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Methodological issues

**Completion of the technical guidance on methodologies
for adjustments under the Kyoto Protocol**

**Completion of the technical guidance on methodologies for adjustments
under Article 5, paragraph 2, of the Kyoto Protocol**

Note by the secretariat

Summary

In response to decision 21/CP.7 and a request from the Subsidiary Body for Scientific and Technological Advice (SBSTA) at its twentieth session, this note contains a proposal for technical guidance on methodologies for adjustment under Article 5, paragraph 2, of the Kyoto Protocol that includes guidance on adjustments for estimates of anthropogenic emissions and removals from land use, land-use change and forestry. This technical guidance has been prepared building on the approach of the technical guidance already recommended, by decision 20/CP.9, for adoption by the Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol (COP/MOP).

The SBSTA may wish to endorse the proposed technical guidance and forward a draft decision for adoption by the Conference of the Parties at its eleventh session, recommending a decision for adoption by the COP/MOP at its first session.

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I. Introduction

A. Mandate

1. The Conference of the Parties (COP), by its decision 21/CP.7,¹ forwarded a draft decision for adoption by the Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol (COP/MOP) on good practice guidance and adjustments under Article 5, paragraph 2, of the Kyoto Protocol. The same decision requested the Subsidiary Body for Scientific and Technological Advice (SBSTA) to develop technical guidance on methodologies for adjustments to be incorporated in the annex to the above-mentioned COP/MOP draft decision. This work was done for all inventory sectors except land use, land-use change and forestry (LULUCF), and the resulting technical guidance was recommended for adoption by the COP/MOP by decision 20/CP.9.² The COP, by its decision 21/CP.7, also decided to develop technical guidance on methodologies for adjustments under Article 5, paragraph 2, of the Kyoto Protocol for estimates of anthropogenic emissions and removals from LULUCF at a later stage after completion of the work by the Intergovernmental Panel on Climate Change (IPCC) on good practice guidance for LULUCF.

2. The SBSTA, at its twentieth session,³ requested the secretariat to prepare a note including a proposal for technical guidance on methodologies for adjustments under Article 5, paragraph 2, of the Kyoto Protocol for estimates of anthropogenic greenhouse gas (GHG) emissions and removals from LULUCF activities under the Kyoto Protocol. It agreed to consider this note at its twenty-second session with a view to recommending a draft decision on adjustments for adoption by the COP at its eleventh session, including a draft decision to be forwarded for adoption by the COP/MOP.

B. Scope of the note

3. The annex to this note contains a proposal for a COP decision including a draft decision for adoption by the COP/MOP at its first session. The proposed COP decision includes technical guidance on methodologies for adjustments under Article 5, paragraph 2, that incorporates the guidance relating to LULUCF requested by decision 21/CP.7 and by the SBSTA at its twentieth session. This incorporation has been prepared building on the approach of the technical guidance already recommended for adoption by the COP/MOP by decision 20/CP.9 referred to in paragraph 1 above. With the adoption of these decisions the work on adjustments, initiated and requested by decision 21/CP.7, will be completed.

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

4. The SBSTA may wish to consider the information contained in this note and forward a draft decision to the COP on the technical guidance on methodologies for adjustments under Article 5, paragraph 2, of the Kyoto Protocol including a draft decision for adoption by the COP/MOP at its first session.

¹ FCCC/CP/2001/13/Add.3.

² See FCCC/CP/2003/6/Add.2 and FCCC/SBSTA/2003/10/Add.2. Because the work by the Intergovernmental Panel on Climate Change to prepare good practice guidance on LULUCF was completed later than the preparation of the good practice guidance for the other IPCC inventory sectors (Energy, Industrial Processes, Agriculture and Waste), the technical guidance on methodologies for adjustments adopted by decision 20/CP.9 does not include methodologies for adjustments for the LULUCF sector. The IPCC report *Good Practice Guidance for Land Use, Land-use Change and Forestry* was completed in November 2003, whereas the IPCC report *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories* was completed in May 2000.

³ Document FCCC/SBSTA/2004/6, paragraphs 16 and 17.

II. Approach

5. The secretariat is proposing modifications to the text of the technical guidance for adjustments under Article 5, paragraph 2, recommended by decision 20/CP.9 for adoption by the COP/MOP at its first session, to incorporate additional guidance on methodologies for adjustments to emissions and removals in the LULUCF sector. Such adjustments could be applicable to emissions and removals of LULUCF in the base year for the purposes of establishing the assigned amount under Article 3, paragraph 7, of the Kyoto Protocol; and for estimates of emissions and removal from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol.
6. In modifying the technical guidance to incorporate elements relating to LULUCF, the secretariat has sought to be consistent with the approach taken for methodologies for adjustment for other IPCC inventory sectors as contained in the technical guidance recommended by decision 20/CP.9. Thus, the proposed methods for adjustment for the LULUCF sector consist of a basic method with the application of a conservativeness factor.
7. The suggested modifications are kept to a minimum necessary to address the specific considerations for the LULUCF sector. All additions to the original technical guidance as adopted by decision 20/CP.9 are indicated in bold in this document; all deletions from the original text are indicated with a strike-through. No other substantive changes have been made to the text. However, as a consequence of introduced modifications, the numbering of paragraphs and footnotes has changed.
8. Modifications have been made throughout the text:
 - (a) To add reference to the IPCC good practice guidance for LULUCF;
 - (b) To change “emissions” to “emissions and removals” where appropriate;
 - (c) To replace “source category” with “category”, to be consistent with the IPCC good practice guidance for LULUCF;
 - (d) To add sector-specific guidance on basic adjustment methods for the LULUCF sector, including additional parameters and relevant examples, similar to the sector-specific guidance provided for the other IPCC inventory sectors.
9. Additional changes, including the incorporation of new paragraphs, were necessary to reflect the implications of adjustments for estimates of GHG emissions and removals from LULUCF, including those resulting from activities under Article 3, paragraphs 3 and 4:
 - (a) Because Parties may choose to account for activities under Article 3, paragraphs 3 and 4, annually or for the commitment period, provisions for adjustments may be applied annually or for the commitment period;
 - (b) Adjustments to the base year estimates for cropland management, grazing land management and revegetation may be necessary during the commitment period in order to enable the calculation of emissions and removals for these activities under Article 3, paragraph 4;
 - (c) The possible effects of reallocations on estimates of emissions and removals for individual LULUCF activities need to be considered;
 - (d) Additional elements under “Reporting” may need to be included to reflect the total magnitude of adjustments in the LULUCF sector.

10. A new set of tables of conservativeness factors has been added for the calculation of adjustments for estimates of emissions and removals from LULUCF, both for the base year and for the commitment period. As was done for the other IPCC inventory sectors, the conservativeness factors for LULUCF have primarily been derived using the uncertainty values and parameters provided in the IPCC good practice guidance for LULUCF, or a combined uncertainty range calculated from the uncertainty ranges for the input parameters. The uncertainty values were then mapped into the appropriate uncertainty band, to yield a conservativeness factor. Because the uncertainty values for emissions and removals in the LULUCF sector fall within the range of uncertainty values for the other inventory sectors, the range of conservativeness factors for the LULUCF sector are also consistent with those for other sectors.⁴

11. Finally, the secretariat has prepared a draft decision for adoption by the COP, at its eleventh session, that recommends the incorporation of the technical guidance (which includes the elements relating to LULUCF) into the annex to draft decision -/CMP.1 (*Article 5.2*) attached to decision 21/CP.7. The proposed draft decision also recommends a draft decision for adoption by the COP/MOP which would replace the draft COP/MOP decision attached to decision 20/CP.9. Most of the substantive provisions of the new draft COP/MOP decision are the same as considered and agreed by decision 20/CP.9, and thus would not be subject to negotiation. However, an additional paragraph (in bold) has been added to extend the application of adjustments to GHG emissions and removals under Article 3, paragraphs 3 and 4, of the Kyoto Protocol.

⁴ A working paper on the sources and values for the uncertainty ranges used in developing the conservativeness factor will be provided on the UNFCCC web site before the twenty-second session of the SBSTA (see <http://unfccc.int/national_reports/accounting_reporting_and_review_under_the_kyoto_protocol/items/1029.php>).

Annex

Draft decision -/CP.11

Issues relating to adjustments under Article 5, paragraph 2, of the Kyoto Protocol

The Conference of the Parties,

Recalling its decisions 21/CP.7 and 20/CP.9,

Having considered the relevant recommendations of the Subsidiary Body for Scientific and Technological Advice regarding the completion of the technical guidance on adjustments,

1. *Decides* to incorporate the technical guidance on methodologies for adjustment under Article 5, paragraph 2, of the Kyoto Protocol, contained below in the annex to this decision, into the annex of draft decision -/CMP.1 (*Article 5.2*) attached to decision 21/CP.7;¹

2. *Recommends* that the Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol, at its first session, adopt draft decision -/CMP.1 (*Issues relating to adjustments under Article 5, paragraph 2, of the Kyoto Protocol*) below, to replace draft decision -/CMP.1 (*Technical guidance on methodologies for adjustments under Article 5, paragraph 2, of the Kyoto Protocol*) attached to decision 20/CP.9.

