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Implications of the implementation of decisions 2/CMP.7 to 4/CMP.7 and 1/CMP.8 on the previous decisions on methodological issues related to the Kyoto Protocol, including those relating to Articles 5, 7 and 8 of the Kyoto Protocol

Technical paper

Summary

This technical paper identifies the implications of the implementation of decisions 2/CMP.7 to 4/CMP.7 and 1/CMP.8 on the previous decisions on methodological issues related to the Kyoto Protocol, including those relating to Articles 5, 7 and 8 of the Kyoto Protocol. This technical paper updates and extends the technical paper FCCC/TP/2013/9, reflecting the status of work as at June 2014 and any submissions from Parties on the subject matter, and addressing the update of the conservativeness factors contained in appendix III to the annex to decision 20/CMP.1.

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I. Introduction

A. Mandate

1. In response to the request made by the Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol (CMP),[1] the Subsidiary Body for Scientific and Technological Advice (SBSTA), at its thirty-sixth session, initiated work to assess and address the implications of the implementation of decisions 2/CMP.7 to 5/CMP.7 on the previous CMP decisions on methodological issues related to the Kyoto Protocol, including those relating to Articles 5, 7 and 8. At the same session, the SBSTA requested the secretariat to prepare a technical paper[2] that includes a comprehensive identification of such implications. That technical paper is available as document FCCC/TP/2012/6.

2. The CMP, by decision 2/CMP.8, paragraph 6, requested the SBSTA to continue to assess and address the implications of the implementation of decisions 2/CMP.7 to 4/CMP.7,[3] as well as those of decision 1/CMP.8, on the relevant decisions adopted for the first commitment period, with the aim of finalizing its consideration and proposing for consideration and adoption at CMP 9 any changes to such decisions.[4]

3. To facilitate the finalization of the work for consideration at CMP 10, SBSTA 40 requested the secretariat[5] to update and extend the technical paper FCCC/TP/2013/9[6] reflecting the status of work as at June 2014, addressing the update of the conservativeness factors contained in appendix III to the annex to decision 20/CMP.1, including the consideration of the default uncertainties in the Intergovernmental Panel on Climate Change (IPCC) *2006 IPCC Guidelines for National Greenhouse Gas Inventories* (hereinafter referred to as the 2006 IPCC Guidelines) and reflecting any submissions from Parties on related matters.

B. Background information

4. As at June 2014, Parties had addressed the implications referred to in paragraphs 1 and 2 above through the following decisions:

(a) Decision 2/CMP.8 defined the timing and content of the report to facilitate the calculation of the assigned amount for the second commitment period;

(b) The same decision defined the information relating to the reporting of land use, land-use change and forestry (LULUCF) activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol that needs to be submitted together with the annual greenhouse gas (GHG) inventory in the second commitment period;

(c) Decision 6/CMP.9 adopted the guidance for submission of information on anthropogenic GHG emissions by sources and removals by sinks from LULUCF activities

[1] Decision 1/CMP.7, paragraph 9.
[2] FCCC/SBSTA/2012/2, paragraph 123(a).
[3] In decision 2/CMP.8, paragraph 1, the CMP agreed that decision 5/CMP.7 does not result in any modification to the previous decisions.
[4] In decision 2/CMP.8, paragraph 7, the CMP noted that some of the work on the implications referred to in paragraph 2 above might only be completed by CMP 10.
[5] FCCC/SBSTA/2014/2, paragraph 137(a).
[6] SBSTA 38 requested the secretariat to update and extend the technical paper contained in FCCC/TP/2012/6, addressing issues not yet covered in that technical paper. The updated and extended technical paper is available as FCCC/TP/2013/9.

under Article 3, paragraphs 3 and 4, pursuant to Article 5, paragraph 2, of the Kyoto Protocol in the second commitment period, including the common reporting format (CRF) tables.

5. Furthermore, Parties have advanced the negotiations on the above-mentioned implications as follows:

(a) CMP 9 requested the SBSTA to continue consideration of the relevant implications on the basis of the "In-session discussion text relating to item 12(a) of SBSTA 39 and item 3(a) of CMP 9";[7]

(b) SBSTA 40 agreed to continue to work on the text contained in the "Note by the co-facilitators – elements of text relating to review and adjustment".[8]

6. The previous technical paper, as referred to in paragraph 3 above, reflects the progress achieved through the adoption of decision 2/CMP.8. Therefore, in updating and extending that document, the present technical paper focuses on reflecting the progress in the negotiations achieved through decision 6/CMP.9 and the texts referred to in paragraph 5(a) and (b) above.

C. Scope and structure of the technical paper

7. This technical paper was prepared in response to the mandate referred to in paragraph 3 above. It aims at facilitating the further deliberations on the above-mentioned implications by the SBSTA, including facilitation of the technical discussions to be held in preparation for SBSTA 41.[9]

8. This technical paper is based on the technical paper referred to in paragraph 3 above and contains the following sections:

(a) Addressing references to decisions, Articles of the Kyoto Protocol, IPCC methodologies for estimating anthropogenic GHG emissions by sources and removals by sinks, gases and the commitment period;

(b) Addressing the substantive implications of decisions 2/CMP.7 to 4/CMP.7, 1/CMP.8 and 2/CMP.8, and structured along the following subsections:

(i) Calculation of the initial assigned amount and review of the report to facilitate the calculation of the assigned amount for the second commitment period;

(ii) Carry-over and previous period surplus reserve accounts;

(iii) Article 3, paragraph 7 ter, in the Doha Amendment to the Kyoto Protocol;[10]

(iv) Share of proceeds;

(v) Any increases in ambition as referred to in decision 1/CMP.8, paragraphs 7 and 8, and Article 3, paragraphs 1 ter and 1 quater, in the Doha Amendment;

(vi) LULUCF issues not covered in decisions 2/CMP.8 and 2/CMP.7;

[7] FCCC/KP/CMP/2013/9, paragraph 36. The discussion text is available at <http://unfccc.int/7969.php>.

[8] FCCC/SBSTA//2014/2, paragraph 138. The note by the co-facilitators is available at <http://unfccc.int/8412.php>.

[9] The SBSTA requested the secretariat to explore ways to facilitate such technical discussion in FCCC/SBSTA/2014/2, paragraph 137(c).

[10] Annex I to decision 1/CMP.8.

(vii) Clarification of reporting requirements for Parties included in Annex I to the Convention (Annex I Parties) without a quantified emission limitation and reduction commitment (QELRC) for the second commitment period.

9. In addition, sections have been added to the technical paper to address the relevant implications for the review process under Article 8 of the Kyoto Protocol, and the issues relating to adjustments and conservativeness factors.

10. In presenting the progress made in negotiations, and wherever necessary, distinction is made between the issues resolved by the adoption of decisions 2/CMP.8 and 6/CMP.9, and the issues advanced but not yet definitely adopted (the in-session discussion text from SBSTA 39 and CMP 9 and the note by the co-facilitators from SBSTA 40 as referred to in para. 5(a) and (b) above).

D. Possible action by the Subsidiary Body for Scientific and Technological Advice

11. The SBSTA may wish to consider this paper in its deliberations under the relevant agenda item at SBSTA 41.

II. Submissions from Parties

12. The European Union (EU) made a submission on related matters on 2 June 2014,[11] which was discussed during SBSTA 40. Specific key issues covered by this submission are presented in the different sections of chapter V below.

13. In addition, the EU noted in its submission that decision 18/CMP.1 (Criteria for cases of failure to submit information relating estimates of greenhouse gas emissions by sources and removals by sinks from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol) is still applicable.

14. Furthermore, the EU reiterated its position that, upon agreement on all issues referred to in paragraph 1 above, all the outputs should be compiled into user-friendly documents (guidelines, instructions and/or decisions) addressing all reporting, review and accounting issues in one place, in order to facilitate and ensure their implementation, and that the secretariat should be requested to undertake this task.

15. On 22 August 2014, New Zealand made a submission[12] in which it expressed its gratitude to the EU for the submission of 2 June, and its hopes that discussions under this agenda item could be finalized at SBSTA 41 and that updated modalities and guidelines relating to Articles 5, 7 and 8 of the Kyoto Protocol could be adopted at CMP 10.

III. General considerations

16. The consideration of the implications must take into account that the provisions related to the first commitment period remain valid for this period even after the rules for the second commitment period become effective, and when addressing the implications it must be ensured that the provisions ensure the simultaneous implementation of both commitment periods.

[11] Available on the UNFCCC website at <http://unfccc.int/documentation/submissions_from_parties/items/5900.php>.

[12] As footnote 11 above.

17. In addressing the implications, Parties have used the same approach in decisions 2/CMP.8 and 6/CMP.9, as well as in the texts referred to in paragraph 5(a) and (b) above. This approach is based on using overarching decisions combined with annexes for thematic methodological issues. It is assumed that Parties may use the same approach in their further deliberations.

IV. References to Articles of the Kyoto Protocol, methodologies of the Intergovernmental Panel on Climate Change and decisions, and any other consequential changes related to references

18. Decisions 2/CMP.8 and 6/CMP.9 addressed the issue of referencing by defining general changes and updates in the overarching part of the decisions whenever these changes apply to more than one previous decision for the first commitment period of the Kyoto Protocol, and identifying changes to specific references in the annexes whenever these apply to a single previous decision. A similar approach was used in the in-session discussion text and in the note by the co-facilitators. It may be assumed that Parties will consider using the same approach in their further deliberations.

19. Overall, considerable progress has been made in identifying the remaining consequential changes to references, captured in both the in-session discussion text and the note by the co-facilitators. Nevertheless, Parties may wish to consider the following additional updates of references to ensure full comprehensiveness:

(a) In paragraph 3 of the note by the co-facilitators, decisions 18/CMP.1, 19/CMP.1, 20/CMP.1 and 22/CMP.1 should be included in the update of references identified under that paragraph;

(b) In paragraph 69(b) of the annex to decision 22/CMP.1, the reference to the IPCC *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories* (hereinafter referred to as the IPCC good practice guidance) should be replaced by a reference to the 2006 IPCC Guidelines;

(c) In paragraph 14(a) of the annex to decision 19/CMP.1, the reference to chapter 7, paragraph 7.2, of the IPCC good practice guidance should be replaced by a reference to chapter 4.3 of the 2006 IPCC Guidelines.

V. Substantive implications of decisions 2/CMP.7 to 4/CMP.7, 1/CMP.8 and 2/CMP.8

A. Calculation of the initial assigned amount and the review of the report to facilitate the calculation of the assigned amount for the second commitment period

20. At CMP 8, Parties decided on the information to be included in the report to facilitate the calculation of the assigned amount for the second commitment period, taking into account decisions 2/CMP.7 to 4/CMP.7.[13] However, a number of related reporting and accounting issues were not resolved at CMP 8 and were addressed at CMP 9 in the in-session discussion text. These issues are as follows:

[13] Decision 2/CMP.8, annex I.

(a) Calculation of the assigned amounts pursuant to Article 3, paragraphs 7 bis, 8 and 8 bis;[14]

(b) Cancellation pursuant to Article 3, paragraph 7 ter;[15]

(c) Recording of the assigned amounts pursuant to Article 3, paragraphs 7 bis, 8 and 8 bis;[16]

(d) Additions to, and subtractions from, the assigned amounts pursuant to Article 3, paragraphs 7 bis, 8 and 8 bis, for the accounting of the compliance assessment;[17]

(e) Basis for the compliance assessment.[18]

21. In addition, Parties have not yet decided on the modalities of the review of the report to facilitate the calculation of the assigned amount pursuant to Article 3, paragraphs 7 bis, 8 and 8 bis (see also chapter V.H below). Some of these modalities are covered in the note by the co-facilitators but the related deliberations by Parties have not yet been completed on the review of this report.[19] Implications related to the report may be identified when addressing the implications related to the good practice guidance and adjustments under Article 5, paragraph 2, of the Kyoto Protocol (see also chapter V.I below).[20]

B. Carry-over and previous period surplus reserve accounts

22. Decision 1/CMP.8, paragraphs 23–26, contains revised modalities for carry-over of Kyoto Protocol units. The in-session discussion text contains, in the section entitled "Transfer, acquisition, cancellation, retirement and carry-over", additional accounting modalities, but the CMP has not adopted a decision on these modalities.

C. Article 3, paragraph 7 ter, in the Doha Amendment to the Kyoto Protocol

23. As set out in section G (Article 3, paragraph 7 ter) of the Doha Amendment, any positive difference between the assigned amount of the second commitment period for a Party included in Annex I and average annual emissions for the first three years of the preceding commitment period multiplied by eight shall be transferred to the cancellation account of that Party.

24. A number of related reporting and accounting issues have been considered, but not yet finalized and formally adopted by Parties, in the following sections of the in-session discussion text :

(a) Calculation of the assigned amounts pursuant to Article 3, paragraphs 7 bis, 8 and 8 bis;

(b) Cancellation pursuant to Article 3, paragraph 7 ter;

(c) Recording of the assigned amounts pursuant to Article 3, paragraphs 7 bis, 8 and 8 bis.

[14] In-session discussion text, annex I, paragraphs 2–4.
[15] In-session discussion text , annex I, chapter I.B.bis.
[16] In-session discussion text, annex I, paragraph 5.
[17] In-session discussion text, annex I, paragraphs 6–8.
[18] In-session discussion text, annex I, paragraph 9.
[19] Note by the co-facilitators, paragraphs 68.
[20] Note by the co-facilitators, paragraphs 20–36.

25. In addition, the "Guidelines for review under Article 8 of the Kyoto Protocol" (hereinafter referred to as the Article 8 review guidelines) may need to be revised for the second commitment period (see also chapter V.H below) on matters related to Article 3, paragraph 7 ter, in the Doha Amendment, in particular on matters related to the review of the report to facilitate the calculation of the assigned amount, including:

(a) The information to be reviewed during the initial review, as contained in paragraph 12 to the annex to decision 22/CMP.1;

(b) The general procedures for review of information on assigned amounts, where Parties may also wish to refer to the cancellation in relation to Article 3, paragraph 7 ter, in the Doha Amendment, depending on the timing for effectuating such cancellations.

26. The note by the co-facilitators does not cover the issues referred to in paragraph 25 above.

D. Share of proceeds

27. Decision 1/CMP.8, paragraphs 20–22, contains modalities for the share of proceeds to assist developing country Parties that are particularly vulnerable to the adverse effects of climate change to meet the costs of adaptation. Most of the related accounting and reporting issues have been addressed in the in-session discussion text, under "Share of proceeds", but the CMP has not adopted a decision on these issues.

28. The Article 8 review guidelines (in particular chapter III), may need to be revised to reflect the changes in the reporting of the information pertaining to the share of proceeds.

E. Increases in ambition as referred to in decision 1/CMP.8, paragraphs 7 and 8, and Article 3, paragraphs 1 ter and 1 quater, in the Doha Amendment

29. By decision 1/CMP.8, paragraph 7, the CMP agreed that each Party included in Annex I will revisit its QELRC for the second commitment period by decreasing its percentage inscribed in the third column of Annex B in the Doha Amendment at the latest by 2014. Paragraphs 7–11 of the same decision established a set of relevant steps and deadlines.

30. In accordance with paragraph 10 of decision 1/CMP.8, a high-level ministerial round table was held during SBSTA 40 to consider information submitted by Parties relating to their intention to increase the ambition of their commitment, including progress made towards achieving their QELRC, the most recently updated projections for GHG emissions until the end of the second commitment period, and the potential for increasing ambition. The report on the round table[21] will be considered at CMP 10.

31. In addition, some related reporting and accounting issues have been addressed in the in-session discussion text in annex II, "Standard electronic format for reporting information on Kyoto Protocol units", but the CMP has not adopted a decision on these issues.

F. Land use, land-use change and forestry issues not covered in decisions 2/CMP.8 and 2/CMP.7

32. The issues related to this section have been addressed by decision 6/CMP.9.

[21] FCCC/KP/CMP/2014/3.

G. Clarification of reporting requirements for Parties included in Annex I to the Convention without a quantified emission limitation and reduction commitment for the second commitment period

33. The provisions of the Kyoto Protocol, of the Doha Amendment and of the CMP decisions relation to accounting, reporting and review include different forms of references to Annex I Parties (Party; Party included in Annex I; Party included in Annex I with a commitment inscribed in Annex B to the Kyoto Protocol; and Party included in Annex I with a commitment inscribed in Annex B in the Doha Amendment).[22]

34. Annex B to the Kyoto Protocol as contained in annex I to decision 1/CMP.8 includes references to a number of Parties for which there are values for QELRCs for the first commitment period, but no values for QELRCs for the second commitment period in the third column of the table. Such Parties would retain some of the obligations under the Kyoto Protocol, the Doha Amendment and its decisions, while some other obligations arising from commitments inscribed in Annex B would not be relevant to them in the second commitment period. Therefore, it appears necessary to clarify references to the relevant Parties in relation to the various provisions of the CMP decisions.

35. For some provisions, CMP decisions have clarified the scope of the application of the provisions, such as the following:

(a) The due date and information to include in the report to facilitate the calculation of the assigned amount (decision 2/CMP.8, paragraphs 2 and 3, clarifies that this report is for Parties with a commitment inscribed in the third column of Annex B);

(b) Provisions related to the calculation of the assigned amount and linked calculations (Article 3, paragraphs 7 bis, 7 ter, 8 and 8 bis, in the Doha Amendment, and relevant provisions in decision 13/CMP.1);

(c) The submission of standard electronic format (SEF) tables for the second commitment period (decision 2/CMP.8, paragraph 5, clarified that this submission is for Parties with a commitment inscribed in the third column of Annex B);

(d) Reporting of information on LULUCF activities under Article 3, paragraphs 3 and 4, and Article 7 of the Kyoto Protocol, in accordance with decision 2/CMP.8, paragraph 4, and annex II, refers to Parties included in Annex I in general;

(e) The national system in accordance with Article 5, paragraph 1, of the Kyoto Protocol and the guidelines for national systems (decision 19/CMP.1);

(f) The methodologies for estimating emissions by sources and removals by sinks, in accordance with Article 5, paragraph 2, of the Kyoto Protocol, and global warming potentials, in accordance with Article 5, paragraph 3, taking into consideration what was agreed in decisions 4/CMP.7 and 6/CMP.9;

(g) The scope of participation by Parties included in Annex I with or without a commitment inscribed in the third column of Annex B in market-based mechanisms referred to in Articles 6, 12 and 17 of the Kyoto Protocol. Decision 1/CMP.8, chapter IV, lays out the rules in relation to participation in market-based mechanisms in the second commitment period.

36. Regarding Parties without QELRCs in the second commitment period, Parties may wish to discuss and clarify the following:

[22] See also document FCCC/SBSTA/2013/3/Add.2, pages 43–50.

(a) Article 3, paragraph 1 bis, in the Doha Amendment, regarding which Annex I Parties are included in the overall emissions referred to in that paragraph;

(b) Article 3, paragraphs 1 ter and 1 quater, in the Doha Amendment are not likely to be applicable to Parties without QELRCs in the second commitment period because although these provisions refer to Parties included in Annex B and Parties included in Annex I, respectively, they do so in conjunction with cross references to the third column of Annex B or the commitment under Article 3, paragraph 1 ter;

(c) Article 3, paragraph 7 ter, in the Doha Amendment refers to Parties included in Annex I in general and does not specify what sort of action a Party without a QELRC in the third column of Annex B, as contained in annex I to decision 1/CMP.8, would have to take with regard to the cancellation of units in accordance with the amendment for Article 3, paragraph 7 ter;

(d) Provisions related to the applicability and calculation of the commitment period reserve (the calculation of the commitment period reserve was addressed in decision 11/CMP.1, annex, paras. 6–10, and decision 1/CMP.8, para. 18);

(e) Provisions related to carry-over of units to subsequent commitment periods. Decision 1/CMP.8, paragraphs 23–26, refers to the establishment of previous period surplus reserve accounts and the limits of carry-over for Parties included in Annex I with a commitment inscribed in the third column of Annex B, but silent as to whether the rules in paragraphs 15 and 16 of the annex to decision 13/CMP.1 continue to apply to all Annex I Parties, including those without a commitment inscribed in the third column of Annex B;

(f) Provisions related to registry requirements, the issuance of removal units (RMUs) and the cancellation of units;

(g) Submission of supplementary information required under Article 7 of the Kyoto Protocol, including:

(i) Information on emission reduction units (ERUs), certified emission reductions (CERs), RMUs and assigned amount units (AAUs) not reported in a SEF table. This refers in particular to the information referred to in decision 15/CMP.1, annex, paragraphs 12–20;

(ii) Changes in national systems;

(iii) Changes in national registries;

(iv) Minimization of adverse impacts in accordance with Article 3, paragraph 14;

(v) Reporting of supplementary information under Article 7, paragraph 2;

(h) The modalities for review of information submitted by such Parties under Article 7 of the Kyoto Protocol and decision 22/CMP.1, and the calculation of adjustments under Article 5, paragraph 2, of the Kyoto Protocol and decision 20/CMP.1.

