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Methodological issues

Issues relating to greenhouse gas inventories

**Guidelines for the preparation of national communications by Parties
included in Annex I to the Convention, Part I: UNFCCC reporting guidelines
on annual inventories (following incorporation of the provisions of
decision 13/CP.9)**

Note by the secretariat

Summary

This document contains the complete updated “Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual inventories” including the revisions to the Land Use, Land-use Change and Forestry sector adopted by the Conference of the Parties (COP) at its ninth session. The secretariat has prepared this document at the request of the COP to facilitate reporting of inventories from Annex I Parties in 2005.

CONTENTS

	<i>Paragraphs</i>	<i>Page</i>
INTRODUCTION.....	1–5	3
A. Mandate.....	1–3	3
B. Scope of the note.....	4–5	3
GUIDELINES FOR THE PREPARATION OF NATIONAL COMMUNICATIONS BY PARTIES INCLUDED IN ANNEX I TO THE CONVENTION, PART I: UNFCCC REPORTING GUIDELINES ON ANNUAL INVENTORIES.....		
A. Objectives.....	1	4
B. Principles and definitions.....	2–5	4
C. Context.....	6–7	5
D. Base year.....	8	5
E. Methods.....	9–17	6
F. Reporting.....	18–50	7
G. Record keeping.....	51	14
H. Systematic updating of the guidelines.....	52	14
I. Language.....	53	15

Annexes

I. Structure of the national inventory report.....	16
II. Common reporting format.....	23

Introduction

A. Mandate

1. The Conference of Parties (COP), by its decision 13/CP.9, completed the tables of the common reporting format for reporting on the land use, land-use change and forestry (LULUCF) sector and decided to use these tables for a trial period covering inventory submissions due in 2005.
2. The COP, by the same decision, also requested the secretariat to incorporate the LULUCF tables, and related technical modifications, into the “Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual inventories” adopted by decision 18/CP.8 (hereinafter referred to as the UNFCCC reporting guidelines on annual inventories).
3. The COP further requested the secretariat to integrate these tables into the new reporting software (hereinafter referred to as the CRF Reporter) currently under development, in order to facilitate the submission of inventories from Parties included in Annex I to the Convention due by 15 April 2005.

B. Scope of the note

4. This document contains the complete updated UNFCCC reporting guidelines for annual inventories for all inventory sectors, including the revisions to the LULUCF sector. In preparing this document, the secretariat has made the changes necessary to incorporate the common reporting format (CRF) tables, technical modifications and other changes as requested by decision 13/CP.9 and as specified in its annexes I, II and III. In addition, a few editorial changes have been made in both the text portion of the guidelines, and the tables, to ensure consistency across sectors and with the CRF tables adopted by decision 18/CP.8. Examples of these editorial changes include replacement of the term ‘source category’ with ‘category’, as explained in footnote 4 to the UNFCCC reporting guidelines on annual inventories, and the introduction of shading in the CRF tables of the LULUCF sector consistent with other sectors of the CRF. As described in paragraphs 11 and 12 of annex II to these guidelines (see page 24), the shading indicates where data are to be entered by the Party in the CRF tables or automatically calculated by the software.
5. The LULUCF section of these guidelines may be further modified following the consideration by the Subsidiary Body for Scientific and Technological Advice (SBSTA), at its twenty-third session, of the views and experiences of Parties on the CRF tables. In accordance with decision 18/CP.8, the SBSTA will consider any possible revision of the UNFCCC reporting guidelines on annual inventories at its twenty-fourth session, which may include those relating to the LULUCF sector, taking into account experiences with the use of these guidelines.

Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual inventories

A. Objectives

1. The objectives of the UNFCCC reporting guidelines on annual inventories are:
 - (a) To assist Parties included in Annex I to the Convention (Annex I Parties) in meeting their commitments under Articles 4 and 12 of the Convention and to assist Annex I Parties to the Kyoto Protocol in preparing to meet commitments under Articles 3, 5 and 7 of the Kyoto Protocol;
 - (b) To facilitate the process of considering annual national inventories, including the preparation of technical analysis and synthesis documentation;
 - (c) To facilitate the process of verification, technical assessment and expert review of the inventory information.

B. Principles and definitions

2. National greenhouse gas inventories, referred to below only as inventories, should be transparent, consistent, comparable, complete and accurate.
3. Inventories should be prepared using comparable methodologies agreed upon by the Conference of the Parties (COP), as indicated in paragraph 9 below.
4. In the context of these UNFCCC reporting guidelines on annual inventories:

Transparency means that the assumptions and methodologies used for an inventory should be clearly explained to facilitate replication and assessment of the inventory by users of the reported information. The transparency of inventories is fundamental to the success of the process for the communication and consideration of information;

Consistency means that an inventory should be internally consistent in all its elements with inventories of other years. An inventory is consistent if the same methodologies are used for the base and all subsequent years and if consistent data sets are used to estimate emissions or removals from sources or sinks. Under certain circumstances referred to in paragraphs 15 and 16, an inventory using different methodologies for different years can be considered to be consistent if it has been recalculated in a transparent manner, in accordance with the Intergovernmental Panel on Climate Change (IPCC) *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories* and *Good Practice Guidance for Land Use, Land-Use Change and Forestry*;¹

Comparability means that estimates of emissions and removals reported by Annex I Parties in inventories should be comparable among Annex I Parties. For this purpose, Annex I Parties should use

¹ In this document, the term IPCC good practice guidance is used to refer collectively to the *IPCC Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories* and *Good Practice Guidance for Land Use, Land-Use Change and Forestry*. Where only the latter is intended, the term good practice guidance for LULUCF is used.

the methodologies and formats agreed by the COP for estimating and reporting inventories. The allocation of different source/sink categories should follow the split of the *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories*,² and the *IPCC Good Practice Guidance for Land Use, Land-Use Change and Forestry*, at the level of its summary and sectoral tables;

Completeness means that an inventory covers all sources and sinks, as well as all gases, included in the IPCC Guidelines as well as other existing relevant source/sink categories which are specific to individual Annex I Parties and, therefore, may not be included in the IPCC Guidelines. Completeness also means full geographic coverage of sources and sinks of an Annex I Party,³

Accuracy is a relative measure of the exactness of an emission or removal estimate. Estimates should be accurate in the sense that they are systematically neither over nor under true emissions or removals, as far as can be judged, and that uncertainties are reduced as far as practicable. Appropriate methodologies should be used, in accordance with the IPCC good practice guidance, to promote *accuracy* in inventories.

5. In the context of these guidelines, definitions of common terms used in greenhouse gas inventory preparation are those provided in the IPCC good practice guidance.

C. Context

6. These UNFCCC reporting guidelines on annual inventories cover the estimation and reporting of greenhouse gas emissions and removals in both annual inventories and inventories included in national communications, as specified by decision 11/CP.4 and other relevant decisions of the COP.

7. An annual inventory submission shall consist of a national inventory report (NIR) and the common reporting format (CRF) tables, as described in paragraphs 38 through 43 and 44 through 50, respectively.

D. Base year

8. The year 1990 should be the base year for the estimation and reporting of inventories. According to the provisions of Article 4.6 of the Convention and decisions 9/CP.2 and 11/CP.4, the following Annex I Parties that are undergoing the process of transition to a market economy are allowed to use a base year or a period of years other than 1990, as follows:

Bulgaria:	1988
Hungary:	the average of the years 1985 to 1987
Poland:	1988
Romania:	1989
Slovenia:	1986

² Referred to in this document as the IPCC Guidelines.

³ According to the instrument of ratification, acceptance, approval or accession to the Convention of each Annex I Party.

E. Methods

Methodology

9. Annex I Parties shall use the IPCC Guidelines to estimate and report on anthropogenic emissions by sources and removals by sinks of greenhouse gases not controlled by the Montreal Protocol. In preparing national inventories of these gases, Annex I Parties shall also use the IPCC good practice guidance in order to improve transparency, consistency, comparability, completeness and accuracy.

10. In accordance with the IPCC Guidelines, Annex I Parties may use different methods (tiers) included in those guidelines, giving priority to those methods which, according to the decision trees in the IPCC good practice guidance, produce more accurate estimates. In accordance with the IPCC Guidelines, Annex I Parties may also use national methodologies which they consider better able to reflect their national situation, provided that these methodologies are compatible with the IPCC Guidelines and IPCC good practice guidance and are well documented and scientifically based.

11. For categories⁴ that are determined to be key categories, in accordance with IPCC good practice guidance, and estimated in accordance with the provisions in paragraph 13 below, Annex I Parties should make every effort to use a recommended method, in accordance with the corresponding decision trees of the IPCC good practice guidance. Annex I Parties should also make every effort to develop and/or select emission factors, and collect and select activity data, in accordance with the IPCC good practice guidance.

12. For most categories, the IPCC Guidelines provide a default methodology which includes default emission factors and in some cases default activity data references. Furthermore, the IPCC good practice guidance provides updated default emission factors and default activity data for some categories and gases. As the assumptions implicit in these default data, factors and methods may not be appropriate for specific national contexts, it is preferable for Annex I Parties to use their own national emission factors and activity data, where available, provided that they are developed in a manner consistent with the IPCC good practice guidance, are considered to be more accurate, and reported transparently. The updated default activity data or emission factors provided in the IPCC good practice guidance should be used, where available, if Annex I Parties choose to use default factors or data due to lack of country-specific information.