Draft decision -/CMP.1

Issues relating to adjustments under Article 5, paragraph 2, of the Kyoto Protocol

The Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol,

Having considered decisions 21/CP.7, 23/CP.7, 20/CP.9 and -/CP.11 (*Issues relating to adjustments under Article 5, paragraph 2, of the Kyoto Protocol*),

1. *Requests* that lead reviewers, as defined in paragraphs 36–42 of the guidelines for review under Article 8 of the Kyoto Protocol (decision 23/CP.7), collectively consider and make recommendations on:

- (a) Means to improve the consistent application, by expert review teams, of the technical guidance, especially the approaches to ensure conservativeness of adjusted estimates;
- (b) The development and regular update of the information in the inventory review resources listed in appendix I to the technical guidance;
- (c) Means to ensure a common approach in applying the provisions of paragraph 55 of the technical guidance and to limit the flexibility given to the expert review teams in this regard, if considered necessary;

¹ See document FCCC/CP/2001/13/Add.3, pages 12–13.

- (d) Updating, as appropriate, the table of conservativeness factors included in appendix III to the technical guidance, including the underlying construction and structure of the uncertainty bands of that table;
2. *Requests* the secretariat to include any recommendations from the collective consideration of the lead reviewers in their annual report, referred to in paragraph 40 of the guidelines under Article 8 of the Kyoto Protocol, to the Subsidiary Body for Scientific and Technological Advice for its consideration;
3. *Requests* the Subsidiary Body for Scientific and Technological Advice, following the consideration of the report referred to in paragraph 2 above, to take any appropriate action pursuant to the recommendations from lead reviewers referred to in paragraph 1 (c) and (d) above;
4. *Requests* the secretariat, following the collective recommendation of lead reviewers, to regularly update the information in the inventory review resources listed in appendix I to the technical guidance;
5. *Requests* the secretariat to archive information on adjustments contained in review reports and other relevant information, and make it available and easily accessible for expert review teams;
6. *Decides* that with respect to any adjustments applied retroactively in accordance with paragraph 12 of the technical guidance, only the adjustment applied for the inventory year under review shall be relevant for the eligibility requirement laid out in paragraph 3 (e) of draft decision -/CMP.1 (*Guidelines for the preparation of the information required under Article 7 of the Kyoto Protocol*) attached to decision 22/CP.7;
7. ***Decides that any adjustments applied to the supplementary inventory information relating to Article 3, paragraphs 3 and 4, of the Kyoto Protocol shall be used in the annual compilation and accounting of emission inventories and assigned amounts.***

ANNEX

Technical guidance on methodologies for adjustments under Article 5, paragraph 2, of the Kyoto Protocol

I. Objective

1. The objective of this technical guidance on methodologies for adjustments under Article 5, paragraph 2, of the Kyoto Protocol¹ is:
 - (a) To provide for adjusted estimates that fully meet the requirements of decision -/CMP.1 (*Good practice guidance and adjustments under Article 5, paragraph 2, of the Kyoto Protocol*) attached to decision 21/CP.7;²
 - (b) To ensure that adjustments are applied consistently,³ comparably and transparently, taking into account the time frames provided in the guidelines for review under Article 8, and that, as far as possible, similar methods are used for similar problems across all inventories subject to adjustments under Article 8.

II. General approach

2. This technical guidance establishes general and specific procedures and methods for use by expert review teams to calculate adjustments.⁴ These procedures and methods are supplemented by inventory review resources listed in appendix I to this technical guidance, which will also facilitate consistency in calculation of adjustments by expert review teams.

A. Procedures

3. The calculation and application of adjustments shall follow paragraphs 3–11 of decision -/CMP.1 (*Good practice guidance and adjustments under Article 5, paragraph 2, of the Kyoto Protocol*) attached to decision 21/CP.7.
4. Adjustments shall be applied, taking into account section II.B below, only when inventory data submitted by Parties included in Annex I to the Convention (Annex I Parties) **including supplementary inventory information on Article 3, paragraphs 3 and 4**, are found to be incomplete and/or are prepared in a way that is not consistent with the *Revised 1996 Intergovernmental Panel on Climate Change (IPCC)⁵ Guidelines for National Greenhouse Gas Inventories* (hereinafter referred to as the IPCC Guidelines) as elaborated by the IPCC reports entitled *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories* (hereinafter referred to as the IPCC good practice guidance) and *Good Practice Guidance for Land Use, Land-Use Change and Forestry*⁶ (hereafter

¹ All articles referred to in this technical guidance are those of the Kyoto Protocol. Adjustments under Article 5, paragraph 2, of the Kyoto Protocol are hereinafter referred to as adjustments.

² Document FCCC/CP/2001/13/Add.3, pages 12–13.

³ In this context, consistency means that the application of adjustments should be consistent across Parties and by all expert review teams.

⁴ ~~This technical guidance does not cover the land use, land-use change and forestry (LULUCF) sector, guidance for which will be completed, in accordance with decision 21/CP.7, after completion of the IPCC good practice guidance on LULUCF.~~

⁵ Intergovernmental Panel on Climate Change.

⁶ **In the context of the Kyoto Protocol and in accordance with decision -/CP.10, the IPCC Good Practice Guidance for Land Use, Land-Use Change and Forestry shall be applied for the first commitment period.**

referred to collectively as the **IPCC good practice guidance**), and any good practice guidance adopted by the Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol (COP/MOP).

5. Expert review teams shall, under their collective responsibility, calculate, document and recommend adjustments in accordance with the provisions for the review of annual inventories under Article 8 and this technical guidance. A compilation of the ~~paragraphs~~ **provisions** relevant to the timing and reporting of adjustments from these guidelines is included in appendix II to this technical guidance.

6. The expert review team should collectively decide on the methodological approach for calculation of any adjustment, including relevant components of the adjustment method (such as data sources, drivers⁷ and clusters⁸ used).

7. Expert review teams should apply the appropriate adjustment method, selected from table 1, in a simple manner, given the limited time available for the calculation of adjustments according to the provisions for the review of annual inventories in the guidelines for review under Article 8 (see paragraph 3 of appendix II).

8. Expert review teams should apply this technical guidance in a consistent and comparable manner and, as far as possible, use similar methods for similar problems across all inventories reviewed under Article 8, taking into account the provisions for obtaining conservative estimates, as described in paragraph ~~47-50~~ below.

9. To enhance consistency in the application of adjustments for any given Party, the same adjustment method should be used, whenever possible, in cases where the same inventory problem was adjusted in an earlier year (e.g. for the base year or for an earlier year of the commitment period). This provision applies to both the basic adjustment method,⁹ and the main components used in the calculation of the adjustment, as appropriate, such as the source of international data, drivers, clusters and any other inventory parameter used.

10. Any adjustments to estimates of emissions and removals in the base year for purposes of establishing the assigned amount under Article 3, paragraphs 7 and 8, will only be applied during the initial review under Article 8.

11. Adjustments should be applied only for individual inventory years, specifically, the base year¹⁰ or the latest year of the commitment period under review, and not for an entire time series or group of years, except for cases described in paragraphs ~~44~~ **12 and 13(a)–(c)** below.

12. For estimates of emissions from sources in Annex A of the Kyoto Protocol, adjustments should not be retroactively applied for any year preceding the inventory year subject to review, except in cases where recalculated estimates for previous commitment period years were submitted by the Party together with the inventory information of the inventory year subject to review. Where the Party submits recalculated estimates for commitment period years prior to the inventory year subject to review,

⁷ For the purpose of this technical guidance, *driver* refers to indicative data other than activity data or other inventory parameters used in the calculation of emission **or** removal estimates, that are correlated with emissions **or** removals, such as gross domestic product (GDP), population, associated production data, wells drilled, GDP per capita. The criteria for selecting drivers for the purpose of adjustments are given in paragraph ~~36~~ **39**.

⁸ For the purpose of this technical guidance, *cluster* refers to inventory-related data from a group of countries. The criteria for selecting clusters for the purpose of adjustments are given in paragraph ~~35~~ **38**.

⁹ For the purpose of this technical guidance, basic adjustment methods are those methods that provide an emission **or** removal estimate before the application of a conservativeness factor described in section III.D below.

¹⁰ ~~Adjustments to the base year, if any, will only be applied during the initial review under Article 8 for the purpose of establishing the Party's assigned amount.~~

adjustments may be applied retrospectively for those estimates that have not yet been reviewed, if the provisions of paragraph 4 above apply to these recalculated estimates.