37. Some issues related to this section have been addressed in paragraphs 11 and 12, and annex II, paragraph 1, of the in-session discussion text and paragraph 6 of the note by the co-facilitators, relating to reporting and accounting. The CMP has not adopted a decision on these issues.

38. As proposed in a submission from a Party, Parties may wish to consider that Parties without a QELRC for the second commitment period should continue to report in a manner consistent with the requirements for Annex I Parties with a QELRC for the second commitment period, whereas requirements directly related to accounting for QELRCs would no longer apply to these Parties.

39. In addition, this Party made the proposal that:

(a) Requirements related to the registry and reporting of Kyoto Protocol units should continue as long as the registries are in place;

(b) Adjustment procedures during reviews would continue to provide incentives for all Parties to provide accurate and complete estimates in the national inventory. This would also enhance the provision to the CMP of comprehensive and accurate information on the national total emissions.

40. To provide more clarity on this matter, Parties could retain the current use of references in all earlier decisions but provide a clarification on their respective scope in an overarching decision. Alternatively, they could review all the references to Parties in earlier methodological decisions to provide better clarity on where a provision applies to all Annex I Parties, and where only to those with a commitment inscribed in Annex B in the Doha Amendment.

H. Implications for the guidelines for review under Article 8 of the Kyoto Protocol

41. At SBSTA 40, Parties discussed and recorded in the note by the co-facilitators proposals related to the review under Article 8 of the Kyoto Protocol, including:

(a) The review of the report to facilitate the calculation of the assigned amounts pursuant to Article 3, paragraphs 7 bis, 8 and 8 bis, in the Doha Amendment, including a definition of the information subject to review, the arrangements to perform reviews and the scope of the review;

(b) The review of national systems and national registries, in particular the information contained in national systems and national registries during annual inventory reviews;

(c) The review of the standard independent assessment report (SIAR). The text formalizes the preparation and use of SIARs under the scope of the review of information on assigned amount pursuant to Article 3, paragraphs 7 and 8, ERUs, CERs, AAUs, and RMUs. The SIAR reports should cover information on any discrepancies or non-replacement and indication of any issues related to accounting, transactions and reporting of units under the Kyoto Protocol.

42. The UNFCCC guidelines for the technical review of greenhouse gas inventories from Parties included in Annex I to the Convention are currently being revised and a decision on the revised review guidelines under the Convention is expected for COP 20.[23]

43. The review guidelines under the Convention and those under the Kyoto Protocol cover common areas such as the organization of reviews (desk reviews, centralized reviews and in-country reviews), the scope of the review phases and the timing of the reviews. One Party in its submission stated that any agreement under the Convention should also apply under the Kyoto Protocol; keeping the same approach to organizing the reviews would allow inventory reviews under the Convention to continue to be conducted in conjunction with those under the Kyoto Protocol. This Party also suggests that when addressing these procedural issues, the review guidelines under the Kyoto Protocol should only refer to the review guidelines under the Convention and not duplicate the provisions in both the review guidelines under the Convention and under the Kyoto Protocol.

44. Therefore, Parties may wish to pay particular attention, while revising the review guidelines under the Kyoto Protocol, to some of the issues covered under the both the

[23] The latest draft version of these guidelines, based on the discussions which took place at SBSTA 40 and based on submissions from Parties, is contained in document FCCC/SBSTA/2014/INF.14.

review guidelines under the Convention and the review guidelines under the Kyoto Protocol, including the consistency of the provisions in terms of:

(a) Objectives; expert review teams, including the composition, competencies and role of experts and lead reviewers; and the role of the secretariat;

(b) General procedures (periodicity of the reviews and the stages);

(c) The scope, timing and reporting procedures for each review stage.

45. Specific proposals for the revision of the review guidelines under the Kyoto Protocol were available from one Party, and the majority of the issues covered in this proposal are already captured in the note by the co-facilitators. However, some others have not yet been addressed, such as:

(a) Changes related to the timing and procedure of the initial review (decision 22/CMP.1, annex, para. 85(a));

(b) Changes related to the review of national inventory systems and national registries (decision 22/CMP.1, annex, paras. 98, 108 and 111);

(c) Changes arising from a future decision on inventory review guidelines under the Convention (decision 22/CMP.1, annex, paras. 40, 52, 55–57, 59–63 , 65–67, 69(d)(i), 80(a) and (b), and 81);

(d) Changes arising from the adoption of decision 9/CMP.9[24] (decision 22/CMP.1, annex, para. 19).

I. Good practice and technical guidance on methodologies for adjustments under Article 5, paragraph 2, of the Kyoto Protocol

1. Good practice and technical guidance

46. At SBSTA 40, Parties discussed and captured progress in proposals in the note by the co-facilitators related to adjustments under Article 5, paragraph 2, of the Kyoto Protocol, including:

(a) Practical changes resulting from the second commitment period (e.g. revision of para. 11 of the annex to decision 22/CMP.1);

(b) Revision of the rules for LULUCF as contained in decisions 2/CMP.7 and 6/CMP.9 (e.g. revision of paras. 23–27 and 29–31 of the note by the co-facilitators);

(c) Revision of the list of IPCC categories and gases (e.g. revision of para. 33 in the note by the co-facilitators).

47. As suggested in the submission from one Party, Parties may wish to consider the following:

(a) Updates of references as addressed above;

(b) Update of conservativeness factors to ensure consistency with the 2006 IPCC Guidelines, the IPCC *2013 Revised Supplementary Methods and Good Practice Guidance Arising from the Kyoto Protocol* and the *2013 Supplement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories: Wetlands* (hereinafter referred to as the Wetlands Supplement), in accordance with decisions 24/CP.19 and 6/CMP.9;

[24] Supplementary information incorporated in sixth national communications submitted in accordance with Article 7, paragraph 2, of the Kyoto Protocol.

(c) Updates to take into account changes in the accounting of LULUCF activities (decision 2/CMP.7) ;

(d) Changes to take into account experiences of the application of adjustments in reviews;

(e) Ensuring consistency across decisions, in particular the timing section in appendix II to the annex to decision 20/CMP.1.

2. Conservativeness factors

48. As discussed in paragraph 49 below, Parties may wish to update the tables of conservativeness factors, which are included in appendix III to the annex to decision 20/CMP.1, taking into consideration:

(a) Revised categories and GHGs in accordance with the revised UNFCCC reporting guidelines[25] and decision 4/CMP.7 (e.g. explicit treatment of carbon dioxide capture);

(b) The use of the 2006 IPCC Guidelines, the IPCC *2013 Revised Supplementary Methods and Good Practice Guidance Arising from the Kyoto Protocol* and the Wetlands Supplement, as implemented in accordance with decisions 24/CP.19 and 6/CMP.9;

(c) Revised rules arising from decisions 2/CMP.7 and 6/CMP.9 on LULUCF activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol.

3. Methodology and assumptions for the calculation of conservativeness factors

49. The secretariat has prepared elements for a proposal for the revision of the conservativeness factors following the same approach as that set out in appendix III to the annex to decision 20/CMP.1.

50. These conservativeness factors are derived from uncertainty values and parameters provided in the 2006 IPCC Guidelines, the IPCC *2013 Revised Supplementary Methods and Good Practice Guidance Arising from the Kyoto Protocol* and the Wetlands Supplement, have been used together with the 2006 IPCC Guidelines. In some cases, the uncertainty values are determined by expert judgement using the following rules:

(a) If the 2006 IPCC Guidelines provide an uncertainty range for a component, this range for that component is used;

(b) For some subcategories, a combined uncertainty range is calculated from the uncertainty values and/or ranges of the input parameters using the tier 1 method. The range is generated by applying the uncertainty value for the category used (e.g. solid waste disposal, and consumption of halocarbons and SF_6);

(c) In cases where the 2006 IPCC Guidelines do not provide an uncertainty range for an estimate or where a combined uncertainty range cannot be calculated because the necessary information is not available, an assessed uncertainty range, determined by an expert for the purposes of this technical guidance, is used taking into consideration the uncertainty ranges available for other subcategories.

51. The conservativeness factors for emissions are, generally, based on the uncertainty for the activity data and the uncertainty for the emission factors, using the error propagation rules (equation 3.1 of chapter 3 of 2006 IPCC Guidelines). The conservativeness factors for emissions are established in accordance with the calculated uncertainties.

[25] Decision 24/CP19.

52. The conservativeness factors are defined using the twenty-fifth or seventy-fifth percentile of the range generated by an uncertainty value for the gas and category, as appropriate, for use in an adjustment for the base year, or a year during the commitment period, assuming a log–normal distribution.

53. In line with decision 20/CMP.1, the uncertainty values have been grouped into five sets of uncertainty bands, with corresponding conservativeness factors, by assigning a given uncertainty value to a given band. These bands relate to the underlying uncertainties, as shown in table 1:

Table 1
Sets of uncertainty bands and related conservativeness factors

Estimated uncertainty range (%)	*Assigned uncertainty band (%)*	*Conservativeness factors for emissions in the base year and/or removals in a year of the commitment period*	*Conservativeness factor for emissions in a year of the commitment period and/or removals in the base year*
Less than or equal to 10	7	0.98	1.02
Greater than 10 and less than or equal to 30	20	0.94	1.06
Greater than 30 and less than or equal to 50	40	0.89	1.12
Greater than 50 and less than or equal to 100	75	0.82	1.21
Greater than 100	150	0.73	1.37

54. The conservativeness factors for a category have been defined by retaining the most stringent available value of the conservativeness factors for its subcategories. This conservativeness factor for the category may be used for the subcategories for which no conservativeness factor has already been defined or if Parties decide not to use conservativeness factors for subcategories (e.g. other categories).

55. Annex II provides two sets of conservativeness factors tables. The first set of tables (tables 3 and 4) covers conservativeness factors for sources included in Annex A to the Kyoto Protocol and the second (tables 5, 6, 7 and 8) covers conservativeness factors for land use, land-use change and forestry (LULUCF) activities.

56. For both sets of tables, the structure of the categories listed follows one of the revised CRF tables adopted by decisions 24/CP.19 and 6/CMP.9.

57. The conservativeness factors for each set of tables are provided in two parts as follows:

(a) For Annex A sources, one set of factors is used in the calculation of adjustments for a base year estimate and one for the calculation of adjustments for a year during the commitment period;

(b) For estimates of emissions and removals from LULUCF activities, separate factors are provided for emissions and removals, for use in the calculation of adjustments to the LULUCF activities during the initial review to establish a Party's assigned amount (tables 5 and 6), and for use in the calculation of adjustments of activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol during a year of the commitment period (tables 7 and 8).

58. In all of the tables, conservativeness factors are provided for emission factors or other estimation parameters, activity data, and emission or removal estimates for each IPCC category, Article 3, paragraphs 3 and 4, activity, and corresponding gas.

59. Annex III provides detailed background information on how the conservativeness factors were determined.

J. Other implications

60. Decision 19/CMP.1, annex, paragraphs 3 and 4, addresses some of the definitions in accordance with IPCC good practice guidance. Parties may wish to revisit these definitions in accordance with the 2006 IPCC Guidelines.

61. Provisions for reporting and review, following the Doha Amendment to the Kyoto Protocol, may be necessary to supplement and update the current training programme established under decision 8/CMP.5. The new training programme may, in particular, use the supplementary IPCC methodological guidance for activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, and be affected by the implementation of the new accounting rules for these activities.

Annex I

Status of the consideration of the implications of the implementation of decisions 2/CMP.7 to 4/CMP.7 and 1/CMP.8 on the previous decisions on methodological issues related to the Kyoto Protocol, including those relating to Articles 5, 7 and 8 of the Kyoto Protocol

Table 2
Summary of the progress made in negotiations and the issues not yet adopted

Implications	*Decision(s) already adopted*	*Covered in the in-session discussion text (SBSTA 39/CMP 9)*[a]	*Covered in the note by the co-facilitators (SBSTA 40)*[b]	*Decision at CMP 10 needed?*	*Outstanding issues to be discussed*
References to Articles of the Kyoto Protocol, methodologies of the Intergovernmental Panel on Climate Change and decisions, and any other consequential changes related to references	1/CMP.8 2/CMP.8 6/CMP.9	Yes	Yes	Yes	Additional references update – see chapter IV of this document
Calculation of the initial assigned amount and the review of the initial report to facilitate the calculation of the assigned amount for the second commitment period	2/CMP.8	Yes	Yes	Yes	Modalities of the review – see paragraphs 20 and 21 of this document
Carry-over and previous period surplus reserve accounts	1/CMP.8	Yes	No	Yes	Issues related to review – see paragraph 22 of this document
Article 3, paragraph 7 ter, in the Doha Amendment	1/CMP.8	Yes	No	Yes	See paragraphs 23–26 of this document
Share of proceeds	1/CMP.8	Yes	No	Yes	Issues related to review – see paragraphs 27 and 28 of this document
Increases in ambition as referred to in decision 1/CMP.8, paragraphs 7 and 8, and Article 3, paragraphs 1 ter and 1 quater, in the Doha Amendment	1/CMP.8	Yes	No	Yes	–

Implications	*Decision(s) already adopted*	*Covered in the in-session discussion text (SBSTA 39/CMP 9)*[a]	*Covered in the note by the co-facilitators (SBSTA 40)*[b]	*Decision at CMP 10 needed?*	*Outstanding issues to be discussed*
Land use, land-use change and forestry issues not covered in decisions 2/CMP.8 and 2/CMP.7 or the common reporting format tables	2/CMP.8 6/CMP.9	No	No	No	–
Clarification of reporting requirements for Parties included in Annex I to the Convention without a quantified emission limitation and reduction commitment for the second commitment period	2/CMP.8	Partly	Partly	Yes	Clarification of reporting and review requirements for such Parties – see paragraphs 33–40 of this document
Implications for the "Guidelines for review under Article 8 of the Kyoto Protocol"	–	No	Partly	Yes	Review of timing and procedures and consistency and linkage to the review guidelines under the Convention – see paragraphs 41–45 of this document
Implications for adjustments under Article 5, paragraph 2, of the Kyoto Protocol	–	No	Partly	Yes	Update of conservativeness factors and use of the *2006 IPCC Guidelines for National Greenhouse Gas Inventories* – see paragraphs 46–59 of this document

Abbreviations: CMP = Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol, IPCC = Intergovernmental Panel on Climate Change, SBSTA = Subsidiary Body for Scientific and Technological Advice.

[a] The discussion text is available at <http://unfccc.int/7969.php>.

[b] The note by the co-facilitators is available at <http://unfccc.int/8412.php>.

Annex II

Tables of proposed conservativeness factors

Table 3
Conservativeness factors for adjustments in the base year (for sources in Annex A to the Kyoto Protocol)

	Emission factors							Activity data	Emission estimates						
	CO_2	CH_4	N_2O	HFCs	PFCs	SF_6	NF_3		CO_2	CH_4	N_2O	HFCs	PFCs	SF_6	NF_3
1. Energy															
A. Fuel combustion (sectoral approach)[a]															
1. Energy industries	0.94	0.73	0.73					0.98	0.89	0.73	0.73				
2. Manufacturing industries and combustion	0.94	0.73	0.73					0.94	0.89	0.73	0.73				
3. Transport															
3.a Domestic Aviation	0.98	0.82	0.73					0.82	0.73	0.73	0.73				
3.b Road Transportation	0.98	0.73	0.73					0.98	0.98	0.73	0.73				
3.c Railways	0.98	0.73	0.73					0.98	0.98	0.73	0.73				
3.d Domestic navigation	0.98	0.89	0.73					0.89	0.82	0.82	0.73				
Off-road vehicles	0.98	0.73	0.73					0.89	0.82	0.73	0.73				
4. Other sectors	0.94	0.73	0.73					0.94	0.89	0.73	0.73				
5. Other															
Biomass (all fuel combustion sources)	NA	0.73	0.73					0.82		0.73	0.73				
Fuel combustion (reference approach)								0.98							
B. Fugitive emissions from fuels															
1. Solid fuels															
1.a.i. Underground coal mining	0.82	0.82						0.98	0.73	0.73					
(Abandoned underground coal mining)	0.73	0.73						0.98	0.73	0.73					
1.a.ii Surface coal mining	0.73	0.73						0.98	0.73	0.73					
2. Oil and natural gas	0.73	0.73	0.73					0.98	0.73	0.73	0.73				
C. CO2 transport and storage	0.82							0.98	0.73						
2. Industrial processes and product use															
A. Mineral industry															
1. Cement production	0.94							0.89	0.89						
2. Lime production	0.94							0.73	0.73						
3.Glass production	0.82							0.98	0.82						
4. Other process uses of carbonates	0.98							0.94	0.94						
B. Chemical industry															
1. Ammonia production	0.98							0.98	0.98						
2. Nitric acid production			0.89					0.98			0.89				
3. Adipic acid production			0.94					0.98			0.94				
4. Caprolactam, glyoxal and glyoxilic acid production			0.89					0.98			0.89				
5. Carbide production	0.89	0.98						0.98	0.89	0.94					
6. Titanium dioxide production	0.94							0.98	0.94						
7. Soda ash production	0.98							0.98	0.98						
8. Petrochemical and carbon black production	0.82	0.82						0.94	0.82	0.82					
9. Fluorochemical production				0.89	0.82	0.82	0.82	0.98				0.89	0.73	0.73	0.73
9.1. By product emissions (HFC-23 emission from HCFC22 production)				0.89				0.89				0.82			
9.2. Fugitive emissions (production of other fluororinated compounds)				0.82	0.82	0.82	0.82	0.98				0.73	0.73	0.73	0.73
C. Metal industry															
1. Iron and steel and metallurgical coke production	0.94	0.94						0.98	0.94	0.94					
2. Ferroalloy production	0.89	0.89						0.98	0.82	0.82					
3. Primary aluminium production	0.98				0.73	0.73		0.98	0.94				0.73	0.73	
4. Magnesium production	0.98			0.98	0.98	0.94		0.98	0.94			0.94	0.94	0.94	
5. Lead production	0.89							0.98	0.82						
6. Zinc production	0.89							0.98	0.82						

	Emission factors							Activity data	Emission estimates						
	CO_2	CH_4	N_2O	HFCs	PFCs	SF_6	NF_3		CO_2	CH_4	N_2O	HFCs	PFCs	SF_6	NF_3
D. Non energy product from fuels and solvent use															
1. Lubricant use	0.89	NA	NA					0.94	0.82						
2. Paraffin wax use	0.82							0.94	0.73						
3. Asphalt production and use	0.73							0.73	0.73						
4. Solvent	0.89							0.98	0.82						
E. Electronic Industry															
1. Integrated circuit or semiconductor					0.73	0.73	0.73	0.94					0.73	0.73	0.73
2. Thin-film transistor flat panel display					0.73	0.73	0.73	0.94					0.73	0.73	0.73
3. Photovoltaics					0.73	0.73	0.73	0.94					0.73	0.73	0.73
4. Heat transfer fluid					0.73	0.73	0.73	0.94					0.73	0.73	0.73
F. Product uses as substitutes for ozone depleting substances															
1. Refregiration and air conditioning				0.73	0.73			0.82				0.73	0.73		
2. Foam blowing agents				0.73	0.73			0.89				0.73	0.73		
3. Fire protection and other applications				0.94	0.94			0.94				0.94	0.94		
4. Aerosol (propullents and solvents)				0.73	0.73			0.73				0.73	0.73		
5. Solvents (non-aerosol)				0.98	0.98			0.98				0.98	0.98		
G. Other product manufacture and use															
1. SF_6 and PFCs from electrical equipment					0.89	0.89		0.89					0.82	0.82	
2. Use of SF_6 and PFCs in other products					0.89	0.89		0.89					0.82	0.82	
3. Agriculture															
A. Enteric fermentation		0.89						0.94		0.82					
B. Manure management		0.94	0.73					0.89		0.82	0.73				
Indirect N_2O emissions			0.73					0.94			0.73				
C. Rice cultivation		0.82						0.82		0.73					
D. Agricultural soils															
a. Direct N_2O emissions from managed soils		0.82	0.73					0.94		0.82	0.73				
b. Indirect N_2O emissions from managed soils			0.73					0.94			0.73				
E. Prescribed burning of savannahs		0.89	0.89					0.73		0.73	0.73				
F. Field burning of agricultural residues		0.89	0.89					0.73		0.73	0.73				
G. Liming	0.98							0.94	0.94						
H. Urea application	0.89							0.94	0.82						
5. Waste															
A. Solid waste disposal		0.82						0.89		0.73					
B. Biological treatment of solid waste															
1. Composting		0.82	0.73					0.94		0.73	0.73				
2. Anaerobic digestion at biogas facilities		0.73						0.94		0.73					
C. Incineration and open burning of waste															
1. Waste incineration	0.94	0.73	0.73					0.89	0.82	0.73	0.73				
2. Open burning of waste	0.89	0.73	0.73					0.89	0.82	0.73	0.73				
D. Wastewater treatment and discharge															
1. Domestic wastewater		0.82	0.73					0.89		0.82	0.73				
2. Industrial wastewater		0.82	0.73					0.73		0.73	0.73				

Note: Entries are marked "NA" because Parties are either not required to report this category in the greenhouse gas inventories or are not required to include it in their national totals.