Key category determination

13. Annex I Parties shall identify their national key categories for the base year and the latest reported inventory year, as described in the IPCC good practice guidance, using the tier 1 or tier 2 level and trend assessment.

Uncertainties

14. Annex I Parties shall quantitatively estimate the uncertainties in the data used for all source and sink categories using at least the tier 1 method, as provided in the IPCC good practice guidance. Alternatively, Annex I Parties may use the tier 2 method in the IPCC good practice guidance to address technical limitations in the tier 1 method. Uncertainty in the data used for all source and sink categories

⁴ The term "categories" refers to both source and sink categories. The term "key categories" refers to both key source categories as addressed in the IPCC *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories* and to the key categories as addressed in the IPCC *Good Practice Guidance for Land Use, Land-Use Change and Forestry*.

should also be qualitatively discussed in a transparent manner in the NIR, in particular for categories that were identified as key categories.

Recalculations

15. The inventories of an entire time series, including the base year and all subsequent years for which inventories have been reported, should be estimated using the same methodologies, and the underlying activity data and emission factors should be obtained and used in a consistent manner. Recalculations should ensure consistency of the time series and shall be carried out only to improve accuracy and/or completeness. Where the methodology or manner in which underlying activity data and emission factors are gathered has changed, Annex I Parties should recalculate inventories for the base and subsequent years. Annex I Parties should evaluate the need for recalculations relative to the reasons provided by the IPCC good practice guidance, in particular for key categories. Recalculations should be performed in accordance with IPCC good practice guidance and the general principles set down in these UNFCCC guidelines.

16. In some cases it may not be possible to use the same methods and consistent data sets for all years due to a possible lack of activity data, emission factors or other parameters directly used in the calculation of emission estimates for some historical years, including the base year. In such cases, emissions or removals may need to be recalculated using alternative methods not generally covered by paragraphs 9 through 12. In these instances, Annex I Parties should use one of the techniques provided by the IPCC good practice guidance (e.g., overlap, surrogate, interpolation, and extrapolation) to determine the missing values. Annex I Parties should document and demonstrate in the NIR that the time series is consistent, wherever such techniques are used.

Quality assurance/quality control (QA/QC)

17. Each Annex I Party shall elaborate an inventory QA/QC plan and implement general inventory QC procedures (tier 1)⁵ in accordance with its QA/QC plan following the IPCC good practice guidance. In addition, Annex I Parties should apply category-specific QC procedures (tier 2) for key categories and for those individual categories in which significant methodological changes and/or data revisions have occurred, in accordance with IPCC good practice guidance. The implementation of tier 2 QC may be more efficiently implemented in conjunction with the evaluation of uncertainties in data sources. In addition, Annex I Parties should implement QA procedures by conducting a basic expert peer review (tier 1 QA) of their inventories in accordance with IPCC good practice guidance.

F. Reporting

1. General guidance

Estimates of emissions and removals

18. Article 12.1(a) of the Convention requires that each Party shall communicate to the COP, through the secretariat, inter alia, a national inventory of anthropogenic emissions by sources and removals by sinks of all greenhouse gases not controlled by the Montreal Protocol. As a minimum requirement, inventories shall contain information on the following greenhouse gases: carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), perfluorocarbons (PFCs), hydrofluorocarbons (HFCs) and sulphur hexafluoride (SF₆). Annex I Parties should report anthropogenic emissions and removals of any other greenhouse gases whose 100-year global warming potential (GWP) values have been identified by

⁵ As outlined in table 8.1 of the IPCC *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories*.

the IPCC and adopted by the COP. Annex I Parties should also provide information on the following indirect greenhouse gases: carbon monoxide (CO), nitrogen oxides (NO_x) and non-methane volatile organic compounds (NMVOCs), as well as sulphur oxides (SO_x).

19. Greenhouse gas emissions and removals should be presented on a gas-by-gas basis in units of mass with emissions by sources listed separately from removals by sinks, except in cases where it may be technically impossible to separate information on sources and sinks in the areas of land use, land-use change and forestry. For HFCs and PFCs, emissions should be reported for each relevant chemical in the category on a disaggregated basis, except in cases where paragraph 27 below applies.

20. In addition, consistent with decision 2/CP.3, Annex I Parties should report aggregate emissions and removals of greenhouse gases, expressed in CO₂ equivalent terms at summary inventory level,⁶ using GWP values provided by the IPCC in its Second Assessment Report, referred to below as 1995 IPCC GWP values, based on the effects of greenhouse gases over a 100-year time horizon. A list of these values is given in table 1 at the end of these guidelines. Table 1 on page 15 will be amended to include any additional greenhouse gases and their 100-year GWP values, once the GWP values have been adopted by the COP.

21. Consistent with decision 2/CP.3, Annex I Parties should report actual emissions of HFCs, PFCs and SF₆, where data are available, providing disaggregated data by chemical (for example, HFC-134a) and source category in units of mass and in CO₂ equivalents. Annex I Parties should make every effort to develop the necessary sources of data for reporting actual emissions. For the source categories where the concept of potential emissions applies, and Annex I Parties do not yet have the necessary data to calculate actual emissions, Annex I Parties should report disaggregated potential emissions. Annex I Parties reporting actual emissions should also report potential emissions for the sources where the concept of potential emissions applies, for reasons of transparency and comparability.

22. Any Annex I Party that is a Party to the Kyoto Protocol and that in accordance with Article 3, paragraph 8 of the Kyoto Protocol chooses to use 1995 as its base year for HFCs, PFCs and SF₆ for the purposes of calculating assigned amounts pursuant to Article 3, paragraphs 7 and 8 of the Kyoto Protocol, should indicate this in its NIR and in the documentation boxes of the relevant tables of the CRF. Irrespective of the base year chosen for these gases for the purpose of the Kyoto Protocol, such Annex I Parties should report, to the extent that data are available, emission estimates and trends for these gases from 1990 onward, in accordance with the provisions of these guidelines.

23. Annex I Parties are strongly encouraged to also report emissions and removals of additional greenhouse gases for which 100-year GWP values are available, but not yet adopted by the COP. These emissions and removals should be reported separately from national totals. The GWP value and reference should be indicated.

24. In accordance with the IPCC Guidelines, international aviation and marine bunker fuel emissions should not be included in national totals but should be reported separately. Annex I Parties should make every effort to both apply and report according to the IPCC good practice guidance method for separation between domestic and international emissions. Annex I Parties should also report emissions from international aviation and marine bunker fuels as two separate entries in their inventories.

25. Annex I Parties should clearly indicate how feedstocks and non-energy use of fuels have been accounted for in the inventory, in the energy or industrial processes sector, in accordance with the IPCC good practice guidance.

⁶ CO₂ equivalent emissions should be provided at a level of category disaggregation similar to that specified in table Summary 1.A of the common reporting format.

26. If Annex I Parties account for effects of CO₂ capture from flue gases and subsequent CO₂ storage in their inventory, they should indicate in which source categories such effects are included, and provide transparent documentation of the methodologies used and the resulting effects.

27. Emissions and removals should be reported at the most disaggregated level of each source/sink category, taking into account that a minimum level of aggregation may be required to protect confidential business and military information.

Completeness

28. Where methodological or data gaps in inventories exist, information on these gaps should be presented in a transparent manner. Annex I Parties should clearly indicate the sources and sinks not considered in their inventories but which are included in the IPCC Guidelines, and explain the reasons for such exclusion. Similarly, Annex I Parties should indicate the parts of their geographical area, if any, not covered by their inventory and explain the reasons for their exclusion. In addition, Annex I Parties should use the notation keys presented below to fill in the blanks in all the tables in the CRF.⁷ This approach facilitates assessment of the completeness of an inventory.

The notation keys are as follows:

- (a) “NO” (not occurring) for activities or processes in a particular source or sink category that do not occur within a country;
- (b) “NE” (not estimated) for existing emissions by sources and removals by sinks of greenhouse gases which have not been estimated. Where “NE” is used in an inventory for emissions or removals of CO₂, N₂O, CH₄, HFCs, PFCs or SF₆, the Annex I Party should indicate in both the NIR and the CRF completeness table why emissions or removals have not been estimated;⁸
- (c) “NA” (not applicable) for activities in a given source/sink category that do not result in emissions or removals of a specific gas. If categories in the CRF for which “NA” is applicable are shaded, they do not need to be filled in;
- (d) “IE” (included elsewhere) for emissions by sources and removals by sinks of greenhouse gases estimated but included elsewhere in the inventory instead of the expected source/sink category. Where “IE” is used in an inventory, the Annex I Party should indicate, using the CRF completeness table, where in the inventory the emissions or removals from the displaced source/sink category have been included and the Annex I Party should explain such a deviation from the expected category;
- (e) “C” (confidential) for emissions by sources and removals by sinks of greenhouse gases which could lead to the disclosure of confidential information, given the provisions of paragraph 27 above.

29. If Annex I Parties estimate and report emissions and removals from country-specific sources or sinks or of gases which are not part of the IPCC Guidelines, they should explicitly describe what source/sink categories or gases these are, as well as what methodologies, emission factors and activity data have been used for their estimation and provide the references for these data.

