bunker fuels;³
 - (h) **Impact on the carbon market:** A preliminary indication of possible changes to the supply and demand for tradable units under the Kyoto Protocol resulting from changes to the means. Where possible, this is presented in qualitative terms (e.g. negligible, small or large changes in supply or demand of tradable units resulting from the implementation of a given option, relative to a situation where the option has not been implemented);
 - (i) **Implications for domestic mitigation:** Indications are given as to likely changes in mitigation action that is undertaken domestically;
 - (j) **Potential links to other options:** Other options analysed in this paper are noted where it may be useful to consider the options together;

³ Emissions of Annex I Parties in 1990 were 18,539 million tonnes carbon dioxide equivalent (source: UNFCCC GHG data interface <http://unfccc.int/ghg_data/ghg_data_unfccc/time_series_annex_i/items/3814.php>, as at July 2008).

- (k) **Ancillary benefits and costs:** Possible implications for sustainable development and other ancillary benefits and costs are described. As this assessment is subjective, the information contained in the tables should be regarded only as examples of such benefits and costs.

8. Where possible, the analysis has been presented in tabular form in order to enhance the readability of the paper. The chapters vary to some extent in their presentation of material, in order to best communicate the different information for each means.

9. The estimates of emissions relating to LULUCF have been calculated on the basis of the current trends and the economic mitigation potentials from the Intergovernmental Panel on Climate Change (IPCC) Fourth Assessment Report (AR4). Reporting of agricultural non-carbon dioxide (CO₂) emissions are not included in the calculations, in accordance with current reporting practices. The quantitative estimates on the emission budget should be regarded as preliminary.

III. Possible improvements to emissions trading and the project-based mechanisms under the Kyoto Protocol

10. Emissions trading and the two project-based mechanisms, the clean development mechanism (CDM) and joint implementation (JI), are defined in Articles 6, 12 and 17 of the Kyoto Protocol. They are market-based mechanisms which seek to direct economic incentives towards the mitigation of climate change and involve the private sector in such mitigation activity.

11. The AWG-KP, at the first part of its fifth session, agreed that the market mechanisms under the Kyoto Protocol should continue to be available to Annex I Parties as means to meet their emission reduction targets. It further agreed to consider, with due attention to improving the environmental integrity of the Kyoto Protocol, in particular, possible improvements to emissions trading and the project-based mechanisms regarding their scope, effectiveness, efficiency, accessibility, contribution to sustainable development, capacity to generate co-benefits and the transfer of technology.⁴

12. In the context of possible improvements to emissions trading and the project-based mechanisms, Parties have raised the following issues during their discussions under the AWG-KP:

- (a) The need to promote the environmental integrity of the Kyoto Protocol and the contribution of the mechanisms to sustainable development;
- (b) The need to ensure that the use of such mechanisms is supplemental to the implementation of domestic actions at the disposal of Annex I Parties;
- (c) The importance of strengthening the use of the market-based mechanisms, including through further expanding their reach and moving towards a global carbon market with a single market price for carbon; this may be achieved through increasing the range of technologies, sectors and gases covered by market-based mechanisms and enhancing the participation of Parties in such measures;
- (d) The importance of engaging the private sector, driving long-term investment decisions and maintaining sufficient stability in the rules of the mechanisms;
- (e) The importance of implementing measures to complement market approaches;
- (f) The importance of stringency in setting emission reduction obligations as the primary factor in ensuring that market prices remain sufficiently high to drive mitigation action.

⁴ FCCC/KP/AWG/2008/2, paragraphs 18 and 21.

13. Every effort has been made to reflect the views of Parties compiled by the Chair of the AWG-KP, as contained in the report of the resumed fifth session of the AWG-KP,⁵ when analysing the options in this chapter, except where it was noted that such views are being considered under a separate process or where discussion of the views needs to first be informed by outcomes from the consideration of non-permanence and other methodological issues in the context of LULUCF. In some cases, several views have been considered together as a single option. Some options may complement other options, while others may be seen as alternatives.

14. The options identified in relation to emissions trading concern the rules that govern trading among Annex I Parties under Article 17 of the Kyoto Protocol and do not seek to prescribe other aspects of emissions trading schemes established as national policies by Parties.

15. The AWG-KP, at its resumed fifth session, noted that a number of issues relating to the Kyoto mechanisms had been identified by Parties during the session that may be considered for possible application within the current commitment period. The AWG-KP recommended that the CMP may consider a list of such issues, as compiled by the Chair of the AWG-KP under his responsibility, at its fourth session (December 2008).⁶

A. Clean development mechanism

Option 3.1: Allow new nuclear plants as clean development mechanism project activities

Current situation

16. Annex I Parties are to refrain from using certified emission reductions (CERs) generated from nuclear facilities to meet their emission commitments under Article 3, paragraph 1.⁷

Description

17. Under this option, activities relating to new nuclear facilities could be registered under the CDM, and Annex I Parties could use credits generated by such project activities for compliance purposes.⁸ Detailed options have not been provided by Parties. It would be possible to define specific criteria or requirements for activities that may be included, for example in relation to time frames, the contribution to sustainable development or the transfer of environmentally safe and sound technology and know-how.

Analysis

Rationale	<ul style="list-style-type: none"> To increase the potential for reducing emissions in non-Annex I Parties, thus enhancing the cost-effectiveness of achieving overall emission commitments
Key elements to be decided	<ul style="list-style-type: none"> Specific criteria or requirements for eligible activities
Necessary follow-up actions	<ul style="list-style-type: none"> CDM Executive Board would need to approve methodologies
Potential challenges	<ul style="list-style-type: none"> Uncertain but potentially large increase in CER supply Assessment of additionality in the context of other support provided to the technology
Implications for the emission budgets of Annex I Parties	<ul style="list-style-type: none"> Potentially large increase in CER supply would allow higher emissions by Annex I Parties
Impact on the carbon market	<ul style="list-style-type: none"> Potentially large increase in CER supply; new nuclear plants could

⁵ FCCC/KP/AWG/2008/3, annex II.

⁶ FCCC/KP/AWG/2008/3, annex III.

⁷ Decision 17/CP.7.

⁸ FCCC/KP/AWG/2008/3, annex II, paragraph 1 (d).

	<p>generate 350 to 620 million CERs in the year 2030 depending upon the mix of generation sources displaced.^a This compares with a projected annual supply of CERs of about 320 million and estimated demand for compliance units of 487 million per year for 2008–2012^b</p> <ul style="list-style-type: none"> • Potentially significant downward pressure on CER prices • Possible reduction in incentives for other technologies
Implications for domestic mitigation	<ul style="list-style-type: none"> • Greatly reduced domestic mitigation needed by Annex I Parties to meet their emission commitments, due to increased supply and lower prices of CERs
Potential links to other options	<ul style="list-style-type: none"> • None identified
Ancillary benefits and costs	<ul style="list-style-type: none"> • Displacing fossil-fired generating stations may reduce pollutant emissions and improve local air quality • Radioactive waste and other environmental impacts • Increased technology transfer

^a The UNFCCC investment and financial flows paper <http://unfccc.int/files/cooperation_and_support/financial_mechanism/application/pdf/background_paper.pdf> indicated, based on IEA 2006 scenarios, 66.5 MW of nuclear capacity generating 522 TWh of electricity in developing countries in 2030 in the reference scenario. In the mitigation scenario, nuclear capacity increased to 154.8 MW and output increased to 1,226 TWh. The increased nuclear power output would avoid 350 to 620 Mt CO₂ eq of CO₂ emissions depending upon the mix of generation sources displaced.

^b Capoor K and Ambrosi P. 2008. *State and Trends of the Carbon Market 2008*. Washington, DC: World Bank. p. 51.

Option 3.2: Broaden clean development mechanism project activities to a sectoral level

Current situation

18. The current CDM modalities and procedures allow for emission reductions under the CDM to be made by multiple entities in a particular sector, though no such project activities have yet been registered by the Executive Board of the CDM.

19. Under the CDM, a programme of activities (PoA) may be registered, to which further activities may be added if they meet the criteria set out in the methodology used in the PoA at its time of registration. PoAs are administered by a coordinating entity which ensures the collection of data across all activities in accordance with a monitoring plan. Under current procedures, PoAs may be registered on the basis of a single methodology and hence a single type of project activity. As more experience is gained, it may be possible to allow PoAs for sectors involving multiple types of project activity.

General description

20. Some options seek to broaden the scope of CDM project activities to a sectoral level by processing CDM project activities, including development, registration and ongoing verification, at an aggregate, sector-wide level.⁹ CERs would be generated on the basis of reductions in sector-wide emissions below a specified reference level. It is apparent that many different definitions are currently in use in relation to potential CDM project activities at the sectoral level.

21. Options 3.2a and 3.2b have been distinguished, based on the views expressed by Parties at the resumed fifth session of the AWG-KP, to illustrate possible ways in which such approaches could be implemented. Option 3.2a would be an extension of the current CDM approach of crediting reductions

⁹ FCCC/KP/AWG/2008/3, annex II, paragraph 1 (e), (f) and (g).

in emissions below what would otherwise have occurred (baseline), while option 3.2b would require the host Party to first reduce emissions to a target level before any subsequent emission reductions would be credited. Both could be ways for implementing crediting for nationally appropriate mitigation actions in non-Annex I Parties.¹⁰

Option 3.2a: Introduce sectoral clean development mechanism project activities for emission reductions below a sectoral baseline

Description

22. Under this option, the sectoral baseline would represent emissions and removals that would occur in the absence of the proposed project activity, in either fixed or intensity terms, and would be determined through new methodologies requiring approval by the Executive Board.¹¹ Such project activities would be subject to all applicable CDM rules, including the demonstration of additionality (at a sectoral level).¹² A project activity could be coordinated by an industry or government body, which would be responsible for all aspects relating to the development, registration and implementation of the project activity, and for appropriately distributing issued CERs among individual facilities in the sector.

Analysis

Rationale	<ul style="list-style-type: none"> To increase the potential for reducing emissions in non-Annex I Parties, thus enhancing the cost-effectiveness of achieving overall emission commitments To reduce the administrative processing and technical assessment of CDM project activities necessary for the volume of CERs generated
Key elements to be decided	<ul style="list-style-type: none"> Specific criteria or procedures, in relation to, for example, the registration of sectoral project activities and how to address other project activities that already exist in a sector
Necessary follow-up actions	<ul style="list-style-type: none"> CDM Executive Board would need to approve methodologies
Potential challenges	<ul style="list-style-type: none"> Demonstration of additionality at a sectoral level Development of methodologies to address changes to the level of output and number of participants in the sector, technology differences among sector participants, sectoral boundaries, national circumstances, applicable policies and measures, etc. Data requirements and verification processes
Implications for the emission budgets of Annex I Parties	<ul style="list-style-type: none"> Potentially large increase in CER supply would allow higher emissions by Annex I Parties
Impact on the carbon market	<ul style="list-style-type: none"> Potentially large increase in CER supply (the extent would depend on the stringency of baselines and additionality) Potentially significant downward pressure on CER prices
Implications for domestic mitigation	<ul style="list-style-type: none"> Greatly reduced domestic mitigation needed by Annex I Parties to meet their emission commitments, due to increased supply and lower prices of CERs
Potential links to other options	<ul style="list-style-type: none"> Options 3.7a and 3.7b
Ancillary benefits and costs	<ul style="list-style-type: none"> Increased assistance in achieving sustainable development Increased technology transfer

¹⁰ FCCC/KP/AWG/2008/3, annex II, paragraph 1 (g).

¹¹ FCCC/KP/AWG/2008/3, annex II, paragraph 1 (e).

¹² Sectoral baselines may need to allow for the possibility of some non-additional mitigation actions being included within the sector.

Option 3.2b: Introduce sectoral crediting of emission reductions below a no-lose target

Description

23. Under this option, a voluntary emissions target would be established for a sector in a non-Annex I Party, in either fixed or intensity terms, at a level below a baseline representing emissions and removals that would occur in the absence of the proposed project activity.¹³ Reductions in sectoral emissions below this target level would generate credits; reductions that leave emissions above the target level would not generate credits but there would also be no further consequences for the target not having been reached (no-lose). It is expected that all emission sources within the sector would need to be included to minimize emissions leakage.

24. Such targets would require negotiation involving the host Party government. Mitigation actions would probably be initiated and coordinated by an agency of the host Party government. This agency would be responsible for distributing credits, or may be able to distribute benefits to participants in forms other than carbon credits (e.g. tax relief or subsidies).

25. Negotiation of the sectoral target could take place through the CMP but, given the level of technical work required, may need to be set through a body established under its authority. Technical guidance for the setting of such sectoral targets would need to be established by the CMP, for example on how to take account of existing or new policies, the period covered by the target, and potential double counting with other projects.

26. It is unclear whether such sectoral crediting would be most appropriately implemented through the CDM or as a new mechanism with an alternative set of institutional arrangements.¹⁴ From a technical perspective, it could be implemented within the CDM. However, a separate mechanism may be useful in underlining the distinctive features of this approach (for example, negotiation of the emissions target as the reference level for the crediting and a greater level of political involvement in its negotiation) and providing for different institutions and procedures to be established.

Analysis

Rationale	<ul style="list-style-type: none"> • To increase the potential for reducing emissions in non-Annex I Parties, thus enhancing the cost-effectiveness of achieving overall emission commitments • To reduce the administrative processing and technical assessment of CDM project activities necessary for the volume of CERs generated • To increase the contribution of non-Annex I Parties to global emission mitigation • To provide incentives for the implementation of domestic policies in non-Annex I Parties to reduce emissions
Key elements to be decided	<ul style="list-style-type: none"> • Process for negotiating sectoral no-lose targets • Institutional structure to administer sectoral crediting • Specific criteria or requirements in relation, for example, to the registration of such mitigation actions and how to address other project activities that already exist in a sector
Necessary follow-up actions	<ul style="list-style-type: none"> • Establishment of sectoral targets
Potential challenges	<ul style="list-style-type: none"> • Definition of sectoral boundaries • Consideration of national circumstances and applicable policies and measures

¹³ FCCC/KP/AWG/2008/3, annex II, paragraph 1 (f).

¹⁴ FCCC/KP/AWG/2008/3, annex II, paragraph 2.

	<ul style="list-style-type: none"> • Data requirements and verification processes • Avoidance of double counting with CDM project activities (e.g. renewable CDM project activities that supply the grid may reduce emissions covered by an electricity sector target) • Avoidance of overlap between sectoral activities, such that the same reductions are not claimed in multiple sectors (e.g. an industry with a target claims emission reductions for electricity emissions covered by a sectoral target)
Implications for the emission budgets of Annex I Parties	<ul style="list-style-type: none"> • Potentially large increase in CER supply would allow higher emissions by Annex I Parties
Impact on the carbon market	<ul style="list-style-type: none"> • Potentially large increase in credit supply (the extent would depend on the stringency of the no-lose targets) • Potentially significant downward pressure on credit prices
Implications for domestic mitigation	<ul style="list-style-type: none"> • Greatly reduced domestic mitigation needed by Annex I Parties to meet their emission commitments, due to increased supply and lower prices of credits
Potential links to other options	<ul style="list-style-type: none"> • Options 3.28 and 3.29
Ancillary benefits and costs	<ul style="list-style-type: none"> • Increased assistance in achieving sustainable development • Increased technology transfer

Option 3.3: Change the composition of the clean development mechanism Executive Board membership to ensure equitable representation of Parties

Current situation

27. The CDM Executive Board consists of 10 members and 10 alternates as specified in the Marrakesh Accords (see paras. 5–19 of the annex to decision 3/CMP.1). The Executive Board consists of one member and alternate from each of the five United Nations regional groups, two other members and alternates from Annex I Parties, two other members and alternates from non-Annex I Parties, and one member and alternate of the small island developing States (SIDS). Members and alternates are nominated by their constituencies.

28. Half of the members/alternates are elected each year for a term of two years. Members are eligible to serve a maximum of two consecutive terms, while there is no limit on the number of terms that may be served as an alternate (that is, a person may serve two consecutive terms as a member, serve as an alternate and then be eligible to serve again as a member). The composition of the Executive Board was negotiated in parallel with that of other constituted bodies under the Kyoto Protocol.

Description

29. The composition of the Executive Board could be altered, with a view to enhancing its efficiency through ensuring the equitable representation of Parties,¹⁵ by changing the number of members/alternates from different constituencies. The membership of the Executive Board could be altered by limiting the number of terms a person can serve as a member or alternate (e.g. allowing only two consecutive terms, irrespective of whether as a member or alternate) or through CMP guidance encouraging or requiring rotation in the Parties from which members and alternates are drawn.

Implications

30. Changing the composition and/or membership of the Executive Board would not have a material impact on the ability of Annex I Parties to meet their emission commitments. Such changes may prompt calls to change the composition and/or membership of other constituted bodies.

Option 3.4: Move the secretariat's function of supporting the clean development mechanism Executive Board to another organization

Current situation

31. The Marrakesh Accords state that the secretariat shall service the Executive Board (see para. 19 of the annex to decision 3/CMP.1). The secretariat provides an operational support structure to all activities of the Executive Board and the panels and working groups established under it. This involves provision of process, technical, legal, organizational, logistical, administrative and communications services. All work is carried out in an objective, impartial and transparent manner.

32. The main areas of support relate to the approval of baseline and monitoring methodologies, the registration of project activities and subsequent issuance of CERs, and the accreditation of operational entities. These areas involve a wide variety of tasks, including: arranging meetings and preparing meeting documentation; preparing recommendations and options for methodologies; conducting completeness checks of submitted project activity documentation; preparing an assessment of registration and issuance requests; preparing recommendations for reviews of registration and issuance requests; operating the CDM registry to manage the issuance and distribution of CERs; conducting desk reviews and on-site assessments of operational entities; and preparing other recommendations for consideration by the Executive Board in all substantive areas.

33. The secretariat is also involved in broader areas of support, such as preparing draft guidance and procedures for consideration by the Executive Board, making project activity and other information publicly available, supporting designated national authorities (DNAs) and designated operational entities (DOEs) in their work (through, inter alia, the DNA Forum and DOE Forum), bringing buyers, sellers and service providers together through the "CDM Bazaar", working to improve the regional distribution of CDM project activities, and facilitating the work under the Nairobi Framework to catalyse CDM project activities in Africa.

¹⁵ FCCC/KP/AWG/2008/3, annex II, paragraph 3.

Description

34. Administrative support for the Executive Board could be transferred to another existing organization or to a new organization.¹⁶ Specific organizations have not been proposed by Parties. A suitable organization would need to be identified or established, taking into account any potential conflict of interest that may arise if the organization is involved in CDM activities. If the functions were to be transferred to an existing organization, the responsible unit would be accountable to both the management of the host organization and to the CMP. The functions, and possibly some or all relevant secretariat staff, would need to be transferred. The secretariat could continue to support the Kyoto Protocol bodies on issues relating to the CDM.

Implications

35. Changing the organization supporting the Executive Board would not have a material impact on the ability of Annex I Parties to meet their emission commitments.

**Option 3.5: Introduce alternative institutional arrangements
for validation, verification and certification**

Current situation

36. Project participants must hire a DOE to validate a proposed CDM project prior to registration. Once the project has been registered, the project participants must hire a different DOE to verify and certify the emission reductions achieved (with the exception of small-scale project activities). DOEs are first accredited for this work by the CDM Executive Board and then designated by the CMP.

37. The work of the DOEs decentralizes the validation, verification and certification work under the CDM, with the result that the Executive Board does not need to conduct this work itself. Although DOEs assess project activities and emission reductions impartially on behalf of the Executive Board, the commercial relationship is between the DOEs and the project participants.

Description

38. Alternative institutional arrangements could be implemented.¹⁷ Specific changes to the institutional arrangements have not been proposed by Parties but several alternatives may be explored for the purpose of further clarifying the accountability of DOEs to the Executive Board.

39. The Executive Board could provide clearer and more comprehensive guidance to DOEs and take further measures to ensure the quality of the work performed by them, through, for example, the accreditation process and frequent, in-depth spot checks of their work. The responsibility for selecting and paying DOEs could also be moved to the Executive Board, through a new selection procedure that ensures that DOEs have adequate incentives to perform high-quality work at a fair price and to adjust their capabilities in response to changes in the mix and location of CDM project activities.¹⁸

40. Alternatively, the work currently conducted by DOEs could be performed by the secretariat, eliminating the accreditation process but requiring that secretariat staff be appropriately trained and resourced. Consideration would need to be given to any conflict of interest with the current role of the

¹⁶ FCCC/KP/AWG/2008/3, annex II, paragraph 4.

¹⁷ FCCC/KP/AWG/2008/3, annex II, paragraph 5.

¹⁸ For example, the project participants could identify three candidate DOEs. The Executive Board could request these DOEs to quote a price for the work before selecting one on the basis of price, the quality of the DOE's work, and possibly other criteria and a random component. The project participants would pay the quoted price to the Executive Board and the Board would pay the DOE.

secretariat, for example in relation to conducting completeness checks or making recommendations on methodologies. The Executive Board would need to establish a fee structure for such work.

Implications

41. Changing the arrangements governing the selection of DOEs would not have a material impact on the ability of Annex I Parties to meet their emission commitments.

Option 3.6: Broaden the role of host Party governments

Current situation

42. The registration of a project activity requires the host Party to provide, through its DNA, written approval of its voluntary participation in the project activity, including confirmation that the activity assists it in achieving sustainable development. As no guidance has been agreed by the CMP regarding such assistance, a host Party may set the requirements it deems appropriate as conditions of its approval.

Description

43. Further guidance could be introduced to broaden the role of the host Party governments,¹⁹ but specific options have not been proposed by Parties. It would be possible for the CMP to provide further guidance to encourage or require host Parties to play a more active role in the development of CDM project activities through, for example, their DNAs providing information to facilitate the development of CDM project activities or guidance on criteria Parties may wish to consider when approving proposed CDM project activities (e.g. project priorities and technology transfer).

Implications

44. More active promotion of CDM project activities would be expected to increase the supply of CERs, but the size of such an increase cannot be estimated.

Option 3.7: Implement alternative ways to ensure environmental integrity and assess the additionality of projects

Current situation

45. The Kyoto Protocol requires emission reductions under the CDM to be additional to those that would have happened in the absence of the project. As it is not possible to know with full certainty what would have happened in this case, the additionality of project activities inevitably involves a degree of subjective assessment.

46. Project participants may use various means to demonstrate that the emission reductions would not take place without the project activity, for example demonstrating that the lower-emitting technology is more costly than the commonly used alternative, or that the emission reduction is costly and not required by law. The Executive Board has developed and refined an additionality tool based on approaches suggested by project participants. This has been adopted for many methodologies.

47. Every proposed CDM project must use an approved methodology to determine the baseline to be used as the reference level for the subsequent certification of emission reductions. If necessary, project participants may propose new methodologies to the CDM Executive Board for approval. Determining the baseline for each project individually can be costly and time-consuming, and new developments in the area of methodologies and PoAs are moving in the direction of standardization.

¹⁹ FCCC/KP/AWG/2008/3, annex II, paragraph 6.

General description

48. It would be possible to simplify the determination of additionality and baselines by undertaking assessments at an aggregate level for defined categories of project activities and subsequently applying these assessments to individual cases. Options 3.7a and 3.7b seek to retain the principle of additionality and the use of baselines while aiming to reduce the costs and time involved in implementing them.

Option 3.7a: Standardized, multi-project baselines*Description*

49. Under this option, the CDM Executive Board would pre-approve parameters or procedures that, when combined with project-specific values, would define a standardized baseline for proposed project activities of a specified type.²⁰ For example, the Executive Board could approve a benchmark for an efficient refrigerator which, when multiplied by the number of refrigerators replaced, would define the baseline for a refrigerator replacement programme. Alternatively, the Executive Board could approve a procedure for estimating grid emission factors which may be used, together with project-specific data, to develop location-specific benchmarks for grid-connected renewable energy project activities. Such standardized baselines could be further used to determine the additionality of project activities.

50. Standardized baselines may allow some project activities to be registered and earn CERs when they would not qualify as additional under an individual additionality test. To ensure that the aggregate quantity of CERs issued for all the project activities using the standardized baseline does not exceed the total emission reductions achieved by those project activities, relative to what would have happened otherwise, the standardized baseline would need to be set conservatively (that is, at a low level relative to that of a project activity that would be able to demonstrate additionality).

51. A project activity that would be able to demonstrate additionality individually would nevertheless have to use the conservative standardized baseline and hence is likely to receive fewer CERs than it would under a non-standardized baseline.²¹ It may be necessary to periodically review the parameters that define the standardized baseline, especially in sectors with rapid technological change.

Analysis

Rationale	<ul style="list-style-type: none"> • To increase the potential for reducing emissions in non-Annex I Parties, thus enhancing the cost-effectiveness of achieving overall emission commitments • To reduce the administrative processing and technical assessment of CDM project activities necessary for the volume of CERs generated
Key elements to be decided	<ul style="list-style-type: none"> • Categories of eligible project activities • Whether the standardized baseline is mandatory for all project activities in the category
Necessary follow-up actions	<ul style="list-style-type: none"> • Determination of parameters or procedures for each category
Potential challenges	<ul style="list-style-type: none"> • Avoidance of aggregate quantity of CERs exceeding total emission reductions achieved by the project activities • Avoidance of double counting with CDM project activities • Project activities able to demonstrate additionality individually would generate fewer CERs while those not able to demonstrate additionality individually could generate CERs

²⁰ FCCC/KP/AWG/2008/3, annex II, paragraph 7 (a) and (b).

²¹ Approving project activities individually would circumvent the conservative setting of the standardized baselines that is done to account for any activities that would not qualify as additional under an individual additionality test.

	<ul style="list-style-type: none"> • Periodic recalculation and updating of parameters used as standardizing factors in baselines
Implications for the emission budgets of Annex I Parties	<ul style="list-style-type: none"> • Increase in CER supply would allow higher emissions by Annex I Parties
Impact on the carbon market	<ul style="list-style-type: none"> • Increase in CER supply (the extent would depend on the stringency of baselines and additionality) • Downward pressure on CER prices
Implications for domestic mitigation	<ul style="list-style-type: none"> • Reduced domestic mitigation needed by Annex I Parties to meet their emission commitments, due to increased supply and lower prices of CERs
Potential links to other options	<ul style="list-style-type: none"> • Options 3.2a and 3.7b
Ancillary benefits and costs	<ul style="list-style-type: none"> • Increased assistance in achieving sustainable development • Increased technology transfer

Option 3.7b: Positive or negative lists of project activity types

Description

52. This option would establish a list of project activity types that do or do not need to demonstrate additionality individually.²² A proposed project activity of a type included on a positive list, or not on a negative list, could apply an approved methodology, including the baseline, without needing to demonstrate additionality.