Abbreviation: NA = not applicable.

[a] Table 1.4 in volume 2 of the Intergovernmental Panel on Climate Change *2006 IPCC Guidelines for National Greenhouse Gas Inventories* provides default carbon dioxide emission factors for combustion and the associated 95 per cent confidence interval. The proposed conservativeness factors in this table are based on an uncertainty lower than 30 per cent. For specific fuels (e.g. petroleum coke, oil shale and tar sands, gas works gas, coke oven gas and blast furnace gas, wastes and biomass fuels) the associated 95 per cent confidence interval in table 1.4 of the same guidelines shows an uncertainty larger than 30 per cent. For these cases, a lower conservativeness factor for the base year and a higher conservativeness factor for the commitment period should be selected (0.94/1.06).

Table 4

Conservativeness factors for adjustments in the commitment year (for sources in Annex A to the Kyoto Protocol)

	Emission factors							Activity data	Emission estimates						
	CO_2	CH_4	N_2O	HFCs	PFCs	SF_6	NF_3		CO_2	CH_4	N_2O	HFCs	PFCs	SF_6	NF_3
1. Energy															
A. Fuel combustion (sectoral approach)[a]															
1. Energy industries	1.06	1.37	1.37					1.02	1.12	1.37	1.37				
2. Manufacturing industries and combustion	1.06	1.37	1.37					1.06	1.12	1.37	1.37				
3. Transport															
3.a Domestic Aviation	1.02	1.21	1.37					1.21	1.37	1.37	1.37				
3.b Road Transportation	1.02	1.37	1.37					1.02	1.02	1.37	1.37				
3.c Railways	1.02	1.37	1.37					1.02	1.02	1.37	1.37				
3.d Domestic navigation	1.02	1.12	1.37					1.12	1.21	1.21	1.37				
Off-road vehicles	1.02	1.37	1.37					1.12	1.21	1.37	1.37				
4. Other sectors	1.06	1.37	1.37					1.06	1.12	1.37	1.37				
5. Other															
Biomass (all fuel combustion sources)	NA	1.37	1.37					1.21		1.37	1.37				
Fuel combustion (reference approach)								1.02							
B. Fugitive emissions from fuels															
1. Solid fuels															
1.a.i. Underground coal mining	1.21	1.21						1.02	1.37	1.37					
(Abandoned underground coal mining)	1.37	1.37						1.02	1.37	1.37					
1.a.ii Surface coal mining	1.37	1.37						1.02	1.37	1.37					
2. Oil and natural gas	1.37	1.37	1.37					1.02	1.37	1.37	1.37				
C. CO2 transport and storage	1.21							1.02	1.37						
2. Industrial processes and product use															
A. Mineral industry															
1. Cement production	1.06							1.12	1.12						
2. Lime production	1.06							1.37	1.37						
3.Glass production	1.21							1.02	1.21						
4. Other process uses of carbonates	1.02							1.06	1.06						
B. Chemical industry															
1. Ammonia production	1.02							1.02	1.02						
2. Nitric acid production			1.12					1.02			1.12				
3. Adipic acid production			1.06					1.02			1.06				
4. Caprolactam, glyoxal and glyoxilic acid production			1.12					1.02			1.12				
5. Carbide production	1.12	1.02						1.02	1.12	1.06					
6. Titanium dioxide production	1.06							1.02	1.06						
7. Soda ash production	1.02							1.02	1.02						
8. Petrochemical and carbon black production	1.21	1.21						1.06	1.21	1.21					
9. Fluorochemical production				1.12	1.21	1.21	1.21	1.02				1.12	1.37	1.37	1.37
9.1. By product emissions (HFC-23 emission from HCFC22 production)				1.12				1.12				1.21			
9.2. Fugitive emissions (production of other fluororinated compounds)				1.21	1.21	1.21	1.21	1.02				1.37	1.37	1.37	1.37
C. Metal industry															
1. Iron and steel and metallurgical coke production	1.06	1.06						1.02	1.06	1.06					
2. Ferroalloy production	1.12	1.12						1.02	1.21	1.21					
3. Primary aluminium production	1.02				1.37	1.37		1.02	1.06				1.37	1.37	
4. Magnesium production	1.02			1.02	1.02	1.06		1.02	1.06			1.06	1.06	1.06	
5. Lead production	1.12							1.02	1.21						
6. Zinc production	1.12							1.02	1.21						

	Emission factors							Activity data	Emission estimates						
	CO_2	CH_4	N_2O	HFCs	PFCs	SF_6	NF_3		CO_2	CH_4	N_2O	HFCs	PFCs	SF_6	NF_3
D. Non Energy product from fuels and solvent use															
1. Lubricant use	1.12	NA	NA					1.06	1.21						
2. Palaffine wax use	1.21							1.06	1.37						
3. Asphalt production and use	1.37							1.37	1.37						
4. Solvent	1.12							1.02	1.21						
E. Electronic Industry															
1. Integrated circuit or semiconductor					1.37	1.37	1.37	1.06					1.37	1.37	1.37
2. Thin-film transistor flat panel display					1.37	1.37	1.37	1.06					1.37	1.37	1.37
3. Photovoltaics					1.37	1.37	1.37	1.06					1.37	1.37	1.37
4. Heat transfer fluid					1.37	1.37	1.37	1.06					1.37	1.37	1.37
F. Product Uses as substitutes for ozone depleting substances															
1. Refregiration and air conditioning				1.37	1.37			1.21				1.37	1.37		
2. Foam blowing agents				1.37	1.37			1.12				1.37	1.37		
3. Fire protection and other applications				1.06	1.06			1.06				1.06	1.06		
4. Aerosol (propullents and solvents)				1.37	1.37			1.37				1.37	1.37		
5. Solvents (non-aerosol)				1.02	1.02			1.02				1.02	1.02		
G. Other Product manufacture and use															
1. SF6 and PFCs from electrical equipments					1.12	1.12		1.12					1.21	1.21	
2. Use of SF6 and PFCs in other products					1.12	1.12		1.12					1.21	1.21	
3. Agriculture															
A. Enteric fermentation		1.12						1.06		1.21					
B. Manure management		1.06	1.37					1.12		1.21	1.37				
5. Indirect N2O emissions			1.37					1.06			1.37				
C. Rice cultivation		1.21						1.21		1.37					
D. Agricultural soils															
a. Direct N2O emissions from managed soils		1.21	1.37					1.06		1.21	1.37				
b. Indirect N2O Emissions from managed soils			1.37					1.06			1.37				
E. Prescribed burning of savannahs		1.12	1.12					1.37		1.37	1.37				
F. Field burning of agricultural residues		1.12	1.12					1.37		1.37	1.37				
G. Liming	1.02							1.06	1.06						
H. Urea application	1.12							1.06	1.21						
5. Waste															
A. Solid waste disposal		1.21						1.12		1.37					
B. Biological treatment of solid waste															
1. Composting		1.21	1.37					1.06		1.37	1.37				
2. Anaerobic digestion at biogas facilities		1.37						1.06		1.37					
C. Incineration and open burning of waste															
1. Waste incineration	1.06	1.37	1.37					1.12	1.21	1.37	1.37				
2. Open burning of waste	1.12	1.37	1.37					1.12	1.21	1.37	1.37				
D. Wastewater treatment and discharge															
1. Domestic wastewater		1.21	1.37					1.12		1.21	1.37				
2. Industrial wastewater		1.21	1.37					1.37		1.37	1.37				

Note: Entries are marked 'NA' because Parties are either not required to report this category in the greenhouse gas inventories or are not required to include it in their national totals.

Abbreviation: NA = Not applicable.

[a] Table 1.4 in volume 2 of the Intergovernmental Panel on Climate Change *2006 IPCC Guidelines for National Greenhouse Gas Inventories* provides default carbon dioxide emission factors for combustion and the associated 95 per cent confidence interval. The proposed conservativeness factors in this table are based on an uncertainty lower than 30 per cent. For specific fuels (e.g. petroleum coke, oil shale and tar sands, gas works gas, coke oven gas and blast furnace gas, wastes and biomass fuels) the associated 95 per cent confidence interval in table 1.4 of the same guidelines shows an uncertainty larger than 30 per cent. For these cases, a lower conservativeness factor for the base year and a higher conservativeness factor for the commitment period should be selected (0.94/1.06).

Table 5

Conservativeness factors for net emissions for adjustments to the land use, land-use change and forestry sector during the initial review for the purpose of establishing a Party's assigned amount under Article 3, paragraphs 7 and 8, of the Kyoto Protocol[a]

	Emission factors							Activity data	Emission estimates						
	CO_2	CH_4	N_2O	HFCs	PFCs	SF_6	NF_3		CO_2	CH_4	N_2O	HFCs	PFCs	SF_6	NF_3
4. Land use, land-use change and forestry															
A.1. Forest land remaining forest land															
Carbon stock change (carbon stock change) in living biomass	**0.89**							**0.98**	**0.89**						
Carbon stock change in dead wood	**0.73**							**0.98**	**0.73**						
Carbon stock change in litter	**0.82**							**0.98**	**0.82**						
Net carbon stock change in soils per area: mineral soils	**0.82**							**0.98**	**0.82**						
Net carbon stock change in soils per area: organic soils[b]	**0.73**							**0.94**	**0.73**						
A.2. Land converted to forest land															
Carbon stock change in living biomass	**0.89**							**0.94**	**0.89**						
Carbon stock change in dead wood	**0.73**							**0.94**	**0.73**						
Carbon stock change in litter	**0.82**							**0.94**	**0.82**						
Net carbon stock change in soils per area: mineral soils	**0.82**							**0.94**	**0.82**						
Net carbon stock change in soils per area: organic soils	**0.73**							**0.94**	**0.73**						
B.1. Cropland land remaining cropland															
carbon stock change in living biomass	**0.82**							**0.98**	**0.82**						
carbon stock change in dead organic matter	**0.73**							**0.98**	**0.73**						
carbon stock change in litter	**0.82**							**0.98**	**0.82**						
Net carbon stock change in soils per area: mineral soils	**0.82**							**0.98**	**0.82**						
Net carbon stock change in soils per area: organic soilsb	**0.82**							**0.94**	**0.82**						
B.2. Land converted to crop land															
Carbon stock change in living biomass	**0.82**							**0.94**	**0.82**						
Carbon stock change in dead wood	**0.73**							**0.94**	**0.73**						
Carbon stock change in litter	**0.82**							**0.94**	**0.82**						
Net carbon stock change in soils per area: mineral soils	**0.82**							**0.94**	**0.82**						
Net carbon stock change in soils per area: organic soilsb	**0.82**							**0.94**	**0.82**						
C.1. Grassland remaining grass land															
Carbon stock change in living biomass															
(Root-to-shoot ratio)	**0.73**							**0.98**	**0.73**						
(All other parameters)	**0.82**							**0.98**	**0.82**						
Carbon stock change in dead organic matter	**0.73**							**0.98**	**0.73**						
Carbon stock change in litter	**0.82**							**0.98**	**0.82**						
Net carbon stock change in soils per area: mineral soils	**0.82**							**0.98**	**0.82**						
Net carbon stock change in soils per area: organic soilsb	**0.82**							**0.94**	**0.82**						
C.2. Land converted to grassland															
Carbon stock change in living biomass															
(Root-to-shoot ratio)	**0.73**							**0.94**	**0.73**						
(All other parameters)	**0.82**							**0.94**	**0.82**						
Carbon stock change in dead organic matter	**0.73**							**0.94**	**0.73**						
Carbon stock change in litter	**0.82**							**0.94**	**0.82**						
Net carbon stock change in soils per area: mineral soils	**0.82**							**0.94**	**0.82**						
Net carbon stock change in soils per area: organic soilsb	**0.82**							**0.94**	**0.82**						

	Emission factors							Activity data	Emission estimates						
	CO_2	CH_4	N_2O	HFCs	PFCs	SF_6	NF_3		CO_2	CH_4	N_2O	HFCs	PFCs	SF_6	NF_3
D.1. Wetlands remaining wetlands															
D.1.1 Peat extraction remaining peat extraction															
Carbon stock change (carbon stock change) in dead organic matter	0.73							0.82	0.73						
carbon stock change in litter	0.73							0.82	0.73						
Net carbon stock change in soils: mineral soils	0.73		0.89					0.82	0.73		0.73				
Net carbon stock change in soils: organic soils	0.73		0.89					0.82	0.73		0.73				
D.1.2 Flooded land remaining flooded land[c]															
D.2. Land converted to wetlands															
carbon stock change in living biomass	0.73							0.94	0.73						
carbon stock change in dead organic matter	0.73							0.94	0.73						
carbon stock change in litter	0.73							0.94	0.73						
Net carbon stock change in soils: mineral soils	0.73							0.94	0.73						
Net carbon stock change in soils: organic soils	0.73							0.94	0.73						
D.2.1 Lands converted to peat extraction															
carbon stock change in living biomass	0.73							0.82	0.73						
carbon stock change in dead organic matter	0.73							0.82	0.73						
carbon stock change in litter	0.73							0.82	0.73						
Net carbon stock change in soils: mineral soils	0.73		0.89					0.82	0.73		0.73				
Net carbon stock change in soils: organic soils	0.73		0.89					0.82	0.73		0.73				
D.2.2 Land converted to flooded land															
carbon stock change in living biomass	0.82							0.89	0.82						
carbon stock change in dead organic matter	NA							0.89							
carbon stock change in litter	NA							0.89							
Net carbon stock change in soils: mineral soils	NA							0.89							
Net carbon stock change in soils: organic soils	NA							0.89							
E.1. Settlements remaining settlements															
carbon stock change in living biomass[d]	0.89							0.89	0.82						
carbon stock change in dead organic matter	0.73							0.98	0.73						
carbon stock change in litter	0.73							0.98	0.73						
Net carbon stock change in soils: mineral soils	0.82							0.98	0.82						
Net carbon stock change in soils: organic soils[b]	0.82							0.98	0.82						
E.2. Land converted to settlements															
carbon stock change in living biomass[\]	0.89							0.89	0.82						
carbon stock change in dead organic matter	0.73							0.98	0.73						
carbon stock change in litter	0.73							0.98	0.73						
Net carbon stock change in soils: mineral soils	0.82							0.98	0.82						
Net carbon stock change in soils: organic soils[b]	0.82							0.94	0.82						
F.1. Other land remaining other land[c]															
F.2. Land converted to other land															
carbon stock change in living biomass	0.89							0.89	0.82						
carbon stock change in dead organic matter	0.73							0.94	0.73						
carbon stock change in litter	0.73							0.94	0.73						
Net carbon stock change in soils: mineral soils	0.82							0.94	0.82						
Net carbon stock change in soils: organic soils[b]	0.82							0.94	0.82						
Cross-cutting categories															
Direct N2O emissions from N inputs to managed soils			0.73					0.94			0.73				
Emissions and removals from drainage and rewetting and other management of organic and mineral soils															
Drained organic soils[e]	0.73	0.73	0.73					0.94	0.73	0.73	0.73				
Rewetted organic soils	0.73	0.73	NA					0.94	0.73	0.73					
Direct N2O emissions from N mineralization/immobilization associated with loss/gain of soil organic matter	0.73							0.94	0.73						
Indirect N2O emissions from managed soils			0.73					0.94			0.73				
Biomass burning	0.82	0.82	0.82					0.89	0.73	0.73	0.73				
Harvested wood products	0.89							0.89	0.82						

[a] Net emissions include net decreases in carbon stocks in individual carbon pools.

[b] In accordance with the Intergovernmental Panel on Climate Change (IPCC) *2013 Supplement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories: Wetlands* (chapter 2), the uncertainty for drained organic soils is 20 per cent, and conservativeness factors are 0.94. The uncertainty for carbon dioxide emissions is higher than 150 per cent for drained and rewetted inland organic soils (conservativeness factors of 0.73) as presented in this table under 'emissions and removals from drainage and rewetting'.

[c] No methodologies are available in the *2006 IPCC Guidelines for National Greenhouse Gas Inventories* (hereinafter the 2006 IPCC Guidelines).

[d] In accordance with the 2006 IPCC Guidelines, the activity data for this subcategory (living biomass) is not land area but crown area or number of trees depending on the methodology.

[e] Information on CO_2 is also included here, although emissions/removals may be reported in the land use remaining in the same category and land converted to a new land use category.

Table 6

Conservativeness factors for net removals for adjustments to the land use, land-use change and forestry sector during the initial review for the purpose of establishing a Party's assigned amount under Article 3, paragraphs 7 and 8, of the Kyoto Protocol[a]

	Emission factors							Activity data	Emission estimates						
	CO_2	CH_4	N_2O	HFCs	PFCs	SF_6	NF_3		CO_2	CH_4	N_2O	HFCs	PFCs	SF_6	NF_3
4. Land use, land-use change and forestry															
A.1. Forest land remaining forest land															
Carbon stock change (CSC) in living biomass	1.12							1.02	1.12						
CSC in dead wood	1.37							1.02	1.37						
CSC in litter	1.21							1.02	1.21						
Net carbon stock change in soils per area: mineral soils	1.21							1.02	1.21						
Net carbon stock change in soils per area: organic soils[b]	1.37							1.06	1.37						
A.2. Land converted to forest land															
CSC in living biomass	1.12							1.06	1.12						
CSC in dead wood	1.37							1.06	1.37						
CSC in litter	1.21							1.06	1.21						
Net CSC in soils per area: mineral soils	1.21							1.06	1.21						
Net CSC in soils per area: organic soils	1.37							1.06	1.37						
B.1. Cropland land remaining cropland															
CSC in living biomass	1.21							1.02	1.21						
CSC in dead organic matter	1.37							1.02	1.37						
CSC in litter	1.21							1.02	1.21						
Net CSC in soils per area: mineral soils	1.21							1.02	1.21						
Net CSC in soils per area: organic soils[b]	1.21							1.06	1.21						
B.2. Land converted to crop land															
CSC in living biomass	1.21							1.06	1.21						
CSC in dead organic matter	1.37							1.06	1.37						
CSC in litter	1.21							1.06	1.21						
Net CSC in soils per area: mineral soils	1.21							1.06	1.21						
Net CSC in soils per area: organic soils[b]	1.21							1.06	1.21						
C.1. Grassland remaining grass land															
CSC in living biomass															
(Root-to-shoot ratio)	1.37							1.02	1.37						
(All other parameters)	1.21							1.02	1.21						
CSC in dead organic matter	1.37							1.02	1.37						
CSC in litter	1.21							1.02	1.21						
Net CSC in soils per area: mineral soils	1.21							1.02	1.21						
Net CSC in soils per area: organic soils[b]	1.21							1.06	1.21						
C.2. Land converted to grassland															
CSC in living biomass															
(Root-to-shoot ratio)	1.37							1.06	1.37						
(All other parameters)	1.21							1.06	1.21						
CSC in dead organic matter	1.37							1.06	1.37						
CSC in litter	1.21							1.06	1.21						
Net CSC in soils per area: mineral soils	1.21							1.06	1.21						
Net CSC in soils per area: organic soils[b]	1.21							1.06	1.21						

	Emission factors							Activity data	Emission estimates						
	CO_2	CH_4	N_2O	HFCs	PFCs	SF_6	NF_3		CO_2	CH_4	N_2O	HFCs	PFCs	SF_6	NF_3
D.1. Wetlands remaining wetlands															
D.1.1 Peat extraction remaining peat extraction															
Carbon stock change (carbon stock change) in dead organic matter	1.37							1.21	1.37						
carbon stock change in litter	1.37							1.21	1.37						
Net carbon stock change in soils: mineral soils	1.37		1.12					1.21	1.37		1.37				
Net carbon stock change in soils: organic soils	1.37		1.12					1.21	1.37		1.37				
D.1.2 Flooded land remaining flooded land[c]															
D.2. Land converted to wetlands															
carbon stock change in living biomass	1.37							1.06	1.37						
carbon stock change in dead organic matter	1.37							1.06	1.37						
carbon stock change in litter	1.37							1.06	1.37						
Net carbon stock change in soils: mineral soils	1.37							1.06	1.37						
Net carbon stock change in soils: organic soils	1.37							1.06	1.37						
D.2.1 Lands converted to peat extraction															
carbon stock change in living biomass	1.37							1.21	1.37						
carbon stock change in dead organic matter	1.37							1.21	1.37						
carbon stock change in litter	1.37							1.21	1.37						
Net carbon stock change in soils: mineral soils	1.37		1.12					1.21	1.37		1.37				
Net carbon stock change in soils: organic soils	1.37		1.12					1.21	1.37		1.37				
D.2.2 Land converted to flooded land															
carbon stock change in living biomass	1.21							1.12	1.21						
carbon stock change in dead organic matter	NA							1.12							
carbon stock change in litter	NA							1.12							
Net carbon stock change in soils: mineral soils	NA							1.12							
Net carbon stock change in soils: organic soils	NA							1.12							
E.1. Settlements remaining settlements															
carbon stock change in living biomass[d]	1.12							1.12	1.21						
carbon stock change in dead organic matter	1.37							1.02	1.37						
carbon stock change in litter	1.37							1.02	1.37						
Net carbon stock change in soils: mineral soils	1.21							1.02	1.21						
Net carbon stock change in soils: organic soils[b]	1.21							1.02	1.21						
E.2. Land converted to settlements															
carbon stock change in living biomass\	1.12							1.12	1.21						
carbon stock change in dead organic matter	1.37							1.02	1.37						
carbon stock change in litter	1.37							1.02	1.37						
Net carbon stock change in soils: mineral soils	1.21							1.02	1.21						
Net carbon stock change in soils: organic soils[b]	1.21							1.06	1.21						
F.1. Other land remaining other land[c]															
F.2. Land converted to other land															
carbon stock change in living biomass	1.12							1.12	1.21						
carbon stock change in dead organic matter	1.37							1.06	1.37						
carbon stock change in litter	1.37							1.06	1.37						
Net carbon stock change in soils: mineral soils	1.21							1.06	1.21						
Net carbon stock change in soils: organic soils[b]	1.21							1.06	1.21						
Cross-cutting categories															
Direct N2O emissions from N inputs to managed soils			1.37					1.06			1.37				
Emissions and removals from drainage and rewetting and other management of organic and mineral soils															
Drained organic soils[e]	1.37	1.37	1.37					1.06	1.37	1.37	1.37				
Rewetted organic soils	1.37	1.37	NA					1.06	1.37	1.37					
Direct N2O emissions from N mineralization/immobilization associated with loss/gain of soil organic matter	1.37							1.06	1.37						
Indirect N2O emissions from managed soils			1.37					1.06			1.37				
Biomass burning	1.21	1.21	1.21					1.12	1.37	1.37	1.37				
Harvested wood products	1.12							1.12	1.21						

[a] Net removals include net decreases in carbon stocks in individual carbon pools.