13. **For estimates of emissions and removals resulting from activities under Article 3, paragraphs 3 and 4, adjustments may be applied to an individual year or for a group of years, as follows:**

- (a) **For activities for which the Party has chosen to account annually, any adjustments should be applied during the annual review for the latest submitted inventory. However, when a Party submits recalculated estimates of activities for which it accounts annually, adjustments may be applied retroactively provided these recalculated estimates have not yet been subject to review and the provisions of paragraph 4 above apply to these recalculated estimates;**
- (b) **For activities for which the Party has chosen to account for the entire commitment period, any adjustments should be considered and applied for any individual year or for any group of years of the commitment period, as necessary, only during the annual review for the final year of the commitment period. Adjustments shall not be considered or applied during any annual review prior to that for the final year of the commitment period;**
- (c) **For cropland management, grazing land management and revegetation under Article 3, paragraph 4,¹¹ any adjustment to the emissions or removals in the base year resulting from these activities should be considered and applied according to the choice made by a Party regarding the periodicity of accounting of these activities (e.g. annually or at the end of the commitment period). In the case that the Party has chosen to account annually for these activities and submits recalculated estimates, adjustments may be applied retroactively for the base year, provided these recalculated estimates have not yet been subject to review and the provisions of paragraph 4 above apply to these recalculated estimates.**

14. The selection of data and other components required for an adjustment method should take into account the time series for any such component.

15. Even if some aspects of a particular case are not fully covered by this technical guidance, the experts calculating the adjustment shall adhere to paragraphs 3–11 of decision -/CMP.1 (Good practice guidance and adjustments under Article 5, paragraph 2, of the Kyoto Protocol) and, as closely as possible, to this technical guidance.

B. Applicability of adjustments

16. In considering the need for an adjustment, expert review teams should adhere to standard inventory review approaches, which also include assessment of the time series for a given estimate.

17. If the expert review team finds that an estimate submitted by a Party leads to an underestimation of emissions in the base year, or an overestimation of emissions in a year of the commitment period, the adjustment calculated in accordance with paragraph 49–52 below should not be applied, if such a calculation would result in an adjusted estimate with a value for the base year that is higher than the

¹¹ In accordance with paragraph 9 of the annex to draft decision -/CMP.1 (*Land use, land-use change and forestry*) attached to decision 11/CP.7, emissions and removals from these activities over the commitment period are to be calculated relative to emissions and removals from these activities in the base year.

original estimate submitted by the Party or a value for a year of the commitment period that is lower than the original estimate.

18. **Similarly, if the expert review team finds that an estimate submitted by a Party leads to an underestimation of net¹² removals resulting from activities under Article 3, paragraphs 3 or 4, in a year of the commitment period, the adjustment calculated in accordance with paragraph 52 below should not be applied if such a calculation would result in an adjusted net removal estimate that is higher than the original estimate submitted by the Party.**

19. An adjustment procedure should be initiated if the information provided by the Party is not sufficiently transparent, taking into account the provisions of paragraph 4 above.

20. If the expert review team identifies a deviation from the IPCC Guidelines as elaborated by the IPCC good practice guidance that is caused by the allocation of estimates to a wrong ~~source~~ category **or to an activity under Article 3, paragraphs 3 or 4**, adjustments should be applied ~~only if reallocation to the correct source category affects total emissions from sources included in Annex A to the Kyoto Protocol~~ **in the following cases:**¹³

- (a) **If reallocation to the correct source category affects total emissions from sources included in Annex A to the Kyoto Protocol;**
- (b) **For those cases where land-use change and forestry (LUCF) constituted a net source of emissions in 1990, if the reallocation within the LUCF sector affects:**
 - (i) **The determination of whether LUCF constituted a net source of emissions in the year 1990; or**
 - (ii) **Total emissions from sources or removals by sinks reported in relation to the conversion of forests (deforestation);**
- (c) **If the reallocation affects net emissions or removals from any individual activity under Article 3, paragraph 3, or any elected activity under Article 3, paragraph 4.**

III. Methods and conservativeness

21. In general, expert review teams shall calculate each adjustment at the level at which the problem is identified, e.g. the IPCC ~~source~~ category level or for the specific component in question. If the problem is limited to only one IPCC ~~source~~ category, only the estimate for that source **or sink** should be adjusted. Similarly, if only one component of a given estimate is problematic (such as inconsistent, incorrect or misapplied emission factors or other inventory parameters, or activity data), the review team should replace only that component in calculating the adjusted estimate.

22. If the necessary input data or parameters are not available at the IPCC ~~source~~ category level at which the problem is identified, or the problem involves more than one component of an emission **or removal** estimation method used by the Party, or the complexity of the methodology used does not allow replacing only the problematic component in question, more aggregate data should be used as the basis for the adjustment. However, expert review teams should make every effort to make the adjustment at the levels at which the problems were identified, in order to avoid making data that do not qualify for an adjustment subject to the adjustment.

¹² **For the purpose of this technical guidance, “net” emissions or removals refers to total CO₂ emissions minus CO₂ removals.**

¹³ If the reallocation will not have such effects, reallocation is recommended to the Party as part of the review of annual inventories under Article 8.

A. Choice of methods

23. If an emission **or removal** estimate needs to be adjusted,¹⁴ the expert review team should choose one of the basic adjustment methods in this technical guidance for the calculation of an estimate for purposes of adjustment.

24. In choosing the basic adjustment method and the input data that are appropriate for a specific adjustment case, expert review teams should, in general, follow the methods listed in priority order in table 1, as appropriate, unless otherwise indicated in the sector-specific elements included in chapter IV. If the requirements for the highest priority adjustment method according to the table are not available, the next preferred adjustment method should be used.

25. If a consistent time series of estimates prepared in accordance with the IPCC good practice guidance is available and no more than two years' estimates are missing, a simple extrapolation of this time series would be the most appropriate adjustment method.

26. If an adjustment is triggered by lack of transparency, and this lack of transparency precludes the expert review team from assessing possible cases of over- or underestimation or from assessing the cause of the potential deviation from the IPCC Guidelines as elaborated by the IPCC good practice guidance (such as inappropriate activity data, emission factors or methods), expert review teams should also apply the basic adjustment methods in the order of priority listed in table 1.

Table 1. Basic adjustment methods to obtain an emission/removal estimate (in order of priority)

Basic adjustment method	Requirements/applicability
1 Default IPCC tier 1	Obtain activity data, and emission factors and other estimation parameters following the prioritizations indicated in paragraphs 29 32 and 30 33 below
2 Extrapolation of emissions or removals	Only for a missing/inappropriate estimate for the year in question if a consistent time series of emission or removal estimates is available
3 Extrapolation/interpolation of emissions or removals based on a driver	Only for a missing/inappropriate estimate for the year in question if a consistent time series of emission or removal estimates and a corresponding driver are available
4 Correlation of emissions or removals between source/ sink categories or gases within an inventory	Emission or removal estimate for the gas/source/ sink category that is correlated to the emissions or removals that need adjustment
5 Average emission or removal rate from a cluster of countries based on a driver	Driver for the country in question and emission or removal rate per driver for a cluster of countries

Note: The methods in this table are those methods that provide an emission **or removal** estimate before the application of a conservativeness factor described in section III.D below. Further details on the basic adjustment methods listed in this table are given in section III.C below.

¹⁴ For example, if an emission **or removal** estimate is missing, if the ~~emission~~ estimation method used by the Party was not in conformity with the IPCC Guidelines as elaborated by the IPCC good practice guidance, or if there is a problem with more than one component (emission factor, activity data or other parameter) of the ~~emission~~ estimation method used by the Party.

27. In the exceptional case where none of the basic adjustment methods listed in table 1 is suitable for a given adjustment case, expert review teams may use other adjustment methods. If adjustment methods other than those included in this technical guidance are applied, expert review teams should report the reason for not using any of the basic adjustment methods of this technical guidance and should justify why they consider the method chosen as appropriate.

B. Choice of data and other components

28. In choosing any input data for calculating an adjustment, expert review teams should give, as appropriate, preference to the national data available in the respective Party's inventory submission or made available by the Party before or during the review, provided that these data were not the cause for the adjustment.

29. Expert review teams should not conduct time-consuming searches for national data that have not been made available to the review team by the Party, or generate new country-specific data.

30. If national data as indicated in paragraph ~~25~~**28** above are not available or are not deemed suitable for the respective adjustment case, expert review teams should select data from the recommended international data sources included in the inventory review resources listed in appendix I.

31. The international data sources to be included in the inventory review resources listed in appendix I should meet most of the following criteria:

- (a) The organizations that make the data available are recognized intergovernmental organizations (e.g. United Nations, **Food and Agriculture Organization of the United Nations (FAO)**, International Energy Agency (IEA));
- (b) The data are regularly updated, maintained and disseminated;
- (c) The data are originally generated by the countries themselves (national statistics);
- (d) The data are widely applicable to Annex I Parties;
- (e) The data are easily accessible by the secretariat and expert review teams (e.g. through Internet or CD-ROM), in a timely manner and at reasonable cost;
- (f) Sufficient information is available to assess the applicability of activity data, drivers, ~~or~~ emission factors **or other estimation parameters** (e.g. descriptions of how the data are collected, which definitions are used, geographic coverage).