53. A positive list would contain project activity types for which virtually all potential project activities would be additional. Baselines would still need to be determined on the basis of approved methodologies or conservatively set, standardized baselines. A negative list would contain activity types for which virtually no activities would be additional. Such lists would need to be reviewed periodically to ensure that virtually all registered project activities in each category are, or are not, additional.

Analysis

Rationale	<ul style="list-style-type: none"> • To increase the potential for reducing emissions in non-Annex I Parties, thus enhancing the cost-effectiveness of achieving overall emission commitments • To reduce the administrative processing and technical assessment of CDM project activities necessary for the volume of CERs generated
Key elements to be decided	<ul style="list-style-type: none"> • Criteria for inclusion of categories of project activities • Process for determining positive or negative lists
Necessary follow-up actions	<ul style="list-style-type: none"> • Periodic review of the lists to ensure that virtually all registered project activities are additional or are not additional
Potential challenges	<ul style="list-style-type: none"> • Establishment of criteria and process for determining lists • Aggregate quantity of CERs issued is likely to exceed total emission reductions achieved by the project activities, to the extent that approved methodologies are used that do not account for the possibility of project activities that would not qualify as additional under an individual additionality test
Implications for the emission budgets of Annex I Parties	<ul style="list-style-type: none"> • Increase in CER supply would allow higher emissions by Annex I Parties
Impact on the carbon market	<ul style="list-style-type: none"> • In the case of positive lists, CER supply would increase with downward pressure on CER prices (the extent would depend on the stringency of baselines)

²² FCCC/KP/AWG/2008/3, annex II, paragraph 7 (b), (c) and (d).

	<ul style="list-style-type: none"> In the case of negative lists, CER supply would decrease with upward pressure on CER prices (the extent would depend on the stringency of baselines)
Implications for domestic mitigation	<ul style="list-style-type: none"> In the case of positive lists, domestic mitigation needed by Annex I Parties would be reduced owing to increased supply and lower prices of CERs In the case of negative lists, domestic mitigation needed by Annex I Parties would be increased owing to decreased supply and higher prices of CERs
Potential links to other options	<ul style="list-style-type: none"> Options 3.2a, 3.7a, 3.10a, 3.14 and 3.20
Ancillary benefits and costs	<ul style="list-style-type: none"> In the case of positive lists, increased assistance in achieving sustainable development and increased technology transfer In the case of negative lists, decreased assistance in achieving sustainable development and decreased technology transfer

Option 3.8: Differentiate the eligibility of Parties to host clean development mechanism project activities

Current situation

54. Currently all non-Annex I Parties are eligible to host CDM project activities. The only requirement is that the Party establish a DNA to provide written approval of its voluntary participation in project activities, including confirmation that the project activities assist it in achieving sustainable development.

Description

55. Indicators would be used to determine which non-Annex I Parties are eligible to participate in the CDM²³ or to host particular types of CDM project activities.²⁴ This would require agreement on the indicator(s) to be used and how this or these would be used to determine which types of project activities are eligible in which host countries. Gross domestic product (GDP) per capita and GHG emissions per capita are two of the many possible indicators. Parties for which the selected indicators lie above specified thresholds could be ineligible to host CDM project activities in general or to host specified types of CDM project activities.

Analysis

Rationale	<ul style="list-style-type: none"> To concentrate CDM project activities in non-Annex I Parties that are considered to be more suitable for the CDM
Key elements to be decided	<ul style="list-style-type: none"> Appropriate indicators to use Indicator threshold(s) for eligibility Project activity categories affected by the eligibility determination Transition issues (e.g. what would happen to a CDM project activity if the host Party is no longer eligible or if the host Party subsequently becomes eligible again)
Necessary follow-up actions	<ul style="list-style-type: none"> Periodic review of the indicators, thresholds and project activity categories affected by the eligibility determination
Potential challenges	<ul style="list-style-type: none"> Definition of appropriate indicators and thresholds
Implications for the emission budgets of Annex I Parties	<ul style="list-style-type: none"> Decrease in CER supply would not affect the level of emissions by Annex I Parties
Impact on the carbon market	<ul style="list-style-type: none"> Decrease in CER supply (the extent would depend on the choice of indicators, thresholds and project activity categories affected by the

²³ FCCC/KP/AWG/2008/3, annex II, paragraph 8 (a).

²⁴ FCCC/KP/AWG/2008/3, annex II, paragraph 9.

	<ul style="list-style-type: none"> eligibility determination) Upward pressure on CER prices
Implications for domestic mitigation	<ul style="list-style-type: none"> Increased domestic mitigation needed by Annex I Parties due to decreased supply and higher prices of CERs (assuming there is no alternative mechanism to which non-eligible Parties graduate)
Potential links to other options	<ul style="list-style-type: none"> Option 3.21
Ancillary benefits and costs	<ul style="list-style-type: none"> Decreased assistance in achieving sustainable development technology transfer, except in those non-Annex I Parties continuing to host CDM project activities

Option 3.9: Improve access to clean development mechanism project activities by certain host Parties

Current situation

56. CDM project activities in the least developed countries (LDCs) are exempt from the share of proceeds on the issuance of CERs. Although not limited to any group(s) of host Parties, the simplified modalities and procedures for small-scale project activities facilitate access to the CDM for smaller countries. Nevertheless, many non-Annex I Parties have few CDM project activities or none. This option is closely related to the two issues of regional distribution of CDM project activities and the main driver of project activities being private sector investment. The factors influencing foreign and domestic investment decisions also apply to investments through the CDM.

Description

57. Changes could be made to selected rules for project activities in specific categories of non-Annex I Parties with few CDM project activities to make it easier to implement project activities in those countries.²⁵ Parties such as LDCs or SIDS could be considered. For example, the maximum size of small-scale project activities could be increased for such host Parties or the requirement to demonstrate additionality could be removed in relation to small-scale project activities. It may also be possible for the validation, verification and certification of project activities in such host Parties to be funded through the management plan of the CDM.

58. Alternatively, it may be possible to allow small-scale project activities in specific categories of host Parties to generate CERs on the basis of only the validation of the project activity and certification of emissions reductions through DOEs (without the CDM Executive Board registering the project activity). Reductions in the size of small-scale project activities may be needed to make such an approach appropriate, as may additional accreditation requirements for DOEs wishing to engage in such activities.

59. The impact of such changes would need to be reviewed periodically to assess their effectiveness in stimulating more CDM project activities in the targeted Parties.

Analysis

Rationale	<ul style="list-style-type: none"> To ensure that the benefits of participation in the CDM are available to non-Annex I Parties that currently have few project activities or none (regional distribution)
Key elements to be decided	<ul style="list-style-type: none"> Determination of the changes in rules Categories of non-Annex I Parties affected by the rule changes Treatment of registered project activities if the host Party moves into or out of the affected categories

²⁵ FCCC/KP/AWG/2008/3, annex II, paragraph 8 (b).

Necessary follow-up actions	<ul style="list-style-type: none"> • Periodic review of the rule changes
Potential challenges	<ul style="list-style-type: none"> • Establishment of categories of affected non-Annex I Parties
Implications for the emission budgets of Annex I Parties	<ul style="list-style-type: none"> • Small increase in CER supply (due to low emissions in the non-Annex I Parties likely to be in the affected categories) would allow a small increase in emissions by Annex I Parties
Impact on the carbon market	<ul style="list-style-type: none"> • Small increase in CER supply (the extent would depend on the affected Parties and nature of the rule changes) • Negligible downward pressure on CER prices
Implications for domestic mitigation	<ul style="list-style-type: none"> • Small reduction in domestic mitigation needed by Annex I Parties to meet their emission commitments, due to small increase in CER supply
Potential links to other options	<ul style="list-style-type: none"> • None identified
Ancillary benefits and costs	<ul style="list-style-type: none"> • Increased assistance in achieving sustainable development and technology transfer in affected non-Annex I Parties

Option 3.10: Enhance the contribution of the clean development mechanism to sustainable development by allocating proportions of the demand for certified emission reductions

Current situation

60. Each CDM project activity is to assist the host country in achieving sustainable development, as determined by the host Party government. At present, CDM project activities are concentrated in a relatively small number of countries, thus limiting the contribution to sustainable development that can be made by the CDM in other non-Annex I Parties. As the CDM is a market mechanism, the factors influencing foreign and domestic investment decisions also apply to investments through the CDM.

General description

61. The contribution of the CDM to sustainable development could be enhanced by establishing minimum quotas for the CERs generated by project activities of specific types or hosted in specific Parties.²⁶ The intention of such minimum quotas would be to increase the demand for CERs from such projects or Parties. Annex I Parties would need to demonstrate, ex post, that the minimum quotas had been purchased and/or used for compliance purposes. The reporting and review of information provided by Parties under Articles 7 and 8 of the Kyoto Protocol could be used for this purpose.

Option 3.10a: Allocate minimum quotas to project activity types that contribute more to the sustainable development of host Parties

Description

62. Under this option, minimum quotas would be set for different project activity types (for example, x per cent of all CERs used by an Annex I Party for compliance must be from project activities of type A). Criteria would be needed to determine the relative contributions of different project activity types to sustainable development and hence which project activity types are eligible for minimum quotas. A basis for setting the minimum quota for each project activity type would also be needed.

63. To enhance the contribution to sustainable development, the minimum quota would need to stimulate an increase in the supply of CERs from the project type in question. A minimum quota for a broadly-defined project activity type, such as 'renewable energy', would not provide assistance to the more expensive technologies in that category (e.g. photovoltaic technology). This would result in pressure to establish separate minimum quotas for each technology.

²⁶ FCCC/KP/AWG/2008/3, annex II, paragraph 10.

Analysis

Rationale	<ul style="list-style-type: none"> To ensure that the benefits of participation in the CDM are available to non-Annex I Parties that currently have few project activities or none (regional distribution)
Key elements to be decided	<ul style="list-style-type: none"> Determination of criteria for assessing relative contributions of project activity types to sustainable development Determination of affected project activity types Determination of minimum quotas for each affected project activity type
Necessary follow-up actions	<ul style="list-style-type: none"> Periodic review of the project activity types to assess their relative contributions to sustainable development Periodic review of the minimum quotas
Potential challenges	<ul style="list-style-type: none"> Determination of criteria for assessing relative contributions of project activity types to sustainable development Process for determining and reviewing minimum quotas Different prices for CERs from each project activity type Pressure to increase the number of project activity types to which separate minimum quotas are allocated
Implications for the emission budgets of Annex I Parties	<ul style="list-style-type: none"> Increase in CER supply would allow higher emissions by Annex I Parties
Impact on the carbon market	<ul style="list-style-type: none"> Increase in CER supply and downward pressure on CER prices from project activity types with minimum quotas (the extent would depend on selected project activity types and quota sizes) Possible decrease in CER supply from project activity types without minimum quotas (the extent would depend on the quota sizes) Fragmentation of the market with greater numbers of minimum quotas and greater differentiation in CER prices
Implications for domestic mitigation	<ul style="list-style-type: none"> Reduced domestic mitigation needed by Annex I Parties to meet their emission commitments, due to expected net increase in supply and lower prices of CERs
Potential links to other options	<ul style="list-style-type: none"> Options 3.7b, 3.14 and 3.23a
Ancillary benefits and costs	<ul style="list-style-type: none"> Increased assistance in achieving sustainable development Increased technology transfer

Option 3.10b: Allocate minimum quotas to specific groups of host Parties*Description*

64. Under this option, minimum quotas would be set for different groups of host Parties (for example, y per cent of all CERs used by an Annex I Party for compliance must be from host Parties in category B). A variant of this option could be that the minimum quota applies to CERs from specified project activity types in these host Parties.²⁷ Criteria would be needed to determine which host Parties, and possibly which project activity types, are eligible. A basis for setting the minimum quota for each category of host Parties would also be needed.

65. To enhance the contribution to sustainable development, the minimum quota would need to stimulate an increase in the supply of CERs from the particular group of host Parties, and possibly also project activity types, in question. Within a group of host Parties, it is likely that some would host more CDM project activities than others, leading to pressure to establish minimum quotas for smaller groups of host Parties or for individual Parties.

²⁷ Other project activity types could be implemented in these host Parties, but they would not benefit from the minimum quotas.

Analysis

Rationale	<ul style="list-style-type: none"> To ensure that the benefits of participation in the CDM are available to non-Annex I Parties that currently have few project activities or none (regional distribution)
Key elements to be decided	<ul style="list-style-type: none"> Determination of affected groups of non-Annex I Parties Determination of minimum quotas for each group of Parties
Necessary follow-up actions	<ul style="list-style-type: none"> Periodic review of the affected groups of Parties Periodic review of the minimum quotas
Potential challenges	<ul style="list-style-type: none"> Process for determining and reviewing minimum quotas Pressure to increase the number of groups of Parties to which separate minimum quotas are allocated
Implications for the emission budgets of Annex I Parties	<ul style="list-style-type: none"> Small increase in CER supply (due to low emissions in non-Annex I Parties likely to be in the affected groups) would allow small increase in emissions by Annex I Parties
Impact on the carbon market	<ul style="list-style-type: none"> Small increase in CER supply (the extent would depend on the affected Parties and quota sizes) Negligible downward pressure on CER prices Some fragmentation of the market with greater numbers of minimum quotas and greater differentiation in CER prices
Implications for domestic mitigation	<ul style="list-style-type: none"> Small reduction in domestic mitigation needed by Annex I Parties to meet their emission commitments, due to small increase in CER supply
Potential links to other options	<ul style="list-style-type: none"> Option 3.23b
Ancillary benefits and costs	<ul style="list-style-type: none"> Increased assistance in achieving sustainable development and technology transfer in affected non-Annex I Parties

Option 3.11: Include monetary and other co-benefits as additional criteria for the registration of project activities

Current situation

66. The registration of project activities is based on their additionality and adherence to other requirements, irrespective of co-benefits in the form of other non-GHG environmental and economic benefits (for example, energy efficiency, lower emissions of other air pollutants when GHG emissions of a coal-fired generating unit are reduced, or employment created by increased generation of biomass energy). The responsibility for assessing the assistance of a project activity in achieving sustainable development, including such co-benefits, resides with the host Party government, while the responsibility for assessing its additionality resides with the CDM Executive Board.

Description

67. Co-benefits could be included in the criteria considered by the Executive Board for registration of a proposed project activity.²⁸ Methods for identifying and measuring different co-benefits would be needed. It is assumed that project activities that are not additional would not be registered, even where they demonstrate significant co-benefits, meaning that this option would not lead to an increase in the number of project activities registered.

²⁸ FCCC/KP/AWG/2008/3, annex II, paragraph 12.

68. If the presence of co-benefits is made a mandatory requirement for registration, it would limit the registration of project activities to those that demonstrate both additionality and co-benefits. This may therefore be considered as a way to restrict the CDM to higher-quality project activities.

Analysis

Rationale	<ul style="list-style-type: none"> To increase the co-benefits achieved through the CDM
Key elements to be decided	<ul style="list-style-type: none"> Determination of which co-benefits to consider Determination of how to measure co-benefits Definition of sufficient co-benefits to allow registration of project activities (if co-benefits were made a mandatory requirement of registration)
Necessary follow-up actions	<ul style="list-style-type: none"> CDM Executive Board may need to amend methodologies Assessment of whether co-benefits foreseen at the registration stage are realized in practice
Potential challenges	<ul style="list-style-type: none"> None identified
Implications for the emission budgets of Annex I Parties	<ul style="list-style-type: none"> The recognition of co-benefits would not increase CER supply and would not affect emissions in Annex I Parties
Impact on the carbon market	<ul style="list-style-type: none"> If co-benefits were made a mandatory requirement, this may reduce CER supply Potential upward pressure on CER prices
Implications for domestic mitigation	<ul style="list-style-type: none"> Increased domestic mitigation needed by Annex I Parties to meet their emission commitments, due to decreased supply and higher prices of CERs
Potential links to other options	<ul style="list-style-type: none"> Options 3.12 and 3.24
Ancillary benefits and costs	<ul style="list-style-type: none"> Decreased assistance in achieving sustainable development Decreased technology transfer

Option 3.12: Include technology transfer as an additional criterion for the registration of project activities

Current situation

69. While technology transfer is not a requirement for the registration of CDM project activities by the CDM Executive Board, project participants are required to explain how a proposed project activity contributes to transfer of technology. Host Parties can make technology transfer a condition for their project approval. Technology transfer could be from an Annex I Party to the host Party (North–South), among non-Annex I Parties (South–South) or within the host Party itself. Analyses of CDM project activities indicate that they do lead to technology transfer, although the rate varies significantly across project types and, for a given project type, across host country Parties.

Description

70. Technology transfer could be made a requirement for registration of a project activity by the Executive Board.²⁹ This would require methods for identifying and measuring technology transfer. It is assumed that project activities that are not additional would not be registered, even where they demonstrate significant technology transfer, meaning that this option would not lead to an increase in the number of project activities registered.

²⁹ FCCC/KP/AWG/2008/3, annex II, paragraph 15.

71. If the presence of technology transfer is made a mandatory requirement for registration, it would limit the registration of project activities to those that demonstrate both additionality and technology transfer. This may therefore be considered as a way to restrict the CDM to higher-quality project activities.

Analysis

Rationale	<ul style="list-style-type: none"> To increase technology transfer achieved through the CDM
Key elements to be decided	<ul style="list-style-type: none"> Determination of what type of technology transfer to consider Determination of how to measure technology transfer Definition of sufficient technology transfer to allow registration of project activities (if technology transfer were made a mandatory requirement of registration)
Necessary follow-up actions	<ul style="list-style-type: none"> CDM Executive Board may need to amend methodologies Assessment of whether technology transfer foreseen at the registration stage is realized in practice
Potential challenges	<ul style="list-style-type: none"> None identified
Implications for the Annex I emission budget	<ul style="list-style-type: none"> The recognition of technology transfer would not increase CER supply and would not affect emissions in Annex I Parties
Impact on the carbon market	<ul style="list-style-type: none"> If co-benefits were made a mandatory requirement, this may reduce CER supply Potential significant upward pressure on CER prices
Implications for domestic mitigation	<ul style="list-style-type: none"> Greatly reduced domestic mitigation needed by Annex I Parties to meet their emission commitments, due to increased supply and lower prices of CERs
Potential links to other options	<ul style="list-style-type: none"> Options 3.11 and 3.25
Ancillary benefits and costs	<ul style="list-style-type: none"> Decreased assistance in achieving sustainable development No impact on technology transfer

Option 3.13: Restrict the clean development mechanism to bilateral project activities

Current situation

72. A CDM project activity can be implemented unilaterally by an entity in a non-Annex I Party. However, the project activity must be approved by an Annex I Party before the CERs can be transferred from the CDM registry to that Party's national registry. Thus, all project activities are bilateral in the sense that they require the approval of both the host Party and an Annex I Party before the CERs are transferred to the Annex I Party.

Description

73. Specific options on how to further restrict the CDM to bilateral project activities³⁰ have not been provided by Parties. It may be possible to require approval by an Annex I Party at an earlier stage in the life of a project activity, for example prior to its registration. This would probably result in an increase in the cost and time required for registration and would not necessarily generate additional investment for proposed project activities.

Implications

74. Requiring Annex I Party approval at an earlier stage in the life of a project activity may reduce the number of project activities and delay the supply of CERs. This may make it more difficult for Annex I Parties to comply with their emission commitments.

³⁰ FCCC/KP/AWG/2008/3, annex II, paragraph 13.

Option 3.14: Introduce multiplication factors to increase or decrease the certified emission reductions issued for specific project activity types

Current situation

75. CDM project activities receive CERs equal to the reductions in GHGs, multiplied by the global warming potentials (GWPs) of the gases.

Description

76. A CDM project activity could receive CERs equal to the emission reductions multiplied by the GWPs of the gases and then multiplied by a factor based on the project activity type or technology.³¹ The favoured project activity types (or technologies) would first need to be identified and multiplication factors for each would then need to be agreed. Criteria on which such an option could be based have not been proposed by Parties. It may be necessary to consider differences in the national circumstances of host Parties, as the selected criteria (e.g. relating to sustainable development) may apply differently from one Party to another.

77. Project activities of the specified type (with multiplication factors greater than 1) would become more profitable relative to the others (with multiplication factors less than 1), leading to a shift in the mix of project activities towards the favoured types. To prevent the total quantity of CERs exceeding the total emission reductions actually achieved, the number of extra CERs from favoured technologies would need to be offset by fewer CERs from less-favoured technologies. The multiplication factors may need to be adjusted periodically to reflect changes to the economic viability of different technologies and changes to the mix of project activities implemented.

78. Alternatively, favoured project activity types could have a multiplication factor of 1 and less favoured technologies could be 'discounted' by a multiplication factor of less than 1.

Analysis

Rationale	<ul style="list-style-type: none"> To alter the mix of project activity types under the CDM
Key elements to be decided	<ul style="list-style-type: none"> Determination of which project activity types to favour Determination of multiplication factors for project activity types
Necessary follow-up actions	<ul style="list-style-type: none"> Periodic review of the project activity types to favour Periodic review of the multiplication factors
Potential challenges	<ul style="list-style-type: none"> Determination of criteria for favouring specific project activity types Determination of process for determining and reviewing multiplication factors Aggregate quantity of CERs issued may exceed total emission reductions achieved by the project activities
Implications for the emission budgets of Annex I Parties	<ul style="list-style-type: none"> If the multiplication factors are set such that the aggregate quantity of CERs issued is equal to the total emission reductions actually achieved, there would be no impact on CER supply or emissions by Annex I Parties If the aggregate quantity of CERs issued differs from the total emission reductions actually achieved, CER supply would increase (reducing emissions by Annex I Parties) or decrease (increasing emissions by Annex I Parties)

³¹ FCCC/KP/AWG/2008/3, annex II, paragraph 14 (a).

Impact on the carbon market	<ul style="list-style-type: none"> An increase in CER supply would create downward pressure on CER prices; a decrease in CER supply would create upward pressure on CER prices
Implications for domestic mitigation	<ul style="list-style-type: none"> Potential reduction in domestic mitigation by Annex I Parties to meet their emission commitments, due to increased supply and lower prices of CERs
Potential links to other options	<ul style="list-style-type: none"> Options 3.7b, 3.10a and 3.27
Ancillary benefits and costs	<ul style="list-style-type: none"> Potential increase in assistance in achieving sustainable development and technology transfer, assuming that these are used as criteria for favouring specific project activity types

B. Joint implementation

Option 3.15: Introduce modalities for the graduation of Parties from hosting clean development mechanism project activities to joint implementation projects

Current situation

79. There are no provisions addressing what would happen to CDM project activities on the territory of a non-Annex I Party if this Party were to adopt an emission commitment under the Kyoto Protocol, thus becoming an Annex I Party eligible to host JI projects but not CDM project activities.

80. Emissions reduced (and removals enhanced) through JI projects do not lead to the creation of credits in addition to the overall assigned amounts of Annex I Parties (as with CDM projects) but instead result in the conversion of existing assigned amount units (AAUs) or removal units (RMUs) of the host Annex I Party into emission reduction units (ERUs). This leaves the assigned amount of Annex I Parties – and thus their overall emission budget – unaffected.

Description

81. Modalities could be established for the graduation of Parties from being eligible to host CDM project activities to being eligible to host JI projects.³² Registered CDM project activities could be allowed to continue as CDM projects until the end of their respective crediting periods or they could be converted to JI Track 2 projects, possibly also with the option to become JI Track 1 projects if the host Party meets the relevant eligibility requirements. Automatic conversion into JI projects may be problematic as the rules governing JI projects differ from the CDM rules. It may also create contractual difficulties for the project participants.³³

82. If project activities are allowed to continue as CDM projects after the host Party has adopted an emission commitment, it would be necessary to cancel existing assigned amount equal to the issuance of CERs if the stringency of emissions targets is to be maintained. This would ensure that the overall emission budget of Annex I Parties remains unaffected, making the situation equivalent to that of JI projects.

Analysis

Rationale	<ul style="list-style-type: none"> To clarify the status of CDM projects if the host Party takes on an emission commitment under the Kyoto Protocol
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³² FCCC/KP/AWG/2008/3, annex II, paragraph 16.

³³ Owing to differences in unit prices and in the acceptance of CERs and ERUs under national policies, contracts established for the delivery of CERs may not allow for their replacement by ERUs or may require compensation to be made.

Key elements to be decided	<ul style="list-style-type: none"> • Status of CDM project activities after the host Party becomes eligible to host JI projects • Whether to cancel assigned amount of the host Party in the case of CDM project activities continuing
Necessary follow-up actions	<ul style="list-style-type: none"> • Adjustment to the reporting and review by Annex I Parties under Articles 7 and 8 of the Kyoto Protocol
Potential challenges	<ul style="list-style-type: none"> • None identified
Implications for the emission budgets of Annex I Parties	<ul style="list-style-type: none"> • No change in emissions of Annex I Parties if CDM projects are converted to JI projects • No change in emissions of Annex I Parties if CDM projects continue under the CDM and assigned amount of the host Party, equivalent to the issued CERs, is cancelled • If CDM projects continue under the CDM without cancelling assigned amount, the increase in emissions of Annex I Parties would depend on the number and size of the CDM projects
Impact on the carbon market	<ul style="list-style-type: none"> • If CDM projects continue under the CDM without cancelling assigned amount and other forms of assigned amount are not cancelled, there would be downward pressure on carbon prices (the size of this impact is unknown) • Uncertainty about the treatment of CDM project activities could adversely affect future CDM project activities
Implications for domestic mitigation	<ul style="list-style-type: none"> • If CDM projects continue under the CDM without cancelling assigned amount, domestic mitigation would decrease (the size of this impact is unknown)
Potential links to other options	<ul style="list-style-type: none"> • None identified
Ancillary benefits and costs	<ul style="list-style-type: none"> • No or negligible impact

Option 3.16: Change the composition of the Joint Implementation Supervisory Committee membership to ensure equitable representation of Parties

Current situation

83. The Joint Implementation Supervisory Committee (JISC), which supervises the verification procedures under JI Track 2, consists of 10 members and 10 alternates as specified in the Marrakesh Accords (see paras. 4–6 of the annex to decision 9/CMP.1). The JISC consists of three members and alternates from Annex I Parties undergoing the transition to a market economy, three members and alternates from other Annex I Parties, three members and alternates from non-Annex I Parties, and one member and alternate from the SIDS. Members and alternates are nominated by their constituencies.