[b] In accordance with the Intergovernmental Panel on Climate Change (IPCC) *2013 Supplement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories: Wetlands* (chapter 2), the uncertainty for drained organic soils is 20 per cent, and conservativeness factors are 1.06. The uncertainty for carbon dioxide emissions is higher than 150 per cent for drained and rewetted inland organic soils (conservativeness factors of 1.37) as presented in this table under 'emissions and removals from drainage and rewetting'.

[c] No methodologies are available in the *2006 IPCC Guidelines for National Greenhouse Gas Inventories* (hereinafter the 2006 IPCC Guidelines).

[d] In accordance with the 2006 IPCC Guidelines, the activity data for this subcategory (living biomass) is not land area, but crown area or number of trees depending on the methodology.

[e] Information on CO_2 is also included here, although emissions/removals may be reported in the land use remaining in the same category and land converted to a new land use category.

Table 7

Conservativeness factors for adjustments to land use, land-use change and forestry activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol: Conservativeness factors for removals[a] in a year during the commitment period/emissions[a] in the base year[b]

	Emission factors							Activity data	Emission estimates						
	CO_2	CH_4	N_2O	HFCs	PFCs	SF_6	NF_3		CO_2	CH_4	N_2O	HFCs	PFCs	SF_6	NF_3
Afforestation and reforestation (total)															
Carbon stock change in above-ground biomass	**0.89**							**0.94**	**0.89**						
Carbon stock change in below-ground biomass	**0.89**							**0.94**	**0.89**						
Carbon stock change in litter	**0.82**							**0.94**	**0.82**						
Carbon stock change in dead wood	**0.73**							**0.94**	**0.73**						
Net carbon stock change in soils: mineral soils	**0.82**							**0.94**	**0.82**						
Net carbon stock change in soils: organic soils[c]	**0.73**							**0.94**	**0.73**						
Harvest wood products	**0.89**							**0.82**	**0.73**						
(Land subject to natural disturbances)[d]															
Carbon stock change in above-ground biomass	**0.89**							**0.94**	**0.89**						
Carbon stock change in below-ground biomass	**0.89**							**0.94**	**0.89**						
Carbon stock change in litter	**0.82**							**0.94**	**0.82**						
Carbon stock change in dead wood	**0.73**							**0.94**	**0.73**						
Net Carbon stock change in soils per area: mineral soils	**0.82**							**0.94**	**0.82**						
Net Carbon stock change in soils: organic soils[c]	**0.73**							**0.94**	**0.73**						
Harvest wood products	**0.89**							**0.82**	**0.73**						
Deforestation (total)[e]															
Carbon stock change in above-ground biomass[f]	**0.73**							**0.94**	**0.73**						
Carbon stock change in below-ground biomass	**0.82**							**0.94**	**0.82**						
Carbon stock change in litter	**0.73**							**0.94**	**0.73**						
Carbon stock change in dead wood	**0.73**							**0.94**	**0.73**						
Net Carbon stock change in soils per area: mineral soils	**0.82**							**0.94**	**0.82**						
Net Carbon stock change in soils: organic soils[c]	**0.82**							**0.94**	**0.82**						
Harvest wood products	**0.89**							**0.82**	**0.73**						
Forest management (total)[g]															
Carbon stock change in above-ground biomass	**0.89**							**0.98**	**0.89**						
Carbon stock change in below-ground biomass	**0.89**							**0.98**	**0.89**						
Carbon stock change in litter	**0.82**							**0.98**	**0.82**						
Carbon stock change in dead wood	**0.73**							**0.98**	**0.73**						
Net Carbon stock change in soils per area: mineral soils	**0.82**							**0.98**	**0.82**						
Net Carbon stock change in soils: organic soils[c]	**0.73**							**0.94**	**0.73**						
Harvest wood products	**0.89**							**0.82**	**0.73**						
(Newly established forest(CEF-ne))[g]															
Carbon stock change in above-ground biomass	**0.89**							**0.94**	**0.89**						
Carbon stock change in below-ground biomass	**0.89**							**0.94**	**0.89**						
Carbon stock change in litter	**0.82**							**0.94**	**0.82**						
Carbon stock change in dead wood	**0.73**							**0.94**	**0.73**						
Net Carbon stock change in soils per area: mineral soils	**0.82**							**0.94**	**0.82**						
Net Carbon stock change in soils: organic soils[c]	**0.73**							**0.94**	**0.73**						
Carbon stock at harvesting[h]															
Harvest wood products	**0.89**							**0.82**	**0.73**						
(Harvested and converted forest plantations (CEF-hc))[i]															
Carbon stock change in above-ground biomass	**0.73**							**0.94**	**0.73**						
Carbon stock change in below-ground biomass	**0.82**							**0.94**	**0.82**						
Carbon stock change in litter	**0.73**							**0.94**	**0.82**						
Carbon stock change in dead wood	**0.73**							**0.94**	**0.73**						
Net Carbon stock change in soils per area: mineral soils	**0.82**							**0.94**	**0.82**						
Net Carbon stock change in soils: organic soils[c]	**0.82**							**0.94**	**0.82**						
Harvest wood products	**0.89**							**0.82**	**0.73**						

	Emission factors							Activity data	Emission estimates						
	CO_2	CH_4	N_2O	HFCs	PFCs	SF_6	NF_3		CO_2	CH_4	N_2O	HFCs	PFCs	SF_6	NF_3
Forest management (Land subject to natural disturbances)[g,j]	0.73														
Carbon stock change in above-ground biomass	0.82							0.94	0.82						
Carbon stock change in below-ground biomass	0.73							0.94	0.73						
Carbon stock change in litter	0.73							0.94	0.73						
Carbon stock change in dead wood	0.82							0.94	0.82						
Net Carbon stock change in soils per area: mineral soils	0.82							0.94	0.82						
Net Carbon stock change in soils: organic soils[c]	0.89							0.94	0.82						
Harvest wood products	0.89							0.82	0.73						
Technical correction[j]															
Cropland management[k]															
Carbon stock change in above-ground biomass	0.82							0.98	0.82						
Carbon stock change in below-ground biomass	0.82							0.98	0.82						
Carbon stock change in litter	0.82							0.98	0.82						
Carbon stock change in dead wood	0.73							0.98	0.73						
Net Carbon stock change in soils per area: mineral soils	0.82							0.98	0.82						
Net Carbon stock change in soils: organic soils[c]	0.82							0.94	0.82						
Grazingland management[k]															
Carbon stock change in above-ground biomass	0.82							0.98	0.82						
Carbon stock change in below-ground biomass	0.73							0.98	0.73						
Carbon stock change in litter	0.82							0.98	0.82						
Carbon stock change in dead wood	0.73							0.98	0.73						
Net Carbon stock change in soils per area: mineral soils	0.82							0.98	0.82						
Net Carbon stock change in soils: organic soils[c]	0.82							0.94	0.82						
Revegetation[k]															
Carbon stock change in above-ground biomass	0.82							0.98	0.82						
Carbon stock change in below-ground biomass	0.73							0.98	0.73						
Carbon stock change in litter	0.73							0.98	0.73						
Carbon stock change in dead wood	0.73							0.98	0.73						
Net Carbon stock change in soils per area: mineral soils	0.82							0.98	0.82						
Net Carbon stock change in soils: organic soils[c]	0.82							0.94	0.82						
Wetland drainage and rewetting[k]															
Carbon stock change in above-ground biomass	0.73							0.94	0.73						
Carbon stock change in below-ground biomass	0.73							0.94	0.73						
Carbon stock change in litter	0.73							0.94	0.73						
Carbon stock change in dead wood	0.73							0.94	0.73						
Net Carbon stock change in soils per area: mineral soils	0.73	0.73	0.73					0.94	0.73	0.73	0.73				
Net Carbon stock change in soils: organic soils[c]	0.73	0.73	NA					0.94	0.73	0.73					
Harvest wood products															
From afforestation/reforestation	0.89							0.82	0.73						
From deforestation	0.89							0.82	0.73						
From forest management	0.89							0.82	0.73						
Cross-cutting categories															
Direct and indirect N2O emissions from N fertilization			0.73					0.94			0.73				
CH4 and N2O emissions from drained and rewetted organic soils[l]															
Drained organic soils[l]	0.73	0.73	0.73					0.94	0.73	0.73	0.73				
Rewetted organic soils[l]	0.73	0.73	NA					0.94	0.73	0.73					
N2O emissions from N mineralization/immobilization due to carbon loss/gain associated with land-use conversions and management change in mineral soils	0.73							0.94	0.73						
Greenhouse gas emissions from biomass burning (CO2, CH4, N2O)	0.82	0.82	0.82					0.89	0.73	0.73	0.73				

[a] Net emissions and removals include net increases and net decreases in carbon stocks in individual carbon pools (in a year during the commitment period and in the base year, respectively).

[b] For the base year, conservativeness factors given in this table apply to cropland management, grazing land management, wetland drainage and rewetting and revegetation under Article 3, paragraph 4, of the Kyoto Protocol.

[c] In accordance with the Intergovernmental Panel on Climate Change (IPCC) *2013 Supplement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories: Wetlands* (chapter 2), the uncertainty for drained organic soils is 20 per cent, and conservativeness factors are 0.94/1.06. The uncertainty for carbon dioxide emissions is higher than 150 per cent for drained and rewetted inland organic soils (conservativeness factors of 0.73/1.37) as presented in this table under 'emissions and removals from drainage and rewetting'

[d] In cases where adjustments are calculated for other variables related to this category in common reporting format (CRF) table 4(KP-I)A.1.1, the conservativeness factor for the specific pool should be applied. This applies, in particular, to the areas subject to natural disturbances in the year that it was first reported: background levels, margins, the emissions in the inventory that can be excluded and subsequent removals in the inventory year. For salvage logging, the conservativeness factors for harvest wood products should apply.

[e] In cases where adjustments are calculated for other variables related to this category in CRF table 4(KP-I)A.2, the conservativeness factor for the specific pool should be applied. This applies, in particular, to the areas subject to natural disturbances in the year that it was first reported: background levels, margins, the emissions in the inventory that can be excluded, and subsequent removals in inventory year. For salvage logging, the conservativeness factors for harvest wood products should apply.

[f] The same conservativeness factors apply for deforested land previously reported under afforestation/reforestation and forest management and subject to natural disturbances.

[g] In cases where adjustments are calculated for other variables related to this category in CRF tables 4(KP-I)B.1, 4(KP-I)B.1.1 and 4(KP-I)B.1.2, the conservativeness factor for the specific pool should be applied.

[h] For all these cases, assume the uncertainties for the specific pool that are being adjusted.

[i] The conservativeness factors for deforestation were assumed for this activity.

[j] In cases where adjustments are calculated for the technical correction, the conservativeness factor for the specific pool should be applied.

[k] The uncertainty for activity data for the base year is 50 per cent, and the conservativeness factors are 0.89/1.12.

[l] Information on CO_2 is also included here, although emissions/removals may be reported in the land use remaining in the same category and land converted to a new land-use category.

Table 8

Conservativeness factors for adjustments to land use, land-use change and forestry activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol: Conservativeness factors for emissions[a] in a year during the commitment period/removals[a] in the base year[b]

	Emission factors							Activity data	Emission estimates						
	CO_2	CH_4	N_2O	HFCs	PFCs	SF_6	NF_3		CO_2	CH_4	N_2O	HFCs	PFCs	SF_6	NF_3
Afforestation and reforestation (total)															
Carbon stock change in above-ground biomass	**1.12**							**1.06**	**1.12**						
Carbon stock change in below-ground biomass	**1.12**							**1.06**	**1.12**						
Carbon stock change in litter	**1.21**							**1.06**	**1.21**						
Carbon stock change in dead wood	**1.37**							**1.06**	**1.37**						
Net carbon stock change in soils: mineral soils	**1.21**							**1.06**	**1.21**						
Net carbon stock change in soils: organic soils[c]	**1.37**							**1.06**	**1.37**						
Harvest wood products	**1.12**							**1.21**	**1.37**						
(Land subject to natural disturbances)[d]															
Carbon stock change in above-ground biomass	**1.12**							**1.06**	**1.12**						
Carbon stock change in below-ground biomass	**1.12**							**1.06**	**1.12**						
Carbon stock change in litter	**1.21**							**1.06**	**1.21**						
Carbon stock change in dead wood	**1.37**							**1.06**	**1.37**						
Net Carbon stock change in soils per area: mineral soils	**1.21**							**1.06**	**1.21**						
Net Carbon stock change in soils: organic soils[c]	**1.37**							**1.06**	**1.37**						
Harvest wood products	**1.12**							**1.21**	**1.37**						
Deforestation (total)[e]															
Carbon stock change in above-ground biomass[f]	**1.37**							**1.06**	**1.37**						
Carbon stock change in below-ground biomass	**1.21**							**1.06**	**1.21**						
Carbon stock change in litter	**1.37**							**1.06**	**1.37**						
Carbon stock change in dead wood	**1.37**							**1.06**	**1.37**						
Net Carbon stock change in soils per area: mineral soils	**1.21**							**1.06**	**1.21**						
Net Carbon stock change in soils: organic soils[c]	**1.21**							**1.06**	**1.21**						
Harvest wood products	**1.12**							**1.21**	**1.37**						
Forest management (total)[g]															
Carbon stock change in above-ground biomass	**1.12**							**1.02**	**1.12**						
Carbon stock change in below-ground biomass	**1.12**							**1.02**	**1.12**						
Carbon stock change in litter	**1.21**							**1.02**	**1.21**						
Carbon stock change in dead wood	**1.37**							**1.02**	**1.37**						
Net Carbon stock change in soils per area: mineral soils	**1.21**							**1.02**	**1.21**						
Net Carbon stock change in soils: organic soils[c]	**1.37**							**1.06**	**1.37**						
Harvest wood products	**1.12**							**1.21**	**1.37**						
(Newly established forest(CEF-ne))[g]															
Carbon stock change in above-ground biomass	**1.12**							**1.06**	**1.12**						
Carbon stock change in below-ground biomass	**1.12**							**1.06**	**1.12**						
Carbon stock change in litter	**1.21**							**1.06**	**1.21**						
Carbon stock change in dead wood	**1.37**							**1.06**	**1.37**						
Net Carbon stock change in soils per area: mineral soils	**1.21**							**1.06**	**1.21**						
Net Carbon stock change in soils: organic soils[c]	**1.37**							**1.06**	**1.37**						
Carbon stock at harvesting[h]															
Harvest wood products	**1.12**							**1.21**	**1.37**						
(Harvested and converted forest plantations (CEF-hc))[i]															
Carbon stock change in above-ground biomass	**1.37**							**1.06**	**1.37**						
Carbon stock change in below-ground biomass	**1.21**							**1.06**	**1.21**						
Carbon stock change in litter	**1.37**							**1.06**	**1.21**						
Carbon stock change in dead wood	**1.37**							**1.06**	**1.37**						
Net Carbon stock change in soils per area: mineral soils	**1.21**							**1.06**	**1.21**						
Net Carbon stock change in soils: organic soils[c]	**1.21**							**1.06**	**1.21**						
Harvest wood products	**1.12**							**1.21**	**1.37**						

	Emission factors							Activity data	Emission estimates						
	CO_2	CH_4	N_2O	HFCs	PFCs	SF_6	NF_3		CO_2	CH_4	N_2O	HFCs	PFCs	SF_6	NF_3
Forest management (Land subject to natural disturbances)[e,i]	1.37														
Carbon stock change in above-ground biomass	1.21							1.06	1.21						
Carbon stock change in below-ground biomass	1.37							1.06	1.37						
Carbon stock change in litter	1.37							1.06	1.37						
Carbon stock change in dead wood	1.21							1.06	1.21						
Net Carbon stock change in soils per area: mineral soils	1.21							1.06	1.21						
Net Carbon stock change in soils: organic soils[c]	1.12							1.06	1.21						
Harvest wood products	1.12							1.21	1.37						
Technical correction[j]															
Cropland management[k]															
Carbon stock change in above-ground biomass	1.21							1.02	1.21						
Carbon stock change in below-ground biomass	1.21							1.02	1.21						
Carbon stock change in litter	1.21							1.02	1.21						
Carbon stock change in dead wood	1.37							1.02	1.37						
Net Carbon stock change in soils per area: mineral soils	1.21							1.02	1.21						
Net Carbon stock change in soils: organic soils[c]	1.21							1.06	1.21						
Grazingland management[k]															
Carbon stock change in above-ground biomass	1.21							1.02	1.21						
Carbon stock change in below-ground biomass	1.37							1.02	1.37						
Carbon stock change in litter	1.21							1.02	1.21						
Carbon stock change in dead wood	1.37							1.02	1.37						
Net Carbon stock change in soils per area: mineral soils	1.21							1.02	1.21						
Net Carbon stock change in soils: organic soils[c]	1.21							1.06	1.21						
Revegetation[k]															
Carbon stock change in above-ground biomass	1.21							1.02	1.21						
Carbon stock change in below-ground biomass	1.37							1.02	1.37						
Carbon stock change in litter	1.37							1.02	1.37						
Carbon stock change in dead wood	1.37							1.02	1.37						
Net Carbon stock change in soils per area: mineral soils	1.21							1.02	1.21						
Net Carbon stock change in soils: organic soils[c]	1.21							1.06	1.21						
Wetland drainage and rewetting[k]															
Carbon stock change in above-ground biomass	1.37							1.06	1.37						
Carbon stock change in below-ground biomass	1.37							1.06	1.37						
Carbon stock change in litter	1.37							1.06	1.37						
Carbon stock change in dead wood	1.37							1.06	1.37						
Net Carbon stock change in soils per area: mineral soils	1.37	1.37	1.37					1.06	1.37	1.37	1.37				
Net Carbon stock change in soils: organic soils[c]	1.37	1.37	NA					1.06	1.37	1.37					
Harvest wood products															
From afforestation/reforestation	1.12							1.21	1.37						
From deforestation	1.12							1.21	1.37						
From forest management	1.12							1.21	1.37						
Cross-cutting categories															
Direct and indirect N2O emissions from N fertilization			1.37					1.06			1.37				
CH4 and N2O emissions from drained and rewetted organic soils[l]															
Drained organic soils[l]	1.37	1.37	1.37					1.06	1.37	1.37	1.37				
Rewetted organic soils[l]	1.37	1.37	NA					1.06	1.37	1.37					
N2O emissions from N mineralization/immobilization due to carbon loss/gain associated with land-use conversions and management change in mineral soils	1.37							1.06	1.37						
Greenhouse gas emissions from biomass burning (CO2, CH4, N2O)	1.21	1.21	1.21					1.12	1.37	1.37	1.37				

[a] Net missions and removals include net increases and net decreases in carbon stocks in individual carbon pools (in a year during the commitment period and in the base year, respectively).