⁷ If notation keys are used in the NIR they should be consistent with those reported in the CRF.

⁸ Even if emissions are considered to be negligible, Parties should either report the emission estimate if calculated or use the notation key “NE”.

Key categories

30. Annex I Parties shall estimate and report the individual and cumulative percentage contributions from key categories to their national total, with respect to both level and trend. The emissions should be expressed in terms of CO₂ equivalents using the methods provided in the IPCC good practice guidance. As indicated in paragraphs 41 and 47 below, this information should be included in table 7 of the CRF as well as the NIR using tables 7.1 – 7.3 of the *IPCC Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories* and tables 5.4.1 – 5.4.3 of the *Good Practice Guidance for Land Use, Land-Use Change and Forestry* adapted to the level of category disaggregation that the Annex I Party used for determining its key categories.⁹

Verification

31. In accordance with the IPCC Guidelines, as well as for verification purposes, Annex I Parties should compare their national estimates of carbon dioxide emissions from fuel combustion with those estimates obtained using the IPCC reference approach, and report the results of this comparison in the CRF and NIR. Annex I Parties are also encouraged to report on any peer review of their inventory conducted nationally.

Uncertainties

32. Annex I Parties shall report, in the NIR, uncertainties estimated as indicated in paragraph 14 above, as well as methods used and underlying assumptions, with the purpose of helping to prioritize efforts to improve the accuracy of national inventories in the future and guide decisions on methodological choice. This information should be presented using tables 6.1 and 6.2 of the *IPCC Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories* adding the lines for the relevant LULUCF categories as indicated in section 5.2.5 of the *Good Practice Guidance for Land Use, Land-Use Change and Forestry*. In these tables, the term “national total” refers to the absolute value of emissions by sources minus the magnitude of removals by sinks. In addition, Annex I Parties should indicate in these tables those categories that have been identified as key categories in their inventory. If the methods used to estimate the level of uncertainty depart from the IPCC good practice guidance, these methods should be described.

Recalculations

33. Recalculations of previously submitted estimates of emissions and removals as a result of changes in methodologies, changes in the manner in which emission factors and activity data are obtained and used, or the inclusion of new sources or sinks which have existed since the base year but were not previously reported, should be reported for the base year and all subsequent years up to the year in which the recalculations are made.

34. Recalculations should be reported in the NIR, with explanatory information including justification for recalculations, and in the relevant CRF tables. Annex I Parties should also provide explanations for those cases in which they have not recalculated an estimate when such a recalculation is called for in the IPCC good practice guidance. Information on the procedures used for performing the recalculations, changes in the calculation methods, emission factors and activity data used, and the inclusion of sources or sinks not previously covered, should be reported with an indication of the relevant

⁹ Table 7.1 of the *IPCC Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories* and table 5.4.1 of the *Good Practice Guidance for Land Use, Land-Use Change and Forestry* should be used as the basis for preparing key category analysis but do not need to be reported in the NIR.

changes in each source or sink category where these changes have taken place. For key categories, Annex I Parties should include this information in the NIR, as indicated in paragraph 41 below.

35. Annex I Parties should report any other changes in estimates of emissions and removals, regardless of magnitude, and clearly indicate the reason for the changes compared with previously submitted inventories, e.g., error correction, statistical or editorial changes or reallocation of categories, using the corresponding CRF table, as indicated in paragraph 47 below and outlined in the annex II to these guidelines.

Quality assurance/quality control (QA/QC)

36. Annex I Parties shall report in the NIR on their QA/QC plan and give information on QA/QC procedures already implemented or to be implemented in the future.

Adjustments¹⁰

37. Inventories are to be reported without adjustments relating, for example, to climate variations or trade patterns of electricity. If Annex I Parties, in addition, carry out such adjustments to inventory data, they should be reported separately and in a transparent manner, with clear indications of the method followed.

2. National inventory report

38. Annex I Parties shall submit to the COP, through the secretariat, an NIR containing detailed and complete information on their inventories. The NIR should ensure transparency and contain sufficiently detailed information to enable the inventory to be reviewed. This information should cover the entire time series, from the base year¹¹ to the latest inventory year, and any changes to previously submitted inventories.

39. Each year, an updated NIR shall be electronically submitted in its entirety to the COP, through the secretariat, in accordance with the relevant decisions of the COP; in instances where Annex I Parties have produced published hard copy versions of their NIR, they are also encouraged to submit copies to the secretariat.

40. The NIR shall include annual inventory information, submitted in accordance with paragraph 38 above.

41. The NIR should include:

- (a) Descriptions, references and sources of information of the specific methodologies, assumptions, emission factors and activity data, as well as the rationale for their selection. It also should include an indication of the level of complexity (IPCC tiers) applied and a description of any national methodology used by the Annex I Party, as well as information on anticipated future improvements. For key categories, an explanation should be provided if the recommended methods from the appropriate decision tree in the IPCC good practice guidance are not used. In addition, activity data, emission factors and related information should be documented in accordance with the IPCC good practice guidance.

¹⁰ The adjustments referred to here relate, for example, to climate variations or trade patterns of electricity. They do not refer to adjustments under Article 5, paragraph 2, of the Kyoto Protocol.

¹¹ According to the provisions of Article 4.6 of the Convention and decisions 9/CP.2 and 11/CP.4, some Parties with economies in transition are allowed to use base years other than 1990, as mentioned in paragraph 8 above.

- (b) A description of the national key categories as indicated in paragraph 30,¹² including:
 - (i) Reference to the key category tables in the CRF;
 - (ii) Information on the level of category disaggregation used and its rationale;
 - (iii) Additional information relating to the methodology used for identifying key categories;
- (c) With regard to possible double counting or non-counting of emissions, an indication in the corresponding sectoral part of the NIR:
 - (i) Whether feedstocks and non-energy use of fuels have been accounted for in the inventory, and if so, where they have been accounted for in the energy or industrial processes sector;
 - (ii) Whether CO₂ from biomass burning has been estimated and where it has been accounted for in the sectoral background data tables of the CRF (tables 5.A-5.F, and table 5(V));
 - (iii) Whether emissions of CO₂ corresponding to atmospheric oxidation of CO, NMVOCs and CH₄ emissions from non-combustion and from non-biogenic processes, such as solvent use, coal mining and handling, venting and leakages of fossil fuels, have been accounted for in the inventory;
 - (iv) Information on source or sink categories excluded or potentially excluded, including efforts to develop estimates for future submissions;
- (d) Information on how the effects of CO₂ capture from flue gases and subsequent CO₂ storage are accounted for in the inventory;
- (e) Information on uncertainties, as requested in paragraph 32 above;
- (f) Information on any recalculations relating to previously submitted inventory data, as requested in paragraphs 33 to 35 above, including changes in methodologies, sources of information and assumptions, as well as recalculations in response to the review process;
- (g) Information on changes from previous years, not related to recalculations, including the changes in methodologies, sources of information and assumptions, as well as changes in response to the review process;
- (h) Information on QA/QC as requested in paragraph 36 above, describing the QA/QC plan, and the QA/QC activities implemented for the entire inventory as well as for individual categories, in particular key categories, and the entire inventory performed internally, as well as on the external reviews conducted, if any. Key findings on the quality of the input data, methods, processing and archiving and how they have been addressed, should be described;
- (i) A description of the institutional arrangements for inventory preparation.

¹² The secretariat will also perform a standardized key source determination for all Parties, based on table 7.1 of the IPCC good practice guidance. Parties may also use this approach if it is consistent with the way they prepare their inventories.

42. If any of the information required under paragraph 41 (a) to (h) above is provided in detail in the CRF, Annex I Parties should indicate in the NIR where in the CRF this information is provided.

43. The NIR should be reported in accordance with the outline contained in the annex I to these guidelines, ensuring that all information requested in paragraph 41 above is included.

3. Common reporting format

44. The common reporting format (CRF) is designed to ensure that Annex I Parties report quantitative data in a standardized format and to facilitate comparison of inventory data and trends among Annex I Parties. Explanation of information of a qualitative character should mainly be provided in the NIR rather than in the CRF tables. Such explanatory information should be cross-referenced to the specific section of the NIR.

45. Annex I Parties shall submit annually to the COP, through the secretariat, the information required in the CRF as contained in annex II to these guidelines. This information shall be electronically submitted on an annual basis in its entirety to the COP, through the secretariat, in accordance with the relevant decisions of the COP.

46. The CRF is a standardized format for reporting estimates of greenhouse gas emissions and removals and other relevant information. The CRF allows for the improved handling of electronic submissions and facilitates the processing of inventory information and the preparation of useful technical analysis and synthesis documentation.

47. The CRF consists of:

- (a) Summary, sectoral and trend tables for all greenhouse gas emissions and removals;
- (b) Sectoral background data tables for reporting implied emission factors¹³ and activity data, including:
 - (i) IPCC worksheet 1-1 containing estimates of CO₂ emissions from fuel combustion using the IPCC reference approach and a table for comparing estimates under this reference approach with estimates under the sectoral approach, as well as providing explanations of any significant differences;¹⁴
 - (ii) Tables for reporting fossil fuel consumption for non-energy feedstocks, international bunkers and multilateral operations;
- (c) Tables for reporting, inter alia, key categories, recalculations and completeness of the inventory.