84. Half of the members/alternates are elected each year for a term of two years. Members are eligible to serve a maximum of two consecutive terms, while there is no limit on the number of terms that may be served as an alternate (that is, a person may serve two consecutive terms as a member, serve as an alternate and then be eligible to serve again as a member). The composition of the JISC was negotiated in parallel with that of other constituted bodies under the Kyoto Protocol.

Description

85. The composition of the JISC could be altered, with a view to enhancing its efficiency through ensuring the equitable representation of Parties,³⁴ by changing the number of members/alternates from different constituencies. The membership of the JISC could be altered by limiting the number of terms a

³⁴ FCCC/KP/AWG/2008/3, annex II, paragraph 20.

person can serve as a member or alternate (e.g. allowing only two consecutive terms, irrespective of whether as a member or alternate) or through CMP guidance encouraging or requiring rotation in the Parties from whom members and alternates are drawn.

Implications

86. This option would have implications similar to those of option 3.3 in the context of the CDM Executive Board. Changing the composition and/or membership of the JISC would not have a material impact on the ability of Annex I Parties to meet their emission commitments. Such changes may prompt calls to change the composition and/or membership of other constituted bodies.

Option 3.17: Move the secretariat's function of supporting the Joint Implementation Supervisory Committee to another organization

Current situation

87. The Marrakesh Accords state that the secretariat shall service the JISC (see para. 19 of the annex to decision 9/CMP.1). The secretariat provides an operational support structure to all activities of the JISC and the panels and teams established under it. This involves provision of process, technical, legal, organizational, logistical, administrative and communications services. All work is carried out in an objective, impartial and transparent manner.

88. The main areas of support relate to the management of the project submission process and the accreditation of independent entities. The support includes, for example, preparing meetings and documentation, conducting completeness checks of submitted project documentation, facilitating determination³⁵ appraisals and reviews, as appropriate, and supporting desk reviews and on-site assessments of independent entities. The secretariat is also involved in broader areas of support, such as preparing draft guidance and procedures for consideration by the JISC, making project and other information publicly available, and supporting Parties' designated focal points (DFPs) and accredited independent entities (AIEs) in their work.

Description

89. Administrative support for the JISC could be transferred to another existing organization or to a new organization.³⁶ Specific organizations have not been proposed by Parties. A suitable organization would need to be identified or established, taking into account any potential conflict of interest that may arise if the organization is involved in JI activities. If the functions were to be transferred to an existing organization, the responsible unit would be accountable to both the management of the host organization and to the CMP. The functions, and possibly some or all relevant secretariat staff, would need to be transferred. The secretariat could continue to support the Kyoto Protocol bodies on issues relating to JI.

Implications

90. This option would have implications similar to those of option 3.4 in the context of the CDM Executive Board. Changing the organization supporting the JISC would not have a material impact on the ability of Annex I Parties to meet their emission commitments.

³⁵ Under JI, "the determination" is the equivalent of validation under the clean development mechanism.

³⁶ FCCC/KP/AWG/2008/3, annex II, paragraph 21.

**Option 3.18: Introduce alternative institutional arrangements
for determination and verification**

Current situation

91. Project participants wishing to implement a JI project under the Track 2 procedures must hire an AIE to determine that a proposed JI Track 2 project meets the requirements. In case of a positive final determination for the project,³⁷ the project participants must hire an AIE to verify the emission reductions achieved. AIEs are accredited for this work by the JISC and are accountable to the CMP through the JISC.

92. The work of the AIEs decentralizes the determination and verification work under JI Track 2, with the result that the JISC does not need to conduct this work itself. Although AIEs assess projects and emission reductions impartially on behalf of the JISC, the commercial relationship is between the AIEs and the project participants.

Description

93. Alternative institutional arrangements could be implemented.³⁸ Specific changes to the institutional arrangements have not been proposed by Parties but several alternatives may be explored for the purpose of further clarifying the accountability of AIEs to the JISC.

94. The JISC could provide clearer and more comprehensive guidance to AIEs and take further measures to ensure the quality of the work performed by them, through, for example, the accreditation process and frequent in-depth spot checks of their work. The responsibility for selecting and paying AIEs could also be moved to the JISC, through a new selection procedure that ensures that AIEs have adequate incentives to perform high-quality work at a fair price and to adjust their capabilities in response to changes in the mix and location of JI projects.³⁹

95. Alternatively, the work currently conducted by AIEs could be performed by the secretariat, eliminating the accreditation process but requiring that secretariat staff be appropriately trained and resourced. Consideration would need to be given to any conflict of interest with the current role of the secretariat, for example in relation to conducting completeness checks or supporting the JISC in its decision-making. The JISC would need to establish a fee structure for such work.

Implications

96. This option would have implications similar to those of option 3.5 in the context of DOEs under the CDM. Changing the arrangements governing the selection of AIEs would not have a material impact on the ability of Annex I Parties to meet their emission commitments.

Option 3.19: Broaden the role of host Party governments

Current situation

97. The role of the Annex I Parties under JI is already broad. Under Track 2, Parties develop national guidelines and procedures for approving JI projects and host Parties may issue ERUs. In the

³⁷ A positive final determination of the project design document for a JI Track 2 project is the equivalent, under the JI guidelines, of the registration of a project activity under the CDM.

³⁸ FCCC/KP/AWG/2008/3, annex II, paragraph 22.

³⁹ For example, the project participants could identify three candidate AIEs. The JISC could request these AIEs to quote a price for the work before selecting one on the basis of price, the quality of the AIE's work, and possibly other criteria and a random component. The project participants would pay the quoted price to the JISC and the JISC would pay the AIE.

case of Annex I Parties that meet the necessary eligibility requirements and wish to host JI Track 1 projects, they may determine almost the whole JI project cycle through their national guidelines and procedures. In both cases, host Parties may set requirements that they deem appropriate as conditions for project approval.

Description

98. Guidance could be introduced to further broaden the role of the host Party governments,⁴⁰ but specific options have not been proposed by Parties. It would be possible for the CMP to provide further guidance to encourage or require host Parties to play a more active role in the development of JI projects through, for example, their DFPs providing information to facilitate the development of JI projects or guidance on criteria they may wish to consider when approving proposed JI projects (e.g. project priorities and technology transfer).

Implications

99. This option would have implications similar to those of option 3.6 in the context of the CDM. More active promotion of JI projects would be expected to change the mix of ERUs, AAUs and RMUs held by Annex I Parties but, because ERUs are converted from already existing AAUs and RMUs, the overall emission budget of Annex I Parties would not change.

Option 3.20: Positive or negative lists of project types

Current situation

100. The Kyoto Protocol requires emission reductions under JI to be additional to those which would have happened without the project. As it is not possible to know with full certainty what would have happened in the absence of the project, the additionality of projects inevitably involves a degree of subjective assessment. Under JI Track 2, project participants may use methodologies and tools approved under the CDM, or may develop and/or apply a JI-specific approach on the basis of guidance provided by the CMP and the JISC, to demonstrate the additionality of the project's emission reductions. Demonstrating the additionality of emission reductions on the basis of individual projects can be costly and time-consuming. Under JI track 1, Parties may implement their own procedures.

Description

101. This option would establish a list of project types that do not demonstrate additionality individually.⁴¹ A positive list would contain project types for which virtually all potential projects would be additional and for which project participants do not need to demonstrate additionality (project baselines would still be needed for crediting purposes). A negative list would contain project types for which virtually no project would be additional and which therefore could not be implemented under JI. Such lists would need to be reviewed periodically to ensure that virtually all projects in each category are, or are not, additional. This option seeks to retain the principle of additionality while aiming to increase the administrative efficiency of implementing it.

Analysis

Rationale	<ul style="list-style-type: none"> • To increase the potential for reducing emissions, thus enhancing the cost-effectiveness of achieving overall emission commitments • To reduce the administrative processing and technical assessment of JI projects necessary for the volume of ERUs generated
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⁴⁰ FCCC/KP/AWG/2008/3, annex II, paragraph 23.

⁴¹ FCCC/KP/AWG/2008/3, annex II, paragraph 24 (a), (b) and (c).

Key elements to be decided	<ul style="list-style-type: none"> • Criteria for inclusion of categories of projects • Process for defining positive or negative lists
Necessary follow-up actions	<ul style="list-style-type: none"> • Periodic review of the lists to ensure that virtually all project remain additional (or not additional)
Potential challenges	<ul style="list-style-type: none"> • Establishment of criteria and process for defining lists
Implications for the emission budgets of Annex I Parties	<ul style="list-style-type: none"> • None identified
Impact on the carbon market	<ul style="list-style-type: none"> • In the case of positive lists, ERU supply would increase • In the case of negative lists, ERU supply would decrease
Implications for domestic mitigation	<ul style="list-style-type: none"> • No change to the domestic mitigation of Annex I Parties to meet their emission commitments
Potential links to other options	<ul style="list-style-type: none"> • Options 3.7b, 3.23a and 3.27
Ancillary benefits and costs	<ul style="list-style-type: none"> • Dependent on technologies and activities deployed

Option 3.21: Differentiate the eligibility of Parties to host joint implementation projects

Current situation

102. Currently all Annex I Parties are eligible to host JI projects using Track 2. Parties that meet specified eligibility conditions can establish their own domestic (Track 1) JI procedure.

Description

103. Indicators would be used to determine which Annex I Parties are eligible to host JI projects⁴² or particular types of JI projects.⁴³ Parties were not specific as to the intent of this option but it is assumed that it is to concentrate JI projects in Annex I Parties which are considered to be more suitable for JI.

104. The option would require agreement on the indicator(s) to be used and how these would be used to determine which types of projects are eligible in which host countries. GDP per capita and emissions per capita are two of the many possible indicators. Parties for which the selected indicators lie above specified thresholds could be ineligible to host JI projects in general or to host specified types of JI projects.

105. Many details would need to be decided, including which indicators to use, the indicator threshold(s) for eligibility, the project categories affected, and how the threshold(s) and project types change over time. The option also gives rise to transition issues, such as what happens to a JI project if the host Party is no longer eligible to host JI projects or subsequently becomes eligible again.

Implications

106. This option would have implications similar to those of option 3.8 in the context of the CDM (see the section on option 3.8 for further analysis). The numbers of JI projects and ERUs are likely to be reduced and the project locations concentrated. However, because ERUs are converted from already existing AAUs and RMUs, the overall emission budget of Annex I Parties would not change.

⁴² FCCC/KP/AWG/2008/3, annex II, paragraph 25 (a).

⁴³ FCCC/KP/AWG/2008/3, annex II, paragraph 26.

Option 3.22: Improve access to joint implementation projects by certain host Parties

Current situation

107. JI projects are currently concentrated in a relatively small number of Annex I Parties. Reasons for this are often considered to relate to the treatment of JI projects under national or regional policy, levels of capacity and information available, and the level of development by Annex I Parties of their national procedures and guidelines.

Description

108. Measures could be taken to improve access to JI projects.⁴⁴ Specific options have not been proposed by Parties. It may be possible to take measures to enhance capacity relating to JI in potential host Parties or for the CMP to provide further guidance encouraging more Parties to complete their national procedures and guidelines for JI and submit them to the secretariat.⁴⁵ The impact of measures may need to be reviewed periodically to assess their effectiveness in stimulating more JI projects in the targeted Parties.

Implications

109. If measures can be identified and successfully implemented, the numbers of JI projects and ERUs would increase. However, because ERUs are converted from already existing AAUs and RMUs, the overall emission budget of Annex I Parties would not change.

Option 3.23: Enhance the contribution of joint implementation to sustainable development by allocating proportions of the demand for emission reduction units

Current situation

110. Unlike for the CDM, the current guidance on JI provided in the Kyoto Protocol and by the CMP does not make specific reference to a contribution by JI to sustainable development. However, like the CDM, JI is a market mechanism and projects are implemented where investors believe they can earn an attractive financial return. As a result, the factors influencing foreign and domestic investment decisions also apply to investments in JI projects.

General description

111. The contribution of JI to sustainable development could be enhanced by establishing minimum quotas for the ERUs generated by specified project types or host Parties.⁴⁶ The intention of such quotas would be to increase the demand for ERUs from such projects or Parties. Annex I Parties would need to demonstrate, ex post, that the minimum quotas had been purchased and/or used for compliance purposes. The reporting and review of Party information under Articles 7 and 8 of the Kyoto Protocol could be used for this purpose. Attention would need to be paid to the reasons for some Annex I Parties having few or no JI projects.

⁴⁴ FCCC/KP/AWG/2008/3, annex II, paragraph 25 (b).

⁴⁵ Decision 9/CMP.1, annex, paragraph 20.

⁴⁶ FCCC/KP/AWG/2008/3, annex II, paragraph 27.

Option 3.23a: Allocate minimum quotas to project types that contribute more to the sustainable development of host Parties

Description

112. Under this option, minimum quotas would be set for different project types (for example x per cent of all ERUs used by an Annex I Party for compliance must be from projects of type A). Criteria would be needed to determine the relative contributions of different project types to sustainable development and hence which project types are eligible for minimum quotas. A basis for setting the minimum quota for each project type would be needed.

113. To enhance the contribution to sustainable development, the minimum quota would need to stimulate an increase in the supply of ERUs from that project type. A minimum quota for a broadly defined project type, such as 'renewable energy', would not benefit the more expensive technologies in that category (e.g. photovoltaic technology). This would result in pressure to establish separate minimum quotas for each technology.

114. Many issues would need to be resolved, including which project types contribute more to sustainable development and what minimum quotas to set for these. There may be a need for a periodic review to assess their effectiveness.

Implications

115. This option would have implications similar to those of option 3.10a in the context of the CDM (see the section on option 3.10a for further analysis). The number of JI projects and the supply of ERUs on the market would be likely to increase. However, because ERUs are converted from already existing AAUs and RMUs, the overall emission budget of Annex I Parties would not change. The greater the number of project types which are assigned quotas, the more differentiated would be ERU prices and the more fragmented would be the market.

Option 3.23b: Allocate minimum quotas to specific groups of host Parties

Description

116. Minimum quotas would be set for different groups of host Parties (for example y per cent of all ERUs used by an Annex I Party for compliance must be from host Parties in category B). A variant of this option could be that the minimum quota applies to ERUs from specified project types in these host Parties.⁴⁷ Criteria also would be needed to determine which host Parties, and possibly project types, are eligible. A basis for setting the minimum quota for each category of host Parties would be needed. Attention would need to be paid to the reasons for some Annex I Parties having few or no JI projects, which often differ from the situation under the CDM.

117. To enhance the contribution to sustainable development, the minimum quota would need to stimulate an increase in the supply of ERUs from these host Parties and possibly project types. Within a group of host Parties, it is likely that some would want to host more JI projects than others, leading to pressure to establish minimum quotas for smaller groups of host Parties or for individual Parties.

118. Many issues would need to be resolved, including which host Parties (and project types) should be assigned minimum quotas and what these should be. There may need to be periodic review to assess their effectiveness.

⁴⁷ Other project types could be implemented in these host Parties, but they would not benefit from the minimum quotas.

Implications

119. This option would have implications similar to those of option 3.10b in the context of the CDM (see the section on option 3.10b for further analysis). The number of JI projects and the supply of ERUs on the market would be likely to increase by a small amount. However, because ERUs are converted from already existing AAUs and RMUs, the overall emission budget of Annex I Parties would not change. The greater the number of Parties (and possibly project types) which are assigned minimum quotas, the more differentiated would be ERU prices and the more fragmented would be the market.

Option 3.24: Include monetary and other co-benefits as additional criteria for the final determination for projects

Current situation

120. In approving proposed JI projects, host Party governments may consider co-benefits in the form of other non-GHG environmental and economic benefits (for example, lower emissions of other air pollutants when GHG emissions of a coal-fired generating unit are reduced). These are not considered by the JISC prior to the final determination for JI Track 2 projects. Under JI Track 1, Parties may implement their own procedures.

Description

121. Co-benefits could be included in the criteria considered by the JISC prior to the final determination for JI Track 2 projects.⁴⁸ Methods for identifying and measuring different co-benefits would be needed. It is assumed that projects which are not additional would not receive a positive final determination, even where they demonstrate significant co-benefits, meaning that this option would not lead to an increase in the number of JI projects.

122. If co-benefits are made a mandatory requirement for a positive final determination, this would limit JI projects to those that demonstrate both additionality and co-benefits. This may therefore be considered as a way to restrict JI to higher-quality projects.

Implications

123. This option would have implications similar to those of option 3.11 in the context of the CDM (see the section on option 3.11 for further analysis). The recognition of co-benefits would not increase ERU supply from JI track 2 projects and would in fact reduce it if co-benefits were to be made a mandatory requirement for a positive final determination. However, because ERUs are converted from already existing AAUs and RMUs, the overall emission budget of Annex I Parties would not change.

Option 3.25: Include technology transfer as an additional criterion for the final determination for projects

Current situation

124. In approving proposed JI projects, host Party governments may consider the contribution of the projects to technology transfer. However, this is not currently considered by the JISC prior to the final determination for JI Track 2 projects. Under JI Track 1, Parties may implement their own procedures. Analyses of JI projects indicate that they do lead to technology transfer.⁴⁹

⁴⁸ FCCC/KP/AWG/2008/3, annex II, paragraph 28.

⁴⁹ Youngman R, Schmidt J, Lee J and de Coninck H. 2007. Evaluating technology transfer in the Clean Development Mechanism and Joint Implementation. *Climate Policy*, 7(6): 488–499.

Description

125. Technology transfer could be included in the criteria considered by the JISC prior to the final determination for JI Track 2 projects.⁵⁰ Methods for identifying and measuring technology transfer would be needed. It is assumed that projects which are not additional would not receive a positive final determination, even where they demonstrate significant technology transfer, meaning that this option would not lead to an increase in the number of JI projects.

126. If technology transfer were made a mandatory requirement for a positive final determination, this would limit JI projects to those that demonstrate both additionality and technology transfer. This may therefore be considered as a way to restrict JI to higher-quality projects.

Implications

127. This option would have implications similar to those of option 3.12 in the context of the CDM (see the section on option 3.12 for further analysis). The recognition of technology transfer would not increase ERU supply from JI Track 2 projects and would in fact reduce it if technology transfer were to be made a mandatory requirement for a positive final determination. However, because ERUs are converted from already existing AAUs and RMUs, the overall emissions budget of Annex I Parties would not change.

Option 3.26: Restrict joint implementation to bilateral projects*Current situation*

128. A JI Track 2 project may be implemented unilaterally by an entity in a host Annex I Party, as the JISC requires approval from the host Party only at the time of the final determination for the project. In accordance with procedures established by the JISC, however, approval by at least one Annex I Party (other than the host) is required by the time of the first verification report being published for the project. Thus, all JI Track 2 projects are bilateral in the sense that they require the approval of at least one host and one non-host Party before ERUs are issued. With regard to JI Track 1, a host Party may implement its own national guidelines and procedures.

Description

129. Specific options on how to further restrict JI to bilateral projects⁵¹ have not been provided by Parties. It may be possible to require approval by a non-host Party at an earlier stage in the life of a project. For example, securing approval of at least one non-host Party could be made a requirement under the JISC prior to the final determination for projects. This would probably result in an increase in the cost and time required for a project to reach the final determination stage.

Implications

130. This option would have implications similar to those of option 3.13 in the context of the CDM. Requiring approval by a non-host Party at an earlier stage in the life of a project may reduce the number of projects and delay the supply of ERUs. However, because ERUs are converted from already existing AAUs and RMUs, the overall emissions budget of Annex I Parties would not change.

⁵⁰ FCCC/KP/AWG/2008/3, annex II, paragraph 31.

⁵¹ FCCC/KP/AWG/2008/3, annex II, paragraph 29.

Option 3.27: Introduce multiplication factors to increase or decrease the emission reduction units issued for specific project types

Current situation

131. The host Party of a project may determine how many AAUs (or RMUs) it will convert into ERUs for the reductions in emissions (or enhancements in removals) achieved by a JI project. In the case of a JI Track 2 project, the maximum quantity of ERUs that can be issued is equal to the verified reductions in emissions (or enhancements in removals) multiplied by the GWPs of the gases.

Description

132. The maximum quantity of ERUs that may be issued for a JI Track 2 project could be calculated as the verified emission reductions multiplied by the GWPs of the gases and then multiplied by a factor based on the project type or technology.⁵² The favoured project types (or technologies) would first need to be identified and multiplication factors for each would then need to be agreed.

133. Projects of the specified project types (with multiplication factors greater than 1) would become more profitable than the others (with multiplication factors less than 1). The multiplication factors could be calculated such that the total quantity of ERUs matches the total emission reductions actually achieved, although this may be seen as less of a concern given that the conversion of existing AAUs and RMUs into ERUs does not affect the emission budget of Annex I Parties.

Implications

134. This option would have implications similar to those of option 3.14 in the context of the CDM (see the section on option 3.14 for further analysis). The project mix would be expected to shift to include more of the favoured project types. It would be possible for the total quantity of ERUs to exceed the total emission reductions actually achieved. However, because ERUs are converted from already existing AAUs and RMUs, the overall emissions budget of Annex I Parties would not change.

C. Emissions trading

Option 3.28: Introduce emissions trading based on sectoral targets

Current situation

135. Emissions trading under Article 17 of the Kyoto Protocol is limited to Annex I Parties, all of which have a national emission limitation commitment under the Protocol. Annex I Parties must meet specific eligibility conditions to participate in emissions trading. The Kyoto Protocol does not include an approach to target emissions from specific sectors but also does not exclude it.

Description

136. In the event that sectoral targets are agreed by groups of Parties, emissions trading under Article 17 could be extended to cover such emissions.⁵³ Although such sectoral targets could cover non-Annex I Parties, for Annex I Parties the targets would be complementary to their national emission limitation commitments. As such, the national emission limitation commitments of Annex I Parties would continue to apply, with the sectoral targets being considered part of those commitments (these would, in effect, be policy instruments for these Parties to reduce their emissions). Alternatively, national emission limitation commitments could be redefined to cover only emissions not included in

⁵² FCCC/KP/AWG/2008/3, annex II, paragraph 30 (a).

⁵³ FCCC/KP/AWG/2008/3, annex II, paragraph 32.

sectoral targets, with the latter in effect serving to increase the stringency of Annex I Party emission commitments.

137. Trading could be confined within the limits of individual sectoral agreements (separate markets, each possibly with its own tradable emission allowance) or could be open for trading across multiple sectoral agreements (an integrated market with a common emission allowance). Sectoral trading schemes could furthermore be linked to other established trading schemes.

Analysis

Rationale	<ul style="list-style-type: none"> To increase the share of global emissions regulated in a manner that addresses cost-effectiveness and competitiveness concerns
Key elements to be decided	<ul style="list-style-type: none"> Which Parties would participate Determination of targets for each sector Whether trading would take place within or also across sectoral agreements How sectoral agreements would be integrated with national emission commitments of Annex I Parties Choice of tradable emission allowance If sectoral agreements include non-Annex I Parties, whether units from such Parties may be used by Annex I Parties for compliance purposes Whether guidance is required on the extent to which reductions should occur in Annex I Parties Whether the agreement(s) is/are implemented by national governments or other organizations
Necessary follow-up actions	<ul style="list-style-type: none"> There may be a need to periodically review the sectoral targets and participating countries
Potential challenges	<ul style="list-style-type: none"> Definition of sectoral boundaries Data requirements and verification processes Avoidance of overlap between emissions under sectoral agreements and other trading schemes implemented at a national level Consideration of differing national circumstances and variation in the use of technology Avoidance of competitiveness and cross-sectoral leakage arising from sectoral definitions Consideration of national circumstances
Implications for the emission budgets of Annex I Parties	<ul style="list-style-type: none"> Sectoral targets could be implemented such that they do not change Annex I Party national emission commitments The effect on the Annex I Party emission budgets depends on the stringency of sectoral targets for Annex I Parties and non-Annex I Parties
Impact on the carbon market	<ul style="list-style-type: none"> Different units for each agreement would fragment the market and lead to a different price for each unit Potentially large increase in the size and liquidity of the market, especially if a common emission allowance is used across sectoral agreements, and the agreements offer significant opportunities for cost-effective mitigation Changes in the relation between supply and demand would depend on the stringency of sectoral targets for Annex I Parties and non-Annex I Parties, but a reduction in prices could be expected

Implications for domestic mitigation	<ul style="list-style-type: none"> If non-Annex I Parties are net sellers, domestic mitigation needed by Annex I Parties to meet their emission commitments would be reduced
Potential links to other options	<ul style="list-style-type: none"> Options 3.2b, 3.29 and 3.30
Ancillary benefits and costs	<ul style="list-style-type: none"> Dependent on technologies and activities deployed

Option 3.29: Introduce the linking of emissions trading between Annex I Parties and voluntary emissions trading schemes in non-Annex I Parties

Current situation

138. As mentioned under option 3.28, emissions trading under Article 17 of the Kyoto Protocol is limited to Annex I Parties, all of which have a national emissions limitation commitment. While no non-Annex I Party currently has an emissions trading scheme covering GHGs, the Protocol does not prevent them from implementing such schemes.

Description

139. If emissions trading schemes were to be implemented on a voluntary basis by non-Annex I Parties at a national, regional or sectoral level, these could be linked to emissions trading schemes in Annex I Parties.⁵⁴

140. Such linking could occur between entity-level⁵⁵ trading schemes in non-Annex I Parties and Annex I Parties, in which case it would be essentially the same as option 3.30 except that the linking would be extended to include entity-level trading schemes in non-Annex I Parties. It would involve issues similar to those discussed under that option for direct linking in relation to the acceptance of emission allowances and the design features on which a certain degree of compatibility would be needed. As with option 3.30, linking between Annex I and non-Annex I Party trading schemes could be agreed and implemented on a bilateral or multilateral basis or, alternatively, may be the subject of guidance established at an international level under the CMP to facilitate such linking.

141. If such entity-level trading schemes were linked, entities in Annex I Parties could purchase and use emission allowances from non-Annex I Parties to comply with domestic targets. However, in the absence of agreement otherwise, such emission allowances could not be used by Annex I Parties in fulfilment of their emission commitments under the Kyoto Protocol. The mitigation of Annex I Party emissions may be lessened, without a corresponding change in their assigned amounts, and could potentially lead to compliance difficulties for these Parties.

142. Alternatively, it could be agreed that Annex I Parties may use emissions allowances from eligible non-Annex I Parties for compliance with their emission commitments under the Kyoto Protocol. Because such non-Annex I Party trading schemes could then increase the emission budgets of Annex I Parties, they would need to demonstrate that any surplus emission allowances sold into Annex I Party trading schemes resulted from real reductions in emissions below the reference level set by the target (similar to the case of CERs generated under the CDM). It would be necessary to establish criteria to determine which non-Annex I Party trading schemes would be eligible, as well as procedures for their review against the criteria and possibly a periodic review to verify that they continue to meet them.