[b] For the base year, conservativeness factors given in this table apply to cropland management, grazing land management, wetland drainage and rewetting, and revegetation under Article 3, paragraph 4, of the Kyoto Protocol.

[c] In cases where adjustments are calculated for other variables related to this category in common reporting format (CRF) table 4(KP-I)A.1.1, the conservativeness factor for the specific pool should be applied. This applies, in particular, to the areas subject to natural disturbances in the year that it was first reported: background levels, margins, the emissions in the inventory that can be excluded and subsequent removals in the inventory year. For salvage logging the conservativeness factors for harvest wood products should apply.

[d] The same conservativeness factors apply for deforested land previously reported under afforestation/reforestation and forest management and subject to natural disturbances.

[e] In case where adjustments are calculated for other variables related to this category in CRF table 4(KP-I)A.2, the conservativeness factor for the specific pool should be applied. This applies, in particular, to the areas subject to natural disturbances in the year that it was first reported: background levels, margins, the emissions in the inventory that can be excluded, and subsequent removals in the inventory year. For salvage logging the conservativeness factors for harvest wood products should apply.

[f] In accordance with the Intergovernmental Panel on Climate Change (IPCC) *2013 Supplement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories: Wetlands* (chapter 2), the uncertainty for drained organic soils is 20 per cent, and conservativeness factors are 0.94/1.06. The uncertainty for carbon dioxide emissions is higher than 150 per cent for drained and rewetted inland organic soils (conservativeness factors of 0.73/1.37) as presented in this table under 'emissions and removals from drainage and rewetting'

[g] In cases where adjustments are calculated for other variables related to this category in CRF table 4(KP-I)B.1, the conservativeness factor for the specific pool should be applied.

[h] For all these cases, assume the uncertainties for the specific pool that are being adjusted.

[i] The conservativeness factors for deforestation were assumed for this activity. In cases where adjustments are calculated for other variables related to this category in CRF table 4(KP-I)B.1, the conservativeness factor for the specific pool should be applied.

[j] In case that adjustments are calculated for the technical correction, the conservativeness factor for the specific pool should be applied.

[k] The uncertainty for activity data for the base year is 50 per cent, and the conservativeness factors are 0.89/1.12.

[l] Information on CO_2 is also included here, although emissions/removals may be reported in the land use remaining in the same category and land converted to a new land-use category.

Annex III

Background information for the estimation of the conservativeness factors

Table 9
Background information used for energy

Category/subcategory	*Rationale*
1.A. Fuel combustion	
1. Stationary combustion (energy industries, manufacturing industries and construction, other sectors, other and biomass use): CO_2, CH_4 and N_2O	*Emission factors*: **CO_2**: uncertainty ranges are provided in table 1.4 in volume 2 of the Intergovernmental Panel on Climate Change (IPCC) *2006 IPCC Guidelines for National Greenhouse Gas Inventories* (hereinafter the 2006 IPCC Guidelines), which can be generally summarized as the following: for natural gas (gaseous fuels) <10%; for common liquid fuels <10%; for solid fuels (generally) <20%; and for biomass fuels around 40%. For specific fuels (e.g. petroleum coke, oil shale and tar sands, gas works gas, coke oven gas and blast furnace gas, wastes and biomass fuels) the associated 95% confidence interval in table 1.4 shows an uncertainty larger than 30%. Accordingly, the following conservativeness factors are proposed: for all fuels other than biomass: assigned uncertainty band = 20%, conservativeness factor = 0.94/1.06; biomass use 'not applicable' **CH_4**: uncertainty values are an order of magnitude. Proposed to use an assigned uncertainty band of 150%, and conservativeness factors of 0.73/1.37 **N_2O**: uncertainty values range from one-tenth of the mean value to ten times the mean value, corresponding to conservativeness factor of 0.73/1.37 *Activity data*: In accordance with the 2006 IPCC Guidelines (sections 1.5 and 2.4.1 and table 2.15, volume 2), statistics on fuel combusted at large sources, obtained from direct measurement or obligatory reporting are likely to be within 3% of the central estimate. Uncertainty resulting from the energy balances is probably in the range of ±5% or ±10% for countries with less well-developed energy data systems. Informal activities, including biomass, may be as much as 50%. Levels of uncertainty for specific fuel combustion activities are available in table 2.15 in volume 2 of the 2006 IPCC Guidelines: electricity and heat production (5 – 10%); industrial combustion (5 – 10%, for energy intensive industries, and 15 – 20% for others); commercial, institutional and residential (15 – 25%); biomass in small sources (60 – 100%).The following proposal for conservativeness factor values for stationary combustion is not significantly different from the values for the first commitment period of the Kyoto Protocol, in accordance with tables 3a/3b in the appendix to decision 20/CMP.1: **Energy industries**: assigned uncertainty band <10%, conservativeness factor = 0.98/1.02 **Manufacturing industries and construction**: assigned uncertainty band = 20%, conservativeness factor = 0.94/1.06 **Other sectors (commercial, institutional, residential combustion)**: assigned uncertainty band = 20%, conservativeness factor = 0.94/1.06 **Biomass**: assigned uncertainty band = 75%, conservativeness factor = 0.82/1.21
2. Road transportation – CO_2, CH_4, N_2O	*Emission factors*: In accordance with the 2006 IPCC Guidelines (table 3.2.1, volume 2), the uncertainty for CO_2 EF is typically 2–5 % for default emission factors (EFs). It is proposed to consider the

Category/subcategory	*Rationale*
	following values that are not significantly different from the current ones for CO_2: assigned uncertainty band 7% (conservativeness factors 0.98/1.02).Uncertainties for CH_4 and N_2O EFs are typically relatively higher, likely to be by a factor of 2–3, and it is proposed that the conservativeness factors change to 0.82/1.21 and 0.73/1.37 *Activity data*: In accordance with information in the 2006 IPCC Guidelines (section 3.2.2, volume 2), uncertainties will typically be about +/-5% for TJ (unit used to estimate CO_2 emissions) but also for the activity data (AD) used to estimate emissions from CH_4 and N_2O. It is proposed that an assigned uncertainty band of 7% (conservativeness factor 0.98/1.02) will be used, which is less stringent than the current values in decision 20/CMP.1
3. Off-road transportation – CO_2, CH_4, N_2O	The 2006 IPCC Guidelines (section 3.3.2, volume 2) use as default the uncertainty values for road transportation for EF and a higher uncertainty for activity data
4. Railways – CO_2, CH_4, N_2O	*Emission factors*: Table 3.4.1 in volume 2 of the 2006 IPCC Guidelines provides ranges indicating the uncertainties associated with diesel fuel. In accordance with the 2006 IPCC Guidelines, in the absence of specific information, the percentage relationship between the upper and lower limiting values, and the central estimate may be used to derive default uncertainty ranges associated with emission factors for additives. The following values were calculated: CO_2 – 6%; CH_4 – 150%; N_2O – 200%. The proposed conservativeness factor values are: **CO_2**: uncertainty <10% (conservativeness factors = 0.98/1.02) **CH_4**: uncertainty >100% (conservativeness factor = 0.73/1.37) **N_2O**: uncertainty >100% (conservativeness factor = 0.73/1.37) *Activity data*: There is no specific information available for this category in the 2006 IPCC Guidelines (section 3.4.2 in volume 2), and hence information on the general part (section 1.5, volume 2) of the 2006 IPCC Guidelines was used, i.e. 5% and the proposed conservativeness factors are 0.98/1.02
5. Water borne navigation – CO_2, CH_4, N_2O	*Emission factors*: The 2006 IPCC Guidelines (section 3.5.1.7, volume 2) provide default uncertainty values for: **CO_2**: EF about ± –1.5% and for residual fuel oil ± –3% **CH_4**: as high as 50% **N_2O**: may range between –40% and 140% above the default value Therefore, the proposal is to use the following conservativeness factors: CO_2 – assigned uncertainty band = 7% (conservativeness factor = 0.98/1.02); CH_4 – assigned uncertainty band = 40% (conservativeness factor = 0.89/1.12); N_2O – assigned uncertainty band = 150% (conservativeness factor = 0.73/1.37) *Activity data*: In accordance with the 2006 IPCC Guidelines (section 3.5.1.7, volume 2), much of the uncertainty in waterborne navigation emission estimates is related to the difficulty of distinguishing between domestic and international fuel consumption. With complete survey data, the uncertainty may be low (± –5%), while for estimations or incomplete surveys, the uncertainties may be considerable (± –50%). It is proposed to use a conservativeness factor in accordance with an assigned uncertainty band of 40%, corresponding to 0.89/1.12

Category/subcategory	*Rationale*
6. Civil aviation – CO_2, CH_4, N_2O	*Emission factors*: The 2006 IPCC Guidelines (section 3.6.1.7, volume 2) provide default uncertainty values for: **CO_2**: EF within a range of ±5 % **CH_4**: for tier 1, the uncertainty of the CH_4 EF may range between –57 and +100% **N_2O**: between –70 and +150% Therefore, the proposal is to use the following conservativeness factor: CO_2 – assigned uncertainty band = 7% (conservativeness factor = 0.98/1.02); CH_4 – assigned uncertainty band = 75% (conservativeness factor = 0.82/1.21); N_2O – assigned uncertainty band = 150% (conservativeness factor = 0.73/1.37) *Activity data*: In accordance with the 2006 IPCC Guidelines (section 3.6.1.7, volume 2), much of the uncertainty is related to the difficulty of distinguishing between domestic and international aviation. With complete survey data, the uncertainty may be very low (less than 5 %) while for estimates or incomplete surveys the uncertainties may become large, perhaps a factor of two, for the domestic share It is proposed to use a conservativeness factor in accordance with an assigned uncertainty band of 75%, corresponding to a conservativeness factor of 0.82/1.21
1.B. Fugitive emissions from fuels	
1. Coal mines – CH_4, CO_2	The 2006 IPCC Guidelines (sections 4.1.3.6, 4.1.4.6 and 4.1.5.6, volume 2), provides guidance on methodologies for three distinct subcategories: underground coal mines, surface mines and abandoned underground coal mines *Emission factors*: **CH_4**: Table 4.1.2 in volume 2 of the 2006 IPCC Guidelines provides uncertainty values for underground mining and post mining activities for tiers 1 and 2. For tier 1, the uncertainty is a factor of two or greater for mining and factor of three for post-mining. It is proposed to use a conservativeness factor in accordance with an assigned uncertainty band of 75%, corresponding to a conservativeness factor of 0.82/1.21 Table 4.1.4 in volume 2 of the 2006 IPCC Guidelines provides uncertainties associated with surface mining emissions for tier 1 and tier 2. The uncertainties are slightly higher than for underground mines: an order of three or greater for both mining and post-mining The proposed conservativeness factor is based on a range greater than 100%, i.e. conservativeness factor of 0.73/1.37 **CO_2**: Uncertainties for CO_2 are assumed to be the same as for CH_4 *Activity data*: The 2006 IPCC Guidelines indicate the following regarding the uncertainty range of coal production: for country-specific tonnages they are likely to be 1–2%, but if raw coal data are not available, then the uncertainty will increase to about ±5%. In countries with a mix of regulated and unregulated mines, activity data may have an uncertainty of ±10% Therefore, to establish the conservativeness factor, it is proposed to use an assigned uncertainty band <10%, equivalent to a conservativeness factor of 0.98/1.02
2. Fugitive emissions from oil and natural gas systems – CO_2, CH_4, N_2O	*Emission factors*: Uncertainty values for specific activities are presented in table 4.2.4 in volume 2 of the 2006 IPCC Guidelines for developed countries and in table 4.2.5 for developing countries and

Category/subcategory	*Rationale*
	countries with economies in transition (EIT countries) **CH_4**: 25–100% (reaching 500% for developed countries and 800% for developing/EIT countries) **CO_2**: 25–100% (although may reach 500% for developed countries and 800% for developing/EIT countries for some activities) **N_2O**: usually range up to 1000% Therefore, the proposed conservativeness factor is based on an assigned uncertainty band of 150%: conservativeness factor = 0.73/1.37 *Activity data*: The 2006 IPCC Guidelines (section 4.2.2.7, volume 2) provide guidance on uncertainty values for AD based on expert judgement: gas compositions are usually accurate to within ±5% on individual components; flow rates have errors typically of ±3% or less for sales volumes and ±15% or more for other volumes; counts of major facilities (e.g. gas plants, refineries and transmission compressor stations) will usually be known with little if any error (e.g. less than 5%); counts of well site facilities, minor field installations and gas gathering compressor stations, as well as the type and amount of equipment at each site, will be much less accurately known (±25%) The information in the 2006 IPCC Guidelines indicates that the most significant part of data (flow) has a low uncertainty, and conservativeness factor values can be kept as an assigned uncertainty band = 7% or 0.98/1.02
3. CO_2 transport, injection and geological storage	*Emission factors*: Table 5.2 in volume 2 of the 2006 IPCC Guidelines, regarding default tier 1 EF for pipeline transport of CO_2 from a CO_2 capture site to the final storage site indicates that the uncertainty range could be a factor of two. Therefore, the proposed conservativeness factor is assigned uncertainty band 75% or 0.82/1.21 *Activity data*: The information in the 2006 IPCC Guidelines (section 5.8, volume 2) does not indicate default uncertainty values. The guidelines also indicate that currently no tier 1/2 defaults for EFs exist. The available guidance appears to indicate that tier-3 methodologies should be used. This may indicate low levels of uncertainty: assigned uncertainty band <10% and conservativeness factor = 0.98/1.02
Reference approach	
	Activity data: In accordance with the 2006 IPCC Guidelines (section 6.10, volume 2), uncertainty resulting from errors in the activity data of countries with well-developed statistical systems is ±5% for a given fuel. For countries with less well-developed energy data systems it could be about ±10% for a given fuel In accordance with this information, a conservativeness factor of 0.98/1.02 with an assigned uncertainty band of 7% is proposed

Table 10
Background information used for industrial processes and product use

Category/subcategory	*Rationale*
2.A. Mineral industry	
1. Cement production	*Emission factors:* **CO_2**: According to the Intergovernmental Panel on Climate Change (IPCC) *2006 IPCC Guidelines for National Greenhouse Gas Inventories* (hereinafter the IPCC 2006 IPCC Guidelines), for tier 1, the major uncertainty component is the clinker fraction of the cement(s) produced. Given the low uncertainty values for cement production-chemical analysis/composition: up to 8% (table 2.3 of section 2.2.2, volume 3); and given the low influence of cement kiln dust on the overall uncertainty (in spite of high uncertainties on cement kiln dust), the overall uncertainty estimate is expected to be between 10% and 30% Therefore, it is proposed to use the assigned uncertainty band of 20 % and conservativeness factor of 0.94/1.06 *Activity data:* According to the 2006 IPCC Guidelines, for tier 1, where clinker production data are estimated from cement production, the uncertainty of the activity data can be as high as about 35% (section 2.2.2, table 2.3, volume 3). Therefore, it is proposed to use an assigned uncertainty band of 40% and a conservativeness factor of 0.89/1.12
2. Lime production	*Emission factors:* **CO_2**: According to the 2006 IPCC Guidelines, for tier 1 the uncertainty of the emission factor is dominated by the uncertainty of lime composition, in particular of the share of hydraulic lime (the uncertainty of the emission factor for hydraulic lime is 15% and the uncertainty for other lime types is 2% as shown in table 2.5 of section 2.3.2, volume 3). The overall uncertainty estimate is expected to be between 10% and 30%. Therefore, it is proposed to use an assigned uncertainty band of 20% and a conservativeness factor of 0.94/1.06 *Activity data:* According to the 2006 IPCC Guidelines (section 2.3.2, volume 3), the uncertainty for the activity data is likely to be much higher than for the emission factors, in particular because of omissions of non-market lime production that may lead to order of magnitude underestimates. Therefore, it is proposed to use an assigned uncertainty band of 150% and a conservativeness factor of 0.73/1.37
3. Glass production	*Emission factors:* **CO_2**: According to the 2006 IPCC Guidelines (section 2.4.2, volume 3), for tier 1 the uncertainty of the emission factor may be of ±60 % (section 2.4.2, volume 3). Therefore, it is proposed to use an assigned uncertainty band of 75% and a conservativeness factor of 0.82/1.21 *Activity data:* According to the 2006 IPCC Guidelines (section 2.4.2, volume 3), the uncertainty on glass production data is ±5%. Therefore, it is proposed to use an assigned uncertainty band of 7% and a conservativeness factor of 0.98/1.02

Category/subcategory	*Rationale*
4. Other process uses of carbonates	*Emission factors:* **CO_2**: According to the 2006 IPCC Guidelines (section 2.5.2.1, volume 3), the emission factors uncertainty should be very low, and it would be reasonable to consider an uncertainty around ±1.5%. Therefore, it is proposed to use an assigned uncertainty band of 7% and a conservativeness factor of 0.98/1.02 *Activity data:* According to the 2006 IPCC Guidelines, the uncertainty for activity data is greater than the uncertainties associated with emission factors. Given the values (up to 3%) provided in section 2.5.2.2, volume 3, and assuming an uncertainty associated with the use of tier 1 method is less than 10%, it would be reasonable to consider an activity data uncertainty between 10% and 30%. Therefore, it is proposed to use an assigned uncertainty band of 20 % and a conservativeness factor of 0.94/1.06
2.B. Chemical industry	
1. Ammonia production	*Emission factors:* **CO_2**: According to the 2006 IPCC Guidelines (section 3.2.3.1 and table 3.1, volume 3), for tier 1 methods the uncertainty is around ±7%. Therefore, it is proposed to use an assigned uncertainty band of 7% and a conservativeness factor of 0.98/1.02 *Activity data:* According to the 2006 IPCC Guidelines (section 3.2.3.2, volume 3), where activity data are obtained from plants, uncertainty estimates can be obtained from producers. These activity data are likely to be highly accurate. Where uncertainty values are not available from other sources, a default value of ±5 % can be used. Therefore, it is proposed to use an assigned uncertainty band of 7% and a conservativeness factor of 0.98/1.02
2. Nitric acid production	*Emission factors:* **N_2O**: According to the 2006 IPCC Guidelines (section 3.3.2.2, volume 3), it is good practice to use the highest emission factor based on the technology type shown in table 3.3, and to assume that there is no abatement of N_2O emissions. Uncertainties for the default values shown in section 3.4.3.1, volume 3, and table 3.4 are estimates based on expert judgement. The uncertainty for the highest value is ±40%. Therefore, it is proposed to use an assigned uncertainty band of 40% and a conservativeness factor of 0.89/1.12 *Activity data:* According to the 2006 IPCC Guidelines, where activity data are obtained from plants, uncertainty estimates can be obtained from producers. These activity data are likely to be highly accurate. Where uncertainty values are not available from other sources, a default value of ±2% can be used. Therefore, it is proposed to use an assigned uncertainty band of 7% and a conservativeness factor of 0.98/1.02
3. Adipic acid production	*Emission factors:* N_2O: According to the 2006 IPCC Guidelines (section 3.4.3.1 and table 3.4, volume 3), for tier 1, it is good practice to use the default emission factor and to assume that there is no abatement of N_2O emissions. The uncertainty for the default value is ±10% (table 3.4, an estimate based on expert judgement), but this may be increased by the uncertainties related to the abatement technology and system. Therefore, it is proposed to use an assigned

Category/subcategory	*Rationale*
	uncertainty band of 20% and a conservativeness factor of 0.94/1.06 *Activity data:* According to the 2006 IPCC Guidelines (section 3.4.3.2 in volume 3), given the small number of adipic acid plants, the uncertainty in national production data (tier 1) is the same as for plant-level data, namely, ±2%. Therefore, it is proposed to use an assigned uncertainty band of 7% and a conservativeness factor of 0.98/1.02
4. Caprolactam, glyoxal and glyoxilic acid production	*Emission factors:* **N_2O**: According to the 2006 IPCC Guidelines (sections 3.5.2.1 and 3.5.2.2, volume 3), for caprolactam production, for tier 1, it is good practice to use the default emission factor shown in table 3.5 and to assume that there is no abatement of N_2O emissions. The uncertainty for the default value of ±40% (table 3.5) is an estimate based on expert judgement. According to table 3.6 the uncertainty for the N2O emission factor from production of glyoxal and glyoxylic acid is ±10%. Therefore, it is proposed to use an assigned uncertainty band of 40% and a conservativeness factor of 0.89/1.12 for the category *Activity data:* According to the 2006 IPCC Guidelines (section 3.5.2.2, volume 3), where uncertainty values are not available from other sources, a default value of ±2% can be used. Therefore, it is proposed to use an assigned uncertainty band of 7% and a conservativeness factor of 0.98/1.02
5. Carbide production	*Emission factors:* **CO_2**: According to the 2006 IPCC Guidelines (section 3.6.3.1, volume 3), in general, the default CO_2 emission factors are relatively uncertain because industrial-scale carbide production processes differ from the stochiometry of theoretical chemical reactions. To reflect this high uncertainty, a value of 50% is proposed. Therefore, it is proposed to use an assigned uncertainty band of 40% and a conservativeness factor of 0.89/1.12 **CH_4**: According to the 2006 IPCC Guidelines (section 3.6.3.1, volume 3), where uncertainty values are not available from other sources, a default value of ±10% can be used. Therefore, it is proposed to use an assigned uncertainty band of 7% and a conservativeness factor of 0.98/1.02 *Activity data:* According to the 2006 IPCC Guidelines (section 3.6.3.2, volume 3), where uncertainty values are not available from other sources, a default value of ±5% can be used. Therefore, it is proposed to use an assigned uncertainty band of 7% and a conservativeness factor of 0.98/1.02
6. Titanium dioxide production	*Emission factors:* **CO_2**: According to the 2006 IPCC Guidelines (section 3.7.2.2 and table 3.9, volume 3), the default emission factors used in tier 1 are expected to have an uncertainty of ± 15%. Therefore, it is proposed to use an assigned uncertainty band of 20% and a conservativeness factor of 0.94/1.06 *Activity data:* According to the 2006 IPCC Guidelines (section 3.7.3.2, volume 3), where uncertainty