48. The CRF should be reported in accordance with the tables included in annex II to these guidelines, ensuring that all information requested in paragraph 47 above is included. In completing these tables Annex I Parties should:

¹³ The sectoral background tables were designed to allow calculation of implied emission factors. These are top-down ratios between an Annex I Party's emission estimates and activity data at the level of aggregation given by the tables. The implied emission factors are intended solely for purposes of data comparison. They will not necessarily be the emission factors actually used in the original emission estimate, unless this was a simple multiplication based on the same aggregate activity data used to calculate the implied emission factor.

¹⁴ Detailed explanations should be included in the NIR.

- (a) Provide the full CRF for the latest inventory year and for those years for which any change in any sector has been made. For years where no changes are made, resubmission of full CRF tables is not necessary, but a reference should be made to the inventory submission in which the unchanged data were reported originally. Annex I Parties should ensure that a full and time-series consistent set of CRF tables is annually available for the entire time series from the base year onwards;
- (b) Provide the CRF trend tables covering inventory years for the entire time series in one submission only, that is, in the CRF for the last inventory year;
- (c) Provide completeness tables in one submission only if the information applies to all years. If the information in these tables differs for each reported year, then either the tables or information on the specific changes must be provided for each year in the CRF;
- (d) Use the documentation boxes provided at the foot of the sectoral report and background data tables to provide cross-references to detailed explanations in the NIR, or any other information, as specified in those boxes.

49. Annex I Parties should provide the information requested in the additional information boxes. Where the information called for is inappropriate because of the methodological tier used by the Annex I Party, the corresponding cells should be completed using the notation key "NA". In such cases, the Annex I Parties should cross-reference in the documentation box the relevant section in the NIR where equivalent information can be found.

50. Annex I Parties should use the notation keys, as specified in paragraph 28 above, in all tables of the CRF, to fill in the cells where no quantitative data are directly entered. Using the notation keys in this way facilitates the assessment of the completeness of an inventory. Specific guidance is provided on how notation keys should be used in each CRF table where qualitative information is required.

G. Record keeping

51. Annex I Parties should gather and archive all relevant inventory information for each year, including all disaggregated emission factors, activity data and documentation on how these factors and data were generated, including expert judgement where appropriate, and how they have been aggregated for reporting in the inventory. This information should allow reconstruction of the inventory by the expert review teams, inter alia. Inventory information should be archived from the base year and should include corresponding data on the recalculations applied. The "paper trail", which can include spreadsheets or databases used to compile inventory data, should enable estimates of emissions and removals to be traced back to the original disaggregated emission factors and activity data. Also, relevant supporting documentation related to QA/QC implementation, uncertainty evaluation, or key category analyses should be kept on file. This information should also facilitate the process of clarifying inventory data in a timely manner when the secretariat prepares annual compilations of inventories or assesses methodological issues. Annex I Parties are encouraged to collect and gather the information in a single national inventory facility or, at least, to keep the number of facilities to a minimum.

H. Systematic updating of the guidelines

52. These UNFCCC reporting guidelines on annual inventories shall be reviewed and revised, as appropriate, in accordance with decisions of the COP on this matter.

I. Language

53. The national inventory report shall be submitted in one of the official languages of the United Nations. Annex I Parties are also encouraged to submit, where relevant, a translation of the national inventory report into English.

Table 1. 1995 IPCC global warming potential (GWP) values^a based on the effects of greenhouse gases over a 100-year time horizon

Greenhouse gas	Chemical formula	1995 IPCC GWP
Carbon dioxide	CO ₂	1
Methane	CH ₄	21
Nitrous oxide	N ₂ O	310
Hydrofluorocarbons (HFCs)		
HFC-23	CHF ₃	11 700
HFC-32	CH ₂ F ₂	650
HFC-41	CH ₃ F	150
HFC-43-10mee	C ₅ H ₂ F ₁₀	1 300
HFC-125	C ₂ HF ₅	2 800
HFC-134	C ₂ H ₂ F ₄ (CHF ₂ CHF ₂)	1 000
HFC-134a	C ₂ H ₂ F ₄ (CH ₂ FCF ₃)	1 300
HFC-152a	C ₂ H ₄ F ₂ (CH ₃ CHF ₂)	140
HFC-143	C ₂ H ₃ F ₃ (CHF ₂ CH ₂ F)	300
HFC-143a	C ₂ H ₃ F ₃ (CF ₃ CH ₃)	3 800
HFC-227ea	C ₃ HF ₇	2 900
HFC-236fa	C ₃ H ₂ F ₆	6 300
HFC-254ca	C ₃ H ₃ F ₅	560
Perfluorocarbons		
Perfluoromethane	CF ₄	6 500
Perfluoroethane	C ₂ F ₆	9 200
Perfluoropropane	C ₃ F ₈	7 000
Perfluorobutane	C ₄ F ₁₀	7 000
Perfluorocyclobutane	c-C ₄ F ₈	8 700
Perfluoropentane	C ₅ F ₁₂	7 500
Perfluorohexane	C ₆ F ₁₄	7 400
Sulphur hexafluoride		
Sulphur hexafluoride	SF ₆	23 900

^a As provided by the IPCC in its second assessment report.

Annex I

Structure of the national inventory report

EXECUTIVE SUMMARY

- ES.1. Background information on greenhouse gas inventories and climate change (e.g., as it pertains to the national context, to provide information to the general public)
- ES.2. Summary of national emission and removal related trends
- ES.3. Overview of source and sink category emission estimates and trends
- ES.4. Other information (e.g., indirect greenhouse gases)

Chapter 1: INTRODUCTION

- 1.1. Background information on greenhouse gas inventories and climate change (e.g., as it pertains to the national context, to provide information to the general public)
- 1.2. A description of the institutional arrangement for inventory preparation
- 1.3. Brief description of the process of inventory preparation (e.g., data collection, data processing, data storage)
- 1.4. Brief general description of methodologies and data sources used
- 1.5. Brief description of key categories
- 1.6. Information on the QA/QC plan including verification and treatment of confidentiality issues where relevant
- 1.7. General uncertainty evaluation, including data on the overall uncertainty for the inventory totals
- 1.8. General assessment of the completeness (with reference to annex 5 of the structure of the national inventory report (NIR))

Chapter 2: TRENDS IN GREENHOUSE GAS EMISSIONS

Information should be provided in this chapter that provides an overview of emission trends, but it is not necessary to repeat information that is provided in the sector chapters and in the common reporting format (CRF) trend tables.

- 2.1. Description and interpretation of emission trends for aggregated greenhouse gas emissions
- 2.2. Description and interpretation of emission trends by gas
- 2.3. Description and interpretation of emission trends by category
- 2.4. Description and interpretation of emission trends for indirect greenhouse gases and SO₂

Chapters 3–9: (e.g. SECTOR NAME (CRF sector number))

The structure outlined below should be followed in each of the following sectoral chapters. The information should be reported following the IPCC sectors.

- 3.1. Overview of sector (e.g., quantitative overview and description)
- 3.2. Source category (CRF source category number)

For each IPCC source category (i.e., at the level of the table Summary 1.A of the CRF, or the level at which IPCC methods are described, or at the level that the Annex I Party estimates its greenhouse gas emissions) the following information should be provided:

- 3.2.1. Source category description (e.g., characteristics of sources)
- 3.2.2. Methodological issues (e.g., choice of methods/activity data/emission factors, assumptions, parameters and conventions underlying the emission and removal estimates – the rationale for their selection, any specific methodological issues (e.g. description of national methods))
- 3.2.3. Uncertainties and time-series consistency
- 3.2.4. Source-specific QA/QC and verification, if applicable
- 3.2.5. Source-specific recalculations, if applicable, including changes made in response to the review process
- 3.2.6. Source-specific planned improvements, if applicable (e.g., methodologies, activity data, emission factors, etc.), including those in response to the review process

Annex I Parties may report some of the information requested above in an aggregate form for some/several source categories if the same methodology, activity data and/or emission factors are used, in order to avoid repetition of information. For key categories, the information should be detailed in order to enable a thorough review of the inventory.

Chapter 3: ENERGY (CRF sector 1)

In addition, the energy information should include the following:

Fuel combustion (CRF 1.A), including detailed information on:

- Comparison of the sectoral approach with the reference approach
- International bunker fuels
- Feedstocks and non-energy use of fuels
- CO₂ capture from flue gases and subsequent CO₂ storage
- Country-specific issues

Fugitive emissions from solid fuels and oil and natural gas (CRF 1.B)

Chapter 4: INDUSTRIAL PROCESSES (CRF sector 2)

Chapter 5: SOLVENT AND OTHER PRODUCT USE (CRF sector 3)

Chapter 6: AGRICULTURE (CRF sector 4)

Chapter 7: LULUCF (CRF sector 5)

In addition, the LULUCF information should include the following:

- *Information on approaches used for representing land areas and on land-use databases used for the inventory preparation;*
- *Land-use definitions and the classification systems used and their correspondence to the LULUCF categories.*

Chapter 8: WASTE (CRF sector 6)

Chapter 9: OTHER (CRF sector 7) (if applicable)

In addition, information previously included in the additional information and the documentation boxes of the CRF version for the trial period (FCCC/CP/1999/7) should be included and expanded in the NIR, where relevant, as specified in the appendix to this proposed structure.