Analysis

Rationale	<ul style="list-style-type: none"> To facilitate the development of emissions trading schemes in non-Annex I Parties
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⁵⁴ FCCC/KP/AWG/2008/3, annex II, paragraph 34.

⁵⁵ Primarily private sector companies, but potentially also public entities.

	<ul style="list-style-type: none"> To enhance the cost-effectiveness of mitigation measures by integrating emissions trading schemes into a global market
Key elements to be decided	<ul style="list-style-type: none"> The extent to which entity-level linking should be encouraged between trading schemes in non-Annex I Parties and Annex I Parties What form of guidance, if any, should be provided under the Kyoto Protocol on the manner of linking, given that this is dependent on the national implementation of entity-level trading Whether non-Annex I emission allowances may be used for compliance with Annex I commitments What eligibility criteria would need to be met by non-Annex I Party trading schemes to allow their emission allowances to be used by Annex I Parties for compliance with emission commitments
Necessary follow-up actions	<ul style="list-style-type: none"> There may be a need to review the stringency of targets set in the non-Annex I Party trading schemes
Potential challenges	<ul style="list-style-type: none"> Achieving the necessary level of compatibility of entity-level trading schemes Determining criteria for eligible non-Annex I Party trading schemes if their emission allowances would be used for compliance with Annex I emission commitments
Implications for the emission budgets of Annex I Parties	<ul style="list-style-type: none"> The effect on the Annex I Party emission budgets depends on the stringency of targets set in non-Annex I Party trading schemes
Impact on the carbon market	<ul style="list-style-type: none"> Potentially large increase in the size and liquidity of the market and opportunities for cost-effective mitigation Changes in the relation between supply and demand would depend on the stringency of targets set in non-Annex I Party trading schemes, but a reduction in prices could be expected Greater convergence in global carbon prices
Implications for domestic mitigation	<ul style="list-style-type: none"> If non-Annex I Parties are net sellers, domestic mitigation needed by Annex I Parties to meet their emission commitments would be reduced
Potential links to other options	<ul style="list-style-type: none"> Options 3.28 and 3.30
Ancillary benefits and costs	<ul style="list-style-type: none"> Dependent on technologies and activities deployed

Option 3.30: Improve the basis for linking national or regional emissions trading schemes across Annex I Parties

Current situation

143. Most Annex I Parties have implemented national or regional emissions trading schemes at the entity level or are considering such implementation. These trading schemes generally have or plan links to the project-based mechanisms under the Kyoto Protocol but have not yet established direct links with other schemes. The decision to create such links resides with the Parties involved. Although discussions among several Parties have taken place regarding linking, it is apparent that there are many obstacles to be overcome. The Kyoto Protocol does not include processes to facilitate the linking of emissions trading schemes at the entity level.

Description

144. Measures could be taken to improve the basis for linking national and regional emissions trading schemes, operating at an entity level, across Annex I Parties.⁵⁶ Linking that is facilitated in this way would increase the cost-effectiveness of reducing emissions. Direct linking would require the acceptance in at least one trading scheme of another scheme's emission allowances. It would need to be determined whether linking should be two-way (both schemes allow the emissions allowances of the other to be traded by their entities and surrendered against their targets) or only one-way (one scheme allows this, but the other does not).

145. This direct linking of trading schemes is only likely to occur where there is sufficient confidence that the purchase of an emissions allowance by one scheme will be compensated by an equivalent reduction in emissions in the Party from which the allowance is sold. This is an issue because some design differences could lead to higher aggregate emissions when schemes are linked. In particular, a degree of compatibility would be required in relation to penalties for not complying with targets, 'safety valve' prices or other measures to limit costs, banking and borrowing provisions, and the types of offset credits that may be used for compliance. Such compatibility need not prescribe all aspects of implementation of a trading scheme.

146. Similarly, the targets set for entities in linked schemes need to be of comparable stringency, otherwise larger numbers of allowances will flow from entities in less stringent schemes to those in schemes with more stringent targets, reducing the level of domestic mitigation in the latter.

147. As an alternative to direct linking, entity-level schemes could be indirectly linked by all allowing the use and surrender of CERs and/or ERUs. To the extent that the targets of all trading schemes are set so that the schemes are net buyers, and the extent to which the CDM and JI serve as the marginal suppliers of the demand that is created, prices of emission allowances in all trading schemes would tend to converge on the prevailing CER and ERU prices. This would yield much of the cost-effectiveness benefit of directly linking the trading schemes, while requiring less compatibility in their design.

148. Linking of entity-level trading schemes could be agreed and implemented on a bilateral basis between two schemes or on a multilateral basis among a wider group of schemes. Alternatively, it may be possible for Parties to establish guidance at an international level under the CMP to facilitate such linking, for example through setting out design principles to promote compatibility.

Analysis

Rationale	<ul style="list-style-type: none"> To enhance the cost-effectiveness of mitigation measures by integrating emissions trading schemes into a global market
Key elements to be decided	<ul style="list-style-type: none"> The extent to which linking should be encouraged or mandated What form of guidance, if any, should be provided under the Kyoto Protocol on the manner of linking, given that this is dependent on the national implementation of entity-level trading Whether guidance under the Kyoto Protocol should encourage or mandate the linking of the CDM and JI to national emissions trading schemes
Necessary follow-up actions	<ul style="list-style-type: none"> There may be a need to review the stringency of caps set in national emissions trading schemes There may be a need for subsequent reporting and review

⁵⁶ FCCC/KP/AWG/2008/3, annex II, paragraph 35.

	of linking activities, possibly under Articles 7 and 8 of the Kyoto Protocol
Potential challenges	<ul style="list-style-type: none"> • Achieving the necessary level of compatibility of entity-level trading schemes
Implications for the emission budgets of Annex I Parties	<ul style="list-style-type: none"> • None identified
Impact on the carbon market	<ul style="list-style-type: none"> • Potentially large increase in the size and liquidity of the market and the opportunities for cost-effective mitigation • Greater convergence in global carbon prices
Implications for domestic mitigation	<ul style="list-style-type: none"> • Price convergence would lead to more mitigation being needed by some Annex I Parties to meet their emission commitments and less in others (with little change overall)
Potential links to other options	<ul style="list-style-type: none"> • Options 3.28, 3.29, 3.31, 3.32 and 3.38
Ancillary benefits and costs	<ul style="list-style-type: none"> • Dependent on technologies and activities deployed

Option 3.31: Eliminate restrictions on the trading and use of certain Kyoto unit types under national and regional emissions trading schemes

Current situation

149. Entity-level national or regional trading schemes in Annex I Parties place restrictions on the trading of Kyoto units and their use for domestic compliance purposes. In the absence of linking arrangements, many schemes prohibit the entry of AAUs and RMUs from other Parties into national and regional trading schemes, either for trading or for compliance use. In addition, many schemes also limit the types and/or quantity of CERs and ERUs that may be used for compliance. The concerns contributing to the establishment of these restrictions relate to the balance between domestic mitigation and the use of lower cost allowances from abroad (supplementarity), as well as perceptions relating to the integrity of different types of units.

150. All trading schemes also prohibit the use of temporary CERs (tCERs) and long-term CERs (lCERs), issued for afforestation and reforestation projects under the CDM, by entities for domestic compliance. This is primarily due to the replacement obligations that these units impose on Annex I Parties using them for compliance with their Kyoto commitments, and the complexity of translating these obligations and the national limit on the use of these units into limits on their use by entities.

Description

151. Annex I Parties may be encouraged to eliminate restrictions on the types and/or quantities of Kyoto units that entities can trade and use for compliance with their targets under national and regional emissions trading schemes.⁵⁷ Specific options have not been proposed by Parties.

Analysis

Rationale	<ul style="list-style-type: none"> • To enhance the cost-effectiveness of mitigation measures by integrating emissions trading schemes into a global market
Key elements to be decided	<ul style="list-style-type: none"> • Whether guidance under the Kyoto Protocol should encourage entity-level emissions trading schemes to allow the trading and use of certain Kyoto unit types • Whether guidance under the Kyoto Protocol should encourage or mandate the linking of the CDM and JI to national emissions trading schemes

⁵⁷ FCCC/KP/AWG/2008/3, annex II, paragraph 36 (a).

Necessary follow-up actions	<ul style="list-style-type: none"> • There may be a need for subsequent reporting and review of linking activities, possibly under Articles 7 and 8 of the Kyoto Protocol
Potential challenges	<ul style="list-style-type: none"> • Issues similar to those of option 3.30 regarding compatibility of entity-level trading schemes
Implications for the emission budgets of Annex I Parties	<ul style="list-style-type: none"> • None identified
Impact on the carbon market	<ul style="list-style-type: none"> • Potentially a small increase in the size and liquidity of the market and the opportunities for cost-effective mitigation • Some convergence in global carbon prices
Implications for domestic mitigation	<ul style="list-style-type: none"> • Price convergence would lead to more mitigation being needed by some Annex I Parties to meet their emission commitments and less in others • Inflows of Kyoto units to some Annex I Parties would rise, resulting in less domestic mitigation being needed in those Parties to meet their emission commitments
Potential links to other options	<ul style="list-style-type: none"> • Options 3.30, 3.32 and 3.38
Ancillary benefits and costs	<ul style="list-style-type: none"> • No or negligible impact

Option 3.32: Enhance equivalence among Kyoto unit types

Current situation

152. Prices for Kyoto units vary for a number of reasons, including differences in perceived environmental quality and delivery risk and differences in their treatment under the rules established for the accounting of assigned amounts under the Kyoto Protocol. The accounting rules differ among Kyoto unit types in the following respects:

- (a) tCERs and ICERs issued for afforestation and reforestation projects under the CDM expire, and require replacement, after a certain period of time,⁵⁸ and are limited in the extent to which they can be used for compliance with Annex I Party commitments.⁵⁹ Other than this, all Kyoto unit types may be used for compliance with Annex I Party commitments in the same manner;
- (b) Some Kyoto unit types are subject to different limits for carry-over (see option 3.36 below).

Description

153. Under this option, it may be possible to enhance the equivalence among Kyoto unit types by amending the assigned amount accounting rules for certain units.⁶⁰ Specific options have not been proposed by Parties. This option would, however, not address other reasons for price differences among the unit types, such as differences in perceived environmental quality and delivery risk.

Implications

154. Enhancing equivalence among Kyoto units through changes to the assigned amount accounting rules under the Kyoto Protocol may have an impact on the ability of Annex I Parties to meet their

⁵⁸ See decision 5/CMP.1.

⁵⁹ The total quantity of tCERs and ICERs that an Annex I Party may use for its compliance purposes during the first commitment period is limited to 1 per cent of its base year emissions times 5 (decision 16/CMP.1, annex, para. 14). However, the expected level of tCERs and ICERs to be generated during the first commitment period suggests that this limit will not in practice restrict their use for compliance.

⁶⁰ FCCC/KP/AWG/2008/3, annex II, paragraph 36 (b).

emission commitments, for example through increasing the number of afforestation and reforestation activities under the CDM, although it is likely that this impact would be small.

Option 3.33: Change the commitment period reserve

Current situation

155. Each Annex I Party is required to maintain a minimum level of Kyoto units in its national registry to limit the scope for selling units to such an extent that it subsequently has difficulty achieving compliance with its emissions commitment (over-selling). This minimum level, known as the commitment period reserve (CPR), is defined as the lower of:

- (a) Ninety per cent of the Party's assigned amount; this value was foreseen as an appropriate limit for a Party that needs to make net purchases over the commitment period (net buyer), given that there may need to be some flexibility to temporarily go below (up to 10 per cent) its expected compliance position (so as to not unnecessarily restrict entity-level trading activities);
- (b) Five times 100 per cent of its most recently reviewed inventory; this value was foreseen as an appropriate limit for a Party whose emissions are below its assigned amount and that is able to make net sales over the commitment period (net seller) without endangering its compliance position.

156. So far there is no experience with the CPR to see if it restricts trade. As it is likely that no Parties will be trading close to their CPR, it is expected that little experience will be gained during the remainder of the first commitment period.

Option 3.33a: Reduce the commitment period reserve

Description

157. The CPR could be reduced in a subsequent commitment period for those Annex I Parties that meet their emission commitments in the current commitment period.⁶¹ This option assumes compliance with commitments to be an indication that the Party is unlikely to engage in over-selling in a second commitment period. This option could apply to net buyers only or also to net sellers. The amount by which the CPR could be reduced has not been proposed by Parties.

158. It would also be possible to eliminate the CPR entirely.⁶² This would remove any protection provided by the CPR against the possibility of an Annex I Party over-selling its assigned amount and consequently experiencing compliance difficulties.

Analysis

Rationale	<ul style="list-style-type: none"> • To reduce any potential restrictions on international trading imposed by the CPR
Key elements to be decided	<ul style="list-style-type: none"> • The CPR that would apply (for net buyers and net sellers)
Necessary follow-up actions	<ul style="list-style-type: none"> • None identified
Potential challenges	<ul style="list-style-type: none"> • Possible greater risk of over-selling and consequent non-compliance
Implications for the emission budgets of Annex I Parties	<ul style="list-style-type: none"> • None identified
Impact on the carbon market	<ul style="list-style-type: none"> • Any restrictions on supply created by the CPR would be

⁶¹ FCCC/KP/AWG/2008/3, annex II, paragraph 37 (b).

⁶² FCCC/KP/AWG/2008/3, annex II, paragraph 37 (a).

	<p>reduced for individual Parties, though this would not necessarily add supply to the market</p> <ul style="list-style-type: none"> • No significant price changes would be expected, though the ability to provide extra supply when needed may stabilize carbon prices
Implications for domestic mitigation	<ul style="list-style-type: none"> • No impact would be expected over the commitment period, as any increase in supply from individual Annex I Parties would be temporary (assuming the Party subsequently purchases assigned amount in order to meet its emission commitment)
Potential links to other options	<ul style="list-style-type: none"> • Option 3.33b
Ancillary benefits and costs	<ul style="list-style-type: none"> • No or negligible impact

Option 3.33b: Increase the commitment period reserve

Description

159. The CPR could be increased for Annex I Parties.⁶³ This option would apply only to the 90 per cent in the case of net buyers, as raising the CPR for net sellers above 100 per cent would require them to maintain holdings of assigned amount that they are unlikely to require for compliance, thus also increasing the cost of compliance for net buyers by keeping surplus units from the market. The amount by which the CPR could be increased has not been proposed by Parties.

Analysis

Rationale	<ul style="list-style-type: none"> • To reduce the potential for over-selling assigned amount, with consequent risks of non-compliance
Key issues for decision	<ul style="list-style-type: none"> • The CPR that would apply (for net buyers)
Necessary follow-up actions	<ul style="list-style-type: none"> • None identified
Potential challenges	<ul style="list-style-type: none"> • Possible restrictions on international trading
Implications for the emission budgets of Annex I Parties	<ul style="list-style-type: none"> • None identified
Impact on the carbon market	<ul style="list-style-type: none"> • Market supply may be restricted, depending on the CPR set • Any supply restrictions, and hence any upward pressure on carbon prices, would be temporary because demand in the longer term would be based on compliance (which is less stringent than the CPR)
Implications for domestic mitigation	<ul style="list-style-type: none"> • Negligible impact over the commitment period, as any price increases would be temporary
Potential links to other options	<ul style="list-style-type: none"> • Option 3.33a
Ancillary benefits and costs	<ul style="list-style-type: none"> • No or negligible impact

Option 3.34: Encourage disclosure of information on transactions of Kyoto units

Current situation

160. Annex I Parties are required to report annually their holdings and transactions of Kyoto units through their reporting under Article 7 of the Kyoto Protocol and on the public websites of their national registry administrators. In addition, the secretariat, in its role of administrator of the international transaction log (ITL), is required to make equivalent information from the ITL publicly available on an

⁶³ FCCC/KP/AWG/2008/3, annex II, paragraph 37 (c).

annual basis. This information is to be made available at an aggregated level, for example, by unit and transaction type over a calendar year. There are no requirements for Parties or the secretariat to collect or publish price information on Kyoto units.

161. This level of information disclosure has been designed to make transparent the accounting of the assigned amounts of Annex I Parties under the Kyoto Protocol, thereby giving an indication of their compliance status. It has not been designed to meet market needs for open and up-to-date information relating to trading volumes and prices. Market analysts and news services do, however, provide such information.

Description

162. More comprehensive and timely information on transactions could be made available as a means to improve the transparency of the emissions trading market.⁶⁴ Data on the quantities of Kyoto units transacted are held in national registries and the ITL, and could be reported either more frequently or at a more disaggregated level.

163. It would be more difficult to disclose price information, except in the case of government transactions, as information on specific market transactions is typically not held by governments. The collection and reporting of price data for international transactions could be introduced. Attention would need to be given to confidentiality concerns when seeking to increase the disclosure of information relating to the market.

Implications

164. Additional information may improve the efficiency of the market, but would not have a material impact on the ability of Annex I Parties to meet their emission commitments.

Option 3.35: Move the secretariat's function of maintaining and operating the international transaction log to another organization

Current situation

165. In accordance with decision 13/CMP.1, the secretariat maintains and operates the ITL for the purpose of verifying the validity of transactions with Kyoto units. The ITL verifies emissions trading and other transactions under the Kyoto Protocol to ensure that they conform to the rules for the accounting of assigned amounts adopted by the CMP. The ITL therefore plays a key role in ensuring the correctness of the information to be used in the assessment of Annex I Party compliance with commitments under Article 3, paragraph 1, of the Kyoto Protocol.

166. The function of verifying transactions is performed by the ITL, in accordance with decisions of the CMP, on a real-time basis through connections to the national registries of Annex I Parties and the CDM registry that ensure that all electronic processing for such transactions passes through the ITL. This results in, inter alia, the ITL having a central role in settling the delivery of Kyoto units after a trade has been agreed by market participants.

Description

167. The technical and administrative support for all functions of the ITL could be transferred to another existing organization or to a new organization.⁶⁵ Specific organizations have not been proposed by Parties. A suitable organization would need to be identified or established, taking into account any

⁶⁴ FCCC/KP/AWG/2008/3, annex II, paragraph 38.

⁶⁵ FCCC/KP/AWG/2008/3, annex II, paragraph 39.

potential conflict of interest that may arise. Arrangements would need to be made for ensuring the appropriate verification of Kyoto transactions and for supplying information on such verification to the review process under the Kyoto Protocol.

168. Given the importance of the ITL in independently ensuring the correctness of information to be used in the assessment of Annex I Party compliance with emission commitments, it may be possible to maintain the mandate for verifying compliance-related Kyoto transactions within the secretariat while moving the technical and administrative support for the settlement of market transactions to another organization or to the private sector.⁶⁶ This may involve the establishment of systems in the secretariat that monitor specific Kyoto transactions without performing the current market settlement function of the ITL.

169. The secretariat could continue to support the Kyoto Protocol bodies on issues relating to the ITL and the verification of compliance-related Kyoto transactions.

Implications

170. Changing the organization responsible for operation of the ITL would not have a material impact on the ability of Annex I Parties to meet their emission commitments.

D. Cross-cutting issues

Option 3.36: Relax or eliminate carry-over restrictions on Kyoto units

Current situation

171. Although there are currently no limits on the carry-over to the subsequent commitment period of AAU, that have not been retired against an emission commitment or cancelled, the following restrictions apply to other Kyoto unit types:

- (a) CERs that have not been retired or cancelled may be carried over only up to a maximum of 2.5 per cent of the Party's assigned amount;
- (b) ERUs that have not been converted from RMUs and have not been retired or cancelled may be carried over only up to a maximum of 2.5 per cent of the Party's assigned amount;
- (c) Any Kyoto unit issued on the basis of a LULUCF activity, including RMUs, ERUs converted from RMUs, tCERs and ICERs, may not be carried over.

172. In practice, these restrictions may not substantially impact on Parties as they may choose to retire all holdings of restricted units against their emission commitments, in preference over AAUs, which may be carried over with no restriction.

Description

173. It would be possible to relax or eliminate the restrictions referred to in paragraph 171 above in relation to the carry-over of Kyoto units from a second commitment period to a third commitment period.⁶⁷ Specific options have not been proposed by Parties.

⁶⁶ Technical settlement services are typically provided by the private sector for other markets, within the framework of government regulation.

⁶⁷ FCCC/KP/AWG/2008/3, annex II, paragraph 40 (a).

174. The carry-over restrictions applying to Kyoto units issued on the basis of LULUCF activities arose from concerns about the permanence of removals by sinks and from efforts to limit the scale of the impact of LULUCF on the emission commitments of Annex I Parties. In addition, the carry-over restrictions on tCERs and lCERs are related to the replacement obligations established for these unit types. Consideration of changes to the carry-over restrictions for these units would need to take account of these issues.

Implications

175. Relaxing or eliminating the carry-over restrictions between a second and a third commitment period would not have a material impact on the ability of Annex I Parties to meet their commitments during the second commitment period. It may increase the assigned amount available to Parties during a third commitment period, although the effect of this would depend on emissions commitments set for that period.

Option 3.37: Introduce borrowing of assigned amount from future commitment periods

Current situation

176. The borrowing of assigned amount from future commitment periods, so that it may be used for compliance purposes in an earlier commitment period, is not permitted under the Kyoto Protocol.

Description

177. An Annex I Party could be permitted to borrow assigned amount from a third commitment period and count it towards compliance with its commitment in a second commitment period.⁶⁸ This borrowing of future emission allowances would need to be 'repaid' in the next commitment period by reducing emissions below that period's emissions commitment by the amount of the borrowing. This option could improve the cost-effectiveness of mitigation efforts over time.

178. The terms and conditions for such borrowing would need to be established in relation to, for example the amount that could be borrowed, the specific circumstances in which borrowing would be permitted, whether borrowing would be permitted for two consecutive commitment periods, whether there would be a cost of borrowing (such as the subsequent reduction in assigned amount being greater than the borrowed amount) and whether there would be more serious consequences for non-compliance in the future commitment period.

179. In the light of emission commitments being established one period at a time, there may be a risk to the long-term environmental effectiveness of the agreement. If commitments were agreed and binding for many commitment periods, this would avoid the possibility of negotiating less stringent future commitments to compensate for having to repay the borrowed assigned amount.

Analysis

Rationale	<ul style="list-style-type: none"> To enhance the cost-effectiveness of mitigation efforts by Annex I Parties
Key elements to be decided	<ul style="list-style-type: none"> Terms and conditions for borrowing
Necessary follow-up actions	<ul style="list-style-type: none"> None identified
Potential challenges	<ul style="list-style-type: none"> Enforcement of the repayment of borrowed amounts
Implications for the emission budgets of Annex I Parties	<ul style="list-style-type: none"> Borrowing would in effect increase the emissions budget in the earlier commitment period and reduce the budget in

⁶⁸ FCCC/KP/AWG/2008/3, annex II, paragraph 40 (d).

	<p>the subsequent period</p> <ul style="list-style-type: none"> • If borrowed amounts were not repaid or led to less stringent future commitments, the cumulative emission budget would be increased
Impact on the carbon market	<ul style="list-style-type: none"> • Market supply in the earlier commitment period would increase relative to demand, resulting in downward pressure on carbon prices; borrowing would in effect set a price ceiling • Market supply in the subsequent commitment period would decrease relative to demand, resulting in upward pressure on carbon prices
Implications for domestic mitigation	<ul style="list-style-type: none"> • Less domestic mitigation by Annex I Parties during the earlier period • More domestic mitigation by Annex I Parties during the subsequent period
Potential links to other options	<ul style="list-style-type: none"> • Option 3.36
Ancillary benefits and costs	<ul style="list-style-type: none"> • Potentially fewer ancillary benefits during the earlier period • Potentially more ancillary benefits during the subsequent period

Option 3.38: Reduce the number of unit types established under the Kyoto Protocol

Current situation

180. Six unit types were established under the Kyoto Protocol: AAs are issued on the basis of assigned amounts defined under Article 3, paragraphs 7 and 8, RMs are issued on the basis of LULUCF activities under Article 3, paragraphs 3 and 4, ERs are converted from AAs or RMs on the basis of JI projects under Article 6, CERs are issued on the basis of emission reductions generated through the CDM under Article 12, and tCERs and ICERs are issued on the basis of removals through afforestation and reforestation projects under the CDM.

181. All Kyoto unit types may be used for compliance with Annex I Party emission commitments, although some are subject to specific provisions (see options 3.32 and 3.36 above). Such provisions may differentiate prices for Kyoto units, as may perceived differences in quality and risk.

Description

182. It may be possible to reduce the number of Kyoto unit types in order to simplify trading or reduce price differentials in the market.⁶⁹ Eliminating some unit types may encourage less differentiation in policy rules. Specific options have not been proposed by Parties but it may be possible to explore, for example, replacing RMs and ERs with AAs.

Implications

183. Reducing the number of unit types would not have a material impact on the ability of Annex I Parties to meet their emission commitments.

⁶⁹ FCCC/KP/AWG/2008/3, annex II, paragraph 41.

Option 3.39: Introduce a mid-commitment period assessment and review process*Current situation*

184. Annex I Parties are required to establish compliance with their emission commitments after the end of the commitment period. For example, owing to the time required to assemble, report and review information submitted annually by Annex I Parties, it is expected that the assessment of their compliance during the first commitment period will be made only in 2015. The current commitment period is five years. It is possible that a future commitment period may be longer.

Description

185. A mid-commitment period assessment and review process could be established.⁷⁰ This may enhance the transparency of Parties' progress toward meeting their emission commitments. It would require guidelines and criteria to be established by the CMP. Alternatively, it may be possible to require the retirement of assigned amount, to match the quantity of a Party's emissions, more frequently during the commitment period instead of only once at the end of the period.

Implications

186. Introducing a mid-commitment period assessment and review process would not have a material impact on the ability of Annex I Parties to meet their emission commitments.

IV. Addressing the definitions, modalities, rules and guidelines for the treatment of land use, land-use change and forestry in the second commitment period*Current situation and general description*

187. LULUCF covers emissions and removals of GHGs resulting from the use and management of land. The Kyoto Protocol follows an activity-based approach to LULUCF. Emissions and removals from a set of eligible LULUCF activities are accounted for in accordance with Article 3, paragraphs 3 and 4, of the Kyoto Protocol (hereinafter referred to as Article 3.3 and Article 3.4) and decision 16/CMP.1. While accounting of emissions and removals from afforestation, reforestation and deforestation (ARD) under Article 3.3 is mandatory, Parties can decide, for the first commitment period, whether or not to account for emissions and removals from forest management (FM), cropland management (CM), grazing land management (GM) and revegetation (RV) under Article 3.4.