Category/subcategory	*Rationale*
	values are not available from other sources, a default value of ±5% can be used. Therefore, it is proposed to use an assigned uncertainty band of 7% and a conservativeness factor of 0.98/1.02
7. Soda ash production	*Emission factors:* **CO_2**: According to the 2006 IPCC Guidelines (section 3.8.2.2, volume 3), the stoichiometric ratio is an exact number and assuming 100% purity of the input or output, the uncertainty of the default emission factor is negligible. Therefore, it is proposed to use an assigned uncertainty band of 7% and a conservativeness factor of 0.98/1.02 *Activity data:* According to the 2006 IPCC Guidelines (section 3.8.2.2, volume 3), where uncertainty values are not available from other sources, a default value of ±5% can be used. Therefore, it is proposed to use an assigned uncertainty band of 7% and a conservativeness factor of 0.98/1.02
8. Petrochemical and carbon black production	*Emission factors:* **CO_2**: According to the 2006 IPCC Guidelines (table 3.27 of section 3.9.3, volume 3), for tier 1 the highest uncertainty for CO_2 emission factors is of ± 60%. Therefore, it is proposed to use an assigned uncertainty band of 75% and conservativeness factor 0.82/1.21 **CH_4**: According to 2006 IPCC Guidelines (table 3.27 of section 3.9.3, volume 3), for tier 1 the highest uncertainty for CH_4 emission factors is ± 85%. Therefore, it is proposed to use an assigned uncertainty band of 75% and a conservativeness factor of 0.82/1.21 *Activity data:* According to the 2006 IPCC Guidelines (table 3.27 of section 3.9.3, volume 3), for tier 1 the activity data uncertainty is ± 30%. Therefore, it is proposed to use an assigned uncertainty band of 20% and a conservativeness factor of 0.94/1.06
9. Fluorochemical production	See subcategories below
9.1. HFC-23 emission from HCFC-22 production	*Emission factors:* **HFCs**: According to the 2006 IPCC Guidelines (section 3.10.1.3, volume 3), tier 1 uncertainties are assessed through expert judgement and an error of approximately 50% is considered. Therefore, it is proposed to use an assigned uncertainty band of 40% and a conservativeness factor 0.89/1.12 *Activity data:* According to the 2006 IPCC Guidelines (section 3.10.1.3, volume 3), unlike for higher tiers, where uncertainties are based on measurements and statistics, tier 1 uncertainties are assessed through expert judgement and an error of approximately 50% is considered. Therefore, it is proposed to use an assigned uncertainty band of 40% and a conservativeness factor of 0.89/1.12
9.2. Production of other fluorinated compounds	*Emission factors:* **HFCs, PFCs, SF_6, NF_3**: According to the 2006 IPCC Guidelines (section 3.10.2.3, volume 3), the actual emission factor may range from well in excess of the default value to zero. The default uncertainty of the default emission factors is therefore set at 100%.Therefore, it

Category/subcategory	*Rationale*
	is proposed to use an assigned uncertainty band of 75% and a conservativeness factor of 0.82/1.21
	Activity data:
	According to the 2006 IPCC Guidelines (section 3.10.2.3, volume 3), in a well-operated facility, the default uncertainty in activity data should be in the region of 1%, assuming that rigorous accounting records are maintained and that production is monitored by weight. It is therefore reasonable to consider that the uncertainty is less than 10%. Therefore, it is proposed to use an assigned uncertainty band of 7% and a conservativeness factor of 0.98/1.02
2.C. Metal industry	
1. Iron and steel and metallurgical coke production	*Emission factors:*
	CO_2 and CH_4: According to the IPCC 2006 IPCC Guidelines (section 4.2.3 and table 4.4, volume 3), the default emission factors for coke production and iron and steel production used in tier 1 may have an uncertainty of ±25%. Therefore, it is proposed to use an assigned uncertainty band of 20% and a conservativeness factor of 0.94/1.06
	Activity data:
	According to the 2006 IPCC Guidelines (section 4.2.3 and table 4.4, volume 3), for tier 1, the most important type of activity data is the amount of steel produced using each method. National statistics should be available and likely have an uncertainty of ±10%. Therefore, it is proposed to use an assigned uncertainty band of 7% and a conservativeness factor of 0.98/1.02
2. Ferroalloy production	*Emission factors:*
	CO_2 and CH_4: According to the 2006 IPCC Guidelines (section 4.3.3.1 and table 4.9, volume 3), the default emission factors used in tier 1 may have an uncertainty of 25 to 50%. Therefore, it is proposed to use an assigned uncertainty band of 40% and a conservativeness factor of 0.89/1.12
	Activity data:
	According to the 2006 IPCC Guidelines, for tier 1 the most important type of activity data is the amount of ferroalloy production by product type. National statistics should be available and are likely to have an uncertainty value of less than 5%. Therefore, it is proposed to use an assigned uncertainty band of 7% and a conservativeness factor of 0.98/1.02
3. Primary aluminium production	*Emission factors:*
	CO_2: According to the 2006 IPCC Guidelines (section 4.4.3.1 and table 4.10, volume 3), for tier 1, the uncertainty of the emission factor should be less than 10%. Therefore, it is proposed to use an assigned uncertainty band of 7% and a conservativeness factor of 0.98/1.02
	PFCs: According to the 2006 IPCC Guidelines (section 4.4.3.1 and table 4.15, volume 3), for tier 1, the uncertainty values are very high for PFCs (up to 380%). Therefore, it is proposed to use an assigned uncertainty band of 150 % and a conservativeness factor of 0.73/1.37
	SF_6: As no specific information is available in the 2006 IPCC Guidelines, the highest

Category/subcategory	*Rationale*
	uncertainty could be assumed (as per PFCs). Therefore, it is proposed to use an assigned uncertainty band of 150% and a conservativeness factor of 0.73/1.37
	Activity data:
	According to the 2006 IPCC Guidelines (section 4.4.3.2, volume 3), there is very little uncertainty in the data for the annual production of aluminium, less than 1%. The uncertainty in recording carbon consumption as baked anode consumption or coke and paste consumption is estimated to be only slightly higher than for aluminium production, less than 2%. Therefore, it is proposed to use an assigned uncertainty band of 7% and a conservativeness factor of 0.98/1.02
4. Magnesium production	*Emission factors:*
	CO_2: According to the 2006 IPCC Guidelines (section 4.5.3, volume 3), the accuracy of magnesium emission data is comparable to that of other national production statistics i.e. ±5%. Additional uncertainty is introduced through estimating the share of production not reporting directly. To account for this latter uncertainty, an overall uncertainty estimate of 10% could be assumed. Therefore, it is proposed to use an assigned uncertainty band of 7% and a conservativeness factor of 0.98/1.02
	HFCs and PFCs: According to the 2006 IPCC Guidelines (section 4.5.3, volume 3), uncertainties are ± 10%. Therefore, it is proposed to use an assigned uncertainty band 7% and a conservativeness factor of 0.98/1.02
	SF_6: According to the 2006 IPCC Guidelines (section 4.5.3, volume 3), for tier 1 approach, aggregating production from different secondary segments and using the default emission factor introduces uncertainty. This approach gives by default a very rough approximation of real emissions. In a typical casting operation, the uncertainty in this assumption should be within 30%. Therefore, it is proposed to use an assigned uncertainty band of 20% and a conservativeness factor of 0.94/1.06
	Activity data:
	According to the 2006 IPCC Guidelines (section 4.5.3, volume 3), the accuracy of magnesium production activity data is comparable to that of other national production statistics i.e. ±5%. Additional uncertainty is introduced through estimating the share of production not reporting directly. To account for this latter uncertainty, an overall uncertainty estimate of 10% could be assumed. Therefore, it is proposed to use an assigned uncertainty band of 7% and a conservativeness factor of 0.98/1.02
5. Lead production	*Emission factors:*
	CO_2: According to the 2006 IPCC Guidelines (section 4.6.3, volume 3), the default emission factors used in tier 1 are expected to have an uncertainty of ±50%. Therefore, it is proposed to use an assigned uncertainty band of 40% and a conservativeness factor of 0.89/1.12
	Activity data:
	According to the 2006 IPCC Guidelines (section 4.6.3, volume 3), national production data is likely have an uncertainty of ±10%. Therefore, it is proposed to use an assigned uncertainty band of 7% and a conservativeness factor of 0.98/1.02

Category/subcategory	*Rationale*
6. Zinc production	*Emission factors:* **CO_2**: According to the 2006 IPCC Guidelines (section 4.7.3, table 4.25, volume 3), the default emission factors used in tier 1 are expected to have an uncertainty of ±50%. Therefore, it is proposed to use an assigned uncertainty band of 40 % and a conservativeness factor of 0.89/1.12 *Activity data:* According to the 2006 IPCC Guidelines (section 4.7.3, table 4.25, volume 3), national production data is likely have an uncertainty of ±10%. Therefore, it is proposed to use an assigned uncertainty band of 7% and a conservativeness factor of 0.98/1.02
2.D. Non energy products from fuels and solvent use	
1. Lubricant use	*Emission factors:* **CH_4 and N_2O**: According to the 2006 IPCC Guidelines (section 5.2.2, volume 3), since CH_4 and N_2O emissions are very small in comparison to CO_2, these could be neglected for the greenhouse gas calculation. No conservativeness factor value was assigned. **CO_2**: According to the 2006 IPCC Guidelines (section 5.2.3.1, volume 3), the default oxidized during use factors developed are very uncertain, as they are based on limited knowledge of typical lubricant oxidation rates. Expert judgement suggests using a default uncertainty of 50 %. Therefore, it is proposed to use an assigned uncertainty band of 40% and a conservativeness factor of 0.89/1.12 *Activity data:* Much of the uncertainty in emission estimates is related to the difficulty in determining the quantity of non-energy products used in individual countries, for which a default of 5% may be used in countries with well-developed energy statistics and 10–20% in other countries, based on expert judgement of the accuracy of energy statistics. Therefore, it is proposed to use an assigned uncertainty band of 20% and a conservativeness factor of 0.94/1.06
2. Paraffin wax use	*Emission factors:* **CO_2**: the 2006 IPCC Guidelines (section 5.3.3.1, volume 3), provides rather high uncertainties (between 50% and 100%). Therefore, it is proposed to use an assigned uncertainty band of 75% and a conservativeness factor of 0.82/1.21 *Activity data:* According to the 2006 IPCC Guidelines (section 5.3.3.2, volume 3), much of the uncertainty in emission estimates is related to the difficulty in determining the quantity of non-energy products used and discarded in individual countries, for which a default of 5% may be used in countries with well-developed energy statistics and 10–20% in other countries, based on expert judgement of the accuracy of energy statistics. Therefore, it is proposed to use an assigned uncertainty band of 20% and a conservativeness factor of 0.94/1.06
3. Asphalt production and use	*Emission factors:* **CO_2**: the 2006 IPCC Guidelines (section 5.4.4volume 3), provides rather default values for uncertainties (between 50% and 100%). The combination of these uncertainties would lead to an overall uncertainty estimate which is greater than 100%. Therefore, it is proposed to

Category/subcategory	*Rationale*
	use an assigned uncertainty band of 150 % and a conservativeness factor of 0.73/1.37
	Activity data:
	According to the 2006 IPCC Guidelines (section 5.4.4, volume 3), the uncertainty in production statistics of asphalt roofing material may be as accurate as ±10% if accounting is complete. If that is not the case, the uncertainty at the high end of the range could be as high as 100% or more. Therefore, it is proposed to use an assigned uncertainty band of 150% and a conservativeness factor of 0.73/1.37
4. Solvent	*Emission factors:*
	CO_2: for non-methane volatile organic compounds the 2006 IPCC Guidelines (section 5.5.4, volume 3) provides rather high uncertainties (about ± 50%), except for countries that have developed a detailed inventory for these sources. Therefore, it is proposed to use an assigned uncertainty band of 40% and a conservativeness factor of 0.89/1.12
	Activity data:
	No quantified information is provided in the 2006 IPCC Guidelines: assigned uncertainty band7 % and conservativeness factors of 0.98/1.02 were assumed.
2.E. Electronic industry	
1. Integrated circuit or semiconductor	*Emission factors:*
	HFCs, PFCs, SF_6, and NF_3: According to the 2006 IPCC Guidelines (section 6.3.1, volume 3), tier 1 emission factors will have an uncertainty range that is skewed towards values close to zero extending up to 200% for semiconductor. Therefore, it is proposed to use an assigned uncertainty band of 150% and a conservativeness factor of 0.73/1.37
	Activity data:
	According to the 2006 IPCC Guidelines (section 6.3.2, volume 3), for tier 1 method, the unit of activity is substrate consumption. Uncertainties in the tier 1 activity data are attributed principally to missing data entries in the World Forest Watch and flat-panel display databases. The estimates are about 10–12%. Therefore, it is proposed to use an assigned uncertainty band of 20% and a conservativeness factor of 0.94/1.06
2. Thin film transistors flat panel display	*Emission factors:*
	The same uncertainty is assumed for all gases
	HFCs, PFCs, SF_6, and NF_3: According to the 2006 IPCC Guidelines (section 6.3.1, volume 3), tier 1 emission factors will have an uncertainty range that is skewed towards values close to zero extending up to 200%. Therefore, it is proposed to use an assigned uncertainty band of 150% and a conservativeness factor of 0.73/1.37
	Activity data:
	The same uncertainty as for the above subcategories is assumed (10–12%). Therefore, it is proposed to use an assigned uncertainty band of 20% and a conservativeness factor of 0.94/1.06
3. Photovoltaics	*Emission factors:*
	The same uncertainty is assumed for all gases
	HFCs, PFCs, SF_6, and NF_3: According to the 2006 IPCC Guidelines (section 6.3.1,

Category/subcategory	*Rationale*
	volume 3), tier 1 emission factors will have an uncertainty range that is skewed towards values close to zero extending up to 200%. Therefore, it is proposed to use an assigned uncertainty band of 150% and a conservativeness factor of 0.73/1.37
	Activity data:
	The same uncertainty as for the above sub-categories is assumed (10–12%). Therefore, it is proposed to use an assigned uncertainty band of 20% and a conservativeness factor of 0.94/1.06
4. Heat transfer fluid	*Emission factors:*
	The same uncertainty is assumed for all gases
	HFCs, PFCs, SF_6, and NF_3: According to the 2006 IPCC Guidelines (section 6.3.1, volume 3), tier 1 emission factors will have an uncertainty range that is skewed towards values close to zero extending up to 200%. Therefore, it is proposed to use an assigned uncertainty band of 150% and a conservativeness factor of 0.73/1.37
	Activity data:
	The same uncertainty as for the above subcategories is assumed (10–12%). Therefore, it is proposed to use an assigned uncertainty band of 20% and a conservativeness factor of 0.94/1.06
2.F. Products use as substitutes for oxygen-depleting substances	
1. Refrigeration and air conditioning	*Emission factors:*
	HFCs and PFCs: Rough estimates of the emission factors uncertainty were calculated using the values provided in the 2006 IPCC Guidelines (sections 7.5.3 and 7.5.2.2, table 7.9, volume 3) and making simple assumptions for the share of activity data between charge in new products, the stock and disposal. The uncertainty estimates for the emission factors are greater than 100%. Therefore, it is proposed to use an assigned uncertainty band of 150% and a conservativeness factor of 0.73/1.37
	Activity data:
	A rough estimate of the activity data uncertainty calculated using the values provided in the 2006 IPCC Guidelines (section 7.5.3, 7.5.2.2, table 7.9, volume 3). The uncertainty estimates for the activity data are up to 100%. Therefore, it is proposed to use an assigned uncertainty band of 75% and a conservativeness factor of 0.82/1.21
2. Foam blowing agents	*Emission factors:*
	HFCs and PFCs: No quantitative uncertainty data available. Therefore, it is proposed to use an assigned uncertainty band of 150% and conservativeness factors of 0.73/1.37.
	Activity data:
	According to the 2006 IPCC Guidelines (section 7.4.3, volume 3), for net consumption activity data, current sales data indicate that the global estimates are accurate to within 10%, regional estimates are in the 30–40 % range, and the uncertainty of country-specific consumption information may be more than 50%. Therefore, it is proposed to use an assigned uncertainty band of 40% and a conservativeness factor of 0.89/1.12

Category/subcategory	*Rationale*
3. Fire protection and other applications	*Emission factors:* **HFCs and PFCs**: According to the 2006 IPCC Guidelines (section 7.6.3, volume 3), it is anticipated that the uncertainty in HFC/PFC emission estimates would be comparable or higher than the uncertainty seen in halon consumption estimates (13–16%). Therefore, it is proposed to use an assigned uncertainty band of 20% and a conservativeness factor of 0.94/1.06 *Activity data:* The same uncertainty as for the emissions factor is assumed for the activity data. Therefore, it is proposed to use an assigned uncertainty band of 20% and a conservativeness factor of 0.94/1.06
4. Aerosol (propellants and solvents)	*Emission factors:* No uncertainty quantitative data available in the 2006 IPCC Guidelines. Therefore, it is proposed to use assigned uncertainty band 150% and conservativeness factors of 0.73/1.37. *Activity data:* No uncertainty quantitative data available in the 2006 IPCC Guidelines. Therefore, it is proposed to use assigned uncertainty band 150% and conservativeness factors of 0.73/1.37.
5. Solvents (non-aerosol)	*Emission factors:* **HFCs and PFCs**: According to the IPCC *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories* (hereinafter referred to as the IPCC good practice guidance) (section 7.2.3), the assumption that all solvent may be emitted within approximately two years (50% in year *t* and 50% in year *t*+1) has been widely accepted by experts as a reasonable default. This suggests that the uncertainty on emission factors is very reliable. Therefore, it is proposed to use an assigned uncertainty band of 7% and a conservativeness factor of 0.98/1.02 *Activity data:* According to the 2006 IPCC Guidelines (section 7.2.3, volume 3), activity data should be reliable at the application level because of the small number of chemical manufacturers, the high cost of the solvent, and the 100% emissive nature of the use over time in most applications. Therefore, it is proposed to use an assigned uncertainty band of 7% and a conservativeness factor of 0.98/1.02
2.G. Other product manufacture and use	
1. SF6 and PFCs from electrical equipment	*Emission factors:* **SF_6 and PFCs**: According to the 2006 IPCC Guidelines (section 8.2.3 and table 8.5,volume 3), given the uncertainty values in the default emission factors provided for tier 1 (up to 30%), it would be reasonable to consider that the cumulative uncertainty would be within less than 50%. Therefore, it is proposed to use an assigned uncertainty band of 40% and a conservativeness factor of 0.89/1.12 *Activity data:* The 2006 IPCC Guidelines (section 8.2.3 and table 8.5, volume 3) provide uncertainty values provided up to 40%. Therefore, it is proposed to use an assigned uncertainty band of 40% and a conservativeness factor of 0.89/1.12

Category/subcategory	*Rationale*
2. Use of SF6 and PFCs in other products	*Emission factors*: **SF6 and PFCs**: According to the 2006 IPCC Guidelines (section 8.3.3, volume 3), if the survey of domestic sales per application by national gas producers and distributors is complete, then the accuracy of annual apparent consumption data will be high. The uncertainty in emissions estimates will be similarly small when the uses are all prompt emissions. In the case of delayed emission applications, the uncertainty values provided are up to 33% for the different parameters. Therefore, it is proposed to use an assigned uncertainty band of 40 % and a conservativeness factor of 0.89/1.12 Activity data: The 2006 IPCC Guidelines (section 8.3.3, volume 3) does not provide tangible uncertainty. However, in the case of delayed emission applications, the uncertainty values provided are up to 33% for the different parameters. Therefore, it is proposed to use an assigned uncertainty band of 40% and a conservativeness factor of 0.89/1.12
3. N_2O from products and uses	*Emission factors:* **N_2O**: No quantified information is provided in the 2006 IPCC Guidelines (section 8.4, volume 3) *Activity data:* No quantified information is provided in the 2006 IPCC Guidelines (section 8.4, volume 3)