Chapter 10: RECALCULATIONS AND IMPROVEMENTS

Information should be provided in this chapter that provides an overview of recalculations and improvements made to the inventory, but it is not necessary to repeat information that is provided in the sector chapters, specifically the category-specific information to be provided, and in particular, Annex I Parties should cross-reference information provided in the sector chapters.

- 10.1. Explanations and justifications for recalculations
- 10.2. Implications for emission levels
- 10.3. Implications for emission trends, including time series consistency
- 10.4. Recalculations, including in response to the review process, and planned improvements to the inventory (e.g., institutional arrangements, inventory preparation)

REFERENCES

ANNEXES TO THE NATIONAL INVENTORY REPORT

Annex 1: Key categories

- Description of methodology used for identifying key categories
- Reference to the key category tables in the CRF
- Information on the level of disaggregation
- Tables 7.A1 - 7.A3 of the IPCC good practice guidance¹

Annex 2: Detailed discussion of methodology and data for estimating CO₂ emissions from fossil fuel combustion

Annex 3: Other detailed methodological descriptions for individual source or sink categories (where relevant)

Annex 4: CO₂ reference approach and comparison with sectoral approach, and relevant information on the national energy balance

Annex 5: Assessment of completeness and (potential) sources and sinks of greenhouse gas emissions and removals excluded

Annex 6: Additional information to be considered as part of the NIR submission (where relevant) or other useful reference information

Annex 7: Tables 6.1 and 6.2 of the IPCC good practice guidance²

Annex 8: Other annexes - (Any other relevant information – optional).

¹ This item has been added for consistency with the provisions in paragraph 30 of these guidelines.

² This item has been added for consistency with the provisions in paragraphs 32 and 41 (f) of these guidelines.

Appendix

Additional guidance on sectoral reporting to be included in the corresponding section of the NIR

This appendix provides guidance on additional information that Annex I Parties could include in their NIR in order to facilitate the review of the inventory. This list is not exhaustive. Additional information may be included in the NIR, depending on the Annex I Party's national approach for estimating greenhouse gas emissions and removals.

Energy

Fuel combustion

More specific information than that required in CRF table 1.A(a) could be provided, e.g.,

- Autoproduction of electricity
- Urban heating (in manufacturing industries, commercial and residential sectors).

Fugitive fuel emissions

Coal mining:

More specific information than that required in CRF table 1.B.1 could be provided, e.g.

- Number of active underground mines
- Number of mines with drainage (recovery) systems.

Oil and natural gas

More specific information than that required in CRF table 1.B.2 could be provided, e.g.

- Pipeline length
- Number of oil wells
- Number of gas wells
- Gas throughput¹
- Oil throughput¹

Industrial processes

Metal production

More specific information than is required in CRF table 2(I).A-G could be provided, e.g., data on virgin and recycled steel production.

Potential emissions of halocarbons and SF₆

In CRF table 2(II)s2, reporting of "production" refers to production of new chemicals. Recycled substances could be included in that table, but it should be ensured that double counting of emissions is avoided. Relevant explanations should be provided in the NIR.

¹ In the context of gas and oil production, throughput is a measure of the total production, such as barrels per day of oil, or cubic metres of gas per year. Specify the units of the reported values. Take into account that these values should be consistent with the activity data reported under production in table 1.B.2 of the CRF.

PFCs and SF₆ from metal production / Production of halocarbons and SF₆

The type of activity data used is to be specified in CRF tables 2(II).C-E (under column "description"). Where applying tier 1b (for 2.C Metal production), tier 2 (for 2.E Production of halocarbons and SF₆) and country-specific methods, any other relevant activity data used should be specified.

Consumption of HFCs, PFCs and SF₆

With regard to activity data reported in CRF table 2(II).F ("Amount of fluid remaining in products at decommissioning"), Annex I Parties should provide in the NIR information on the amount of the chemical recovered (recovery efficiency) and other relevant information used in the emission estimation.

CRF table 2(II).F provides for reporting of the activity data and emission factors used to calculate actual emissions from consumption of halocarbons and SF₆ using the "bottom-up approach" (based on the total stock of equipment and estimated emission rates from this equipment). Some Annex I Parties may prefer to estimate their actual emissions following the alternative "top-down approach" (based on annual sales of equipment and/or gas). Those Annex I Parties should provide the activity data used in that CRF table and provide any other relevant information in the NIR. Data these Annex I Parties should provide include:

- The amount of fluid used to fill new products
- The amount of fluid used to service existing products
- The amount of fluid originally used to fill retiring products (the total nameplate capacity of retiring products)
- The product lifetime
- The growth rate of product sales, if this has been used to calculate the amount of fluid originally used to fill retiring products.

Alternatively, Annex I Parties may provide alternative formats with equivalent information.

Solvents and other product use

The IPCC Guidelines do not provide methodologies for the calculation of emissions of N₂O from solvent and other product use. If reporting such data in the CRF, Annex I Parties should provide additional information (activity data and emission factors) used to make these estimates in the NIR.

AgricultureCross-cutting

Annex I Parties should provide livestock population data in CRF table 4.A. Any further disaggregation of these data, e.g. for regions, for type (according to the classification recommended in the IPCC good practice guidance), could be provided in the NIR, where relevant. Consistent livestock population data should be used in the relevant CRF tables to estimate CH₄ emissions from enteric fermentation, CH₄ and N₂O emissions from manure management, N₂O emissions from soils, and N₂O emissions associated with manure production and use, as well as emissions from the use of manure as fuel and sewage-related emissions reported in the waste sector.

Enteric fermentation

More specific information than is required in CRF table 4.A could be provided, e.g., parameters relevant to the application of good practice guidance.

Manure management

More specific information than is required in CRF tables 4.B(a) and 4.B(b) could be provided, e.g., parameters relevant to the application of the IPCC good practice guidance. Information required in the additional information table may not be directly applicable to country-specific methods developed for methane conversion factor (MCF) calculations. If relevant data cannot be provided in the additional information box, information on how the MCF are derived should be described in the NIR.

Rice cultivation

More specific information than is required in CRF table 4.C could be provided. For example, when disaggregating by more than one region within a country and/or by growing season, provide additional information on disaggregation and related data in the NIR. Where available, provide activity data and scaling factors by soil type and rice cultivar in the NIR.

Agricultural soils

More specific information than is required in CRF table 4.D could be provided. For example,

- The IPCC Guidelines do not provide methodologies for the calculation of CH₄ emissions or removals by agricultural soils. If reporting such data, Annex I Parties should provide in the NIR additional information (activity data and emission factors) used to make these estimates;
- In addition to the data required in the additional information box of table 4.D, disaggregated values for Frac_{GRAZ} according to animal type, and for Frac_{BURN} according to crop types, should be provided in the NIR.

Prescribed burning of savannas and field burning of agricultural residues

More specific information than is required in CRF tables 4.E and 4.F could be provided. For example, the IPCC Guidelines do not provide methodologies for the calculation of CO₂ emissions from savanna burning or agricultural residues burning. If reporting such data, Annex I Parties should provide in the NIR additional information (activity data and emission factors) used to make these estimates.

Land-use, land-use change and forestry

More specific information than is required in the CRF for each land use category and for subcategories could be provided, for example:

- When providing estimates by subdivisions, additional information on disaggregation and related data in the NIR
- Separate reporting of CO₂ emissions from biomass burning, including wildfires and controlled burning
- For those Parties choosing to report harvested wood products, detailed information on CO₂ emissions and removals from harvested wood products, including information by product type and disposal
- Information on how double counting and omissions between the Agriculture and LULUCF sectors have been avoided.

Waste

Solid waste disposal and waste incineration

More specific information than is required in CRF tables 6.A and 6.C could be provided, e.g.,

- All relevant information used in the calculation should be provided in the NIR, if it is not already included in the additional information box of the CRF
- Composition of landfilled waste (%), according to paper and paperboard, food and garden waste, plastics, glass, textiles, other (specify according to inert or organic waste, respectively)

- Fraction of wastes recycled
- Fraction of wastes incinerated
- Number of solid waste disposal sites recovering CH₄.

Waste-water handling

More specific information than is required in CRF table 6.B could be provided. For example, with regard to data on N₂O from waste-water handling to be reported in CRF table 6.B, Annex I Parties using other methods for estimation of N₂O emissions from human sewage or waste-water treatment should provide in the NIR corresponding information on methods, activity data and emission factors used.