188. For the first commitment period, the definitions, rules, modalities and guidelines for LULUCF are specified by decision 16/CMP.1. This decision establishes different rules for different activities. For example, ARD and FM are accounted on a gross-net basis (e.g. only net emissions or removals during the commitment period are considered and not those in the base year). The other activities, CM, GM and RV, are accounted on a net-net basis (e.g. net changes in GHG emissions by sources and removals by sinks in the commitment period are compared with those in the base year, times five). According to Article 3, paragraph 7, of the Kyoto Protocol and paragraph 5(b) of the annex to decision 13/CMP.1, a Party shall add emissions from land-use change (e.g. deforestation) to its assigned amount if its LULUCF sector was a net source of emissions in the base year. Other specific rules included in the annex to decision 16/CMP.1 are that:

⁷⁰ FCCC/KP/AWG/2008/3, annex II, paragraph 43.

- (a) Debits resulting from harvesting during the first commitment period following afforestation and reforestation since 1990 shall not be greater than credits accounted for on that unit of land;
- (b) If an Annex I Party incurs a net source of emissions under the provisions of Article 3.3, it may account for anthropogenic GHG emissions by sources and removals by sinks in areas under forest management under Article 3.4 up to a pre-established level and under specified conditions;
- (c) The FM net emissions or removals are limited to individual cap values for Parties given in the appendix to the annex to decision 16/CMP.1.

189. Additional background information on LULUCF is presented in annex I.

A. Activity-based approach

190. The options in this “activity-based approach” category entail the continuation of defining, reporting and accounting a limited number of eligible LULUCF activities. Activities identified in Article 3.3 and in the annex to decision 16/CMP.1 would be the starting point to continue to apply an activity-based approach, although Parties have suggested that new eligible activities be included.

Option 4.1: No changes to current rules

Description

191. Definitions, modalities, rules and guidelines that govern the treatment of LULUCF in the first commitment period, as specified in decision 16/CMP.1, would apply to the second commitment period of the Kyoto Protocol.

Analysis

Rationale	<ul style="list-style-type: none"> • Continuity in reporting and accounting is ensured • Keeping rules unchanged would avoid the need for negotiations • Mandatory accounting for ARD provides incentives to reduce emissions and increase removals from land-use changes in forested areas • The scale for FM is limited with a fixed cap • The scales for CM, GM and RV are reduced with net-net accounting
Necessary follow-up actions	<ul style="list-style-type: none"> • How to treat debits from harvesting following afforestation or reforestation since 1990 • How to treat compensation of net emissions from ARD with net removals from FM • Values applicable to the accounting of emissions and removals from FM in the second commitment period, as contained in the appendix to the annex to decision 16/CMP.1
Potential challenges	<ul style="list-style-type: none"> • ARD and elected activities may overlap with FM (prioritization addressed in the <i>Good Practice Guidance for Land Use, Land-Use Change and Forestry</i>) • Complex reporting and accounting, in particular with tracking lands and areas of land subject to LULUCF activities
Implications for the emission budgets of Annex I Parties	<ul style="list-style-type: none"> • Net removals or reduced emissions, as percentage of total national emissions without LULUCF in 1990 in Annex I Parties: More than 3 % (500 Tg CO₂ per year)^a assuming Parties will not

	change the choice of activities under Article 3.4 More than 4 % (700 Tg CO ₂ per year) assuming mandatory accounting of all activities under Article 3.4
Impact on the carbon market	<ul style="list-style-type: none"> Potentially a small increase in the supply of tradable units resulting from LULUCF activities. This increase depends on the election of activities under Article 3.4. by different Parties, and on the occurrence of disturbances in managed forests
Implications for domestic mitigation	<ul style="list-style-type: none"> Little or no change, as rules applied during the first commitment period would also apply during the second commitment period There may be incentives to increase and maintain forest area, but little or no incentive to promote sustainable forest management, and to increase removals and decrease emissions in existing forests and agricultural soils
Potential links to other options	<ul style="list-style-type: none"> None identified
Ancillary benefits and costs	<ul style="list-style-type: none"> Limited promotion of sustainable forestry and agriculture, and maintenance and increase of forest cover

^a The values are based on current trends in the LULUCF sector. The implications are estimated to be around 2 per cent for the first commitment period. The increase is estimated to come mainly from additional net removals from AR. The values have been rounded off to one digit after the decimal point owing to the uncertainties involved.

Option 4.2: Change only the treatment of forest management

192. The treatment of forest management has triggered concern among some Parties regarding the scale of reductions achieved through this activity, including from non-anthropogenic effects, and their contribution to meeting emission reduction targets. Under options 4.2a and 4.2b, only the treatment of forest management, as specified in decision 16/CMP.1, would be changed.

Option 4.2a: Apply discount factors to forest management

Description

193. The definitions, modalities, rules and guidelines of the first commitment period, as specified in decision 16/CMP.1, would also apply in the second commitment period of the Kyoto Protocol, but the fixed cap on forest management would be replaced by a discount factor.

Analysis

Rationale	<ul style="list-style-type: none"> To provide incentives to FM activities Consistency with current definitions, rules, modalities and guidelines
Necessary follow-up actions	<ul style="list-style-type: none"> As in option 4.1 Agreement on the discount factor
Potential challenges	<ul style="list-style-type: none"> As in option 4.1
Implications for the emission budgets of Annex I Parties	<ul style="list-style-type: none"> Depends on the agreed discount factor. For example, applying a discount factor of 85 % to the emissions and removals currently reported by Annex I Parties in the national inventories for forest land remaining forest land would yield almost the same results as using the current cap (approximately 1.4 % (267 Tg CO₂ per year) of the total emissions without LULUCF in 1990). For individual Parties the differences are greater
Impact on the carbon market	<ul style="list-style-type: none"> Depends on the size of the discount factor: the smaller the discount factor, the larger the potential number of additional tradable units that would be generated from FM
Implications for domestic	<ul style="list-style-type: none"> As in option 4.1

mitigation	<ul style="list-style-type: none"> • Incentives to manage forests and hence to increase removals from forests will increase depending on the discount factor
Potential links to other options	<ul style="list-style-type: none"> • Other activity-based options and options on elements in accounting applicable to both activity-based and land-based accounting
Ancillary benefits and costs	<ul style="list-style-type: none"> • Promotion of sustainable forestry

Option 4.2b: Apply net-net accounting to forest management

Description

194. The definitions, modalities, rules and guidelines of the first commitment period, as specified in decision 16/CMP.1, would also apply in the second commitment period of the Kyoto Protocol, but emissions and removals from FM would be accounted both in the base year and during the commitment period (net-net accounting).

Analysis

Rationale	<ul style="list-style-type: none"> • Increased incentive to reduce emissions and/or increase removals from FM as all changes would be included in accounting • Largely consistent with current definitions, rules, modalities and guidelines • Consistency with the treatment of other activities under Article 3.4
Necessary follow-up actions	<ul style="list-style-type: none"> • Agreement on how to factor out direct human-induced and other effects (natural disturbances, indirect human-induced effects) • How to treat the compensation of net emissions from ARD with net removals from FM
Potential challenges	<ul style="list-style-type: none"> • Increased risks for Parties where natural disturbances can cause large fluctuations in emissions or removals from FM • It will be difficult to separate direct human-induced and other effects (natural disturbances, indirect human-induced effects) at the national level
Implications for the emission budgets of Annex I Parties	<ul style="list-style-type: none"> • Changes in net removals from FM as percentage of total emissions excluding LULUCF in 1990 in Annex I Parties:^a <ul style="list-style-type: none"> - More than 1.6 % assuming Parties will not change the choice of activities under Article 3.4 - More than 1.5 % if all Parties elect FM
Impact on the carbon market	<ul style="list-style-type: none"> • Potentially a small increase in the supply of tradable units resulting from FM, and no changes for ARD, CM, GM and RV
Implications for domestic mitigation	<ul style="list-style-type: none"> • Increased incentives to implement FM may increase domestic mitigation action in LULUCF but there may be trade-offs with domestic action in other sectors
Potential links to other options	<ul style="list-style-type: none"> • Other activity-based options and options on elements in accounting applicable to both activity-based and land-based accounting
Ancillary benefits and costs	<ul style="list-style-type: none"> • Promotion of sustainable forestry

^a These estimates are based on comparing average net removals during 2001–2005 with net removals in 1990 for the category forest land remaining forest in Annex I Parties (source: UNFCCC GHG Data Interface).

Option 4.3: Harmonize the treatment of activities under Articles 3.3 and 3.4

195. This option seeks to solve inconsistencies with the treatment of different LULUCF activities. Such inconsistencies result from the application of different rule to different eligible activities or by the fact that, under Article 3.4 eligible activities only include those that in principle lead to net removals.

Option 4.3a: Apply current definitions, modalities, rules and guidelines in the second commitment period, but apply net-net accounting to all activities

Description

196. Emissions and removals from all eligible LULUCF activities would be accounted for in the base year and during the commitment period (net-net accounting). Accounting of all activities would be mandatory. There would not be a need for separate reporting of the emissions and removals from ARD and FM. Although not all lands would be reported and not all their emissions would be accounted for, this option would be close to full land accounting.

Analysis

Rationale	<ul style="list-style-type: none"> • Consistent treatment of activities under Articles 3.3 and 3.4, which could simplify reporting and accounting • Incentive to reduce emissions and/or increase removals from management of forest land, cropland, grazing land and lands subjected to revegetation as all changes would be included in accounting
Necessary follow-up actions	<ul style="list-style-type: none"> • Application of net-net accounting in the context of reporting and accounting
Potential challenges	<ul style="list-style-type: none"> • Increased risks for Parties where natural disturbances can cause large fluctuations in emissions or removals from FM • Increased uncertainties in the accounting • Calculating the base year for the different activities • It will be difficult to separate direct human-induced and other effects (natural disturbances, indirect human-induced effects) at the national level
Implications for the emission budgets of Annex I Parties	<ul style="list-style-type: none"> • Estimated to be small in comparison with option 4.1. Net removals in Annex I Parties (average net removals in 2001–2005 relative to those in 1990) would slightly increase by about 2 per cent of total emissions excluding LULUCF
Impact on the carbon market	<ul style="list-style-type: none"> • Possibly negligible to small increases in the supply of tradable units generated from most LULUCF activities
Implications for domestic mitigation	<ul style="list-style-type: none"> • Estimated to be small or negligible. Incentives for ARD could decrease and incentives for FM increase. Incentives for CM, GM and RV would increase but the impact is not expected to be large • Increased incentives to implement FM may increase domestic mitigation action in LULUCF but there may be trade-offs with domestic action in other sectors
Potential links to other options	<ul style="list-style-type: none"> • Other activity-based options and options applicable to both activity-based and land-based accounting
Ancillary benefits and costs	<ul style="list-style-type: none"> • Promotion of sustainable forestry and agriculture, and maintenance and increase of forest cover

Option 4.3b: Allow “land-use flexibility” under Article 3.3

Description

197. Under this option, emissions in areas that have been deforested could be offset with removals in areas of the same size that are subject to AR (also referred to as land swapping) even if the removals were less than the emissions. The option would be applied only to planted forests.

Analysis

Rationale	<ul style="list-style-type: none"> Currently, the social need for land hinders the application of current rules to activities under Article 3.3. Emissions from deforestation cannot always be compensated with removals from AR as it takes time for recently forested land to become an efficient net sink. Allowing land-use flexibility would ensure compensation and provide additional incentives for ARD
Necessary follow-up actions	<ul style="list-style-type: none"> Agreement on how the rule is applied in reporting and accounting
Potential challenges	<ul style="list-style-type: none"> Increased difficulties in identifying and tracking the land where the emission/sinks occurred
Implications for the emission budgets of Annex I Parties	<ul style="list-style-type: none"> Small. Additional removals from increase in AR, as percentage of total emissions without LULUCF in 1990 in Annex I Parties, would be much less than 0.5 %^a
Impact on the carbon market	<ul style="list-style-type: none"> Negligible to small reductions in the demand for tradable units resulting from the possibility to offset emissions from deforestation with AR
Implications for domestic mitigation	<ul style="list-style-type: none"> More flexibility for land management at national level Incentives for increased AR for Parties in which net emissions from deforestation are expected to be larger than net removals from AR
Potential links to other options	<ul style="list-style-type: none"> All accounting options on ARD
Ancillary benefits and costs	<ul style="list-style-type: none"> Will depend on the policies adopted for land management

^a Emissions from deforestation in 2001–2005 (based on reporting under the Convention for the category forest land converted to other land-use categories) represented approximately 0.5 per cent of total Annex I Party emissions excluding LULUCF in 1990. Net emissions from deforestation are compensated with net removals from AR (based on reporting under the Convention for the category land converted to forest land).

Option 4.3c: Add new eligible activities under Article 3.4*Description*

198. This option entails the identification of new eligible activities under Article 3.4. For example, such activities could include forest degradation, devegetation and wetland management.

Analysis

Rationale	<ul style="list-style-type: none"> To ensure symmetry in the accounting. When the land area reported under FM is smaller than the total area of managed forest, degradation of forest could be omitted from the accounting. Including “degradation of forest” as an additional activity under Article 3.4 would remove the imbalance if election of the activity would be part of the election of FM. Similar reasoning is given for inclusion of devegetation to balance the election of revegetation Wetland management would be included in the accounting to increase incentives for net removals from wetland restoration. Wetland management would cover other activities in wetlands to ensure balance in accounting
Necessary follow-up actions	<ul style="list-style-type: none"> Definitions and accounting rules for the new activities would need to be agreed
Potential challenges	<ul style="list-style-type: none"> The complexity of reporting and accounting would be increased by adding new activities

	<ul style="list-style-type: none"> • Uncertainties in reporting and accounting would be increased, because some of the proposed new activities have more uncertainty • More robust methods for some activities, in particular those taking place in wetlands, would be needed
Implications for the emission budgets of Annex I Parties	<ul style="list-style-type: none"> • Small to medium. In most Annex I Parties, the areas subject to FM are mostly the same as areas classified under “managed forests”. Some Parties may need to account for emissions resulting from forest degradation. Large-scale degradation does not occur in most Parties • No estimates for devegetation in Annex I Parties are available. Only three Parties elected RV for the first commitment period. Adding devegetation to balance revegetation would probably have only a small effect on the emissions budget • According to the AR4, the mitigation potential for restoration of drained organic soils is significant. Uncertainties in potential emission reduction from wetland restoration are large when all gases are considered • Drained organic soils and soils which are under threat of degradation may be included under cropland management, grazing land and forest management in the accounting, depending on the elections by Parties. Wetland restoration could therefore also be covered under these categories
Impact on the carbon market	<ul style="list-style-type: none"> • In principle, adding activities that are a net sink would increase the supply of and reduce the demand for tradable units under the Kyoto Protocol. The opposite would also be true for activities that are a net source • Accounting for wetland restoration could lead to a small increase in the supply of tradable units under the Kyoto Protocol. Accounting for the other new activities could potentially lead to a small decrease in the supply of units. The impact would depend on how the option is implemented, for example, if new activities were mandatory or subject to caps or discount factors
Implications for domestic mitigation	<ul style="list-style-type: none"> • Adding new activities could increase domestic action, depending on rules of implementation and national circumstances (see annex I)
Potential links to other options	<ul style="list-style-type: none"> • Land-based accounting: the activities would be covered in accounting based on the reporting under the Convention
Ancillary benefits and costs	<ul style="list-style-type: none"> • Promotion of sustainable forestry • Increased biodiversity from wetland restoration

B. Land-based accounting

199. The options in this “land-based accounting” category imply a change in the underlying approach to LULUCF. Instead of defining activities, Parties would report and account for emissions and removals from land areas, regardless of whether an eligible activity takes place in them. This option allows the possibility that LULUCF is included in Annex A to the Kyoto Protocol and is treated as the other sectors.

Option 4.4: Apply accounting based on reporting under the Convention: all land-use categories mandatory and net-net accounting

Description

200. All land-use categories and all emissions and removals from managed lands would be included in the accounting of LULUCF, based on the current reporting of GHG inventories under the Convention

Analysis

Rationale	<ul style="list-style-type: none"> • A holistic, symmetrical approach with reduced risk of unbalanced accounting • Consistency with reporting under the Convention would simplify reporting and accounting and reduce the burden on Annex I Parties • To allow application of net-net accounting
Necessary follow-up actions	<ul style="list-style-type: none"> • Agreement on whether the LULUCF sector would be included in national totals, or whether the emissions or removals from the sector would be taken into account only partially, or separately
Potential challenges	<ul style="list-style-type: none"> • Increased risks for Parties where natural disturbances can cause large fluctuations in emissions or removals from FM • Uncertainties in accounting of emissions and removals would increase, in particular in relation to methodologies for and data on wetlands, settlements and changes in soil carbon stocks • Impact of including wetlands and settlements is not known for most Annex I Parties as fewer than 50 % report on these categories • Depending on the formulation, this option may result in large sinks or sources for Annex I Parties • A complete new set of rules and modalities needs to be developed
Implications for the emission budgets of Annex I Parties	<ul style="list-style-type: none"> • As percentage of national total emissions without LULUCF in 1990 in Annex I Parties: Based on current reporting: more than 2 % increase in net removals since 1990 Full potential from AR4 by 2030: approximately 30 %^a
Impact on the carbon market	<ul style="list-style-type: none"> • Unknown and depending on how the option is implemented. If realised, the potential for mitigation could lead to an increase in the supply of tradable units. Impact for individual Parties may be large depending on national circumstances
Implications for domestic mitigation	<ul style="list-style-type: none"> • Depends on national circumstances and rules of implementation. In principle, this option could increase domestic action in LULUCF but there may be trade offs with domestic action in other sectors. Carbon management would become a larger factor in land-use policies, with benefits and trade-offs with other social needs for the use of land
Potential links to other options	<ul style="list-style-type: none"> • Options 4.3a, 4.3b, 4.3c and 4.6
Ancillary benefits and costs	<ul style="list-style-type: none"> • Could promote sustainable forest management and agricultural practices

^a The IPCC (2007) has estimated the economic mitigation potential for different LULUCF activities. Economic mitigation potential is usually smaller than the market potential.

C. Options applicable to either an activity-based or a land-based approach to land use, land-use change and forestry

201. Several Parties made suggestions that are applicable to an activity-based or land-based approach to LULUCF. Such suggestions are intended to solve specific problems of LULUCF, for example by avoiding the accounting of emissions or removals resulting from inter-annual variability, natural disturbances and non-anthropogenic effects. Instead, only direct human-induced emissions and removals from LULUCF should be accounted for. This implies that the effects of elevated CO₂ concentrations, nitrogen deposition and age structure should be factored out. Although these phenomena have been widely studied, methodologies for estimating and reporting them are not available for their application under the Kyoto Protocol.

202. During the first commitment period, the absence of methodologies for dealing with the above effects was dealt with by applying a cap to the accounting of FM. At that time, it was considered that

indirect and non-anthropogenic effects were particularly significant for this activity. However, natural and indirect human-induced effects may vary from Party to Party and, therefore, the current use of the cap may not produce the desired outcome for all. Discounting may also result in direct human-induced emissions and removals being factored out from the accounting.

203. The net-net approach can also be used to factor out indirect and non-anthropogenic effects when the natural and indirect human-induced effects are the same in the base year and in the commitment period. However, under a changing environment (for example with increasing impacts from climate change) this approach may have limitations. In addition, it is not suitable to factor out large annual fluctuations caused by natural disturbances.

204. Some Parties have suggested that the impact of natural disturbances could be factored out by excluding emissions from the accounting after they have been identified and their impact has been estimated, for example, through temporary removal from the accounting of land areas subject to natural disturbance. The challenges lie mainly in how to do this in a balanced way, also taking into account the resulting impact on the removals.

Option 4.5: Address inter-annual fluctuations

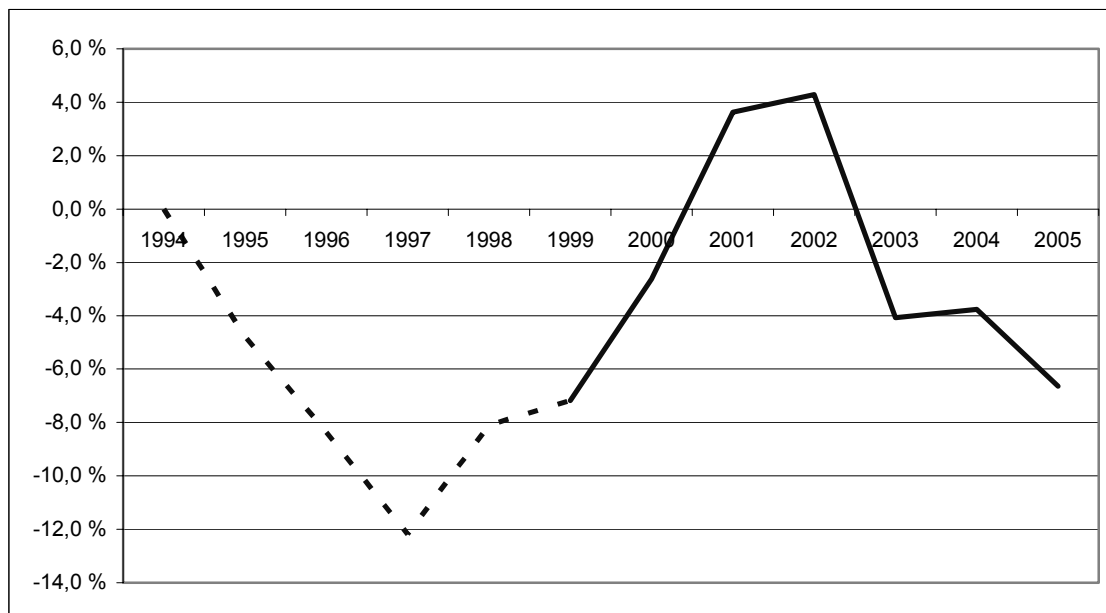
Current situation and general description

205. Inter-annual fluctuations and other disturbances have major implications for the accounting of LULUCF. These fluctuations and disturbances could be smoothed during the five years of the commitment period, thus diminishing the implications for reporting and accounting. In the case of the base year, because it is a single year, such smoothing is not possible.

206. Annual fluctuations in the LULUCF sector have been large (see figure 1). Five-year floating averages of net emissions or removals from LULUCF in Annex I Parties for the period 1991–1995 onwards have changed relative to 1990 in a range of –24 to –45 per cent.⁷¹ If, instead, those five-year averages are compared with levels in 1991, the corresponding range would change to +4 to –12 per cent. For individual Parties, changes can be much larger. Options 4.5a, 4.5b and 4.5c could be used to overcome this problem.

⁷¹ A negative number means an increase in removals, a decrease in emissions or a change from a source to sink; a positive number means an increase in emissions, a decrease in net removals or a sink changing to a source.

Figure 1. Trend in net emissions/removals in the land use, land-use change and forestry sector in all Annex I Parties
(in percentage deviation from 1990-1994 baseline)



Note: The trend is presented as the floating five-year averages of net emissions or removals using the period 1990–1994 as the base period. The years are the year based on which the five-year average has been calculated (e.g. 1999 means the period 1995–1999). The period 1995–1999 would include the base year and it is identified by the dotted line.

Option 4.5a: Apply a temporary removal from accounting of areas subject to natural disturbances

Description

207. This option entails the temporary removal from the accounting of those areas that are subject to natural disturbances and whose emissions and/or removals present large fluctuations. Emissions and removals from these areas would be reported but not accounted for.

208. Fluctuations in the emissions and removals from forest land due to natural disturbances (and hence in the supply or demand for tradable credits) have been significant in some countries (for example, Canada and the Russian Federation), owing to fires and pest outbreaks. For Canada, the difference between the highest removals and highest emissions reported in the category forest land remaining forest land between 1990 and 2005 has been more than 300 Tg CO₂; for Russia the difference is even larger, more than 750 Tg CO₂. Whether the difference as a whole can be attributed to natural disturbances is unknown. These large fluctuations show, however, that the impact of natural disturbances could be large, around 5 per cent of total emissions without LULUCF in 1990 in Annex I Parties.

Rationale	<ul style="list-style-type: none"> • The risk and potential impact of emissions from natural disturbances (such as fires and insect outbreaks) has been considered as a barrier to the election of FM. The option would reduce these risks and provide an incentive for Annex I Parties to account for emissions and removals from FM • This option could also be applicable for other activities and land-based accounting
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Necessary follow-up actions	<ul style="list-style-type: none"> • Agreement on the nature and scale of disturbances and the rules and modalities for the temporary exclusion as well as for returning the lands to the accounting
Potential challenges	<ul style="list-style-type: none"> • Complexity in reporting and accounting would be increased • Natural disturbances can increase the growth of the forest afterwards. If land areas subject to natural disturbances were excluded from reporting, then removals due to those disturbances would also need to be adjusted in order to maintain a balance in the accounting
Implications for the emission budgets of Annex I Parties	<ul style="list-style-type: none"> • Emissions reported and accounted for could largely be reduced by some Annex I Parties. The actual implications for the emission budgets of these Parties would depend on the occurrence of natural disturbances
Impact on the carbon market	<ul style="list-style-type: none"> • Unknown. The impact would depend on the type of natural disturbances that take place during the commitment period
Implications for domestic mitigation	<ul style="list-style-type: none"> • Increased incentives for mitigation activities in Parties that did not elect FM due to natural disturbances
Potential links to other options	<ul style="list-style-type: none"> • All relating to LULUCF
Ancillary benefits and costs	<ul style="list-style-type: none"> • Not relevant

Option 4.5b: Apply a base-year period instead of a single base year

Description

209. The base year would be replaced by a base-year period together with the application of net–net accounting. The base year period could cover average emissions or removals over a five- or 10-year period. Using an average of 10 years would further smooth the effect of fluctuations.