1. Choice of activity data

32. If the calculation of an adjustment requires the use or replacement of activity data, e.g. either as input to the IPCC tier 1 default methodology or because the activity data are the cause of the adjustment, and if no national data are available, expert review teams should use, in order of preference:

- (a) Recommended international data sources as included in the inventory review resources listed in appendix I;
- (b) Extrapolation (interpolation) methods if the international data sources do not provide data for the year in question, in which case the activity data should be obtained as follows (in order of preference):

- (i) Extrapolation (interpolation) of national activity data, if these data are available as required in paragraph ~~25~~**28** above, and were collected in accordance with the IPCC good practice guidance;
 - (ii) Extrapolation (interpolation) of data from recommended international data sources included in the inventory review resources listed in appendix I;
 - (iii) Extrapolation (interpolation) using drivers or surrogate data from the inventory review resources listed in appendix I.
- (c) Activity data based on appropriate drivers (e.g. activity data per capita) from cluster of countries following the provisions of paragraphs ~~31~~ **34–34-37** below.

2. Choice of emission factors or other inventory parameters

33. If the calculation of an adjustment requires the use or replacement of an emission factor or other inventory parameter, e.g. either as input to the IPCC tier 1 default methodology or because the emission factor or other inventory parameter itself is the cause of the adjustment, the expert review team should use, in order of preference:

- (a) IPCC default values from the IPCC good practice guidance, the IPCC Guidelines or other recommended international data sources included in the inventory review resources listed in appendix I, and consistent with the IPCC good practice guidance. If emission factors **or other inventory parameters** from other international data sources are used, the expert review team should, in the review report, justify and document the reason for their use;
- (b) Extrapolation (interpolation) of the national emission factor, implied emission **or average carbon-stock-change** factors or other inventory parameter from earlier years as reported in the common reporting format (CRF) or national inventory report if the factor in question was prepared in accordance with the IPCC good practice guidance;
- (c) Average implied emission **or average carbon-stock-change** factors or other inventory parameter from a cluster of countries obtained as described in paragraphs ~~31~~ **34–34-37** below.

3. Choice of drivers and clusters

34. If the calculation of an adjustment requires the use of a driver, the expert review team should use the recommended drivers as included in the inventory review resources listed in appendix I.

35. If an average inventory parameter from a cluster of countries is used, expert review teams should follow the recommended approaches and tools for clustering of inventory data as included in the inventory review resources listed in appendix I. The inclusion in the inventory review resources listed in appendix I of drivers and approaches and tools for clustering of inventory data should be subject to guidance by lead reviewers in accordance with the provisions of appendix I.

36. Expert review teams should report the reason for the use of drivers and clusters and demonstrate the appropriateness of the cluster and/or the correlation between the driver and the emissions **or removals**. The use of drivers or approaches and tools for clustering of inventory data other than those recommended in the inventory review resources listed in appendix I should be explained and justified.

37. When using an average inventory parameter from a cluster of countries, assumptions made in choosing the cluster should be documented, as should how the given inventory average parameter

compares with the default parameter or range provided in the IPCC good practice guidance or IPCC Guidelines, where available. Similarly, when clustering is related to the use of a driver (application of an average driver-based emission **or removal** rate) from a cluster of countries, assumptions made for the composition of the cluster and the established relationship with the driver should be documented.

38. The clusters¹⁵ to be used in the adjustment process should, to the extent possible, be selected according to the following criteria, taking into account expert judgement:

- (a) Only Annex I Parties that have undergone an individual review, and for which the relevant data were deemed accurate during the review process and for which no adjustment to any inventory parameter of the gases or ~~source~~ categories concerned was made, should be included. Inventory data from the Party subject to adjustment should be excluded from the cluster;
- (b) The cluster should cover a minimum number of countries, as specified in the recommended approaches and tools for clustering of inventory data;
- (c) The grouping of countries into clusters should, to the extent possible, take into account similar national circumstances. National circumstances could relate to, inter alia, climatic conditions, economic development, operation or management practices, types of oil and gas activity, or the age of equipment or installations and their technical features, **forest and soil characteristics**, depending on the source **or sink** category in question.

39. The drivers to be used in the adjustment process should, to the extent possible, be selected according to the following criteria:

- (a) The driver shall be adequately correlated with the emissions **or removals** concerned;
- (b) The significance of the relationship between the driver used and the emissions **or removals** calculated needs to be demonstrated, taking into account national circumstances.

C. Details and variations on the basic adjustment methods

40. The following section provides further guidance on the application of the basic adjustment methods described in section III.A above. Because this section covers possible variations of those methods, the numbering and ordering do not match the list in table 1.

1. Default IPCC tier 1 methods

41. This basic adjustment method refers to default IPCC tier 1 methods as described in the IPCC Guidelines and as elaborated by the IPCC good practice guidance. If this adjustment method is used, the IPCC good practice guidance should always be consulted before the IPCC Guidelines. This adjustment method will only be applicable if activity data are available from national sources in accordance with paragraph ~~25~~**28** above or from international data sources as described in paragraph ~~27~~**30** above, or are obtained as described in paragraph ~~29~~**32** above. An emission factor or other inventory parameter as required by the method and obtained as described in paragraph ~~30~~**33** above should be used.

¹⁵ Because of the need to use reviewed data from other countries, clustering will only be possible for one year prior to the year in question. This implies that clustering would have to be combined with extrapolation techniques.

2. Extrapolation and interpolation methods

42. If extrapolation and/or interpolation methods are used, the expert review team should follow the guidance on trend extrapolation and interpolation provided in the IPCC good practice guidance, in particular, section 7.3.2.2 of the *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories* and section 5.6. of the *Good Practice Guidance for Land Use, Land-Use Change and Forestry*.

43. *Extrapolation of emission or removal estimates* is applicable if inventory estimates are missing or not prepared in accordance with the IPCC good practice guidance for the beginning (base year) and/or the end (latest inventory year) of the time series, and reviewed and time-series-consistent values are available for most years of the time series.

44. *Extrapolation of inventory parameters* (e.g. activity data): in addition to applying extrapolation methods to emission **or removal** estimates it may be necessary to use extrapolation at the level of activity data, emission factors or other inventory parameters, depending on the circumstances (see paragraphs ~~29~~ **32** and ~~30~~ **33** above).

45. *Extrapolation of emissions or removals using drivers or surrogate data* can be applied if inventory estimates are available for some years (at a minimum for all years but two) of the time series but are missing or not prepared in accordance with the IPCC good practice guidance for the required year (base year and/or latest inventory year). The emissions **or removals** need to be strongly correlated with other well-known and more readily available indicative data (drivers).

46. *Interpolation* is applicable for calculating an adjustment for a given inventory year provided that reviewed values of the adjacent years are available. ~~As adjustments will be undertaken on individual inventory years, this~~ **This** method would most likely be applied in exceptional cases only, but could be applicable to activity data, emission factors or other inventory parameters, depending on the circumstances.

3. Adjustment methods based on correlation of emissions/removals between source categories or gases

47. *Correlation of emissions or removals between source categories or gases* within an inventory could in some cases be used to estimate emissions **or removals** of a specific gas or from a specific ~~source~~ category. For example, CH₄ and N₂O emissions from fuel combustion activities could be calculated from CO₂ emissions, if available.

4. Adjustment methods based on clustering of countries

48. *Application of average inventory parameters from a cluster of countries* with comparable national circumstances for the sector in question could be used to correct any inventory parameter (e.g. emission factor) that was found not to be in accordance with IPCC good practice guidance, or as input to the IPCC tier 1 method. The inventory review resources listed in appendix I provide recommended approaches and tools for clustering inventory data. If an adjustment has to be made for a given country, expert review teams should assign the Party in question to the cluster of countries to which it would most likely belong according to its national circumstances.

49. *Application of an average driver-based emission/removal rate from a cluster of countries* can be used if an emission **or removal** estimate is missing entirely or was not prepared in accordance with the IPCC good practice guidance, but data for a parameter driving the emissions **or removals** from that source **or sink** are available for the country in question. The estimate is derived by establishing a

relationship between emissions/**removals** and an appropriate driver for the cluster of countries with comparable national circumstances, and applying this relationship to the Party in question. If data for the driver are not available for the year in question, the driver should be extrapolated as described in paragraph ~~42~~**45** above.

D. Conservative approach

50. The choice of adjustment methods and application of the inventory parameters relevant to the calculation of adjustments should result in conservative ~~emission~~ estimates, in that emission estimates for the base year **and removals by sinks in a year of the commitment period** are not overestimated, and emission estimates for a year of the commitment period are not underestimated relative to the likely true value of the emissions **or removals** of the Party concerned.