Annex II

Common reporting format¹

Notes on the common reporting format

1. The common reporting format (CRF) is an integral part of the national inventory submission. It is designed to ensure that Annex I Parties report quantitative data in a standardized format, and to facilitate the comparison of inventory data across Annex I Parties. Details regarding any information of a non-quantitative character should be provided in the NIR.
2. The information provided in the CRF is aimed at enhancing the comparability and transparency of inventories by facilitating, inter alia, activity data and implied emission factor (IEF) cross-comparisons among Annex I Parties, and easy identification of possible mistakes, misunderstandings and omissions in the inventories.
3. As stated in these reporting guidelines, the CRF consists of summary report and sectoral report tables from the Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories (IPCC Guidelines) plus newly developed sectoral background data tables and other tables that are consistent with the IPCC Guidelines and the IPCC good practice guidance.
4. Some sectoral background tables call for the calculation of IEFs. These are top-down ratios between the Annex I Party's emissions estimate and aggregate activity data. The IEFs are intended solely for purposes of comparison. They will not necessarily be the emission factors actually used in the original emissions estimate, unless this was a simple multiplication based on the same aggregate activity data used to calculate the IEF.
5. Consistent with the IPCC Guidelines, memo items, such as emissions estimates from international marine and aviation bunker fuels, CO₂ emissions from biomass and emissions from multilateral operations, should be reported in the appropriate tables, but not included in the national totals.
6. Annex I Parties should use the documentation boxes below the tables to provide specific references to the relevant sections of the NIR where full details for a given sector/category are to be provided.
7. Annex I Parties should fill in all the cells calling for emissions or removals estimates, activity data, or emission factors. Notation keys, as described in paragraph 28 of the reporting guidelines, should be used where data have not been entered.
8. In the sectoral background tables, below the category "Other", an empty row indicates that country-specific categories may be added. These categories will automatically be included in the sectoral report tables.

¹ The document FCCC/SBSTA/2002/L.5/Add.2, which contains the UNFCCC reporting guidelines on annual inventories, includes on pages 23 to 27 a descriptive section on agreed changes to the tables of the common reporting format. The complete tables were published separately as document FCCC/WEB/SBSTA/2002/1 prior to the eighth session of the Conference of the Parties. Because the complete common reporting format tables with the changes are now included in this document (beginning on page 27), the descriptive section has been deleted from this final version.

9. Annex I Parties should complete the data in the additional information boxes. Where the information called for is inappropriate because of the methodological tier used by the Annex I Party, the corresponding cells should be completed using the indicator “NA”.
10. Neither the order nor the notations of the columns, rows or cells should be changed in the tables as this will complicate data compilation. Any additions to the existing disaggregation of source and sink categories should be provided under “Other”, if appropriate.
11. To simplify the layout of the tables and indicate clearly the specific reporting requirements for each table, only those cells that require entries by Annex I Parties have been left blank. Slight shading in cells indicates that they are expected to be filled in by software to be provided by the secretariat. However, Annex I Parties that choose not to use any software for completing the CRF would have to provide entries in those cells as well.
12. As in the current CRF, dark shading has been used in those cells that are not expected to contain any information.
13. CO₂ emissions and removals (carbon increase and decrease) should be listed separately in the LULUCF sectoral background data tables except in cases where, due to the methods used, it may be technically impossible to separate information on increases and decreases.
14. If a Party does not provide information in new CRF tables for LULUCF for all years, and has not recalculated the estimates for LULUCF for these years, it should provide information on mapping categories provided in the IPCC Good Practice Guidance for Land Use, Land-Use Change and Forestry to the LUCF categories (5.A to 5.E) used in the 1996 IPCC Guidelines and should include information on how it calculated totals for forest and grassland conversion. The information provided in the NIR should be cross-referenced to information in the CRF and vice versa.

List of tables

	<u>Page</u>
Energy	
Table 1 Sectoral Report for Energy	27–28
<i>Sectoral Background Data for Energy</i>	
Table 1.A(a) Fuel Combustion Activities – Sectoral Approach	29–32
Table 1.A(b) CO ₂ from Fuel Combustion Activities – Reference Approach	33
Table 1.A(c) Comparison of CO ₂ Emissions from Fuel Combustion	34
Table 1.A(d) Feedstocks and Non-Energy Use of Fuels	35
Table 1.B.1 Fugitive Emissions from Solid Fuels	36
Table 1.B.2 Fugitive Emissions from Oil, Natural Gas and Other Sources	37
Table 1.C International Bunkers and Multilateral Operations	38
Industrial Processes	
Table 2(I) Sectoral Report for Industrial Processes	39–40
<i>Sectoral Background Data for Industrial Processes</i>	
Table 2(I).A-G Emissions of CO ₂ , CH ₄ and N ₂ O	41–42
Table 2(II) Sectoral Report for Industrial Processes – Emissions of HFCs, PFCs and SF ₆	43–44
Table 2(II).C, E Metal Production, Production of Halocarbons and SF ₆	45
Table 2(II).F Consumption of Halocarbons and SF ₆	46–47
Solvent and Other Product Use	
Table 3 Sectoral Report for Solvent and Other Product Use	48
Table 3.A-D Sectoral Background Data for Solvent and Other Product Use	49
Agriculture	
Table 4 Sectoral Report for Agriculture	50–51
<i>Sectoral Background Data for Agriculture</i>	
Table 4.A Enteric Fermentation	52
Table 4.B(a) CH ₄ Emissions from Manure Management	53
Table 4.B(b) N ₂ O Emissions from Manure Management	54
Table 4.C Rice Cultivation	55
Table 4.D Agricultural Soils	56
Table 4.E Prescribed Burning of Savannas	57
Table 4.F Field Burning of Agricultural Residues	58
Land Use, Land-Use Change and Forestry	
Table 5 Sectoral Report for Land Use, Land-Use Change and Forestry	59
<i>Sectoral Background Data for Land Use, Land-Use Change and Forestry</i>	
Table 5.A Forest land.....	60
Table 5.B Cropland.....	61
Table 5.C Grassland.....	62
Table 5.D Wetlands.....	63
Table 5.E Settlements	64
Table 5.F Other land	65
Table 5(I) Direct N ₂ O emissions from N fertilization	66
Table 5(II) N ₂ O emissions from drainage of soils	67
Table 5(III) N ₂ O emissions from disturbance associated with land-use conversion to cropland.....	68

Table 5(IV) Carbon emissions from agricultural lime application	69
Table 5(V) Biomass burning.....	70
Waste	
Table 6 Sectoral Report for Waste	71
<i>Sectoral Background Data for Waste</i>	
Table 6.A Solid Waste Disposal	72
Table 6.C Waste Incineration	72
Table 6.B Waste-water Handling	73
Summary Tables	
Summary 1.A Summary Report for National Greenhouse Gas Inventories (IPCC Table 7A)	74–76
Summary 1.B Short Summary Report for National Greenhouse Gas Inventories (IPCC Table 7B)	77
Summary 2 Summary Report for CO ₂ Equivalent Emissions	78
Summary 3 Summary Report for Methods and Emission Factors Used	79–80
Other Tables	
Table 7 Summary Overview for Key Categories	81
Table 8(a) Recalculation – Recalculated Data	82–83
Table 8(b) Recalculation – Explanatory Information	84
Table 9(a) Completeness – Information on Notation Keys	85
Table 9(b) Completeness – Information on Additional Greenhouse Gases	86
Table 10 Emissions Trends (CO ₂).....	87
Table 10 Emissions Trends (CH ₄).....	88
Table 10 Emissions Trends (N ₂ O)	89
Table 10 Emissions Trends (HFCs, PFCs and SF ₆).....	90
Table 10 Emissions Trends (Summary).....	91

Explanatory note:

In order to avoid changes to the layout of the complex tables of the common reporting format, the tables have not been translated. The common reporting format is a standardized format to be used by Annex I Parties for electronic reporting of estimates of greenhouse gas emissions and removals and any other relevant information. Due to technical limitations, the layout of the printed version of the CRF in this document (e.g., size of tables and fonts) cannot be standardized. The list of tables in this document follows the order of tables in the electronic version of the CRF.

TABLE 1 SECTORAL REPORT FOR ENERGY
(Sheet 1 of 2)

Country
Year
Submission

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO ₂	CH ₄	N ₂ O	NO _x	CO	NMVOC	SO ₂
	(Gg)						
Total Energy							
A. Fuel Combustion Activities (Sectoral Approach)							
1. Energy Industries							
a. Public Electricity and Heat Production							
b. Petroleum Refining							
c. Manufacture of Solid Fuels and Other Energy Industries							
2. Manufacturing Industries and Construction							
a. Iron and Steel							
b. Non-Ferrous Metals							
c. Chemicals							
d. Pulp, Paper and Print							
e. Food Processing, Beverages and Tobacco							
f. Other (as specified in table 1.A(a) sheet 2)							
3. Transport							
a. Civil Aviation							
b. Road Transportation							
c. Railways							
d. Navigation							
e. Other Transportation (as specified in table 1.A(a) sheet 3)							

TABLE 1 SECTORAL REPORT FOR ENERGY
(Sheet 2 of 2)

Country
Year
Submission

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO ₂	CH ₄	N ₂ O	NO _x	CO	NMVOC	SO ₂
	(Gg)						
4. Other Sectors							
a. Commercial/Institutional							
b. Residential							
c. Agriculture/Forestry/Fisheries							
5. Other (as specified in table 1.A(a) sheet 4)							
a. Stationary							
b. Mobile							
B. Fugitive Emissions from Fuels							
1. Solid Fuels							
a. Coal Mining and Handling							
b. Solid Fuel Transformation							
c. Other (as specified in table 1.B.1)							
2. Oil and Natural Gas							
a. Oil							
b. Natural Gas							
c. Venting and Flaring							
Venting							
Flaring							
d. Other (as specified in table 1.B.2)							
Memo Items: ⁽¹⁾							
International Bunkers							
Aviation							
Marine							
Multilateral Operations							
CO₂ Emissions from Biomass							

⁽¹⁾ Countries are asked to report emissions from international aviation and marine bunkers and multilateral operations, as well as CO₂ emissions from biomass, under Memo Items. These emissions should not be included in the national total emissions from the Energy sector. Amounts of biomass used as fuel are included in the national energy consumption but the corresponding CO₂ emissions are not included in the national total as it is assumed that the biomass is produced in a sustainable manner. If the biomass is harvested at an unsustainable rate, net CO₂ emissions are accounted for as a loss of biomass stocks in the Land Use, Land-Use Change and Forestry sector.