Analysis

Rationale	<ul style="list-style-type: none"> • To smooth the effect of fluctuations and disturbances
Necessary follow-up actions	<ul style="list-style-type: none"> • None identified
Potential challenges	<ul style="list-style-type: none"> • Data requirements
Implications for the emission budgets of Annex I Parties	<ul style="list-style-type: none"> • Emissions or removals would not change on average during the commitment period; however, the application of a base-year period of five or 10 years would probably reduce assigned amounts:^a <ul style="list-style-type: none"> - For Annex I Parties for which the LULUCF sector was a net source in 1990, the assigned amount would be reduced by approximately 1 % of total emissions in 1990 excluding LULUCF (for some Parties the LULUCF sector would become a net source of emissions if a base-year period was applied) - Applying net–net accounting, approximately 2 % of total emissions in 1990 excluding LULUCF (removals in the base year period would be larger)
Impact on the carbon market	<ul style="list-style-type: none"> • Potentially a large increase in the demand of tradable credits, depending on the option followed, the period or year selected and the rules of implementation
Implications for domestic mitigation	<ul style="list-style-type: none"> • The incentives to realize the mitigation potential will depend on how the emissions or removals from LULUCF are included in the national total emissions of the Party in the base year and the national targets • Implications could be positive or negative depending on the accounting approach and the national circumstances
Potential links to other options	<ul style="list-style-type: none"> • Options involving net–net accounting
Ancillary benefits and costs	<ul style="list-style-type: none"> • Not evaluated

^a The estimates are calculated based on the differences between the net emissions or removals in 2001–2005 (average) and 1990 (source: UNFCCC GHG Data Interface).

Option 4.5c: Apply forward-looking baselines*Description*

210. The accounting of LULUCF would not be relative to a base year but to a baseline that had been developed in advance, based on management plans and historical information, for example. Emissions and removals in a given year of the commitment period would not be compared with emissions or removals in the base year but with emissions or removals from the adopted baseline in the same year. The baselines could be reviewed with the actual data on natural disturbances and other factors.

Analysis

Rationale	<ul style="list-style-type: none"> • Dealing with disturbances and considering national circumstances • Accounting direct human-induced emissions and removals
Necessary follow-up actions	<ul style="list-style-type: none"> • Role of LULUCF in meeting emission targets as LULUCF would not be accounted in the base year; its accounting would be completely separate from that of other sectors. The approach to LULUCF, as specified in Articles 3.3, 3.4 and 3.7 of the Kyoto Protocol, would need to be revised • Agreement on methodologies for development of the baselines • Agreement on rules and modalities for updating and reviewing the baselines
Potential challenges	<ul style="list-style-type: none"> • Developing baselines in a scientifically sound and consistent manner across Annex I Parties • Need to review baselines periodically
Implications for the emission budgets of Annex I Parties	<ul style="list-style-type: none"> • The emissions or removals would not change on average for Annex I Parties during the commitment period
Impact on the carbon market	<ul style="list-style-type: none"> • Depends on the specification of the option. With the current information it is not possible to provide an indication of the implications on the carbon market • In principle, using baselines instead of a base year can potentially limit the amount of tradable units generated from LULUCF
Implications for domestic mitigation	<ul style="list-style-type: none"> • Implications could be positive or negative depending on the accounting approach and the national circumstances.
Potential links to other options	<ul style="list-style-type: none"> • Activity and land-base accounting approaches
Ancillary benefits and costs	<ul style="list-style-type: none"> • Not evaluated

Option 4.6: Introduce mandatory accounting and reporting of land use, land-use change and forestry activities*Description*

211. Present accounting rules would not be changed, but reporting of activities under Article 3.4 would be mandatory.

Analysis

Rationale	<ul style="list-style-type: none"> • Comprehensive accounting • Consistency in the use of LULUCF across Annex I Parties
Necessary follow-up actions	<ul style="list-style-type: none"> • As in option 4.1
Potential challenges	<ul style="list-style-type: none"> • Increased risks for Parties where natural disturbances can cause large fluctuations in emissions or removals from FM • Uncertainties in accounting of emissions and removals would increase

	(significant uncertainties in methodologies and data related to change in soil carbon stock for many Parties)
Implications for the emission budgets of Annex I Parties	<ul style="list-style-type: none"> Depends on the rules of implementation. Assuming that the rules that apply to the first commitment period will remain: ^a AR, deforestation and FM largely as under current accounting rules CM, GM and RV: 0 to 8 % increase (probably closer to the lower end of the range)
Impact on the carbon market	<ul style="list-style-type: none"> Potentially a small increase in the supply of tradable units resulting from LULUCF activities Depends on the rules of implementation
Implications for domestic mitigation	<ul style="list-style-type: none"> Increased incentives for mitigation may increase domestic action in LULUCF
Potential links to other options	<ul style="list-style-type: none"> As in option 4.1
Ancillary benefits and costs	<ul style="list-style-type: none"> Could promote sustainable forest management and agricultural practices (also trade-offs with food security due to increased carbon management of agricultural land)

^a Mandatory accounting of LULUCF activities is not expected to change the amount of emissions and removals reported and accounted for by Annex I Parties if current rules are applied. Changes to individual Parties may be significant. The IPCC estimates the economic mitigation potential for CM, GM and RV to be in the order of 8 per cent in Annex I Parties.

Option 4.7: Limit the scale of land use, land-use change and forestry activities

212. Some Parties have expressed concern with regard to the scale of the contribution of LULUCF in meeting targets of Annex I Parties. While options 4.5a, 4.5b, 4.5c and 4.6 are intended to solve problems other than that of the scale of LULUCF, some of them would also limit this scale (for example, by applying discount factors, or introducing net-net accounting). In addition, some Parties have suggested that the scale of LULUCF activities can also be limited by applying limits to the fungibility of credits generated from LULUCF activities. This option is not analysed in this paper.

D. Harvested wood products

Option 4.8: Include harvested wood products in the accounting

Current situation

213. The Kyoto Protocol applies the default assumption of the *Revised 1996 IPCC Guidelines for National Greenhouse Inventories* (hereinafter referred to as the Revised 1996 IPCC Guidelines), which is that there is no change in the size of the wood-products pool. In other words, only emissions and removals relating to the changes of stock in forests are reported and accounted for. Emissions from harvested wood are reported and accounted for in the year of harvest and by the country of harvest.

Description

214. This option entails the reporting and accounting of harvested wood products (HWPs) by applying one of the following approaches⁷² or any other that may be suggested:

- (a) The stock-change approach, which estimates net changes in carbon stocks in the forest and in the wood-products pool. Changes in carbon stock in forests are accounted for in the country where the wood is produced. Changes in the products pool are accounted for

⁷² The Subsidiary Body for Scientific and Technological Advice, at its fifteenth session, requested the secretariat to prepare a technical paper on HWP accounting (FCCC/SBSTA/2001/8, paragraph 29 (l)). This technical paper (FCCC/TP/2003/7) provides further information on HWPs.

in the country where the products are used. These stock changes are counted within national boundaries, where and when they occur;

- (b) The production approach, which estimates the net changes in carbon stocks in the forests and in the wood-products pool, but attributes both to the producing country. Stock changes are counted when, but not where, they occur. A variant of the production approach is the so-called simple-decay approach, which uses emission factors to account for the decomposition of carbon in HWPs;
- (c) The atmospheric-flow approach, which accounts for net emissions or removals of carbon to/from the atmosphere within national boundaries, where and when emissions and removals occur. Removals of carbon from the atmosphere due to forest growth are accounted for in the producing country, and emissions of carbon to the atmosphere from oxidation of wood products are accounted for in the consuming country.

215. All approaches could include the impact of carbon from HWPs stored in solid waste disposal sites (landfills), but this impact is not considered here.

Analysis

Rationale	<ul style="list-style-type: none"> • Reflect the actual changes in HWPs more accurately • Provide incentives for increasing the stock of HWPs and for sustainable forest management • Enhance the substitution of energy-consuming material with wood, e.g. in the building sector
Necessary follow-up actions	<ul style="list-style-type: none"> • Agreement on an approach to be applied
Potential challenges	<ul style="list-style-type: none"> • Accurate data for imports and exports of HWPs may be needed • Increase of complexity in reporting and tracking of HWPs • In the stock-change approach, imports from unsustainable HWPs could result in credits for a Party • In the production and simple-decay approaches, exported HWPs would result in credits based on rough assumptions and from activities that the Party would have no influence over. The period of accounting and reporting can have an effect on the calculation of emissions or removals; for example, if only recent years are considered, emissions from the existing HWP pool may be underestimated • The atmospheric-flow approach may require modifying the reporting requirements for forests
Implications for the emission budgets of Annex I Parties	<ul style="list-style-type: none"> • Increased incentives for increasing the HWP pool could result in lower emissions (e.g. additional net removals), estimated to be in the order of less than 100 Tg per year (less than 0.5 % of total national emissions in Annex I Parties in 1990) • Additional reductions could be achieved in energy-related emissions
Impact on the carbon market	<ul style="list-style-type: none"> • Potentially a small increase in the supply of, or a small decrease in the demand for, tradable units resulting from the decrease in emissions reported from the harvesting of forests • The impacts on the carbon market would strongly depend on the approach followed and the rules of implementation
Implications for domestic mitigation	<ul style="list-style-type: none"> • Incentives to increase the HWP pool differ depending on approach and Party
Potential links to other options	<ul style="list-style-type: none"> • All relating to LULUCF
Ancillary benefits and costs	<ul style="list-style-type: none"> • Difficult to predict the implications for the timber sector in developing countries (displacement of emissions, etc.)

- | | |
|--|--|
| | <ul style="list-style-type: none"> • Could increase unsustainable practices in the harvesting and use of wood, depending on the approach followed |
|--|--|

V. Approaches targeting sectoral emissions in Annex I Parties

216. Some Parties have suggested that approaches targeting emissions from specific sectors be developed and applied. Such approaches allow comparison of the economic and technical factors concerning the specific sector across different countries, and could complement the current approach of nationwide emission targets. Several issues would need to be taken into account when such options are considered:

- (a) The boundaries of the sectors have to be defined precisely, so that there is clarity on which emissions are covered by the sector and which are not. For example, does the cement sector include emissions related to the production of electricity that is used in cement production?
- (b) The production conditions for the same product may be different in various countries owing to national circumstances. For example, are renewable energy resources available to reduce emissions in the sector?
- (c) Sectoral approaches require robust methodologies for defining the sector, indicators and targets and for collecting sufficient data (relevant detailed data are rarely readily available). National GHG inventories are based on national energy statistics. While the national total energy used is relatively easy to quantify, the split among sectors is less certain. This split also depends on the definition of the sectors.

Option 5.1: Introduce approaches targeting sectoral emissions

217. Quantitative emission limitation or reduction objectives applicable at the national level are currently the main avenue for mitigation commitments of Annex I Parties under the Kyoto Protocol. The Protocol does not include any approach to targeting emissions from specific sectors, except international aviation and maritime transport.

218. Parties have proposed several types of possible approaches targeting sectoral emissions, including:

- (a) Bottom-up sectoral analysis to inform the discussion on mitigation potentials of Annex I Parties; this option is analysed below as option 5.1a;
- (b) Complementary sector-specific goals for Annex I Parties, which involves adopting mitigation goals at the sector level that would complement nationwide targets, for example, energy efficiency benchmarks for a particular sector or industry, or emission standards for given appliances;⁷³
- (c) Cooperative sectoral approaches supported and enabled by finance and technology. This option is not further assessed in this paper;
- (d) Sectoral crediting in non-Annex I Parties. This option is discussed in chapter III as option 3.2b.

⁷³ This option needs further clarification by Parties, including whether such goals would apply nationally or across Annex I Parties, whether they would be mandatory or voluntary, and whether they would be quantitative or qualitative.

Option 5.1a: Use bottom-up sectoral analysis to inform the discussion on mitigation potentials of Annex I Parties

Description

219. Under this option, further commitments for Annex I Parties, including new quantitative emission limitation or reduction commitments, are to be determined on the basis of information at the sector level. Countries would put forward information on, for example, current energy efficiency or carbon intensity for selected sectors, future production volumes, future reference emission levels and mitigation potential.

Analysis

Rationale	<ul style="list-style-type: none"> To take into account national and sector-specific circumstances when defining further commitments for Annex I Parties under the Kyoto Protocol
Necessary follow-up actions	<ul style="list-style-type: none"> A process may need to be established to define a methodology or consider national factors. Such work could be included in the discussions on mitigation potential
Potential challenges	<ul style="list-style-type: none"> Each Party will have to provide a large set of data. To ensure the comparability of the data, definitions of sector boundaries and the various indicators (e.g. emissions per kWh electricity or per tonne of steel) have to be defined National circumstances that determine emissions from different sectors vary largely across Annex I Parties
Implications for the emission budgets of Annex I Parties	<ul style="list-style-type: none"> Ideally, all emissions and removals would be covered under the application of this option; however, accounting could be limited by national and sectoral circumstances and by the methodology applied Depending on the approach to the methodology, emission reductions resulting from the use of the flexibility mechanisms may or may not be covered by the analysis
Impact on the carbon market	<ul style="list-style-type: none"> Unknown. It depends on the approach and methodology followed A strict focus on national and sectoral circumstances that does not take into consideration the use of the flexibility mechanisms could considerably reduce demand for tradable units
Implications for domestic mitigation	<ul style="list-style-type: none"> Detailed analysis of the sectoral mitigation potential could allow Parties to adjust the stringency of the target to their respective capabilities; thus domestic action could be increased and be determined by those capabilities
Potential links to other options	<ul style="list-style-type: none"> None identified
Ancillary benefits and costs	<ul style="list-style-type: none"> Not applicable

VI. Broadening the coverage of greenhouse gases, sectors and source categories

A. Gases

Current situation

220. The following GHGs are listed in Annex A to the Kyoto Protocol: CO₂, methane (CH₄), nitrous oxide (N₂O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF₆).

221. Most HFCs and PFCs are synthetic gases developed by the chemical industry. They are used for refrigeration and are also by-products from the production of some chemicals. New HFCs and PCFs have been developed since the adoption of the Kyoto Protocol. Updating Annex A to include them is not necessary, as it covers HFCs and PFCs as broad groups. However, agreement by the CMP on GWPs is needed so that these gases can be reported and accounted for (see also option 7.2). A list of these gases is included in annex IV. The AR4 does not provide GWP values for all gases. The IPCC has informed the secretariat that a table with the full set of GWPs, including the missing values, will be included in a list of errata to be published by the IPCC shortly. This will be made available to Parties on the UNFCCC website.

222. New synthetic GHGs have been developed for industrial purposes. These gases include:

- (a) Nitrogen trifluoride (NF₃): used in semiconductor manufacturing, including for flat screen televisions;
- (b) Trifluoromethyl sulphur pentafluoride (SF₅CF₃): a by-product in chemical production;
- (c) Fluorinated ethers: sometimes used as replacements for HFCs. Their GWP is usually lower than that of HFCs, but their price is higher;
- (d) Perfluoropolyethers: used in high-end applications and in fire fighting;
- (e) Other halocarbons including iodotrifluoromethane (CF₃I), dibromomethane (CH₂BR₂), bromo difluoro methane (CHBrF₂), methyl chloroform (CH₃CCl₃), dimethyl ether (CH₃OCH₃), dichloromethane (CH₂Cl₂) and methyl chloride (CH₃Cl), used in the electronics industry or occurring as by-products.

Option 6.1: Add new greenhouse gases to Annex A to the Kyoto Protocol

Description

223. New GHGs would be added to Annex A of the Kyoto Protocol. A GWP for each individual new gas and for each new HFC and PFC would be adopted by the CMP. This applies to NF₃, SF₅CF₃, fluorinated ethers, perfluoropolyethers and other halocarbons (e.g. CF₃I, CH₂BR₂, CHBrF₂, CH₃CCl₃, CH₃OCH₃, CHCl₃, CH₂Cl₂, CH₃Cl and C₃F₇C(O)C₂F₅).

Analysis

Rationale	<ul style="list-style-type: none"> To increase the number of GHGs covered by the Kyoto Protocol and limit emissions from gases that may have negative implications for the climate in the future
Necessary follow-up actions	<ul style="list-style-type: none"> Estimation and reporting requirements, including GWPs, for these gases need to be agreed. Estimation methodologies for most of the gases are already included in the 2006 IPCC Guidelines
Potential challenges	<ul style="list-style-type: none"> Very little is known about sources, current and future emissions and atmospheric abundances of these gases An additional burden of reporting requirements of a relatively small source of emissions would be imposed on countries. These emissions may be a key category in only a few Parties
Implications for the Annex I emission budget	<ul style="list-style-type: none"> Insignificant at present, but may become considerable in the future. Emissions in 1990 are assumed to have been close to zero but are increasing exponentially. Total current emissions of these gases are unknown but estimated to be less than 50 Mt CO₂ eq (0.3 % of

	Annex I 1990 emissions)
Impact on the carbon market	<ul style="list-style-type: none"> Unknown but potentially a small increase in the demand for tradable units. Adding new gases would, in principle, increase the demand for tradable units under the Kyoto Protocol
Implications for domestic mitigation	<ul style="list-style-type: none"> The new gases have been developed only recently. Emissions of these gases can be avoided or mitigated by finding alternatives before they further increase their share of the market
Potential links to other options	<ul style="list-style-type: none"> As in option 7.1
Ancillary benefits and costs	<ul style="list-style-type: none"> Coverage of the new GHGs would induce the development and/or use of alternatives to these gases, which could be made available to developing countries to help them pursue development without starting to use these new GHGs

B. Sectors

Current situation and general description

224. The sectors covered by the Kyoto Protocol are specified in its Annex A, which lists energy, industrial processes, solvent and other product use, agriculture and waste. GHG emissions and removals from LULUCF are not included in Annex A to the Kyoto Protocol, but are partly covered by the rules under Articles 3.3 and 3.4 (see chapter IV above).

225. The 2006 IPCC Guidelines for National Greenhouse Gas Inventories (hereinafter referred to as the 2006 IPCC Guidelines) have reorganized the definitions of the sectors that are listed in Annex A. If these guidelines are adopted (see option 7.1), Annex A would need to be changed to reflect the definition of sectors within these guidelines. Annex A may also need to be changed to reflect any substantive change in the way the LULUCF sector is treated. Matching of sectors and source categories listed in Annex A to the Kyoto Protocol with the categories included in the 2006 IPCC Guidelines is presented in annex III.

226. Emissions from aviation and marine bunker fuels (emissions from international aviation and maritime transport) are also not covered under Annex A to the Kyoto Protocol. According to Article 2, paragraph 2, of the Kyoto Protocol, Annex I Parties “shall pursue limitation or reduction” of these emissions “working through the International Civil Aviation Organization and the International Maritime Organization, respectively”). Some Parties have proposed adding emissions from international transport to national totals.⁷⁴

227. Emissions from international transport are substantial (474 Mt CO₂ eq reported by Annex I Parties for 2005, which is 2.6 per cent of 1990 emissions of Annex I Parties) and are rising faster than emissions in other sectors. Emissions from international aviation reported by Annex I Parties have increased by 66 per cent over the period 1990–2005, and international marine bunker fuel emissions by 7 per cent.

C. Source categories

228. The 2006 IPCC Guidelines redefine and identify new categories of emissions, which are listed in annex III. All categories would be covered once the 2006 IPCC Guidelines are adopted and Annex A to

⁷⁴ The Subsidiary Body for Scientific and Technological Advice discussed options for including these emissions in national totals before the Kyoto Protocol was adopted. Since the adoption of the Kyoto Protocol, the International Civil Aviation Organization and the International Maritime Organization have discussed the limitation or reduction of international aviation and maritime transport.

the Kyoto Protocol listing the sectors and source categories is adjusted. This is further discussed under chapter VII.

VII. Relevant methodological issues

A. Methodologies

Current situation

229. Annex I Parties use the Revised 1996 IPCC Guidelines, the *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories* and the *Good Practice Guidance for Land Use, Land-Use Change and Forestry* to estimate national GHG emissions under the Kyoto Protocol. These guidelines allow the use of country-specific methods (mostly models). At the request of the Subsidiary Body for Scientific and Technological Advice,⁷⁵ the IPCC developed new guidelines, the 2006 IPCC Guidelines.

230. The 2006 IPCC Guidelines provide changes in the definitions of sectors and categories. The most important changes include the following:

- (a) The new sector Industrial Processes and Products Use consolidates the Industrial Processes and Solvent and Other Product Use sectors that are currently listed in Annex A to the Kyoto Protocol and included in the Revised 1996 IPCC Guidelines. The only procedural consequence of the change is that Annex A to the Kyoto Protocol needs to be adjusted;
- (b) The new sector Agriculture, Forestry and Other Land Use consolidates the Agriculture and Land Use, Land-use Change and Forestry sectors included in the Revised 1996 IPCC Guidelines. Only Agriculture is currently listed in Annex A to the Kyoto Protocol.

231. The 2006 IPCC Guidelines also provide new or updated estimation methodologies and emission factors for almost all sectors. The categories in the 2006 IPCC Guidelines are given in annex III.

Option 7.1: Apply the 2006 IPCC Guidelines for National Greenhouse Gas Inventories

Description

232. The 2006 IPCC Guidelines would be applied for the estimation of national GHG inventories for the next commitment period.

Analysis

Rationale	<ul style="list-style-type: none"> • The 2006 IPCC Guidelines provide methodologies that apply the best available scientific knowledge for estimation of national GHG inventories and would be the most recent methodological guidance agreed by the time the next commitment period starts
Necessary follow-up actions	<ul style="list-style-type: none"> • Annex A to the Kyoto Protocol to be changed to include the new IPCC sector and category definitions. If separate reporting of LULUCF were continued, only the respective subcategories of agriculture, forestry and other land use would be included in Annex A. This depends on decisions on LULUCF. In addition, the guidelines for reporting and review under the Kyoto Protocol would need to be changed
Potential challenges	<ul style="list-style-type: none"> • Ensuring consistency in the time series. This may require

⁷⁵ FCCC/SBSTA/2002/13, paragraph 14 (f).

	<p>recalculating the full time series since 1990 or any other agreed base year using the new guidelines. The closer the base year is to the present, the less difficult the recalculation</p>
Implications for the emission budgets of Annex I Parties	<ul style="list-style-type: none"> • The new guidelines provide methods only for estimating direct CO₂ emissions and not for those CO₂ emissions that arise from other gases that decay to CO₂ in the atmosphere (i.e. CO and NMVOCs), which are reported on a voluntary basis. The new guidelines provide guidance only on how to calculate indirect CO₂ emissions from CO, CH₄ and NMVOC emissions. For fuel combustion, the carbon content of these “indirect GHGs” is small (only a few percent) compared with the direct CO₂ emissions • The new guidelines include guidance for estimating N₂O emissions resulting from nitrogen deposition in soils of all anthropogenic sources of NO_x and NH₃. Only agricultural sources of nitrogen were considered in the Revised 1996 IPCC Guidelines. N₂O is produced in soils through the biological processes that are driven by the deposition of nitrogen resulting from NO_x and NH₃. Including non-agricultural nitrogen emissions will increase emissions in this source category considerably (possibly by 50 %). Currently N₂O from agricultural soils makes up 1 to 6 % of national emissions of Annex I Parties. Estimates of emissions of N₂O from soils have large uncertainties • The new guidelines cover only actual emissions and no longer provide a method for potential emissions. For fluorinated gases and for CH₄ in landfills, the methods to estimate potential emissions assume an immediate emission of all gases produced and stored in products or processes. The methods for estimating actual emissions account for these gases at the time of real emission. This change increases the accuracy of reporting and usually accounts for the same total amount of emissions, but spread over a longer time period. All Annex I Parties already have to calculate actual emissions of fluorinated GHGs. All but four Annex I Parties calculate actual CH₄ emissions from landfills. This category accounts for 0.5–8 % of national totals • The energy sector now includes carbon capture and storage. Although this is a new technology, it may be applied on a large scale in the future • The energy sector also now includes CH₄ from abandoned coal mines
Impact on the carbon market	<ul style="list-style-type: none"> • Negligible
Implications for domestic mitigation	<ul style="list-style-type: none"> • The effect on domestic mitigation potential is small. For CH₄ from landfills, some mitigation measures are now better covered by the “actual” methodology, but most Annex I Parties already report emissions using this method
Potential links to other options	<ul style="list-style-type: none"> • All options on LULUCF considered in chapter IV
Ancillary benefits and costs	<ul style="list-style-type: none"> • Not applicable

B. Global warming potentials and other metrics to compare the effects of greenhouse gases

Current situation

233. GWPs are used as factors to compare and sum the effects of different GHGs. GWPs compare the radiative forcing of a tonne of a GHG over a given time period (e.g. 100 years) with that of a tonne of CO₂ (see annex IV). With GWPs, targets for a group of gases can be set, allowing Parties flexibility to

achieve different reductions for different GHGs. Without GWPs, separate targets for individual gases would have to be agreed. In accordance with decision 2/CP.3, the Kyoto Protocol uses GWP values extracted from the Second Assessment Report of the IPCC for a 100-year time horizon.

234. The values for GWPs change over time, first because scientific knowledge improves and input parameters are adapted to the latest scientific knowledge, and second because the atmospheric composition changes, thus affecting radiative forcing of additional emissions of GHGs. As CO₂ in the atmosphere reaches a level of saturation, additional amounts of this gas have a decreasing relative impact. Therefore the relative effect of all other gases increases over time, as their effect is always compared with the effect of additional amounts of CO₂.

235. The IPCC periodically provides updated values for GWPs. They are based on the atmospheric composition in the year of calculation.

236. GWPs are provided for time horizons of 20, 100 and 500 years. Choosing a shorter time horizon gives a higher weight⁷⁶ to short-lived GHGs (e.g. CH₄); choosing a longer time horizon gives a higher weight to long-lived GHGs (e.g. CO₂ and some fluorinated gases).

237. The IPCC also publishes global temperature potentials (GTPs). These assess the total effect on temperature increase, after a specific time horizon, of a tonne of GHG compared with that of a tonne of CO₂. GTPs generally give a lower weight to short-lived GHGs (e.g. CH₄) compared with 100-year GWPs, and a higher weight to long-lived GHGs (e.g. CO₂ and some fluorinated gases). Only one study⁷⁷ was available with values for GTPs. The IPCC did not endorse GTP values and did not recommend a way to calculate them. The table in annex IV provides the GTP values from Shine et al.

238. The IPCC notes that “although it has several known shortcomings, a multi-gas strategy using GWPs is very likely to have advantages over a CO₂-only strategy ... Thus, GWPs remain the recommended metric to compare future climate impacts of emissions of long-lived climate gases”.⁷⁸ Annex IV to this document provides further analysis on the implications of using different alternatives to the current GWPs.