51. As a principle to achieve conservative estimates, the calculation of an adjustment for a commitment period year should not result in an emission estimate that is lower **or a removal estimate that is higher** than that originally submitted by the Party, and an adjustment for an estimate of the base year should not result in an emission estimate that is higher than the originally submitted estimate.

52. To ensure conservativeness for the purpose of adjustments, a conservativeness factor should be applied to the specific component of the ~~emission~~ estimation method used by the Party or to the emission/ **removal** estimate generated by the basic adjustment methods described in section III.A of this technical guidance. For illustration purposes, this approach may be expressed as:

$$M \times CF = \text{Adjusted estimate}$$

Where M is the component of an ~~emission~~ estimation method used by a Party, or the emission **or removal** estimate generated by a basic adjustment method in this technical guidance, and CF is the conservativeness factor.

53. The conservativeness factor should be selected from the tables of conservativeness factors provided in appendix III to this technical guidance. In the case that the tables does not provide a conservativeness factor for a given source/**sink** category, a conservativeness factor for a ~~source~~ category with similar characteristics should be used.

54. For cases where only one component of an ~~emission~~ estimation method used by a Party is replaced, the expert review team should apply the conservativeness factor to that component, in accordance with paragraph ~~18~~**21** above. In other cases, the expert review team should apply the conservativeness factor to the emission **or removal** estimate generated by the basic adjustment method, in accordance with paragraph ~~20~~**23** above.

55. If, exceptionally, an expert review team considers that, in its expert judgement, the estimate generated by applying the basic approach referred to in paragraph ~~49~~**52** above is not conservative or is overly conservative for the Party concerned,¹⁶ the expert review team may use an alternative approach for applying conservativeness, and, where applicable, in accordance with the provisions of paragraphs ~~18~~**21** and ~~24~~**27** above. The expert review team shall justify and document the technical reason for its decision, and for its choice of the alternative approach used, and include this information in the review report.

¹⁶ That is, the expert review team believes that the likely true value of the emissions **or removals** from a source/**sink** for a year of the commitment period is higher or much lower than the adjusted estimate generated, or the true value of the emissions from a source in the base year is lower or much higher than the adjusted estimate generated, taking into account any guidance from lead reviewers on this matter.

II. Sector-specific elements

56. When calculating adjustments, expert review teams should follow the provisions of chapter III taking into account the sector-specific elements given below, as appropriate. The provisions of this chapter apply to the calculation of the adjustments before applying the conservativeness factor described in section III.D above.

A. Fuel combustion

57. When adjusting CO₂ emissions from one or several disaggregated IPCC source categories, care should be taken that total CO₂ emissions are in accordance with the total fuel consumption, which is generally better known than the fuel consumption in each of the disaggregated IPCC source categories.

58. In the event that total CO₂ emissions from fuel combustion need to be adjusted, the reference approach is the preferred option for calculating an adjustment. Reference approach estimates should preferably be taken from the Party. If this is not considered appropriate, emission estimates from the IEA can be used.

59. If an N₂O emission factor from road transport needs to be replaced, increased use of catalytic converters leading to increased emission factors should be taken into account when calculating an adjustment.

B. Industrial processes

60. The expert review team should consider the possibility of double counting (for instance, the use of lime in iron and steel production) and avoid any double counting through the application of adjustments.

61. If adjusting HFC, PFC and SF₆ estimates from the consumption of halocarbons and SF₆, consideration should be given to the uncertainty of sales figures (e.g. for sales of these chemicals to the foam blowing industry) and other parameters (such as the composition of the mix in coolants) as given in the IPCC good practice guidance.

C. Agriculture

62. When adjusting emissions from agricultural soils, preference should be given to tier 1.a methods as provided in the IPCC good practice guidance.

63. The expert review team should note that when adjusting emissions from manure management systems, savanna burning, or field burning of agricultural residues, the same activity data should be used for CH₄ as for N₂O.

64. Similarly, consistent livestock data should be used for CH₄ and N₂O emissions from enteric fermentation and manure management, and for N₂O emissions from animal manure applied to soils.

D. Land use, land-use change and forestry (LULUCF)

65. **When using data from a cluster of countries, data should be selected on the basis of the similarity of these countries in relation to:**

- (a) **National circumstances such as climatic conditions, vegetation types, management regimes, national policies and others;**

- (b) **Choices in relation to definitions, selection of carbon pools and of activities in accordance with draft decision -/CMP.1 (*Land use, land-use change and forestry*) attached to decision 11/CP.7.**

66. **If a Party has chosen not to account for a given carbon pool, an adjustment for this pool should not be applied for reasons of incompleteness as long as the Party has demonstrated, in accordance with paragraph 21 of the annex to draft decision -/CMP.1 (*Land use, land-use change and forestry*) attached to decision 11/CP.7, that the pool in question is not a source of emissions.**

67. **Estimates of emissions and removals in the LULUCF sector and from LULUCF activities will frequently be based not on annual data but on extrapolations and be recalculated at a later stage. For this reason, the application of an adjustment to the base year of cropland management, grazing land management or revegetation through an extrapolation should be done with care, given that data may not be reported for the years between 1990 and the commitment period. If an extrapolation is needed for the base year of these activities, the expert review team could use as a driver the time series for the LULUCF sector included in the annual inventory submission under the Convention.**

E. Waste

68. Data on populations and/or urban populations, and GDP per capita, could be used in some cases to estimate the volume of solid waste, taking into account national circumstances. Urban population and protein consumption data could be used to obtain activity data to estimate emissions from domestic waste-water handling. Production data associated with the main industries in a specific country could be used as a possible driver to estimate the amount of industrial waste water, taking into account differences in technologies (e.g. emission per unit production).

69. For activity data, a cluster of countries based mainly on waste management practices could be used for estimating certain types of data, such as the waste generation rate, but not for estimating other types of data, such as the amount of waste incinerated or the amount of waste deposited, because these data largely depend on national environmental waste management policies.

70. When adjusting emissions from waste incineration, the applicability of drivers is very limited.

71. When adjusting emissions from solid waste disposal sites or waste-water treatment, the recovery of the methane needs to be considered. For solid waste disposal the expert review team should also take into account that if activity data are constant or increasing and the country used the IPCC tier 1 default method, this will have resulted in a conservative emission estimate.

Appendix I

List of inventory review resources relevant for the calculation of adjustments

This appendix lists inventory review resources relevant for the calculation of adjustments using the adjustment methods and approaches described in the technical guidance.

The information contained in the inventory review resources listed here will be maintained by the UNFCCC secretariat and made available to expert review teams by electronic means. This information will be updated periodically following the collective recommendation of lead reviewers on ways to improve the review process,¹ including the consistent application of the technical guidance by expert review teams.

A. Resources for supporting the review of GHG inventories

1. Recommendations for improving the technical review of GHG inventories and for applying common approaches in the review by expert review teams (*resulting from meetings of lead reviewers*)
2. Recommended international data sources (*for activity data, drivers, ~~and~~ emission factors **and other estimation parameters***)
3. Recommended approaches and tools for clustering of inventory data
4. Recommended drivers (*prepared on the basis of data obtained from external data sources that have adequate correlation with GHG ~~emission~~ estimates*).

B. Specific resources for the calculation of adjustments

1. Information on previous adjustment calculations by expert review teams.

¹ This would also include any guidance for identifying departures from the IPCC good practice guidance.

Appendix II

Provisions ~~in the guidelines~~ for review under Article 8 of the Kyoto Protocol that relate to adjustments

I. Timing

1. Within the review of the inventory, the expert review team shall list all the problems identified, indicating which would need an adjustment, and send this list to the Annex I Party no later than 25 weeks from the submission due date of the annual inventory. This list should be prepared under the collective responsibility of the expert review team.
2. The Annex I Party shall comment on these questions within six weeks and, where requested by the review team, may provide revised estimates.
3. If adjustments are still needed, the expert review team shall calculate adjustments in accordance with this technical guidance, in consultation with the Party concerned, and shall prepare a draft individual inventory review report which includes, where appropriate, adjusted estimates and related information, within eight weeks of the receipt of the comments on the questions posed, and shall send the draft report to the Party concerned.
4. The Annex I Party shall be provided with four weeks to comment on the draft individual inventory review report and, where appropriate, on whether, and for what reasons, it accepts or rejects the adjustment. If the Party concerned disagrees with the proposed adjustment(s) the expert review team should send the notification from the Party, along with the recommendation of the expert review team, in its final report to the COP/MOP and the Compliance Committee, which will resolve the disagreement in accordance with the procedures and mechanisms on compliance.