Documentation Box:

Parties should provide detailed explanations on the Energy sector in Chapter 3: Energy (CRF sector 1) of the NIR. Use this documentation box to provide references to relevant sections of the NIR if any additional information and/or further details are needed to understand the content of this table.

TABLE 1.A(a) SECTORAL BACKGROUND DATA FOR ENERGY
Fuel Combustion Activities - Sectoral Approach
(Sheet 1 of 4)

Country
Year
Submission

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	AGGREGATE ACTIVITY DATA		IMPLIED EMISSION FACTORS ⁽²⁾			EMISSIONS		
	Consumption		CO ₂	CH ₄	N ₂ O	CO ₂	CH ₄	N ₂ O
	(TJ)	NCV/GCV ⁽¹⁾	(t/TJ)	(kg/TJ)		(Gg)		
I.A. Fuel Combustion								
Liquid Fuels								
Solid Fuels								
Gaseous Fuels								
Biomass					(3)			
Other Fuels								
I.A.1. Energy Industries								
Liquid Fuels								
Solid Fuels								
Gaseous Fuels								
Biomass					(3)			
Other Fuels								
a. Public Electricity and Heat Production								
Liquid Fuels								
Solid Fuels								
Gaseous Fuels								
Biomass					(3)			
Other Fuels								
b. Petroleum Refining								
Liquid Fuels								
Solid Fuels								
Gaseous Fuels								
Biomass					(3)			
Other Fuels								
c. Manufacture of Solid Fuels and Other Energy Industries								
Liquid Fuels								
Solid Fuels								
Gaseous Fuels								
Biomass					(3)			
Other Fuels								

Note: All footnotes for this table are given at the end of the table on sheet 4.

Note: For the coverage of fuel categories, refer to the IPCC Guidelines (Volume 1. Reporting Instructions - Common Reporting Framework, section 1.2, p. 1.19). If some derived gases (e.g. gas works gas, coke oven gas, blast furnace gas) are considered, Parties should provide information on the allocation of these derived gases under the above fuel categories (liquid, solid, gaseous, biomass and other fuels) in the NIR (see also documentation box at the end of sheet 4 of this table).

TABLE 1.A(a) SECTORAL BACKGROUND DATA FOR ENERGY
Fuel Combustion Activities - Sectoral Approach
(Sheet 2 of 4)

Country
Year
Submission

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	AGGREGATE ACTIVITY DATA		IMPLIED EMISSION FACTORS ⁽²⁾			EMISSIONS		
	Consumption		CO ₂	CH ₄	N ₂ O	CO ₂	CH ₄	N ₂ O
	(TJ)	NCV/GCV ⁽¹⁾	(t/TJ)	(kg/TJ)		(Gg)		
1.A.2 Manufacturing Industries and Construction								
Liquid Fuels								
Solid Fuels								
Gaseous Fuels								
Biomass					(3)			
Other Fuels								
a. Iron and Steel								
Liquid Fuels								
Solid Fuels								
Gaseous Fuels								
Biomass					(3)			
Other Fuels								
b. Non-Ferrous Metals								
Liquid Fuels								
Solid Fuels								
Gaseous Fuels								
Biomass					(3)			
Other Fuels								
c. Chemicals								
Liquid Fuels								
Solid Fuels								
Gaseous Fuels								
Biomass					(3)			
Other Fuels								
d. Pulp, Paper and Print								
Liquid Fuels								
Solid Fuels								
Gaseous Fuels								
Biomass					(3)			
Other Fuels								
e. Food Processing, Beverages and Tobacco								
Liquid Fuels								
Solid Fuels								
Gaseous Fuels								
Biomass					(3)			
Other Fuels								
f. Other (please specify)								
⁽⁴⁾								
Liquid Fuels								
Solid Fuels								
Gaseous Fuels								
Biomass					(3)			
Other Fuels								

Note: All footnotes for this table are given at the end of the table on sheet 4.

TABLE 1.A(a) SECTORAL BACKGROUND DATA FOR ENERGY
Fuel Combustion Activities - Sectoral Approach
(Sheet 3 of 4)

Country
Year
Submission

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	AGGREGATE ACTIVITY DATA		IMPLIED EMISSION FACTORS ⁽²⁾			EMISSIONS		
	Consumption		CO ₂	CH ₄	N ₂ O	CO ₂	CH ₄	N ₂ O
	(TJ)	NCV/GCV ⁽¹⁾	(t/TJ)	(kg/TJ)		(Gg)		
I.A.3 Transport								
Liquid Fuels								
Solid Fuels								
Gaseous Fuels								
Biomass								
Other Fuels								
a. Civil Aviation								
Aviation Gasoline								
Jet Kerosene								
b. Road Transportation								
Gasoline								
Diesel Oil								
Liquefied Petroleum Gases (LPG)								
Other Liquid Fuels <i>(please specify)</i>								
Gaseous Fuels								
Biomass								
Other Fuels <i>(please specify)</i>								
c. Railways								
Liquid Fuels								
Solid Fuels								
Gaseous Fuels								
Other Fuels <i>(please specify)</i>								
d. Navigation								
Residual Oil (Residual Fuel Oil)								
Gas/Diesel Oil								
Gasoline								
Other Liquid Fuels <i>(please specify)</i>								
Solid Fuels								
Gaseous Fuels								
Other Fuels <i>(please specify)</i>								
e. Other Transportation <i>(please specify)</i>								
⁽⁵⁾								
Liquid Fuels								
Solid Fuels								
Gaseous Fuels								
Biomass								
Other Fuels								

Note: All footnotes for this table are given at the end of the table on sheet 4.

TABLE 1.A(a) SECTORAL BACKGROUND DATA FOR ENERGY
Fuel Combustion Activities - Sectoral Approach
 (Sheet 4 of 4)

Country
 Year
 Submission

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	AGGREGATE ACTIVITY DATA		IMPLIED EMISSION FACTORS ⁽²⁾			EMISSIONS		
	Consumption		CO ₂	CH ₄	N ₂ O	CO ₂	CH ₄	N ₂ O
	(TJ)	NCV/GCV ⁽¹⁾	(t/TJ)	(kg/TJ)		(Gg)		
1.A.4 Other Sectors								
Liquid Fuels								
Solid Fuels								
Gaseous Fuels								
Biomass								
Other Fuels								
a. Commercial/Institutional								
Liquid Fuels								
Solid Fuels								
Gaseous Fuels								
Biomass								
Other Fuels								
b. Residential								
Liquid Fuels								
Solid Fuels								
Gaseous Fuels								
Biomass								
Other Fuels								
c. Agriculture/Forestry/Fisheries								
Liquid Fuels								
Solid Fuels								
Gaseous Fuels								
Biomass								
Other Fuels								
1.A.5 Other (Not specified elsewhere)⁽⁶⁾								
a. Stationary (please specify)								
⁽⁷⁾								
Liquid Fuels								
Solid Fuels								
Gaseous Fuels								
Biomass								
Other Fuels								
b. Mobile (please specify)								
⁽⁸⁾								
Liquid Fuels								
Solid Fuels								
Gaseous Fuels								
Biomass								
Other Fuels								

- ⁽¹⁾ If activity data are calculated using net calorific values (NCV) as specified by the IPCC Guidelines, write NCV in this column. If gross calorific values (GCV) are used, write GCV in this column.
- ⁽²⁾ Accurate estimation of CH₄ and N₂O emissions depends on combustion conditions, technology and emission control policy, as well as on fuel characteristics. Therefore, caution should be used when comparing the implied emission factors across countries.
- ⁽³⁾ Although carbon dioxide emissions from biomass are reported in this table, they will not be included in the total CO₂ emissions from fuel combustion. The value for total CO₂ from biomass is recorded in Table1 sheet 2 under the Memo Items.
- ⁽⁴⁾ Use this cell to list all activities covered under "f. Other".
- ⁽⁵⁾ Use this cell to list all activities covered under "e. Other transportation".
- ⁽⁶⁾ Include military fuel use under this category.
- ⁽⁷⁾ Use this cell to list all activities covered under "1.A.5.a Other - stationary".
- ⁽⁸⁾ Use this cell to list all activities covered under "1.A.5.b Other - mobile".

Documentation Box:

- Parties should provide detailed explanations on the fuel combustion sub-sector in the corresponding part of Chapter 3: Energy (CRF sub-sector 1.A) of the NIR. Use this documentation box to provide references to relevant sections of the NIR if any additional information and/or further details are needed to understand the content of this table.
- If estimates are based on GCV, use this documentation box to provide reference to the relevant section of the NIR where the information necessary to allow the calculation of the activity data based on NCV can be found.
- If some derived gases (e.g. gas works gas, coke oven gas, blast furnace gas) are considered, use this documentation box to provide a reference to the relevant section of the NIR containing the information on the allocation of these derived gases under the above fuel categories (liquid, solid, gaseous, biomass and other fuels).