239. Which metric and values are used under the Kyoto Protocol to compare the effect of GHGs depends on several policy choices, including the choice of a metric (currently GWPs), time horizon (currently 100 years) and the year whose atmospheric composition is the basis for the calculations (currently 1994). Parties have come forward with options for the first two policy choices. Regarding the year for the basis for the atmospheric composition, the following options are available:

- (a) Keep GWP values unchanged. Accepting this would eliminate the need to update the values. This option is not further assessed;
- (b) Use the latest IPCC values to assume that comparison of the effect of emissions should be, based on the atmospheric concentration in 2006. This would apply to emissions that occur in the base year (possibly 1990) and the target years, most or all of which have an atmospheric composition different from that in 2006. This option is further assessed below as option 7.2;

⁷⁶ Weight in this context refers to the effect on the climate of emissions of non-CO₂ gases relative to the effect of CO₂.

⁷⁷ Shine, KP, Fuglestvedt JS., Hailemariam K and. Stuber N. 2005. Alternatives to the global warming potential for comparing climate impacts of emissions of greenhouse gases. *Climate Change*. 68: pp. 281–302.

⁷⁸ Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change, chapter 2.10.1.

- (c) Use time-dependent GWPs to assume that comparison of the effect of emissions should be based on the atmospheric concentration of those emissions in the year in which they take place. This option is not further assessed in this paper.

Option 7.2: Use the latest global warming potentials from the Intergovernmental Panel on Climate Change

Description

240. New GWPs for the 100-year time horizon would be adopted for the purpose of determining compliance with commitments of the second commitment period. New values would be applied to calculate emissions and removals in the base year and during the commitment period on the basis of the most recent scientific information available.

Analysis

Rationale	<ul style="list-style-type: none"> Atmospheric composition has changed and scientific knowledge of the radiative effects of GHGs has improved
Necessary follow-up actions	<ul style="list-style-type: none"> Rules for carrying over units from the first to the second commitment period need to be agreed
Potential challenges	<ul style="list-style-type: none"> Rules need to be applied in cases when Kyoto units are carried over from the first commitment period to the next commitment period. This includes “carry-over” of unused AAUs but also of credits generated from CDM projects that were initiated before 2013 Emissions trends calculated in the past will change (see annex IV) Current GWP values are based on atmospheric concentrations that are probably not those of the base or target years
Implications for the emission budgets of Annex I Parties	<ul style="list-style-type: none"> The relative weight of each GHG changes and therefore the share of each gas in the total emissions of a Party also changes. The trend from 1990 to 2005 for individual Annex I Parties varies between +1 and –1 percentage points when using 2007 GWP values instead of 1995 values (see figures 4 and 5 in annex IV)
Impact on the carbon market	<ul style="list-style-type: none"> Higher mitigation potential for CH₄ may increase the supply of tradable units resulting from reductions of emissions of this gas
Implications for domestic mitigation	<ul style="list-style-type: none"> The impact on mitigation potential is generally small, except for countries with high CH₄ emissions. New GWPs give 19 % higher weight to CH₄. This would increase the total emissions but also the mitigation potential of countries that have opportunities to reduce emissions of CH₄
Potential links to other options	<ul style="list-style-type: none"> Not relevant
Ancillary benefits and costs	<ul style="list-style-type: none"> Not applicable

Option 7.3: Use a time horizon other than 100 years (20 or 500 years)

Description

241. GWPs for a 20- or 500-year time horizon would be adopted for the second commitment period.

Analysis

Rationale	<ul style="list-style-type: none"> Emphasis is placed on short-term (20 years) or long-term (500 years) mitigation
Necessary follow-up actions	<ul style="list-style-type: none"> Rules for moving tradable units under the Kyoto Protocol from the first to the second commitment period need to be agreed

Potential challenges	<ul style="list-style-type: none"> • Rules need to be applied in cases when Kyoto units are carried over from the first commitment period to the next commitment period. This includes “carry-over” of unused AAUs but also of credits generated from CDM projects that were initiated before 2013 • Emissions trends calculated in the past will change (see annex IV)
Implications for the emission budgets of Annex I Parties	<ul style="list-style-type: none"> • The relative weight of each GHG changes. Therefore the share of a country’s emissions of total emissions and the trend in emissions change. The trend from 1990 to 2005 for individual Annex I Parties varies roughly between +10 and –10 percentage points when using a 20- or 500-year time horizon (see figures 4 and 5 in annex IV)
Impact on the carbon market	<ul style="list-style-type: none"> • Possibly a large increase or decrease (depending on the time horizon selected) in the supply of tradable units resulting from an increased or reduced mitigation potential for non-CO₂ gases (see above)
Implications for domestic mitigation	<ul style="list-style-type: none"> • The weight of CH₄ and N₂O and other non-CO₂ gases would change considerably. This would increase or decrease the emissions and the mitigation potential of countries that have a high potential to reduce non-CO₂ gases
Potential links to other options	<ul style="list-style-type: none"> • Not relevant
Ancillary benefits and costs	<ul style="list-style-type: none"> • Not applicable

Option 7.4: Use global temperature potentials*Description*

242. GTPs are adopted as the metric to compare and sum up GHGs in the second commitment period.

Analysis

Rationale	<ul style="list-style-type: none"> • Emphasis is placed on the effect on temperature, not on radiative forcing
Necessary follow-up actions	<ul style="list-style-type: none"> • GTPs need to be calculated, after which the IPCC would need to agree on GTP values. This process could take two to three years. This must be followed by an agreement by the CMP. • A time horizon needs to be chosen (as for GWPs)
Potential challenges	<ul style="list-style-type: none"> • GTP values are not available from the IPCC. • The calculation method is under discussion. • GTPs have been calculated only for a limited set of gases by one research group (CO₂, CH₄, N₂O, HFC-134a, HFC-152a and CF₄; see table 1 in annex IV). • The IPCC has recommended the GWP concept
Implications for the emission budgets of Annex I Parties	<ul style="list-style-type: none"> • The relative weight of each GHG, and therefore the trend in total emissions, would change (see figures 4 and 5 in annex IV)
Impact on the carbon market	<ul style="list-style-type: none"> • Potentially a decrease in the supply of tradable units resulting from lower mitigation potential for short-lived gases
Implications for domestic mitigation	<ul style="list-style-type: none"> • GTPs give much lower weight to short-lived gases (e.g. CH₄). This would decrease emissions and the mitigation potential of countries that have opportunities to reduce CH₄
Potential links to other options	<ul style="list-style-type: none"> • Not relevant
Ancillary benefits and costs	<ul style="list-style-type: none"> • Not applicable

Annex I**Additional background information on land use, land-use change and forestry**

1. Information on the current trend in emissions and removals from land use, land-use change and forestry (LULUCF) in Annex I Parties can be used to provide an indication of the contribution of LULUCF in the second commitment period of the Kyoto Protocol. Data have been extracted from the UNFCCC greenhouse gas (GHG) database, which at the time of writing included data from the 2007 inventory submissions of Annex I Parties (data for the years 1990–2005). The following estimates, where relevant, have taken into account choices made with respect to activities under Article 3, paragraph 4, of the Kyoto Protocol.

2. In the period 1990–2005, the LULUCF sector in Annex I Parties resulted in net removals of GHGs. For the period 2001–2005, net annual average removals of GHGs were approximately 38 per cent larger than in 1990 and equivalent to about 7 per cent of total GHG emissions for the same period, excluding LULUCF. The figure below illustrates the share of emissions or removals from LULUCF in total emissions from Annex I Parties in 1990 and 2005:¹

- (a) Removals since 1990 have increased in 23 Parties and have decreased in nine Parties
- (b) Emissions since 1990 have decreased in three Parties and have increased in one Party
- (c) LULUCF has changed from a net source to a net sink in four Parties.

3. In the majority of the Annex I Parties (30 Parties) the emissions and removals from LULUCF have developed in a favourable direction since 1990.² In 23 Parties the removals have increased, in three Parties the emissions have decreased and in four Parties the LULUCF sector has changed from a source to a sink. In nine Parties the removals have decreased and in one Party the emissions have increased. Data for one Party were not available.

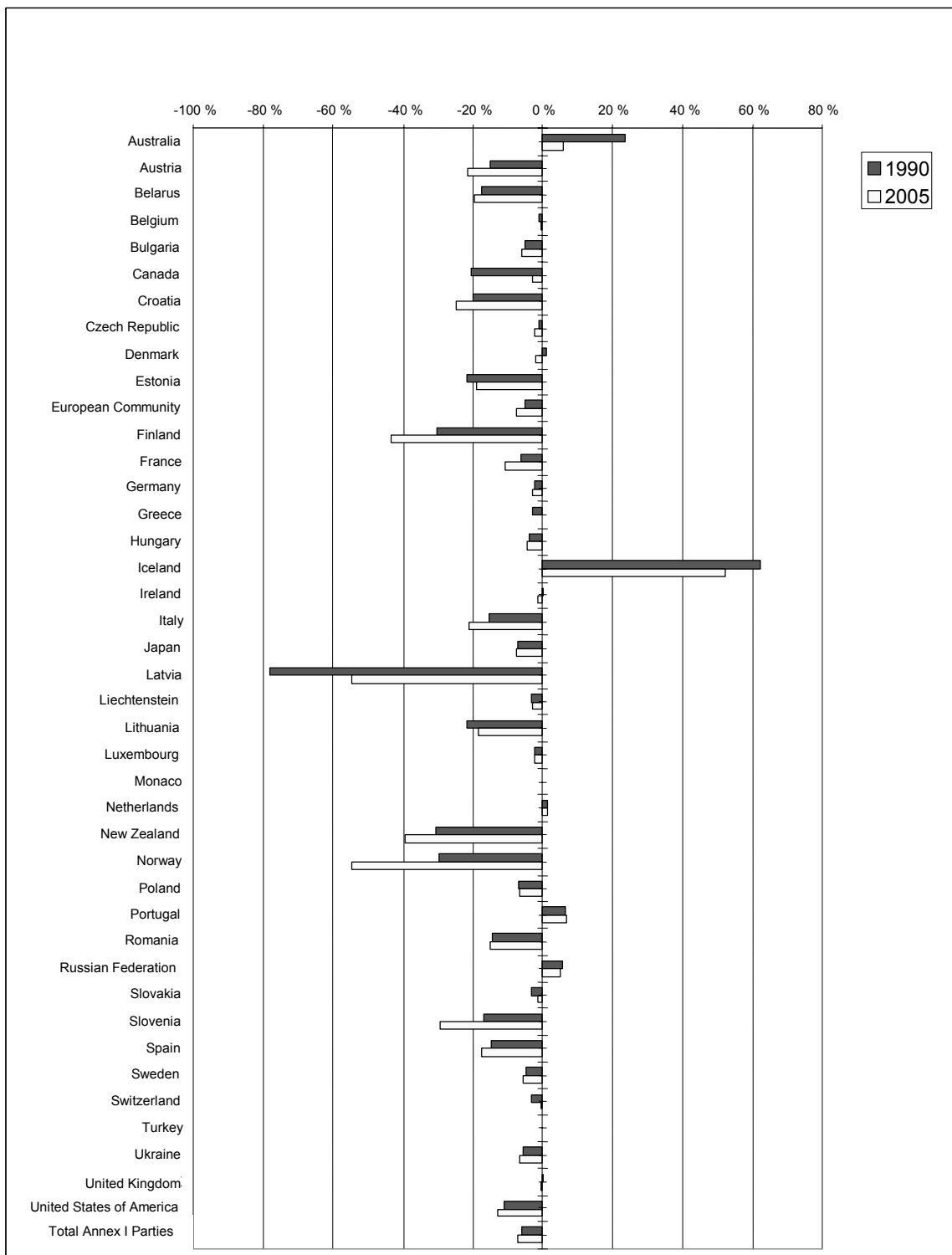
4. The contributions to the observed sink in Annex I Parties have been unequal across different land categories; forest land provides most of the removals in the sector whereas croplands are a small net sink and grasslands a small net source in Annex I Parties as a whole. Reporting of the emissions and removals from the other land-use categories (wetlands, settlements and other land) is partly voluntary, and therefore the estimation of their contributions is more uncertain.

5. The contributions for individual Parties can differ considerably from the Annex I Parties average. Inter-annual variability due to anthropogenic and natural events can affect individual Parties in very different ways, and it was not possible to analyse such impacts here. The analysis provided in the figure below is made at the level of Annex I Parties as a whole – the importance of the sector at Party level may be larger or smaller.

¹ UNFCCC GHG Database, 2008.

² UNFCCC GHG Database, 2008.

Figure. Net emissions or removals from land use, land-use change and forestry as a percentage of total national greenhouse gas emissions in Annex I Parties in 1990



6. Data from the contribution of Working Group III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC) have been used to assess the upper limit for the potential impact of LULUCF on emission budgets of Annex I Parties. In agriculture, despite the large annual exchanges of carbon dioxide (CO₂) between agricultural land and the atmosphere, the IPCC estimates that the net flux is approximately in balance (e.g. emissions are approximately the same as removals). The future evolution of CO₂ emissions or removals from agriculture is considered uncertain and no quantitative baseline estimate for 2030 is available. The following are estimates of the global economic mitigation potential³ in that year:

- (a) 1,400–1,500 Tg CO₂ per year from cropland management (about 8 per cent of the total national emissions in Annex I Parties in 1990). Grazing land management is expected to be of the same order of magnitude;
- (b) 1,300 Tg CO₂ per year from restoration of cultivated organic soils;
- (c) 600 Tg CO₂ per year from restoration of degraded lands;
- (d) 200 Tg CO₂ per year from the soils component of bioenergy (other impacts on mitigation of bioenergy are considered under the energy sector);
- (e) 100 Tg CO₂ per year from improved water management and other measures.

7. The mitigation potential in Annex I Parties for forestry is estimated to be large, although subject to some degree of uncertainty. This potential in 2030 has been estimated to be as follows:

- (a) About 3,000 Tg CO₂ per year from forest management (16 per cent of total emissions of Annex I Parties in 1990 without the LULUCF sector);
- (b) About 1,200 Tg CO₂ per year from afforestation (7 per cent of total emissions of Annex I Parties in 1990 without the LULUCF sector);
- (c) 130 Tg CO₂ per year from reduced deforestation (less than 1 per cent of total emissions of Annex I Parties in 1990 without the LULUCF sector).

³ The economic potential is defined as the mitigation potential which takes into account social costs and benefits and social discount rates, assuming that the market efficiency is improved by policies and measures and that barriers are removed. The economic potential is generally greater than the market potential.

Annex II

Background information on fluorinated gases

1. Little is known about the sources, current and future emissions and atmospheric abundances of the new fluorinated greenhouse gases referred to in chapter VI of this document.
2. An article by Prather and Hsu (2008)¹ reports that nitrogen trifluoride (NF₃), which was once a niche product for rocket fuel and lasers, is now being marketed as a plasma etchant and equipment cleaning gas in the semiconductor industry. Production of NF₃ has increased considerably in recent years, owing in particular to the high demand for flat screen televisions. The authors estimate production of the gas to be about 4,000 tonnes in 2008, to double by 2010. Emissions of NF₃ occur during the semiconductor process, where about 97 per cent is destroyed and 3 per cent vented to the atmosphere. It can also be released during manufacture, transport, application or disposal. Prather and Hsu estimate the maximum annual potential release of NF₃ to be 67 million tonnes of carbon dioxide (CO₂) equivalent, but do not provide an estimate of the actual emissions of this gas.
3. Assuming that NF₃ has the highest global warming potential of the new greenhouse gases, and taking into account the quantities referred to in paragraph 2 above, the total emissions of the new gases at present can be estimated to be less than 50 Mt CO₂ eq.

¹ Prather MJ and Hsu J. 2008. NF₃, the greenhouse gas missing from Kyoto. *Geophysical Research Letters*. 35 (L12810).

Annex III

Matching sectors and source categories listed in Annex A to the Kyoto Protocol with the categories in the 2006 IPCC Guidelines for National Greenhouse Gas Inventories

Annex A to the Kyoto Protocol	2006 IPCC Guidelines for National Greenhouse Gas Inventories
Energy <ul style="list-style-type: none"> Fuel combustion <ul style="list-style-type: none"> Energy industries Manufacturing industries and construction Transport Other sectors Other Fugitive emissions from fuels <ul style="list-style-type: none"> Solid fuels Oil and natural gas Other 	1 Energy <ul style="list-style-type: none"> 1A Fuel Combustion Activities <ul style="list-style-type: none"> 1A1 Energy Industries 1A2 Manufacturing Industries and Construction 1A3 Transport 1A4 Other Sectors 1A5 Non-Specified 1B Fugitive Emissions from Fuels <ul style="list-style-type: none"> 1B1 Solid Fuels 1B2 Oil and Natural Gas 1B3 Other Emissions from Energy Production 1C Carbon Dioxide Transport and Storage <ul style="list-style-type: none"> 1C1 Transport of CO₂ 1C2 Injection and Storage
Industrial processes <ul style="list-style-type: none"> Mineral products Chemical industry Metal production Other production Production of halocarbons and sulphur hexafluoride Consumption of halocarbons and sulphur hexafluoride Other Solvent and other product use	2 Industrial Processes and Product Use <ul style="list-style-type: none"> 2A Mineral Industry 2B Chemical Industry 2C Metal Industry 2D Non-Energy Products from Fuels and Solvent Use 2E Electronics Industry 2F Product Uses as Substitutes for Ozone Depleting Substances 2G Other Product Manufacture and Use 2H Other
Agriculture <ul style="list-style-type: none"> Enteric fermentation Manure management Rice cultivation 	3 Agriculture, Forestry and Other Land Use <ul style="list-style-type: none"> 3A Livestock <ul style="list-style-type: none"> 3A1 Enteric Fermentation 3A2 Manure Management 3B Land <ul style="list-style-type: none"> 3B1 Forest Land 3B2 Cropland 3B3 Grassland 3B4 Wetlands 3B5 Settlements 3B6 Other Land 3C Aggregate Sources and Non-CO₂ Emissions Sources on Land <ul style="list-style-type: none"> 3C2 Liming 3C3 Urea Application 3C6 Indirect N₂O Emissions from Manure Management 3C7 Rice Cultivations

<p>Agricultural soils Prescribed burning of savannas Field burning of agricultural residues Other</p>	<p>3C4 Direct N₂O Emissions from Managed Soils 3C5 Indirect N₂O Emissions from Managed Soils 3C1 Emissions from Biomass Burning</p> <p>3C8 Other 3D Other 3D1 Harvested Wood Products 3D2 Other</p>
<p>Waste Solid waste disposal on land Wastewater handling Waste incineration Other</p>	<p>4 Waste 4A Solid Waste Disposal 4B Biological Treatment of Solid Waste 4D Wastewater Treatment and Discharge 4C Incineration and Open Burning of Waste 4E Other</p>
	<p>5 Other 5A Indirect N₂O Emissions from the Atmospheric Deposition of Nitrogen in NO_x and NF₃ 5B Other</p>

Annex IV

Global warming potentials and global temperature potentials

1. Values for global warming potentials (GWPs) and global temperature potentials (GTPs) are provided in the table below. Values for GWPs have been extracted from the assessment reports of the Intergovernmental Panel on Climate Change (IPCC). Values for GTPs have been extracted from Shine et al¹ (2005, cited by the Fourth Assessment Report of the IPCC). In that publication, GTPs have been calculated in two ways: first, using analytical formulas, and second, using a dynamic climate model.
2. Changes to the approach of using GWPs affect the effect on the climate (referred to as the weight) of different greenhouse gases (GHGs) relative to carbon dioxide (CO₂). The overall trend of GHG emissions will change considerably if mitigation is focused on a GHG whose GWP is higher.
3. Changes to the approach of using GWPs also lead to a change in the total emissions of a country (see figure 1). Latest values for GWPs provided by the IPCC give a higher weight to methane (CH₄) and a lower weight to nitrous oxide (N₂O) relative to GWPs contained in the Second Assessment Report of the IPCC. However, this change is relatively small, with the maximum of +4.5 per cent for New Zealand.
4. A change of the time horizon of GWPs to 20 or 500 years, or moving to GTPs, also leads to a change of total emissions of a Party (see figure 2). A 20-year time horizon puts more weight on short-lived gases such as CH₄. This change would have an effect on the total emissions of Australia, Ireland and New Zealand. On the other hand, a 500-year time horizon and using GTPs put emphasis on long-lived gases, which has a noticeable effect in countries such as Japan.
5. Not only the total emissions, but also the trend in emissions is important. Figure 3 shows the trend in emissions from 1990 to 2005 for CO₂, CH₄ and N₂O for a hypothetical country using the 1995 GWPs with a 100-year time horizon and a 20-year time horizon. The weight of CH₄ relative to CO₂ for a 100-year time horizon is 21 and for a 20-year time horizon is 56. Whenever this country pursues a mitigation strategy that focuses on CH₄, its emissions reductions would be 22 per cent using a 20-year time horizon but only 15 per cent using a 100-year time horizon. The difference in the trends is therefore -7 percentage points.
6. Likewise, the difference in trends can be calculated for moving from 1995 to 2001 and 2007 GWP values with a 100-year time horizon (figure 4) and for moving from a 100-year to a 20-year and 500-year time horizon using 1995 GWP values, and for moving from the current approach to GWPs to using GTPs (figure 5). Figure 4 shows that Parties with a high share of CH₄ mitigation would have reduced total emissions more when newer GWP values are used. However, this change would be relatively small, with a maximum of -1.5 per cent for Ukraine and +1 per cent for Turkey. The changes illustrated in figure 5 are larger. The higher weight on short-lived gases, such as CH₄, increases overall reductions in most countries. On the other hand, the use of a 500-year time horizon or of GTPs puts more emphasis on long-lived gases and would increase total emission reductions in those Parties that have reduced these gases, such as Canada, New Zealand and Turkey.

¹ Shine, KP, Fuglestvedt JS., Hailemariam K and. Stuber N. 2005. Alternatives to the global warming potential for comparing climate impacts of emissions of greenhouse gases. *Climate Change*. 68:pp. 281-302.

Table. Global warming potentials and global temperature potentials

Species	Chemical formula	Covered by Kyoto Protocol	Covered by Montreal Protocol	Estimation method in 2006 Guidelines	IPCC 1995			IPCC 2001			IPCC 2007			Shine et al 2005					
					Global Warming Potential			Global Warming Potential			Global Warming Potential			Analytical GTP _P			EBM GTP _P		
					20 years	100 year	500 years	20 years	100 year	500 years	20 years	100 year	500 years	20	100	500	20	100	500
Carbon dioxide	CO2	x		x	1	1	1	1	1	1	1	1	1	1	1	1	1		
Methane	CH4	x		x	56	21	6.5	62	23	7	72	25	7.6	52	0.35	0	46	5	0.8
Nitrous oxide	N2O	x		x	280	310	170	275	296	156	289	298	153	290	270	13	290	270	35
<i>Substances controlled by the Montreal Protocol</i>																			
CFC-11	CCl3F		x					6300	4600	1600	6730	4750	1620						
CFC-12	CCl2F2		x					10200	10600	5200	11000	10900	5200						
CFC-13	CClF3		x					10000	14000	16300	10800	14400	16400						
CFC-113	CCl2FCClF2		x					6100	6000	2700	6540	6130	2700						
CFC-114	CClF2CClF2		x					7500	9800	8700	8040	10000	8730						
CFC-115	CClF2CF3		x					4900	7200	9900	5310	7370	9990						
Halon-1301	CBrF3		x					7900	6900	2700	8480	7140	2760						
Halon-1211	CBrClF2		x					3600	1300	390	4750	1890	575						
Halon-2402	CBrF2CBrF2		x								3680	1640	503						
Carbon tetrachloride	CCl4		x					2700	1800	580	2700	1400	435						
Methyl bromide	CH3Br		x					16	5	1	17	5	1						
HCFC-21	CHCl2F		x					700	210	65									
HCFC-22	CHClF2		x					4800	1700	540	5160	1810	549						
HCFC-123	CHCl2CF3		x					390	120	36	273	77	24						
HCFC-124	CHClCF3		x					2000	620	190	2070	609	185						
HCFC-141b	CH3CCl2F		x					2100	700	220	2250	725	220						
HCFC-142b	CH3CClF2		x					5200	2400	740	5490	2310	705						
HCFC-225ca	CHCl2CF2CF3		x					590	180	55	429	122	37						
HCFC-225cb	CHClCF2CClF2		x					2000	620	190	2030	595	181						
<i>Hydrofluorocarbons</i>																			
HFC-23	CHF3	x		x	9100	11700	9800	9400	12000	10000	12000	14800	12200						
HFC-32	CH2F2	x		x	2100	650	200	1800	550	170	2330	675	205						
HFC-41	CH3F	x		x	490	150	45	330	97	30									
HFC-125	C2HF5	x		x	4600	2800	920	5900	3400	1100	6350	3500	1100						
HFC-134	C2H2F4	x		x	2900	1000	310	3200	1100	330									
HFC-134a	CH2FCF3	x		x	3400	1300	420	330	1300	400	3830	1430	435	2840	34	0	2550	300	44
HFC-143	C2H3F3	x		x	1000	300	94	110	330	100									
HFC-143a	C2H3F3	x		x	5000	3800	1400	5500	4300	1600	5890	4470	1590						
HFC-152	CH2FCH2F			x				140	43	13									
HFC-152a	CH3CHF2	x		x	460	140	42	410	120	37	437	124	38	170	0.15	0	135	22	4
HFC-161	CH3CH2F			x				40	12	4									
HFC-227ea	C3HF7	x		x	4300	2900	950	5600	3500	1100	5310	3220	1040						
HFC-236fa	CF3CH2CF3	x		x	5100	6300	4700	7500	9400	7100	8100	9810	7660						
HFC-236cb	CH2FCF2CF3			x				3300	1300	390									
HFC-236ea	CF3CHF2CF3			x				360	1200	390									
HFC-245ca	C3H3F5	x		x	1800	560	170	2100	640	200									
HFC-245fa	CHF2CH2CF3			x				3000	950	300	3380	1030	314						
HFC-365mfc	CH3CF2CH2CF3			x				2600	890	280	2520	794	241						
HFC-43-10mee	CF3CHFCHFCF2CF3			x	3000	1300	400	3700	1500	470	4140	1640	500						

Species	Chemical formula	Covered by Kyoto Protocol	Covered by Montreal Protocol	Estimation method in 2006 Guidelines	IPCC 1995			IPCC 2001			IPCC 2007			Shine et al 2005					
					Global Warming Potential			Global Warming Potential			Global Warming Potential			Analytical GTP _P			EBM GTP _P		
					20 years	100 year	500 years	20 years	100 year	500 years	20 years	100 year	500 years	20	100	500	20	100	500
<i>Perfluoropolyethers</i>																			
PFPME	CF3OCF(CF3)CF2OCF2OCF3										7620	10300	12400						
<i>Other halogenated compounds</i>																			
FIC-1311	CF3I			x				1	1	<<1	1	0.4	0.1						
	CH2BR2			x				5	1	<<1									
Halon-1201	CHBrF2							1500	470	150									
Methyl chloroform	CH3CCl3							450	140	42	506	146	45						
Dimethylether	CH3OCH3							1	1	<<1	1	1	<<1						
	CHCl3			x	..	4	..	100	30	9									
Methylene chloride	CH2Cl2			x	..	9	..	35	10	3	31	8.7	2.7						
Methyl chloride	CH3Cl			x				55	16	5	45	13	4						
	(CF3)2CFOCH3							1100	330	100									
	(CF3)CH2OH							190	57	18									
	CF3CF2CH2OH							140	40	13									
	(CF3)2CHOH							640	190	59									
	(CF3)2CHOCHF2							1200	370	110									
	(CF3)2CHOCH3							88	26	8									
	-(CF3)2CH(OH)-							240	70	22									
	C3F7C(O)C2F5			x															

Figure 1. Percentage change in share in Annex I emissions in 2005 due to moving from 1995 global warming potential values to 2001 and 2007 values with a 100-year time horizon (only carbon dioxide, methane and nitrous oxide are considered).