II. Reporting

5. The following information on adjustments shall be reported by the expert review teams in the review reports:
 - (a) The original estimate, if applicable;
 - (b) The underlying problem;
 - (c) The adjusted estimate;
 - (d) The rationale for the adjustment;¹
 - (e) The assumptions, data and methodology used to calculate the adjustment;
 - (f) A description of how the adjustment is conservative;
 - (g) The expert review team's identification of possible ways for the Annex I Party to address the underlying problem;
 - (h) The magnitude of the numerical values relating to an adjusted problem as:
 - (i) The percentage by which the aggregate adjusted GHG emissions for an Annex I Party exceed the aggregate submitted emissions, defined as aggregate

¹ This includes procedures for selection of the calculation methods used for the adjustments.

submitted emissions of the gases and from the sources listed in Annex A to the Kyoto Protocol, for any single year;²

- (ii) The sum of the numerical values of the percentages calculated in paragraph 5 (h) above for all years of the commitment period for which the review has been conducted;
- (i) **The magnitude of the numerical values relating to any adjusted problems of net removals relating to an activity under Article 3, paragraphs 3 or 4, as the percentage by which the adjusted net removals for that activity:**
 - (i) **Differs from the submitted estimates for that activity;**
 - (ii) **Exceed the total net removals resulting from all Article 3, paragraphs 3 and 4, activities, either for the individual year of the commitment period to which the adjustment was applied or for a group of years over the five-year commitment period, according to the choice made by the Party regarding the periodicity of accounting of the activity in question (e.g. annually or at the end of the commitment period).**
- (j) The number of reviews that identified and adjusted the problem previously, and the percentage that the key source category contributed to the aggregate submitted emissions, defined as aggregate submitted emissions of the gases and from the sources listed in Annex A to the Kyoto Protocol;
- (k) An indication whether the adjustment was agreed upon by the Annex I Party and the expert review team.

² “Any single year” refers to the years of the commitment period.

Appendix III

Table of conservativeness factors

1. This appendix provides **two sets of a** tables of conservativeness factors to be used in the calculation of adjustments to ensure that adjusted estimates are conservative, in accordance with paragraph 47 **50** of the technical guidance. **The first set of tables (tables 1 and 2) covers conservativeness factors for sources included in Annex A to the Kyoto Protocol. The second set of tables (tables 3 to 6) covers conservativeness factors for emissions and removals from LULUCF. For both sets of tables, these conservativeness factors are provided in two sets parts:** one for use in the calculation of adjustments for a base year estimate and one for the calculation of adjustments for a year of the commitment period. These are provided for activity data, emission factors **or other estimation parameters** and emission estimates for each IPCC ~~source~~ category and corresponding gas.
2. When a given ~~source~~ category is not covered in the table, the provision of paragraph 50 **53** of the technical guidance applies, such as for categories “other” under industrial processes, agriculture, **LULUCF**, waste and the IPCC sector “7 Other”.
3. The conservativeness factors in ~~this~~ **these** tables will be updated, as required, following the collective recommendation of lead reviewers, subject to approval by the SBSTA.

Background information on the preparation of the tables of conservativeness factors

4. The conservativeness factors are derived from uncertainty values and parameters provided in the IPCC good practice guidance, and in some cases are determined by expert judgement for the purpose of this technical guidance, as indicated below:
 - (a) If the IPCC good practice guidance provides an uncertainty range for a component, this range for that component is used;
 - (b) If the IPCC good practice guidance provides an uncertainty range for emissions **or removals** from a particular ~~source~~ **category** or a combined uncertainty range can be calculated from the uncertainty values and/or ranges of the input parameters using the tier 1 method, the range generated by applying the uncertainty value for the ~~source~~ **category** is used;
 - (c) In cases where the IPCC good practice guidance does not provide an uncertainty range for an estimate or a combined uncertainty range cannot be calculated because necessary information is not available, an assessed uncertainty range determined by expert judgement for the purposes of this technical guidance is used.
5. Different conservativeness factors are provided for use in adjustments to estimate for a base year and for a year of the commitment period. The conservativeness factors are calculated using the 25th and 75th percentiles of the range generated by an uncertainty value for the gas and ~~source~~ **category** for use in an adjustment for the base year, and a year of the commitment period, respectively, assuming a log-normal distribution.
6. The uncertainty values have been grouped into five sets of uncertainty bands, with corresponding conservativeness factors, by assigning a given uncertainty values to a given band. These bands relate to the underlying uncertainties, as follows:

Estimated uncertainty range (%)	Assigned uncertainty band (%)	Conservativeness factor for the base year	Conservativeness factor for a year of the commitment period
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

Table 2: Conservativeness factors for adjustments in the commitment period (for sources in Annex A of the Kyoto Protocol)

	Emission factors						Activity data	Emission estimates						
	CO ₂	CH ₄	N ₂ O	HFCs	PFCs	SF ₆		CO ₂	CH ₄	N ₂ O	HFCs	PFCs	SF ₆	
1. Energy														
A. Fuel combustion (sectoral approach)														
1. Energy industries	1.02	1.21	1.37				1.02	1.06	1.21	1.37				
2. Manufacturing industries and construction	1.02	1.21	1.37				1.06	1.06	1.37	1.37				
3. Transport (aviation and shipping)	1.02	1.12	1.21				1.21	1.21	1.37	1.37				
3. Transport (road and other)	1.02	1.12	1.21				1.06	1.06	1.12	1.37				
4. Other sectors	1.02	1.21	1.37				1.06	1.06	1.37	1.37				
5. Other	1.02	1.21	1.37				1.21	1.06	1.37	1.37				
Biomass (all fuel combustion sources)	N/A	1.21	1.21				1.21	N/A	1.37	1.37				
Fuel combustion (reference approach)	1.02						1.02	1.02						
B. Fugitive emissions from fuels														
1. Solid fuels	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				
2. Industrial processes														
A. Mineral products (cement)	1.06						1.02	1.06						
A. Mineral products (all other sources)	1.06						1.21	1.37						
B. Chemical industry	1.02	1.37					1.06	1.06	1.37					
Nitric acid production			1.21				1.06			1.37				
Adipic acid production			1.02				1.06			1.06				
C. Metal production	1.02	1.21			1.21	1.21	1.02	1.06	1.37			1.21	1.21	
D. Other production	1.06	1.37	1.21				1.06	1.12	1.37	1.37				
E. Production of halocarbons and SF ₆				1.12	1.21	1.21	1.21				1.12	1.21	1.21	
F. Consumption of halocarbons and SF ₆				1.21	1.21	1.21	1.21				1.21	1.21	1.21	
G. Other														
3. Solvent and other product use	1.06		1.06				1.21	1.06		1.06				
4. Agriculture														
A. Enteric fermentation		1.12					1.02		1.12					
B. Manure management		1.12	1.21				1.02		1.12	1.21				
C. Rice cultivation		1.12					1.06		1.12					
D. Agricultural soils	1.21	1.21	1.37				1.21	1.37	1.21	1.37				
CO ₂ (liming) ^a	1.02	N/A	N/A				1.21	1.21	N/A	N/A				
N ₂ O (fertilizer and manure)	N/A	1.21	1.21				1.06	N/A	1.21	1.37				
E. Prescribed burning of savannas	N/A	1.06	1.06				1.21	N/A	1.21	1.21				
F. Field burning of agricultural residues	N/A	1.06	1.06				1.21	N/A	1.21	1.21				
G. Other														
5. Land-use change and forestry^a														
6. Waste														
A. Solid waste disposal on land	1.12	1.12					1.21	1.37	1.37					
B. Waste-water handling		1.12	1.12				1.02		1.21	1.21				
C. Waste incineration	1.12	1.21	1.12				1.21	1.37	1.37	1.37				
D. Other														
7. Other (please specify)														

The conservativeness factors for the commitment period correspond to the 75th percentile of the range generated by the assigned uncertainty values as follows:

Assigned uncertainty	75th percentile
7%	1.02
20%	1.06
40%	1.12
75%	1.21
150%	1.37

N/A: Not applicable, because Parties are either not required to report this source in the greenhouse gas inventories or not required to include it in their national total.

^a To be included following completion of the IPCC good practice guidance on land use, land-use change and forestry.

* According to decision 13/CP.9, including its annexes I and II, CO₂ emissions from liming are to be reported under the LULUCF sector.