Table 11
Background information used for agriculture

Subcategory	*Rationale*
3.A. Enteric fermentation	
	Emission factors:
	CH_4: The Intergovernmental Panel on Climate Change (IPCC) *2006 IPCC Guidelines for National Greenhouse Gas Inventories* (hereinafter referred to as the 2006 IPCC Guidelines) (volume 4, chapter 10.3.4,) state that as the emission factors for the tier 1 method are not based on country-specific data, they may not accurately represent a country's livestock characteristics, and may be highly uncertain as a result. Emission factors estimated using the tier 1 method are unlikely to be known more accurately than ±30% and may be uncertain to ±50%
	Therefore, it is proposed to use assigned uncertainty band of 40% and conservativeness factors of 0.89/1.12
	Activity data:
	The 2006 IPCC Guidelines (volume 4, chapter 10.2.3) states that the uncertainty associated with populations will vary widely depending on source, but should be known within ±20%
	Therefore, it is proposed to use assigned uncertainty band of 20% and conservativeness factor of 0.94/1.06
3.B. Manure management	
	Emission factors:
	CH_4: The 2006 IPCC Guidelines (volume 4, chapter 10.4.4) state that there are large uncertainties associated with the default emission factors for tier 1 (tables 10.14 to 10.16). The uncertainty range for the default factors is estimated to be ±30%
	Therefore, it is proposed to use assigned uncertainty band of 20% and conservativeness factor of 0.94/1.06
	N_2O: The 2006 IPCC Guidelines (volume 4, chapter 10.5.5) state that there are large uncertainties associated with the default emission factors for this source category (–50% to +100%)
	The IPCC 2006 IPCC Guidelines (volume 4, chapter 10.5.5) state that uncertainty ranges for the default N excretion rates are estimated at about +50% (source: Judgement by IPCC Expert Group)
	Uncertainty for emission factor for N_2O, taking into account the nitrogen excretion ratio and the emission factor, is estimated as 111.8%
	Therefore, it is proposed to use an assigned uncertainty band of 150% and conservativeness factor of 0.73/1.37
	Activity data:
	The 2006 IPCC Guidelines (volume 4, chapter 10.4.4) state that for countries where there is a wide variety of management systems used with locally different operating practices, the uncertainty range in management system usage data can be much higher, in the range of 25% to 50%, depending on the availability of reliable and representative survey data that differentiates animal populations by system usage
	Therefore, it is proposed to use an assigned uncertainty band of 40% and

Subcategory	*Rationale*
	conservativeness factors of 0.89/1.12
Indirect N_2O emissions	The uncertainties of activity data and emission factor for this category should be same as those for the category '3.D. Agricultural soils – b. Indirect N_2O Emissions from managed soils'
	Emission factors:
	N_2O: The 2006 IPCC Guidelines (table 11.3, volume 4) provide a range of default values for each parameter which are used for estimation of N_2O emissions from agricultural soils (EF_4 -80% - +400%, EF_5 -93.3% - +233.3%, $Frac_{GASF}$ -70% - + 200%, $Frac_{GASM}$ -75% - + 150%, and $Frac_{LEACH}$ -66.7% - +166.7%). All of the uncertainty ranges for each parameter are more than 100%
	Therefore, it is proposed to use an assigned uncertainty band of 150% and conservativeness factor of 0.73/1.37
	Activity data:
	Neither the 2006 IPCC Guidelines (volume 4, chapter 11.2.2) nor the IPCC *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories* (IPCC good practice guidance) (chapter 4.8) provide quantified information on uncertainty
3.C. Rice cultivation	
	Emission factors:
	CH_4: The 2006 IPCC Guidelines (volume 4, chapter 5.5.4) state that in the case of CH_4 emissions from rice cultivation, the uncertainty ranges of tier 1 values (emission and scaling factors) can be adopted directly from tables 5.11–5.14. Ranges are defined as the standard deviation about the mean, indicating the uncertainty associated with a given default value for this source category
	The average of each factor in table 5.11-14 (e.g. EF, SFw, SFp, organic amendment) is 85.3%
	Therefore, it is proposed to use an assigned uncertainty band of 75% and conservativeness factor of 0.82/1.21
	Activity data:
	According to the 2006 IPCC Guidelines (volume 4, chapter 5.5.4), uncertainties for parameters relevant to activity data can be up to 60%
	Therefore, it is proposed to use an assigned uncertainty band of 75% and conservativeness factors of 0.82/1.21
3.D. Agricultural soils	
1. Direct N_2O emissions from managed soils	*Emission factors:*
	CH_4: The 2006 IPCC Guidelines does not provide method for CH_4 emissions except for emissions from rice cultivation and from biomass burning. *The 2013 Supplement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories: Wetlands* (section 5.2.2.4) provides methodologies and uncertainty values for CH4 emissions from managed lands on inland wetlands mineral soils. The uncertainty for the emission factor is + 95%. Therefore, it is proposed to use an assigned uncertainty band of 75% and conservativeness factors of 0.82/1.21
	N_2O: The 2006 IPCC Guidelines (table 11.1, volume 4) provides range of default values for each parameter which are used for estimation of N_2O emissions from agricultural

Subcategory	*Rationale*
	soils. All of the uncertainty ranges for each parameter are above 100% Therefore, it is proposed to use an assigned uncertainty band of 150% and conservativeness factor of 0.73/1.37 *Activity data:* Although the 2006 IPCC Guidelines (volume 4, chapter 11.2.2) does not provide quantified information on uncertainty for AD, the IPCC good practice guidance (chapter 4.7) indicates that the uncertainty in activity data is expected to be about 25%. The proposed conservativeness factors are 0.94/1.06 (assigned uncertainty band 10 and 30%)
2. Indirect N_2O emissions from managed soils	*Emission factors:* **N_2O:** The 2006 IPCC Guidelines (volume 4, table 11.3) provide a range of default values for each parameter which are used for estimation of N_2O emissions from agricultural soils (EF4 -80% - +400%, EF5 -93.3% - +233.3%, FracGASF -70% - + 200%, FracGASM -75% - + 150%, and FracLEACH -66.7% - +166.7%). All of the uncertainty ranges for each parameter are more than 100% Therefore, it is proposed to use an assigned uncertainty band of 150% and conservativeness factor of 0.73/1.37 *Activity data:* Neither the 2006 IPCC Guidelines (volume 4, chapter 11.2.2) nor the IPCC good practice guidance (chapter 4.8) provide quantified information on uncertainty for AD. The same uncertainties for direct emissions were considered
3.E. Prescribed burning of savannahs	
	The 2006 IPCC Guidelines (volume 4, chapter 2.4) provide uncertainties for some parameters (table 2.4 and 2.5.) *Emission factors:* **CH_4:** according to table 2.5, 39.1% (savannah and grassland) could be applicable for CH_4 EF Therefore, it is proposed to use an assigned uncertainty band of 40% and conservativeness factor of 0.89/1.12 **N_2O:** according to table 2.5, 47.6% (savannah and grassland) could be applicable for CH_4 EF Therefore, it is proposed to use an assigned uncertainty band of 40% and conservativeness factor of 0.89/1.12 *Activity data:* According to table 2.4, 101.0% (all savannah and grassland (mid/late dry season burns)) could be applicable for the CH_4 emission factor Therefore, it is proposed to use an assigned uncertainty band of 150% and conservativeness factor of 0.73/1.37
3.F. Field burning of agricultural residues	
	Similar to 3.E. Prescribed burning, the 2006 IPCC Guidelines do not provide specific guidance on 3. F. Field burning of agricultural residues The 2006 IPCC Guidelines (volume 4, chapter 2.4), provides some parameters in tables 2.4 and 2.5

Subcategory	*Rationale*
	However, those tables do not provide uncertainties for field burning of agricultural residues for EF and AD. It is proposed to use the same values for prescribed burning of savannahs
3.G. Liming	
	Emission factors:
	The 2006 IPCC Guidelines (volume 4, chapter 11.3.3) do not state clearly the uncertainty for liming
	However, for the tier-1 default emission factor, it is based on the assumption that 100% of carbon contained in limestone and dolomite will be emitted. The 2006 Guidelines state in the explanation on tier 2, CO_2 emissions are expected to less than tier 1
	Based on this description, uncertainty for CO_2 EF could be less than 100%
	Therefore, it is proposed to use an assigned uncertainty band of 10% and conservativeness factor of 0.98/1.02
	Activity data:
	The 2006 IPCC Guidelines (volume 4, chapter 11.3.3) do not provide quantified information on uncertainty for activity data. An uncertainty of 20% was assumed
3.H. Urea application	
	Emission factors:
	In accordance with the 2006 IPCC Guidelines (volume 4, chapter 11.4.1), the default emission factor is 0.20 for urea, which is equivalent to the carbon content of urea on an atomic weight basis (20% for $CO(NH_2)_2$). A default -50% uncertainty may be applied.
	Therefore, it is proposed to use an assigned uncertainty band of 40% and conservativeness factor of 0.89/1.12
	Activity data:
	The 2006 IPCC Guidelines (volume 4, chapter 11.4.4) do not provide quantified information on uncertainty for AD. The same conservativeness factors for liming are assumed

Table 12
Background information used for land use, land-use change and forestry and land use, land-use change and forestry activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol

Subcategory	*Rationale*
Activity data	
Land uses - representation of land	The Intergovernmental Panel on Climate Change (IPCC) *2006 IPCC Guidelines for National Greenhouse Gas Inventories* (hereinafter referred to as the 2006 IPCC Guidelines) (section 3.5 and table 3.7, volume 4) provide indicative uncertainties for areas in accordance with the approach used. For approaches 1 and 2, for each category the uncertainty value can be up to 10%, and can be greater for changes in area. The information provided is the same that is included in the *Good Practice Guidance for Land Use, Land-Use Change and Forestry* (hereinafter referred to as the IPCC good practice guidance for LULUCF) The IPCC *2013 Revised Supplementary Methods and Good Practice Guidance Arising from the Kyoto Protocol* (section 2.4.3.2) indicates that same approaches used to assess uncertainties for land use, land-use change and forestry (LULUCF) could be used to assess the uncertainty for activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, although some issues are specific for individual activities. Uncertainties for the base year are likely to be higher than for estimates in years of the commitment period. Using expert judgement, default uncertainty ranges corresponding to a sampling error of 50% can be assigned, based on an analysis of no-till long-term experiments in Europe The *2013 Supplement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories: Wetlands* (hereinafter referred to as the Wetlands Supplement) presents information on uncertainty for areas under drained inland organic soils (section 2.2.1), stating that the default level of uncertainty for land area estimates on organic soils could be 20%; twice the uncertainty estimate for mineral soils. Therefore, it is proposed to use: (a) Assigned uncertainty bands of 7% and conservativeness factors of 0.98/1.02 for activity data (AD) for areas remaining under the same land use: forest land remaining forest land, cropland remaining cropland, grassland remaining grassland, wetlands remaining wetlands, settlements remaining settlements and other land remaining other land under the Convention, and forest management, cropland management, grazing land management, and revegetation under the Kyoto Protocol, except as indicated below (b) Assigned uncertainty band of 20% and a conservativeness factor of 0.94/1.06 for areas changing land use (land converted to forest land, cropland, grassland, wetlands, settlements and other land under the Convention, and afforestation/reforestation, deforestation and wetland drainage and rewetting under the Kyoto Protocol. It is proposed to also include in this group all areas under natural disturbances, newly established forest, and harvested and converted forest plantations) (c) Assigned uncertainty band of 20% and CF of 0.94/1.06 for areas on organic soils (d) For AD for base year for cropland management, grazing land management, revegetation and wetland drainage and rewetting, and for these activities the conservativeness factor could be presented with a footnote explaining that higher values apply for the base year These assigned uncertainty bands and conservativeness factors will be used when areas are used as AD unless otherwise specified. Some of the exceptions to this rule are: organic soils as drained soils, biomass from settlements remaining settlements, peatland and flooded land (see below)

Subcategory	*Rationale*
4.A. Forest land, and forest management and deforestation	
Forest land remaining forest land and forest management	*Change in carbon stock (CO_2):* **Biomass (above ground and below ground)**: the 2006 IPCC Guidelines (section 4.2.1.5, volume 4) provide ranges of uncertainty for individual parameters (annual increment, density, biomass expansion factors, shoot to root ratio and loses) based on data from the Food and Agriculture Organization of the United Nations (FAO) and several Parties, revising the values in the IPCC good practice guidance for LULUCF. Generally the uncertainty for all parameters is lower than 50% (although it can be lower for biomass expansion factors and root ratio); it is propose to use an assigned uncertainty band of 40% and a conservativeness factor of 0.89/1.12 for all parameters (no need to distinguish annual increment) **Dead organic matter (dead wood and litter)**: the 2006 IPCC Guidelines (section 4.2.2.5, volume 4) do not provide default uncertainties for this pool. It is proposed to maintain the conservativeness factor in decision 20/CMP.1, which are based on the information provided in the IPCC good practice guidance for LULUCF: dead wood: assigned uncertainty band >150% and conservativeness factor of 0.73/1.37; litter: assigned uncertainty band of 75% 0.82/1.21 **Soils**: The information in the 2006 IPCC Guidelines (section 4.2.3.5, tables 2.3 and 4.6, volume 4) indicates that the uncertainty for the emission factors (EFs) or parameters used to estimate carbon stock change in organic soils could larger (uncertainties between 200% and 600%) than for mineral soils (90%, expressed as standard deviations as percentages of the mean). Propose to separate conservativeness factors for mineral soils and organic soils in forest land remaining forest land and forest management and set the following conservativeness factors: *Mineral soils*: 0.82/1.21 (assigned uncertainty band of 90%) *Organic soils*: 0.73/1.37 (assigned uncertainty band of 600%) But see information regarding drained inland organic soils and rewetted organic soils below. In addition, it is proposed that if the technical correction can be subject to adjustments, these use the conservativeness factor for the component (AD, EF, emissions), being adjusted *Activity data:* The general information on representation of lands was used to derive the conservativeness factor for this category, although the information in the 2006 IPCC Guidelines indicate (section 4.2.1.5, volume 4), citing FAO, stated that the uncertainties for this category could be 3% for industrialized countries
Land converted to forest land and afforestation/reforestation	*Change in carbon stock (CO_2 emission/removals):* **Biomass (above ground and below ground)**: the 2006 IPCC Guidelines (section 4.3.1.5, volume 4) indicates that the EFs used to estimate carbon stock change are nearly identical to those required for forest land remaining forest land, and the discussion on uncertainties for this last land use change also applies here. Therefore, it is propose to use an assigned uncertainty band of 40% and conservativeness factor of 0.89/1.12 for all parameters **Dead organic matter (dead wood and litter)**: the 2006 IPCC Guidelines (section 4.3.2.5, volume 4) do not provide quantitative uncertainties for this pool, but indicate that uncertainties for dead organic matter are higher than those for biomass. The IPCC good practice guidance for LULUCF stated that uncertainties for dead wood are close to zero in the first years after the conversion. It is proposed to use the conservativeness

Subcategory	*Rationale*
	factor defined for forest land remaining forest land: dead wood: assigned uncertainty band >150% and a conservativeness factor of 0.73/1.37; litter: assigned uncertainty band of 75% and a conservativeness factor of 0.82/1.21
	Soils: The information in the 2006 IPCC Guidelines (section 4.3.3.5, tables 2.3 and 4.6, volume 4) indicates that the uncertainty analyses for cropland are fundamentally the same as forest land remaining;
	Forest land: Propose to separate conservativeness factors for mineral soils and organic soils in forest land remaining forest land and forest management and set the following conservativeness factors:
	Mineral soils: 0.82/1.21 (assigned uncertainty band of 90%)
	Organic soils: 0.73/1.37 (assigned uncertainty band of 600%)
Areas subject to natural disturbances	The 2006 IPCC Guidelines and the IPCC *2013 Revised Supplementary Methods and Good Practice Guidance Arising from the Kyoto Protocol* do not provide specific quantitative information regarding natural disturbances. It is propose to assume that these are equal to those under deforestation
	Adjustments for salvage logging, margin and subsequent removals, and maybe background levels, use the conservativeness factor for the component (AD, EF, emissions for each specific pool), being adjusted
Newly established forest, harvested and converted forest plantations	The 2006 IPCC Guidelines and the IPCC *2013 Revised Supplementary Methods and Good Practice Guidance Arising from the Kyoto Protocol* do not provide specific quantitative information regarding these subcategories
	Harvest and converted forest plantations and newly established forests reported under forest management are affected for land use change that is somehow similar to deforestation and afforestation/reforestation, respectively. It is proposed that uncertainty values for AD, EF/parameters and emissions be the same as for afforestation/reforestation and deforestation, respectively. In addition, it is proposed that the uncertainty for carbon stock at harvest has an uncertainty similar to emissions. Adjustments for the carbon stock at harvest should use the conservativeness factor for the component (AD, EF, emissions), being adjusted
Deforestation	There is no specific quantitative information for this activity neither in the 2006 IPCC Guidelines nor in the IPCC *2013 Revised Supplementary Methods and Good Practice Guidance Arising from the Kyoto Protocol* . It is proposed to assume that the uncertainties for this activity are the highest amongst those for cropland, grassland and settlements
4.B Cropland, and cropland management	
Cropland remaining cropland and cropland management	*Carbon stock change (CO_2 emissions/removals):*
	Biomass (above ground and below ground): the 2006 IPCC Guidelines determine that a default uncertainty level of + 75% for parameters has been assigned based on expert judgement. Therefore, it is propose to use an assigned uncertainty band of 75% and a conservativeness factor of 0.82/1.21 for all parameters
	Dead organic matter: the 2006 IPCC Guidelines (section 5.2.2.5, volume 4) recognize that there is not much information available since uncertainty estimation is not required at tier 1 as the dead organic matter stocks are assumed to be stable. The same approach used for forest land remaining forest land and that was used in decision 20/CMP.1 is proposed: dead wood: assigned uncertainty band >150% and a conservativeness factor of 0.73/1.37; litter: assigned uncertainty band of 75% and a conservativeness factor of

Subcategory	*Rationale*
	0.82/1.21
	Soils: The information in the 2006 IPCC Guidelines (section 5.2.3.5, tables 2.3, 5.5 and 5.6, volume 4) indicates that the uncertainty for the EFs or parameters used to estimate carbon stock change in organic soils could be the following: factor for land use 9 – 50%; factor for management 4 – 50%; and factor for input – 10 – 50%, and a nominal error estimate of ±90% are assumed for mean stocks for soil-climate types The information on chapter 5 of the IPCC *2013 Revised Supplementary Methods and Good Practice Guidance Arising from the Kyoto Protocol* (tables 5.2 and 5.3) do not change significantly this situation
	Table 5.6 presents the uncertainty for the EFs for cultivated organic soils: 90%. Propose to use the following conservativeness factor for mineral and organic soils: 0.82/1.21 (assigned uncertainty band of 75%)
	Activity data:
	The general uncertainty values for representation of areas (see above) were used for this category, although the 2006 IPCC Guidelines state (sections 5.2.1.5 and 5.2.3.5, volume 4) that: uncertainty for tier 1 is likely to be low (<10%) for estimates of area under different cropping systems since most countries annually estimate cropland area using reliable methods; and if using aggregate land-use area statistics for activity data (e.g. FAO data), the default level of uncertainty for the land area estimates should be ±50%
	Under cropland management, the uncertainty for AD should be higher for 1990 (base year)
Land converted to cropland	It can be concluded from information in the 2006 IPCC Guidelines (sections 5.3.1.5, 5.3.2.5 and 5.3.3.5, volume 4) that uncertainty analyses for cropland are fundamentally the same as cropland remaining cropland
4.C. Grassland and grazing land management	
Grassland remaining grassland and grazing land management	*Carbon stock change (CO_2 emissions/removals):*
	Biomass (above ground and below ground): the 2006 IPCC Guidelines note that the default uncertainty estimates provided in table 6.1, section 6.2.1.5, volume 4, can be used for the uncertainty expressed for below-ground biomass expansion factors (these range between 80 and 150%). Uncertainties associated with expansion factors for carbon content of woody and herbaceous biomass, are smaller. Therefore, it is propose to use an assigned uncertainty band of 150% and a conservativeness factor of 0.73/1.37 for the root-to-shoot and an assigned uncertainty band of 75% and a conservativeness factor of 0.82/1.21 for all other parameters
	Dead organic matter: the 2006 IPCC Guidelines (section 6.2.2.5, volume 4) recognize that there is no much information available since uncertainty estimation is not required at tier 1 since the dead organic matter stocks are assumed to be stable. The same approach used for forest land remaining forest land and that was used in the decision 20/CMP.1 is proposed: dead wood: assigned uncertainty band >150% and a conservativeness factor of 0.73/1.37; litter: assigned uncertainty band of 75% and a conservativeness factor of 0.82/1.21
	Soils: The information in the 2006 IPCC Guidelines (section 6.2.3.5, tables 2.3, 6.2 and 6.3, volume 4) indicates that the uncertainty for the EFs or parameters used to estimate carbon stock change in organic soils could be the following: factor for management 11 – 40%; and factor for input – 7%, and a nominal error estimate of ±90% are assumed for mean stocks for soil-climate types
	Table 6.3, volume 4 in the 2006 IPCC Guidelines, presents the uncertainty for the EF for cultivated organic soils: 90%. Propose to use the following conservativeness factor for