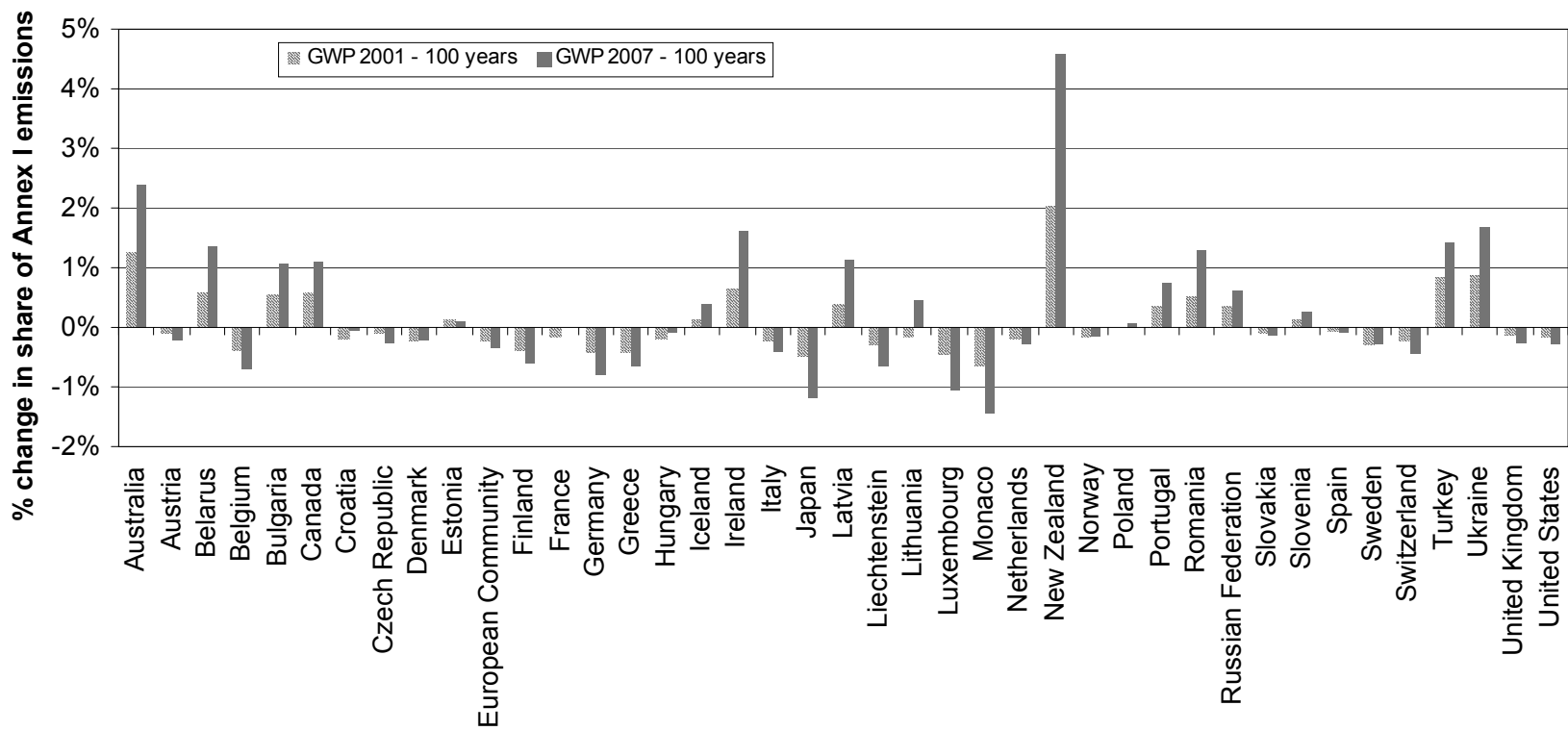


Figure 2. Percentage change in share in total Annex I Party emissions in 2005 due to moving from a 100-year to a 20- or 500-year time horizon or moving to global temperature potentials (only carbon dioxide, methane and nitrous oxide are considered).

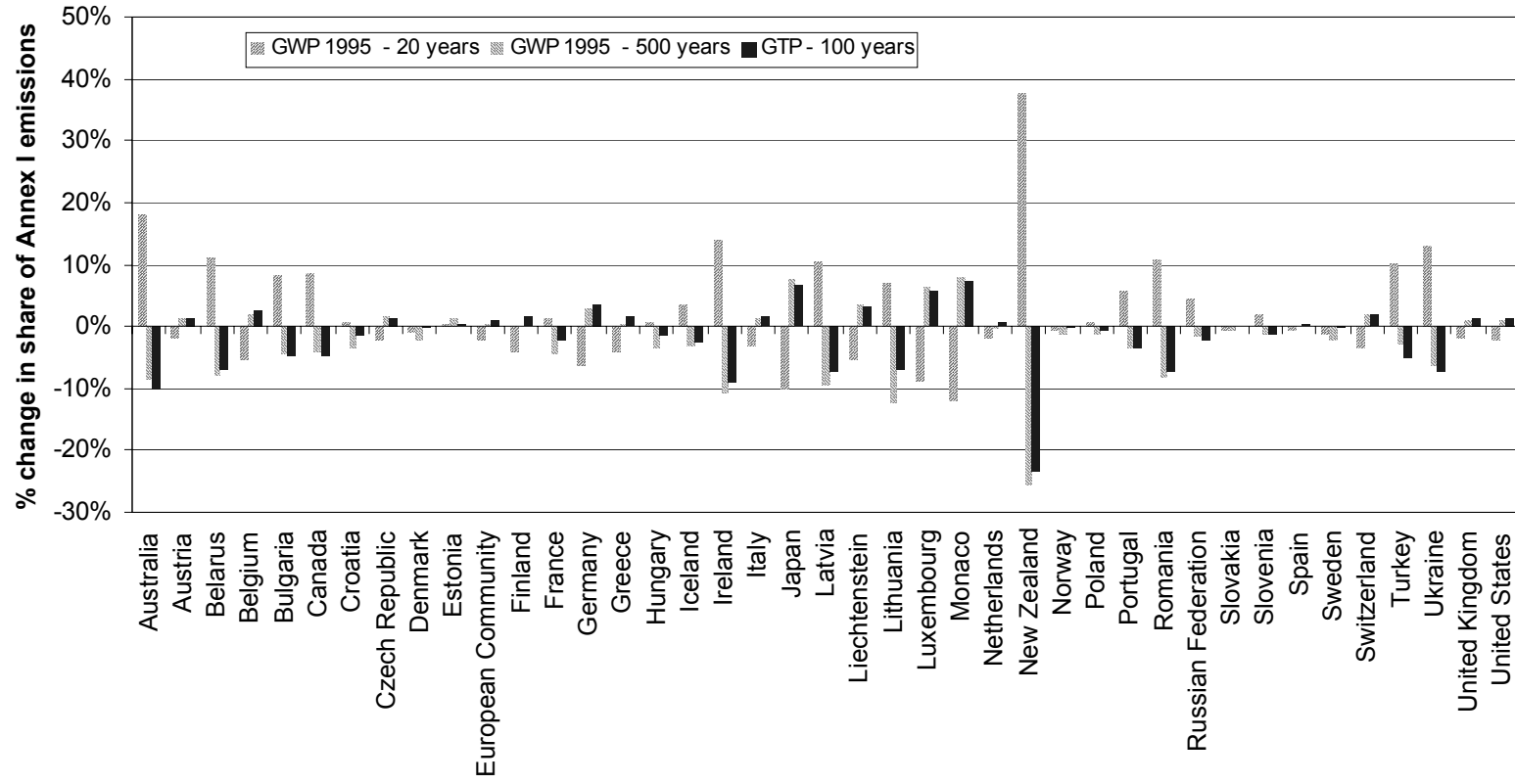


Figure 3. Emissions trend of a hypothetical country for carbon dioxide, methane and nitrous oxide for 1995 global warming potentials with a 100-year and a 20-year time horizon

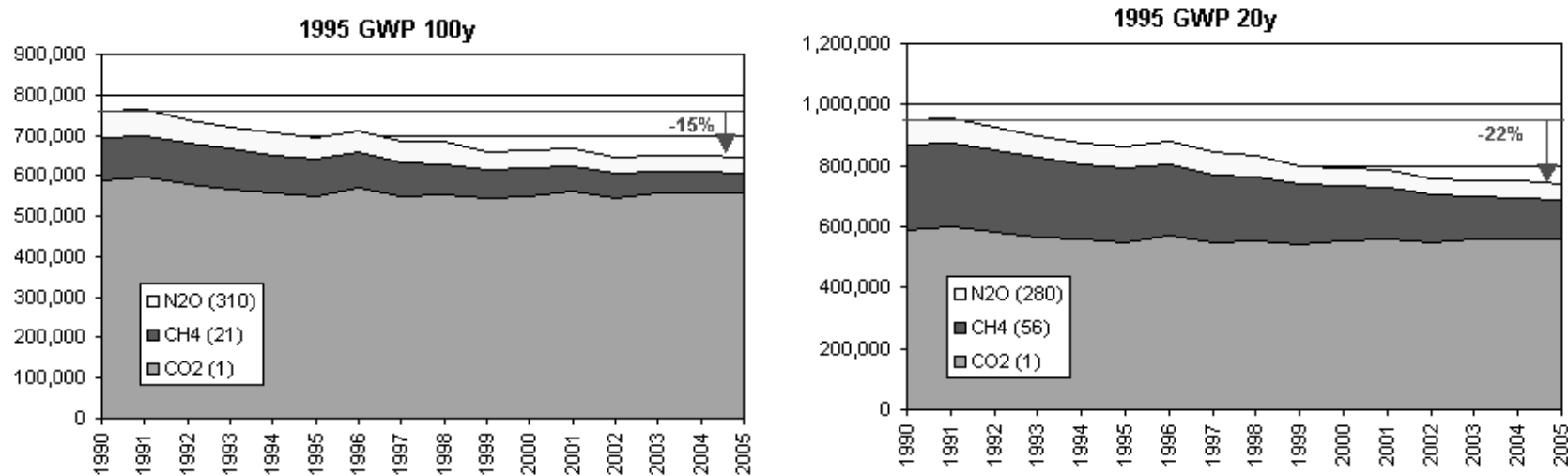


Figure 4. Percentage point change in trend from 1990 to 2005 of Parties due to moving from 1995 to 2001 and 2007 global warming potential values with 100-year time horizon (only carbon dioxide, methane and nitrous oxide are considered).

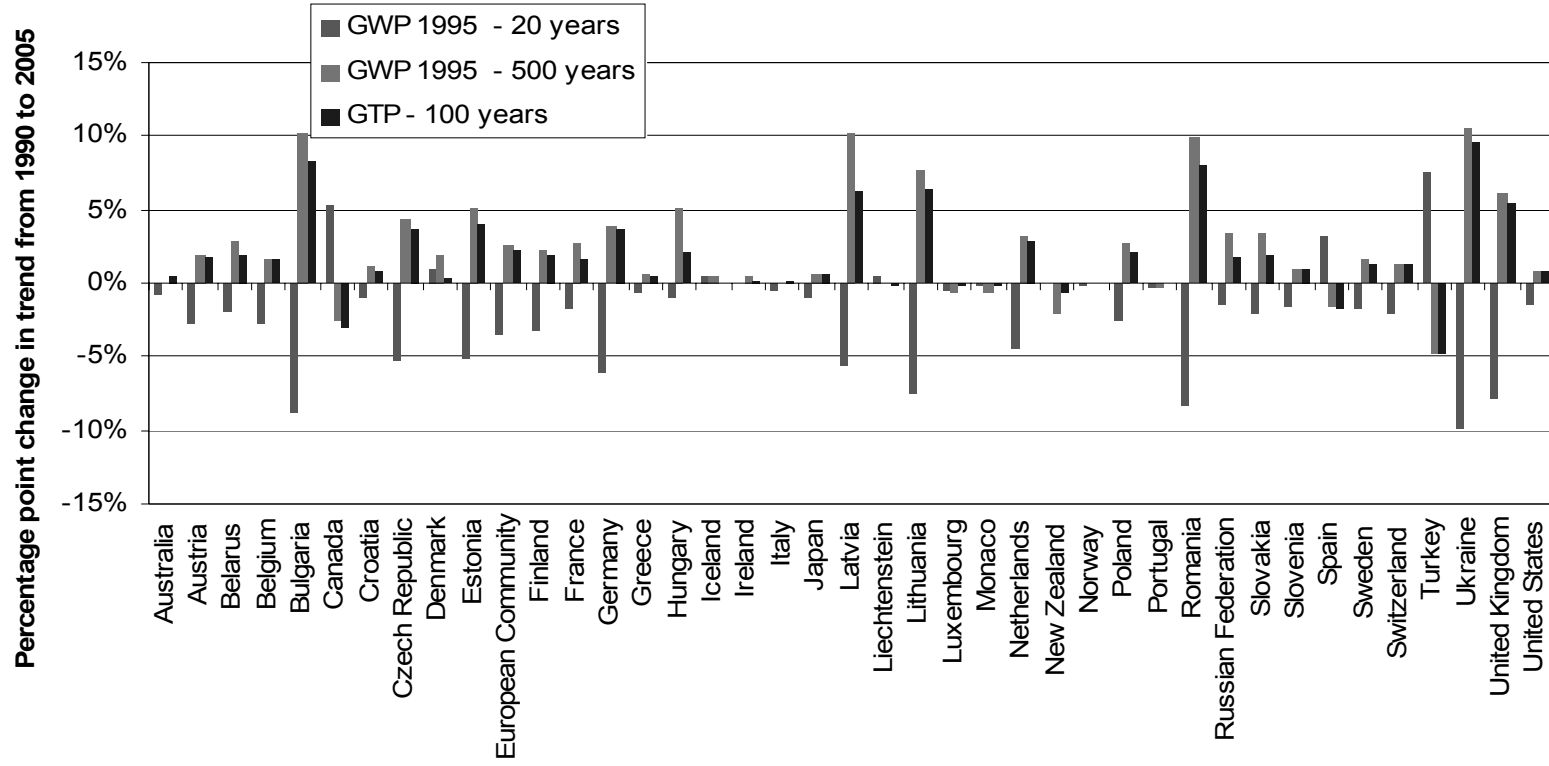
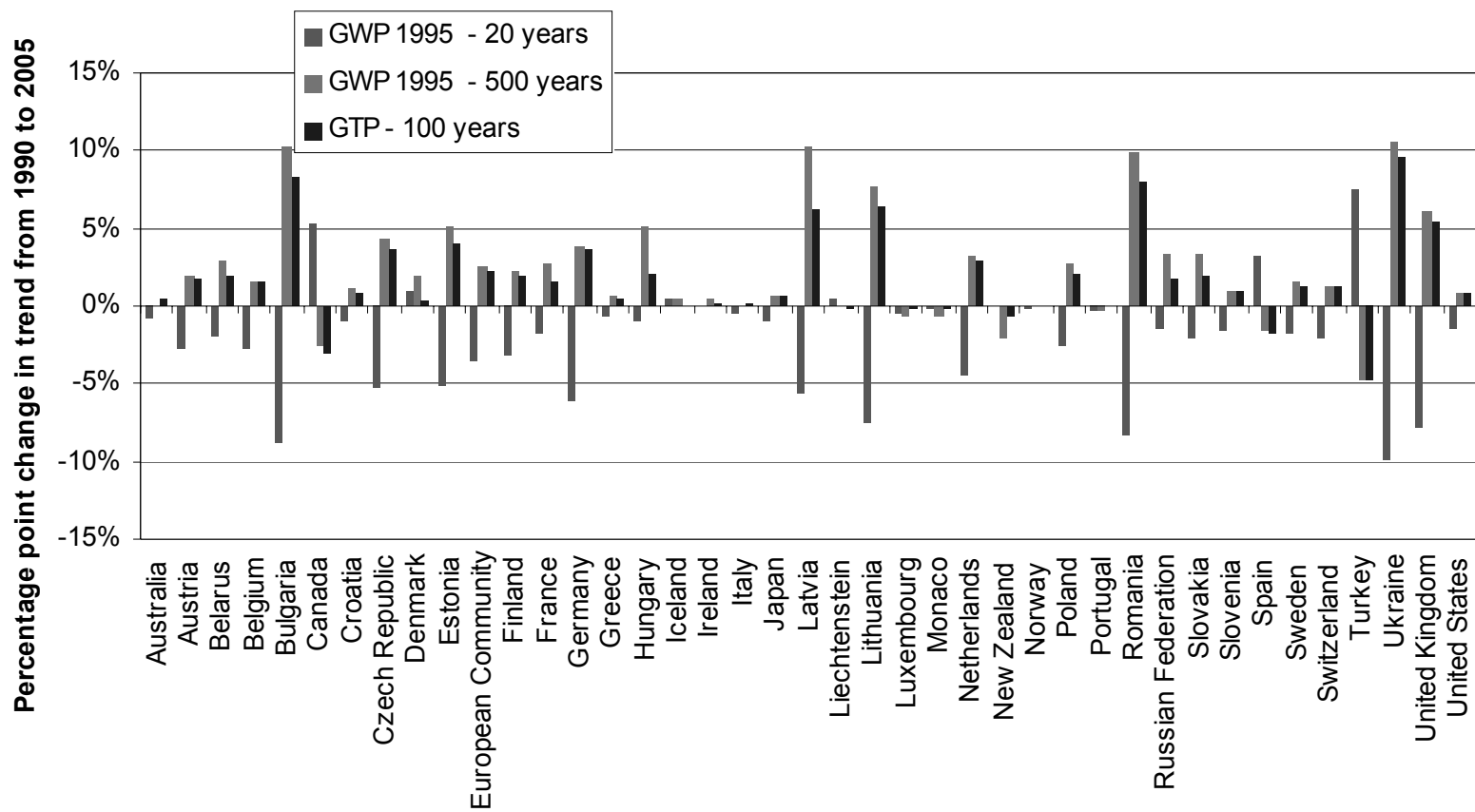


Figure 5. Percentage point change in trend from 1990 to 2005 of Parties due to moving from a 100-year to a 20- or 50-year time horizon or moving to global temperature potentials (only carbon dioxide, methane and nitrous oxide are considered).



Annex V**List of abbreviations used in the paper**

2006 IPCC Guidelines	<i>2006 IPCC Guidelines for National Greenhouse Gas Inventories</i>
AAU	assigned amount unit
AIE	accredited independent entity
AR	afforestation and reforestation under Article 3.3
AR4	Fourth Assessment Report of the IPCC
ARD	afforestation, reforestation and deforestation under Article 3.3
AWG-KP	Ad Hoc Working Group on Further Commitments for Annex I Parties under the Kyoto Protocol
CDM	clean development mechanism
CER	certified emission reduction
CM	cropland management under Article 3.4
CMP	Conference of the Parties serving as the Meeting of the Parties to the Kyoto Protocol
CPR	commitment period reserve
DFP	designated focal point
DNA	designated National Authority
DOE	designated operational entity
EBM	energy balance model
ERU	emission reduction unit
FM	forest management under Article 3.4
GDP	gross domestic product
GHG	greenhouse gas
GM	grazing land management under Article 3.4
GTPs	global temperature potentials
GWPs	global warming potentials
HCFs	hydrofluorocarbons
HWPs	harvested wood products
IEA	International Energy Agency
IPCC	Intergovernmental Panel on Climate Change
ITL	international transaction log
JI	joint implementation
JISC	Joint Implementation Supervisory Committee
ICER	long-term CER
LDC	least developed country
LULUCF	land use, land-use change and forestry
NMVOCs	non-methane volatile organic compounds
PFCs	perfluorocarbons
PoA	programme of activities
Revised 1996 IPCC Guidelines	<i>Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories</i>
RMU	removal unit

RV	revegetation under Article 3.4
SIDS	small island developing States
tCER	temporary CER

Annex VI**List of options analysed in the paper****Possible improvements to emissions trading and the project based mechanism under the Kyoto Protocol**Clean development mechanism

- Option 3.1: Allow new nuclear plants as clean development mechanism project activities
- Option 3.2a: Introduce sectoral clean development mechanism project activities for emission reductions below a sectoral baseline
- Option 3.2b: Introduce sectoral crediting of emission reductions below a no-lose target
- Option 3.3: Change the composition of the Executive Board membership to ensure equitable representation of Parties
- Option 3.4: Move the secretariat's function of supporting the Executive Board to another organization
- Option 3.5: Introduce alternative institutional arrangements for validation, verification and certification
- Option 3.6: Broaden the role of host Party governments
- Option 3.7a: Standardized, multi-project baselines
- Option 3.7b: Positive or negative lists of project activity types
- Option 3.8: Differentiate the eligibility of Parties to host clean development mechanism project activities
- Option 3.9: Improve access to clean development mechanism project activities by certain host Parties
- Option 3.10a: Allocate minimum quotas to project activity types that contribute more to the sustainable development of host Parties
- Option 3.10b: Allocate minimum quotas to specific groups of host Parties
- Option 3.11: Include monetary and other co-benefits as additional criteria for the registration of project activities
- Option 3.12: Include technology transfer as an additional criterion for the registration of project activities
- Option 3.13: Restrict the clean development mechanism to bilateral project activities
- Option 3.14: Introduce multiplication factors to increase or decrease the certified emission reductions issued for specific project activity types

Joint implementation

- Option 3.15: Introduce modalities for the graduation of Parties from hosting clean development mechanism project activities to joint implementation projects
- Option 3.16: Change the composition of the Joint Implementation Supervisory Committee membership to ensure equitable representation of Parties
- Option 3.17: Move the secretariat's function of supporting the Joint Implementation Supervisory Committee to another organization
- Option 3.18: Introduce alternative institutional arrangements for determination and verification
- Option 3.19: Broaden the role of host Party governments
- Option 3.20: Positive or negative lists of project types
- Option 3.21: Differentiate the eligibility of Parties to host joint implementation projects

- Option 3.22: Improve access to joint implementation projects by certain host Parties
- Option 3.23a: Allocate minimum quotas to project types that contribute more to the sustainable development of host Parties
- Option 3.23b: Allocate minimum quotas to specific groups of host Parties
- Option 3.24: Include monetary and other co-benefits as additional criteria for the final determination for projects
- Option 3.25: Include technology transfer as an additional criterion for the final determination for projects
- Option 3.26: Restrict joint implementation to bilateral projects
- Option 3.27: Introduce multiplication factors to increase or decrease the emission reduction units issued for specific project types

Emissions trading

- Option 3.28: Introduce emissions trading based on sectoral targets
- Option 3.29: Introduce the linking of emissions trading between Annex I Parties and voluntary emissions trading schemes in non-Annex I Parties
- Option 3.30: Improve the basis for linking of national or regional emissions trading schemes across Annex I Parties
- Option 3.31: Eliminate restrictions on the trading and use of certain Kyoto unit types under national and regional emissions trading schemes
- Option 3.32: Enhance equivalence among Kyoto unit types
- Option 3.33a: Reduce the commitment period reserve
- Option 3.33b: Increase the commitment period reserve
- Option 3.34: Encourage disclosure of information on transactions of Kyoto units
- Option 3.35: Move the secretariat's function of maintaining and operating the international transaction log to another organization

Cross-cutting issues

- Option 3.36: Relax or eliminate carry-over restrictions on Kyoto units
- Option 3.37: Introduce borrowing of assigned amount from future commitment periods
- Option 3.38: Reduce the number of unit types established under the Kyoto Protocol
- Option 3.39: Introduce a mid-commitment period assessment and review process

Addressing the definitions, modalities, rules and guidelines for the treatment of land use, land-use change and forestry in the second commitment period

Activity-based approach

- Option 4.1: No changes to current rules
- Option 4.2: Change only the treatment of forest management
- Option 4.2a: Apply discount factors to forest management
- Option 4.2b: Apply net-net accounting to forest management
- Option 4.3: Harmonize the treatment of activities under Articles 3.3. and 3.4.
- Option 4.3a: Apply current definitions, modalities, rules and guidelines in the second commitment period, but apply net-net accounting to all activities
- Option 4.3b: Allow "land use flexibility" under Article 3.3
- Option 4.3c: Add new eligible activities under Article 3.4

Land-based accounting

- Option 4.4: Apply accounting based on reporting under the Convention: all land-use categories mandatory and net-net accounting

Options applicable to either an activity-based or a land-based approach to land use, land-use change and forestry

- Option 4.5: Deal with inter-annual fluctuations
- Option 4.5a: Apply a temporary removal from accounting of areas subject to natural disturbances
- Option 4.5b: Apply a base-year period instead of a single base year
- Option 4.5c: Apply forward-looking baselines
- Option 4.6: Use mandatory reporting and accounting of land use, land-use change and forestry
- Option 4.7: Limit the scale of land use, land-use change and forestry

Harvested wood products

- Option 4.8: Include harvested wood products in the accounting

Approaches targeting sectoral emissions in Annex I Parties

- Option 5.1: Introduce approaches targeting sectoral emissions
- Option 5.1a: Use bottom-up sectoral analysis to inform the discussion on mitigation potentials of Annex I Parties

Broadening the coverage of greenhouse gases, sectors and source categories Gases

- Option 6.1: Add new greenhouse gases to Annex A of the Kyoto Protocol

Relevant methodological issues

- Option 7.1: Apply the 2006 IPCC Guidelines
- Option 7.2: Use latest global warming potentials from the Intergovernmental Panel on Climate Change
- Option 7.3: Use a time horizon other than 100 years (20 or 500 years)
- Option 7.4: Use global temperature potentials