Table 3: Conservativeness factors for adjustments of emissions in the base year / removals in a year of the commitment period (LULUCF sector of the annual inventory)

	Emission factors and other estimation parameters			Activity data	Emission/removal estimates		
	CO ₂	CH ₄	N ₂ O		CO ₂	CH ₄	N ₂ O
5. LULUCF							
A. Forest Land							
1. Forest Land remaining Forest Land							
Carbon stock change in living biomass				0.98	0.73		
Annual increment	0.73			0.98			
Other estimation parameters (wood density, BEFs etc.)	0.94			0.98			
Carbon stock change in dead organic matter				0.98	0.73		
Dead wood	0.73			0.98			
Litter	0.82			0.98			
Carbon stock change in soils	0.82			0.98	0.73		
2. Land converted to Forest Land							
Carbon stock change in living biomass				0.94	0.73		
Annual increment	0.73			0.94			
Other estimation parameters (wood density, BEFs etc.)	0.82			0.94			
Carbon stock change in dead organic matter				0.94			
Dead wood	0.98			0.94	0.94		
Litter	0.82			0.94	0.73		
Carbon stock change in soils	0.82			0.94	0.73		
B. Cropland							
1. Cropland remaining Cropland							
Carbon stock change in living biomass	0.82			0.98	0.82		
Carbon stock change in dead organic matter	See Forest land remaining Forest land			0.98	See Forest land remaining Forest land		
Carbon stock change in soils	0.82			0.98	0.82		
2. Land converted to Cropland							
Carbon stock change in living biomass	0.82			0.94	0.82		
Carbon stock change in dead organic matter	See Forest land remaining Forest land			0.94	See Forest land remaining Forest land		
Carbon stock change in soils	0.82			0.94	0.82		
C. Grassland							
1. Grassland remaining Grassland							
Carbon stock change in living biomass				0.98	0.73		
Above-ground biomass	0.82			0.98			
Root to shoot ratio	0.73			0.98			
Carbon stock change in dead organic matter	See Forest land remaining Forest land			0.98	See Forest land remaining Forest land		
Carbon stock change in soils	0.82			0.98	0.82		
2. Land converted to Grassland							
Carbon stock change in living biomass				0.94	0.73		
Above-ground biomass	0.82			0.94			
Root to shoot ratio	0.73			0.94			
Carbon stock change in dead organic matter	See Forest land remaining Forest land			0.94	See Forest land remaining Forest land		
Carbon stock change in soils	0.82			0.94	0.82		
D. Wetlands							
1. Wetlands remaining Wetlands							
Carbon stock change in living biomass and soils (peat extraction and flooded lands)	0.73			0.98	0.73		
2. Land converted to Wetlands							
Carbon stock change in living biomass				0.94			
Peat extraction	0.82			0.94	0.82		
Flooded land	0.82			0.94	0.73		
Carbon stock change in soils (peat extraction)	0.82			0.94	0.82		
E. Settlements							
1. Settlements remaining Settlements							
Carbon stock change in living biomass				0.98	0.82		
Crown cover and number of trees	0.94			0.98			
Removal factors and other estimation parameters	0.89			0.98			
Carbon stock change in dead organic matter	See Forest land remaining Forest land			0.98	See Forest land remaining Forest land		
Carbon stock change in soils	0.82			0.98	0.82		
2. Land converted to Settlements							
Carbon stock change in living biomass	0.82			0.94	0.82		
Carbon stock change in dead organic matter	See Forest land remaining Forest land			0.94	See Forest land remaining Forest land		
Carbon stock change in soils	0.82			0.94	0.82		
F. Other Land							
1. Other Land remaining Other Land							
Carbon stock change in living biomass	0.82			0.98	0.73		
Carbon stock change in dead organic matter	See Forest land remaining Forest land			0.98	See Forest land remaining Forest land		
Carbon stock change in soils	0.82			0.98	0.73		
2. Land converted to Other Land							
Carbon stock change in living biomass	0.82			0.94	0.82		
Carbon stock change in dead organic matter	See Forest land remaining Forest land			0.94	See Forest land remaining Forest land		
Carbon stock change in soils	0.82			0.94	0.82		
Cross-cutting sources							
Fertilizer use			0.73	0.94			0.73
Drained soils (including peat extraction and flooded lands)		0.73	0.73	0.82		0.73	0.73
Disturbances associated with land-use conversions to cropland ^a			0.73/0.82	0.94			0.73
Lime application (limestone and dolomite)	0.98			0.82	0.82		
Controlled burning and wildfires ^b		0.82	0.82	0.94		0.82	0.82

Note: BEF = biomass expansion factor

^a For N₂O emission factors and other parameters the value of 0.73 is to be used for emission factors, whereas 0.82 is to be used for any other estimation parameters.

^b No conservativeness factors are given for CO₂ from controlled burning and wildfires as these emissions would be covered under the respective land categories.

Table 4: Conservativeness factors for adjustments of emissions in a year of the commitment period / removals in the base year (LULUCF sector of the annual inventory)

	Emission factors and other estimation parameters			Activity data	Emission/removal estimates		
	CO ₂	CH ₄	N ₂ O		CO ₂	CH ₄	N ₂ O
S. LULUCF							
A. Forest Land							
1. Forest Land remaining Forest Land							
Carbon stock change in living biomass				1.02	1.37		
Annual increment	1.37			1.02			
Other estimation parameters (wood density, BEFs etc.)	1.06			1.02			
Carbon stock change in dead organic matter				1.02	1.37		
Dead wood	1.37			1.02			
Litter	1.21			1.02			
Carbon stock change in soils	1.21			1.02	1.37		
2. Land converted to Forest Land							
Carbon stock change in living biomass				1.06	1.37		
Annual increment	1.37			1.06			
Other estimation parameters (wood density, BEFs etc.)	1.21			1.06			
Carbon stock change in dead organic matter				1.06			
Dead wood	1.02			1.06	1.06		
Litter	1.21			1.06	1.37		
Carbon stock change in soils	1.21			1.06	1.37		
B. Cropland							
1. Cropland remaining Cropland							
Carbon stock change in living biomass	1.21			1.02	1.21		
Carbon stock change in dead organic matter	See Forest land remaining Forest land			1.02	See Forest land remaining Forest land		
Carbon stock change in soils	1.21			1.02	1.21		
2. Land converted to Cropland							
Carbon stock change in living biomass	1.21			1.06	1.21		
Carbon stock change in dead organic matter	See Forest land remaining Forest land			1.06	See Forest land remaining Forest land		
Carbon stock change in soils	1.21			1.06	1.21		
C. Grassland							
1. Grassland remaining Grassland							
Carbon stock change in living biomass				1.02	1.37		
Above-ground biomass	1.21			1.02			
Root to shoot ratio	1.37			1.02			
Carbon stock change in dead organic matter	See Forest land remaining Forest land			1.02	See Forest land remaining Forest land		
Carbon stock change in soils	1.21			1.02	1.21		
2. Land converted to Grassland							
Carbon stock change in living biomass				1.06	1.37		
Above-ground biomass	1.21			1.06			
Root to shoot ratio	1.37			1.06			
Carbon stock change in dead organic matter	See Forest land remaining Forest land			1.06	See Forest land remaining Forest land		
Carbon stock change in soils	1.21			1.06	1.21		
D. Wetlands							
1. Wetlands remaining Wetlands							
Carbon stock change in living biomass and soils (peat extraction and flooded lands)	1.37			1.02	1.37		
2. Land converted to Wetlands							
Carbon stock change in living biomass				1.06			
Peat extraction	1.21			1.06	1.21		
Flooded land	1.21			1.06	1.37		
Carbon stock change in soils (peat extraction)	1.21			1.06	1.21		
E. Settlements							
1. Settlements remaining Settlements							
Carbon stock change in living biomass				1.02	1.21		
Crown cover and number of trees	1.06			1.02			
Removal factors and other estimation parameters	1.12			1.02			
Carbon stock change in dead organic matter	See Forest land remaining Forest land			1.02	See Forest land remaining Forest land		
Carbon stock change in soils	1.21			1.02	1.21		
2. Land converted to Settlements							
Carbon stock change in living biomass	1.21			1.06	1.21		
Carbon stock change in dead organic matter	See Forest land remaining Forest land			1.06	See Forest land remaining Forest land		
Carbon stock change in soils	1.21			1.06	1.21		
F. Other Land							
1. Other Land remaining Other Land							
Carbon stock change in living biomass	1.21			1.02	1.37		
Carbon stock change in dead organic matter	See Forest land remaining Forest land			1.02	See Forest land remaining Forest land		
Carbon stock change in soils	1.21			1.02	1.37		
2. Land converted to Other Land							
Carbon stock change in living biomass	1.21			1.06	1.21		
Carbon stock change in dead organic matter	See Forest land remaining Forest land			1.06	See Forest land remaining Forest land		
Carbon stock change in soils	1.21			1.06	1.21		
Cross-cutting sources							
Fertilizer use			1.37	1.06			1.37
Drained soils (including peat extraction and flooded lands)		1.37	1.37	1.21		1.37	1.37
Disturbances associated with land-use conversions to cropland ^a			1.37/1.21	1.06			1.37
Lime application (limestone and dolomite)	1.02			1.21	1.21		
Controlled burning and wildfires ^b		1.21	1.21	1.06		1.21	1.21

Note : BEF = biomass expansion factor

^a For N₂O emission factors and other parameters the value of 1.37 is to be used for emission factors, whereas 1.21 is to be used for any other estimation parameters.