Subcategory	*Rationale*
	mineral and organic soils: 0.82/1.21 (uncertainty of 75%)
	Activity data:
	The general uncertainty values for representation of areas (see above) were used for this category
	Under grazing land management, the uncertainty for AD should be higher for 1990 (base year)
Land converted to grassland	Uncertainty analyses for grassland are fundamentally the same as grassland remaining grassland (2006 IPCC Guidelines, sections 6.3.1.5, 6.3.2.5 and 6.3.3.5, volume 4)
4.E. Settlements	
Settlements remaining settlements	*Carbon stock change (CO_2 emissions/removals):*
	Biomass (above ground and below ground): the 2006 IPCC Guidelines (section 8.2.1.4, volume 4) regarding biomass stated that the overall relative uncertainty of the estimate of changes in carbon stocks is unlikely to be less than 30–50%, without distinguishing for AD (the methodology included in the 2006 IPCC Guidelines uses either the crown cover or number of trees as AD) and parameters
	It is proposed to use the same uncertainty for AD and EFs/parameters for biomass, i.e. assigned uncertainty band of 40% corresponding to a conservativeness factor of 0.89/1.12
	Dead organic matter: the 2006 IPCC Guidelines (section 8.2.2.4, volume 4) informs that there is no there is no need to estimate uncertainty at tier 1 since the dead organic matter stocks are assumed to be stable. Uncertainties associated with carbon stocks and other parameter values are likely to be at least a factor of three unless country-specific data are available from well-designed surveys. The following conservativeness factors are proposed for dead wood and litter: assigned uncertainty band >150% and a conservativeness factor of 0.73/1.37
	Soils: The information in the 2006 IPCC Guidelines (section 8.2.3.4, volume 4) refers to the uncertainties of cropland (tables 5.5 and 5.6) and grassland (tables 6.5 and 6.6). Propose to use the following conservativeness factor for mineral and organic soils: 0.82/1.21 (assigned uncertainty band of 90%)
4.F. Other land	
Other land remaining other land	The 2006 IPCC Guidelines provides no methodologies or uncertainties. Propose to delete the category [or assume the highest uncertainty equivalent to assigned uncertainty band >150% and a conservativeness factor of 0.73/1.37
Land converted to other land	*Carbon stock change (CO_2 emissions/removals):*
	Biomass (above ground and below ground): a default uncertainty level of +75% of the estimated mean CO_2 emission may be assumed (2006 IPCC Guidelines, 9.3.1.4, volume 4), equivalent to an assigned uncertainty band <100% and a conservativeness factor of 0.82/1.21
	No information is provided for the other pools, proposing to delete the pools (or assume the highest uncertainty equivalent to an assigned uncertainty band >150% and a conservativeness factor of 0.73/1.37

Subcategory	*Rationale*
4.D. Wetlands	
Peatlands remaining peatlands (CO_2, N_2O)	*Emissions/removals:* The 2006 IPCC Guidelines (volume 4) propose range of uncertainty values for EF in table 7.4 (CO_2) and table 7.6 (N_2O from soils), indicating that the uncertainty for CO_2 could be as high as a factor of 2–3 and 40% for N_2O. The proposed conservativeness factors are: CO_2 – assigned uncertainty band of 150%, conservativeness factor of 0.73/1.37; N_2O – assigned uncertainty band of 40%, conservativeness factor of 0.89/1.1 *Activity data:* In accordance with the 2006 IPCC Guidelines (section 7.2.1.23, volume 4), the uncertainty in AD could be of 50% in Europe and North America, and a factor of 2 in the rest of the world. Therefore, the proposed conservativeness factors are: assigned uncertainty band of 75% corresponding to a conservativeness factor of 0.82/1.21
Land being converted to peat extraction (CO_2, N_2O)	*Emissions/removals:* The 2006 IPCC Guidelines (section 7.2.2.3, volume 4) propose range of uncertainty values as for peatland remaining peatland *Activity data:* No specific information for this activity. It is proposed to use the same range as for peatland remaining peatland
Flooded land remaining flooded land	The 2006 IPCC Guidelines (section 7.3.2.3, volume 4)indicate that no methodologies are available for flooded land remaining flooded land
Land being converted to flooded land (CO_2)	*Carbon stock change (CO_2 emissions/removals):* For land converted to flooded land, the methodology (eq. 7.10, volume 4 of the 2006 IPCC Guidelines) is based on the biomass before and after flooding. Uncertainty in biomass stocks is discussed in chapters 4, 5 and 6: forest land 40%; cropland 75%; grassland/above-ground 75; and grassland – below ground >150%. Using the uncertainty ranges, the proposed conservativeness factor is: 0.82/1.21 (assigned uncertainty band of 75%) *Activity data:* The 2006 IPCC Guidelines state that national statistical information on large dams (> $100km^2$) is accurate to within 10%. Where other information is used, the uncertainty for flooded land areas of more than 50%, especially for countries with large flooded land areas. Propose to consider the range <50% and a conservativeness factor of 0.89/1.12
Specific issues	
Revegetation	There is no specific quantitative information for this activity neither in the 2006 IPCC Guidelines nor in the IPCC *2013 Revised Supplementary Methods and Good Practice Guidance Arising from the Kyoto Protocol*. It is proposed that one assume that the uncertainties for this activity are the highest among those for forest land and grazing land
Harvest wood products (HWP) (Convention) and changes in HWP for afforestation/reforestation, deforestation and forest	*Carbon stock change (CO_2 emissions/removals):* The 2006 IPCC Guidelines (section 12.3, volume 4) provides uncertainty values for different parameters: product volume to product weight factors – 25%; oven dry product weight to carbon weight – 10%; decay (or discard) rate for solid wood and paper using variables 1A – 50%, and higher for 1B. Assuming the half-life/decay rate (k) as the most

Subcategory	*Rationale*
management	influential parameter, the uncertainty in parameters is around 50%, hence a conservativeness factor of 0.89/1.12
	Activity data:
	The 2006 IPCC Guidelines state (section 2.8.6, volume 4) that estimates for variables 1A, 1B, 2A and 2B estimates using tier 1 methods could have uncertainties of ± 50% or more. The IPCC *2013 Revised Supplementary Methods and Good Practice Guidance Arising from the Kyoto Protocol* (section 2.8.6) states that an overall estimate of these factors results in an estimated uncertainty of the reported values for HWP categories (i.e. sawn wood, wood-based panels and paper and paperboard)between –25% to +50% (based on the authors' expert judgement)
	The uncertainty in AD (HWP fractions) appears to be <50% for the Convention, hence a conservativeness factor of 0.89/1.12
	Regarding the uncertainty for the Kyoto Protocol, it is probable that it is higher (because of the allocation of HWP to specific activities), propose to use an assigned uncertainty band <100% and a conservativeness factor of 0.82/1.21
Drained inland organic soils	*Emissions and removals:*
	CO_2: CO_2 emissions include on-site emission and off-site emissions from waterborne carbon losses from drained inland organic soils
	For on-site emissions, the uncertainty for EFs and parameters, in accordance with table 2.1 of the Wetlands supplement range between 20 and 260%. For off-site emissions, table 2.2. In the same report, indicates a range of 10–40% for parameters and 40–80 for the overall EF. Overall, uncertainty due to parameters could be significant, higher than 150% and the proposed conservativeness factor is 0.73/1.37
	CH_4: Uncertainty ranges are provided in table 2.3 of the IPCC *2013 Revised Supplementary Methods and Good Practice Guidance Arising from the Kyoto Protocol* . The uncertainties are significant, either for $EF_{CH4LAND}$ (106–436%) or EF_{CH4}_ditch (92–162%)
	N_2O: Uncertainties in table 2.5 indicate a range of 60–240%. The uncertainties for CH_4 EF and N_2O EF are high (>150%) and the proposed conservativeness factor corresponds to the band 0.73/1.37 It does not appear, from the information in the IPCC documents, that there is any need to distinguish conservativeness factors per land use or LULUCF activity
	Activity data:
	The Wetlands supplement (section 2.2.1) states that, if using aggregate land-use area statistics for activity data (e.g. FAO data), the uncertainty for land area estimates on organic soils should be ±20%; twice the uncertainty estimate given in table 3.7 for mineral soils in the 2006 IPCC Guidelines (volume 4). Propose to consider an assigned uncertainty band of 20% and a conservativeness factor of 0.94/1.06
Rewetted organic soils	*Emissions and removals:*
	CO_2: Table 3.1 in the Wetlands supplement presents the ranges for carbon fluxes (40–242%) and table 3.2 present the ranges for export from rewetted organic soils (indirect emissions): 20–75%. The proposed values are a conservativeness factor of 0.73/1.37 (assigned uncertainty band >150%)
	CH_4: Table 3.3 in the Wetlands supplement present default EFs and the 95% ranges: 227–500%. The proposed values for a conservativeness factor are 0.73/1.37 (assigned uncertainty band >150%)
	N_2O: Section 3.2.3 in the Wetlands supplement indicate that under tier 1, N_2O emissions

Subcategory	*Rationale*
	from rewetted soils are assumed to be negligible *Activity data:* The Wetlands supplement indicates that the uncertainty in AD depends on the source. Therefore, it is assumed that AD have uncertainty values typical of land use changes
Direct and indirect N_2O emissions from nitrogen fertilization and mineralization/immobilization associated with loss/gain of soil organic matter resulting from change of land use or management of mineral soils	*N_2O emissions:* **Direct emissions**: the uncertainty for the EF (table 11.1 in section 11.2.1.4, volume 4 in the IPCC good practice guidance) is 270% **Indirect emissions**: uncertainties in estimates of indirect N_2O emissions from managed soils are caused by uncertainties related to natural variability and to the emission, volatilization and leaching factors. The same table 11.3 presents information for EF4, EF5, $Frac_{GASM}$, $Frac_{GASF}$ and $Frac_{LEACH}$, and the uncertainties are all high, between 225 and 480%. This corresponds to a proposed values for a conservativeness factor of 0.73/1.37 (assigned uncertainty band >150%). This range would also apply for N_2O emissions from mineralization *Activity data:* The IPCC *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories* indicate for LULUCF that the uncertainty in AD is expected to be about 25%. The proposed conservativeness factor is 0.94/1.06 (assigned uncertainty bands of 10 and 30%)
Biomass burning	The information from the 2006 IPCC Guidelines for several land uses (forest land remaining forest land, cropland remaining cropland (savannahs), cropland, grassland remaining grassland and grassland) appears to indicate that the uncertainty of areas is around 20%, but large fires may result in uncertainties up to 50%. This is correspondent to conservativeness factor of 0.89/1.12 (assigned uncertainty band of 40%) Emissions per unit of area are provided in the 2006 IPCC Guidelines for cropland and grassland as a factor of 2. This corresponds to conservativeness factor of 0.82/1.21 (assigned uncertainty band of 475%)

Table 13
Background information used for waste

Subcategory	*Rationale*
5.A. Solid waste disposal	
Managed waste disposal sites, unmanaged waste disposal sites and uncategorized waste disposal sites	*Emission factors:* **CH_4**: The Intergovernmental Panel on Climate Change (IPCC) *2006 IPCC Guidelines for National Greenhouse Gas Inventories* (hereinafter referred to as the 2006 IPCC Guidelines) (table 3.5, volume 5) state that for default IPCC values: for degradable organic carbon, the uncertainty is : ±20%, for the fraction of degradable organic carbon decomposed is ± 20%; for methane correction factors: –50% – +60%; for the fraction of CH_4 in generated landfill gas = 0.5: for the IPCC default value: ±5% Based on uncertainties for those four parameters, the uncertainty for activity data (AD) was estimated as 100% Therefore, it is proposed to use an assigned uncertainty band of 75% and a conservativeness factor of 0.82/1.21 for CH_4 emission factor (EF) *Activity data:* The 2006 IPCC Guidelines (table 3.5, volume 5) informs the following regarding uncertainty ranges for activity data (AD): Total municipal solid waste: 30% is a typical value for countries which collect waste generation data on a regular basis. Fraction of municipal solid waste sent to solid waste disposal sites (municipal solid waste fraction): ±30% for countries collecting data on disposal at solid waste disposal sites The total uncertainty of waste composition is ±30% for countries with country-specific data based on studies including periodic sampling. Based on uncertainties for the three parameters, uncertainty for AD could be calculated as 50% Therefore, it is proposed to use an assigned uncertainty band of 40% and a conservativeness factor of 0.89/1.12
5.B. Biological treatment of solid waste	
1. Composting	*Emission factors:* **CH_4 and N_2O**: The 2006 IPCC Guidelines (table 4.1, volume 5) provide uncertainty defaults for each EF Based on table 4.1, uncertainties for EFs are proposed as follows; CH_4 EF: 100%, N_2O EF: 166.7% Therefore, it is proposed to use assigned uncertainty bands of 75% and 150% and conservativeness factors of 0.82/1.21 and 0.73/1.37 for CH_4 EF and N_2O EF, respectively *Activity data:* The 2006 IPCC Guidelines (table 3.5, volume 5) states that total municipal solid waste: Country-specific: 30% is a typical value for countries which collect waste generation

Subcategory	*Rationale*
	data on a regular basis Therefore, it is proposed to use an assigned uncertainty band of 40% and a conservativeness factor of 0.89/1.12
2. Anaerobic digestion at biogas facilities	*Emission factors:* **CH_4 and N_2O**: The 2006 IPCC Guidelines (table 4.1, volume 5) provide uncertainty for each EF Based on table 4.1, the uncertainties for EFs are proposed as follows: CH_4 EF: 900%, N_2O EF: not applicable Therefore, it is proposed to use an assigned uncertainty band of >150% and a conservativeness factor of 0.73/1.37 for CH_4 EF. And for N_2O EF, an assigned uncertainty band could not be proposed *Activity data:* The 2006 IPCC Guidelines (table 3.5, volume 5) states that for total municipal solid waste: country-specific: 30% is a typical value for countries which collect waste generation data on a regular basis Therefore, it is proposed to use an assigned uncertainty band of 40% and a conservativeness factor of 0.89/1.12
5.C. Incineration and open burning of waste	
1. Waste incineration	*Emission factors:* **CO_2**: The 2006 IPCC Guidelines (volume 5, chapter 5.7.1) state that the major uncertainty associated with CO_2 emissions estimate is related to the estimation of the fossil carbon fraction: ± 20 for degradable organic carbon in table 3.5 Therefore, it is proposed to use an assigned uncertainty band of 20% and conservativeness factor of 0.94/1.06 **CH_4 and N_2O**: The 2006 IPCC Guidelines (volume 5, chapter 5.7.1) state that, If default values for N_2O and CH_4 emission factors are used, uncertainty ranges have been estimated to be ± 100 % or more. Therefore, it is proposed to use an assigned uncertainty band of >150% and conservativeness factor of 0.73/1.37 for CH_4 and N_2O EF *Activity data:* The 2006 IPCC Guidelines (volume 5, chapter 5.7.2) state that the conversion of waste amounts from wet weight to dry weight adds additional uncertainty. Depending on the frequency and the accuracy of the dry weight determination, this uncertainty varies substantially. The uncertainty of the dry matter content may therefore range between ± 10% up to ± 50% and even more Therefore, it is proposed to use an assigned uncertainty band of 40% and a conservativeness factor of 0.89/1.12 for AD
2. Open burning of waste	*Emission factors:* **CO_2**: In the 2006 IPCC Guidelines (volume 5, chapter 5.7.1), a default value of ± 40% is proposed for countries relying on default data on the composition in their

Subcategory	*Rationale*
	calculations. Therefore, it is proposed to use an assigned uncertainty band of 40% and a conservativeness factor of 0.89/1.12
	CH_4 and N_2O: The 2006 IPCC Guidelines (volume 5, chapter 5.7.1) state that, if default values for N_2O and CH_4 emission factors are used, uncertainty ranges have been estimated to be ± 100% or more Therefore, it is proposed to use an assigned uncertainty band of >150% and a conservativeness factor of 0.73/1.37 for CH_4 and N_2O EF.
	Activity data:
	The 2006 IPCC Guidelines (volume 5, chapter 5.7.2) state that the conversion of waste amounts from wet weight to dry weight adds additional uncertainty. Depending on the frequency and the accuracy of the dry weight determination, this uncertainty varies substantially. The uncertainty of the dry matter content may therefore range between ± 10% up to ± 50% or even more
	Therefore, it is proposed to use an assigned uncertainty band of 40% and a conservativeness factor of 0.89/1.12
5.D. Wastewater treatment and discharge	
1. Domestic wastewater	*Emission factors:*
	CH_4: The 2006 IPCC Guidelines (volume 5, table 6.7) provides the following information on quantitative uncertainties: Maximum CH_4 producing capacity is around ± 30%
	Fraction treated anaerobically: The fraction treated anaerobically is technology dependent (see table 6.3, volume 5). Thus the uncertainty range is also technology dependent. The uncertainty range should be determined by expert judgement, bearing in mind that the fraction treated anaerobically is a fraction and must be between 0 and 1. Suggested ranges are provided
	Untreated systems and latrines: ± 50%, lagoons, poorly managed treatment plants: ± 30%, centralized well-managed plant, digester, reactor: ± 10%
	For maximum CH_4 producing capacity x fraction treated anaerobically on the combined uncertainty could be calculated as follows 58%
	Therefore, it is proposed to use an assigned uncertainty band of 75% and a conservativeness factor of 0.82/1.21 for CH_4 EF
	N_2O: The 2006 IPCC Guidelines (volume 5, table 6.11) states the following; Emission factor (kg N_2O-N/kg –N) = more than 100% (deforestation = 0.005, 0.0005 – 0.25), Emission factor (g N_2O/person/year) = more than 100% (deforestation = 3.2, 2 – 8)
	Therefore, it is proposed to use an assigned uncertainty band of 150% and a conservativeness factor of 0.73/1.37 for CH_4 and N_2O EF
	Activity data:
	The 2006 IPCC Guidelines (volume 5, table 6.7) state the following:
	Human population = ± 5%, biological oxygen demand per person = ± 30%
	Based on uncertainties for two parameters, uncertainty for AD could be calculated as 30%

Subcategory	*Rationale*
	Therefore, it is proposed to use an assigned uncertainty band of 40% and a conservativeness factor of 0.89/1.12
2. Industrial wastewater	*Emission factors:*
	CH_4: The 2006 IPCC Guidelines (volume 5, table 6.10) state the following: Maximum CH_4 producing capacity = ± 30%
	Methane correction factor: The uncertainty range should be determined by expert judgement, bearing in mind that this is a fraction and uncertainties cannot take it outside the range of 0 to 1 (the secretariat assume a value of 75%)
	For maximum CH_4 producing capacity x methane correction factor, the combined uncertainties could be calculated as 80%
	Therefore, it is proposed to use an assigned uncertainty band of 75% and a conservativeness factor of 0.82/1.21 for CH_4 EF
	N_2O: The 2006 IPCC Guidelines (volume 5, table 6.11) state the following: Emission factor (kg N_2O-N/kg –N) = more than 100% (deforestation = 0.005, 0.0005 - 0.25), Emission factor (g N_2O/person/year) = more than 100% (deforestation = 3.2, 2 - 8)
	Therefore, it is proposed to use an assigned uncertainty band of 150% and a conservativeness factor of 0.73/1.37 for CH_4 and N_2O EF
	Activity data:
	The 2006 IPCC Guidelines (volume 5, table 6.10) states the following:
	Industrial production = ± 25%. Use expert judgement regarding the quality of data source to assign a more accurate uncertainty range
	Wastewater/unit production + chemical oxygen demand/unit wastewater: These data can be very uncertain as the same sector might use different waste handling procedures at different plants and in different countries. The product of the parameters (wastewater/unit production •chemical oxygen demand) is expected to have less uncertainty. An uncertainty value can be attributed directly to kg chemical oxygen demand/tonne of product. –50 %, +100% is suggested (i.e. a factor of two)
	For industrial production x wastewater/unit production x chemical oxygen demand the combined uncertainty could be calculated as follows 103%
	Therefore, it is proposed to use an assigned uncertainty band of 150% and a conservativeness factor of 0.73/1.37.