^b No conservativeness factors are given for CO₂ from controlled burning and wildfires as these emissions would be covered under the respective land categories.

Table 5: Conservativeness factors for adjustments of emissions in the base year^a / removals in a year of the commitment period (LULUCF activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol)

	Emission factors and other estimation parameters			Activity data	Emission/removal estimates		
	CO ₂	CH ₄	N ₂ O		CO ₂	CH ₄	N ₂ O
Supplementary information reported under the Kyoto Protocol							
Article 3.3 activities							
A.1 Afforestation and reforestation							
Carbon stock changes in above-ground biomass				0.94	0.73		
Annual increment	0.73			0.94			
Other estimation parameters (wood density, BEFs etc.)	0.82			0.94			
Carbon stock changes in below-ground biomass				0.94	0.73		
Annual increment	0.73			0.94			
Other estimation parameters (wood density, BEFs etc.)	0.82			0.94			
Carbon stock changes in litter	0.82			0.94	0.73		
Carbon stock changes in dead wood	0.98			0.94	0.94		
Carbon stock changes in soil	0.82			0.94	0.73		
A.2 Deforestation							
Carbon stock changes in above-ground biomass	0.82			0.94	0.82		
Carbon stock changes in below-ground biomass	0.82			0.94	0.82		
Carbon stock changes in litter	0.82			0.94	0.73		
Carbon stock changes in dead wood	0.73			0.94	0.73		
Carbon stock changes in soil							
Mineral soils (management practices and estimation parameters) ^b	0.82			0.98	0.73		
Organic soils	0.82			0.98	0.82		
Article 3.4 activities							
B.1 Forest management							
Carbon stock changes in above-ground biomass				0.98	0.73		
Annual increment	0.73			0.98			
Other estimation parameters (wood density, BEFs etc.)	0.94			0.98			
Carbon stock changes in below-ground biomass				0.98	0.73		
Annual increment	0.73			0.98			
Other estimation parameters (wood density, BEFs etc.)	0.94			0.98			
Carbon stock changes in litter	0.82			0.98	0.73		
Carbon stock changes in dead wood	0.73			0.98	0.73		
Carbon stock changes in soil	0.82			0.98	0.73		
B.2 Cropland management							
Carbon stock changes in above-ground biomass	0.82			0.98	0.82		
Carbon stock changes in below-ground biomass	0.82			0.98	0.82		
Carbon stock changes in litter	0.82			0.98	0.73		
Carbon stock changes in dead wood	0.73			0.98	0.73		
Carbon stock changes in soil				0.98			
Mineral soils ^c (management practices and estimation parameters) ^b	0.82			0.98/0.94	0.73		
Organic soils	0.82			0.98	0.82		
B.3 Grazing land management							
Carbon stock changes in above-ground biomass	0.82			0.98	0.82		
Carbon stock changes in below-ground biomass	0.73			0.98	0.73		
Carbon stock changes in litter	0.82			0.98	0.73		
Carbon stock changes in dead wood	0.73			0.98	0.73		
Carbon stock changes in Soil (management practices and estimation parameters) ^b	0.82			0.98	0.73		
B.4 Revegetation							
Carbon stock changes in above-ground biomass	0.82			0.98	0.82		
Carbon stock changes in below-ground biomass	0.82			0.98	0.82		
Carbon stock changes in litter	0.82			0.98	0.73		
Carbon stock changes in dead wood	0.73			0.98	0.73		
Carbon stock changes in soil	0.82			0.98	0.73		
Cross-cutting sources							
N fertilization			0.73	0.94			0.73
Drainage of soils (forest management)			0.73	0.82			0.73
Lime application	0.98			0.82	0.82		
Biomass burning (for Article 3.3 activities and Forest management under Article 3.4)		0.82	0.82	0.94		0.82	0.82
Biomass burning (for all Article 3.4 activities except Forest management)		0.82	0.82	0.82		0.82	0.82
Disturbances associated with land-use conversions to cropland ^d			0.73/0.82	0.94			0.73

Note: BEF = biomass expansion factor

^a For the base year, conservativeness factors given in this table apply to only cropland management, grazing land management and revegetation under Article 3, paragraph 4, of the Kyoto Protocol (see footnote 11 of the technical guidance).

^b For adjustments concerning management practices and estimation parameters, the conservativeness factors given for emission factors and other estimation parameters are to be used.

^c With regard to activity data, the value of 0.94 is to be used for pre-1990 data.

^d For N₂O emission factors and other parameters the value of 0.73 is to be used for emission factors, whereas 0.82 is to be used for any other estimation parameters.

**Table 6: Conservativeness factors for adjustments of emissions in a year of the commitment period / removals in the base year^a
(LULUCF activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol)**

	Emission factors and other estimation			Activity data	Emission/removal estimates		
	CO ₂	CH ₄	N ₂ O		CO ₂	CH ₄	N ₂ O
Supplementary information reported under the Kyoto Protocol							
Article 3.3 activities							
A.1 Afforestation and reforestation							
Carbon stock changes in above-ground biomass				1.06	1.37		
Annual increment	1.37			1.06			
Other estimation parameters (wood density, BEFs etc.)	1.21			1.06			
Carbon stock changes in below-ground biomass				1.06	1.37		
Annual increment	1.37			1.06			
Other estimation parameters (wood density, BEFs etc.)	1.21			1.06			
Carbon stock changes in litter	1.21			1.06	1.37		
Carbon stock changes in dead wood	1.02			1.06	1.06		
Carbon stock changes in soil	1.21			1.06	1.37		
A.2 Deforestation							
Carbon stock changes in above-ground biomass	1.21			1.06	1.21		
Carbon stock changes in below-ground biomass	1.21			1.06	1.21		
Carbon stock changes in litter	1.21			1.06	1.37		
Carbon stock changes in dead wood	1.37			1.06	1.37		
Carbon stock changes in soil							
Mineral soils (management practices and estimation parameters) ^b	1.21			1.02	1.37		
Organic soils	1.21			1.02	1.21		
Article 3.4 activities							
B.1 Forest management							
Carbon stock changes in above-ground biomass				1.02	1.37		
Annual increment	1.37			1.02			
Other estimation parameters (wood density, BEFs etc.)	1.06			1.02			
Carbon stock changes in below-ground biomass				1.02	1.37		
Annual increment	1.37			1.02			
Other estimation parameters (wood density, BEFs etc.)	1.06			1.02			
Carbon stock changes in litter	1.21			1.02	1.37		
Carbon stock changes in dead wood	1.37			1.02	1.37		
Carbon stock changes in soil	1.21			1.02	1.37		
B.2 Cropland management							
Carbon stock changes in above-ground biomass	1.21			1.02	1.21		
Carbon stock changes in below-ground biomass	1.21			1.02	1.21		
Carbon stock changes in litter	1.21			1.02	1.37		
Carbon stock changes in dead wood	1.37			1.02	1.37		
Carbon stock changes in soil							
Mineral soils (management practices and estimation parameters) ^b	1.21			1.02/1.06	1.37		
Organic soils	1.21			1.02	1.21		
B.3 Grazing land management							
Carbon stock changes in above-ground biomass	1.21			1.02	1.21		
Carbon stock changes in below-ground biomass	1.37			1.02	1.37		
Carbon stock changes in litter	1.21			1.02	1.37		
Carbon stock changes in dead wood	1.37			1.02	1.37		
Carbon stock changes in Soil (management practices and estimation parameters) ^b	1.21			1.02	1.37		
B.4 Revegetation							
Carbon stock changes in above-ground biomass	1.21			1.02	1.21		
Carbon stock changes in below-ground biomass	1.21			1.02	1.21		
Carbon stock changes in litter	1.21			1.02	1.37		
Carbon stock changes in dead wood	1.37			1.02	1.37		
Carbon stock changes in soil	1.21			1.02	1.37		
Cross-cutting sources							
N fertilization			1.37	1.06			1.37
Drainage of soils (forest management)			1.37	1.21			1.37
Lime application	1.02			1.21	1.21		
Biomass burning (for Article 3.3 activities and Forest management under Article 3.4)		1.21	1.21	1.06		1.21	1.21
Biomass burning (for all Article 3.4 activities except Forest management)		1.21	1.21	1.21		1.21	1.21
Disturbances associated with land-use conversions to cropland ^d			1.37/1.21	1.06			1.37

Note : BEF = biomass expansion factor

^a For the base year, conservativeness factors given in this table apply to only cropland management, grazing land management and revegetation under Article 3, paragraph 4, of the Kyoto Protocol (see footnote 11 of the technical guidance).

^b For adjustments concerning management practices and estimation parameters, the conservativeness factors given for emission factors and other estimation parameters are to be used.

^c With regard to activity data, the value of 1.06 is to be used for pre-1990 data.

^d For N₂O emission factors and other parameters the value of 1.37 is to be used for emission factors, whereas 1.21 is to be used for any other estimation parameters.