TABLE 1.A(b) SECTORAL BACKGROUND DATA FOR ENERGY
CO₂ from Fuel Combustion Activities - Reference Approach (IPCC Worksheet 1-1)
 (Sheet 1 of 1)

Country
 Year
 Submission

FUEL TYPES			Unit	Production	Imports	Exports	International bunkers	Stock change	Apparent consumption	Conversion factor (TJ/Unit)	NCV/ GCV ⁽¹⁾	Apparent consumption (TJ)	Carbon emission factor (t C/TJ)	Carbon content (Gg C)	Carbon stored (Gg C)	Net carbon emissions (Gg C)	Fraction of carbon oxidized	Actual CO ₂ emissions (Gg CO ₂)	
Liquid Fossil	Primary Fuels	Crude Oil																	
		Orimulsion																	
		Natural Gas Liquids																	
	Secondary Fuels	Gasoline																	
		Jet Kerosene																	
		Other Kerosene																	
		Shale Oil																	
		Gas / Diesel Oil																	
		Residual Fuel Oil																	
		Liquefied Petroleum Gas (LPG)																	
		Ethane																	
		Naphtha																	
		Bitumen																	
		Lubricants																	
		Petroleum Coke																	
Refinery Feedstocks																			
Other Oil																			
Other Liquid Fossil																			
Liquid Fossil Totals																			
Solid Fossil	Primary Fuels	Anthracite ⁽²⁾																	
		Coking Coal																	
		Other Bituminous Coal																	
		Sub-bituminous Coal																	
		Lignite																	
		Oil Shale																	
		Peat																	
	Secondary Fuels	BKB ⁽³⁾ and Patent Fuel																	
		Coke Oven/Gas Coke																	
		Other Solid Fossil																	
Solid Fossil Totals																			
Gaseous Fossil	Natural Gas (Dry)																		
Other Gaseous Fossil																			
Gaseous Fossil Totals																			
Total																			
Biomass total																			
	Solid Biomass																		
	Liquid Biomass																		
	Gas Biomass																		

⁽¹⁾ To convert quantities in previous columns to energy units, use net calorific values (NCV) and write NCV in this column. If gross calorific values (GCV) are used, write GCV in this column.

⁽²⁾ If data for Anthracite are not available separately, include with Other Bituminous Coal.

⁽³⁾ BKB: Brown coal/peat briquettes.

Documentation Box:

Parties should provide detailed explanations on the fuel combustion sub-sector, including information relating to CO₂ from the Reference approach, in the corresponding part of Chapter 3: Energy (CRF sub-sector 1.A) of the NIR. Use this documentation box to provide references to relevant sections of the NIR if any additional information and/or further details are needed to understand the content of this table.

TABLE 1.A(c) SECTORAL BACKGROUND DATA FOR ENERGY
Comparison of CO₂ emissions from Fuel Combustion
(Sheet 1 of 1)

Country
Year
Submission

FUEL TYPES	REFERENCE APPROACH			SECTORAL APPROACH ⁽¹⁾		DIFFERENCE ⁽²⁾	
	Apparent energy consumption ⁽³⁾	Apparent energy consumption (excluding non-energy use and feedstocks) ⁽⁴⁾	CO ₂ emissions	Energy consumption	CO ₂ emissions	Energy consumption	CO ₂ emissions
	(PJ)	(PJ)	(Gg)	(PJ)	(Gg)	(%)	(%)
Liquid Fuels (excluding international bunkers)							
Solid Fuels (excluding international bunkers) ⁽⁵⁾							
Gaseous Fuels							
Other ⁽⁵⁾							
<i>Total</i> ⁽⁵⁾							

⁽¹⁾ "Sectoral approach" is used to indicate the approach (if different from the Reference approach) used by the Party to estimate CO₂ emissions from fuel combustion as reported in table 1.A(a), sheets 1-4.

⁽²⁾ Difference in CO₂ emissions estimated by the Reference approach (RA) and the Sectoral approach (SA) (difference = 100% x ((RA-SA)/SA)). For calculating the difference in energy consumption between the two approaches, data as reported in the column "Apparent energy consumption (excluding non-energy use and feedstocks)" are used for the Reference approach.

⁽³⁾ Apparent energy consumption data shown in this column are as in table 1.A(b).

⁽⁴⁾ For the purposes of comparing apparent energy consumption from the Reference approach with energy consumption from the Sectoral approach, Parties should, in this column, subtract from the apparent energy consumption (Reference approach) the energy content corresponding to the fuel quantities used as feedstocks and/or for non-energy purposes, in accordance with the accounting of energy use in the Sectoral approach.

⁽⁵⁾ Emissions from biomass are not included.

Note: The Reporting Instructions of the Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories require that estimates of CO₂ emissions from fuel combustion, derived using a detailed Sectoral approach, be compared to those from the Reference approach (Worksheet 1-1 of the IPCC Guidelines, Volume 2, Workbook). This comparison is to assist in verifying the Sectoral data.

Documentation Box:

- Parties should provide detailed explanations on the fuel combustion sub-sector, including information related to the comparison of CO₂ emissions calculated using the Sectoral approach with those calculated using the Reference approach, in the corresponding part of Chapter 3: Energy (CRF sub-sector 1.A) of the NIR. Use this documentation box to provide references to relevant sections of the NIR if any additional information and/or further details are needed to understand the content of this table.
- If the CO₂ emission estimates from the two approaches differ by more than 2 per cent, Parties should briefly explain the cause of this difference in this documentation box and provide a reference to relevant section of the NIR where this difference is explained in more detail.

TABLE 1.B.1 SECTORAL BACKGROUND DATA FOR ENERGY
Fugitive Emissions from Solid Fuels
(Sheet 1 of 1)

Country
Year
Submission

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	ACTIVITY DATA	IMPLIED EMISSION FACTORS		EMISSIONS		
	Amount of fuel produced	CH ₄ ⁽¹⁾	CO ₂	CH ₄		CO ₂
				Recovery/Flaring ⁽²⁾	Emissions ⁽³⁾	
	(Mt)	(kg/t)		(Gg)		
I. B. 1. a. Coal Mining and Handling						
i. Underground Mines ⁽⁴⁾						
Mining Activities						
Post-Mining Activities						
ii. Surface Mines ⁽⁴⁾						
Mining Activities						
Post-Mining Activities						
I. B. 1. b. Solid Fuel Transformation						
I. B. 1. c. Other (please specify)⁽⁵⁾						

⁽¹⁾ The IEFs for CH₄ are estimated on the basis of gross emissions as follows: (CH₄ emissions + amounts of CH₄ flared/recovered) / activity data.

⁽²⁾ Amounts of CH₄ drained (recovered), utilized or flared.

⁽³⁾ Final CH₄ emissions after subtracting the amounts of CH₄ utilized or recovered.

⁽⁴⁾ In accordance with the IPCC Guidelines, emissions from Mining Activities and Post-Mining Activities are calculated using the activity data of the amount of fuel produced for Underground Mines and Surface Mines.

⁽⁵⁾ This category is to be used for reporting any other solid-fuel-related activities resulting in fugitive emissions, such as emissions from abandoned mines and waste piles.

Note: There are no clear references to the coverage of 1.B.1.b. and 1.B.1.c. in the IPCC Guidelines. Make sure that the emissions entered here are not reported elsewhere. If they are reported under another source category, indicate this by using notation key IE and making the necessary reference in Table 9 (completeness).

Documentation box:

- Parties should provide detailed explanations on the fugitive emissions from source category 1.B.1 Solid Fuels, in the corresponding part of Chapter 3: Energy (CRF source category 1.B.1) of the NIR. Use this documentation box to provide references to relevant sections of the NIR if any additional information and/or further details are needed to understand the content of this table.
- Regarding data on the amount of fuel produced entered in the above table, specify in this documentation box whether the fuel amount is based on the run-of-mine (ROM) production or on the saleable production.
- If entries are made for "Recovery/Flaring", indicate in this documentation box whether CH₄ is flared or recovered and provide a reference to the section in the NIR where further details on recovery/flaring can be found.
- If estimates are reported under 1.B.1.b. and 1.B.1.c., use this documentation box to provide information regarding activities covered under these categories and to provide a reference to the section in the NIR where the background information can be found.

TABLE 1.B.2 SECTORAL BACKGROUND DATA FOR ENERGY
Fugitive Emissions from Oil, Natural Gas and Other Sources
 (Sheet 1 of 1)

Country
 Year
 Submission

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	ACTIVITY DATA ⁽¹⁾			IMPLIED EMISSION FACTORS			EMISSIONS		
	Description ⁽¹⁾	Unit ⁽¹⁾	Value	CO ₂	CH ₄	N ₂ O	CO ₂	CH ₄	N ₂ O
				(kg/unit) ⁽²⁾			(Gg)		
I. B. 2. a. Oil ⁽³⁾									
i. Exploration	<i>(e.g. number of wells drilled)</i>								
ii. Production ⁽⁴⁾	<i>(e.g. PJ of oil produced)</i>								
iii. Transport	<i>(e.g. PJ oil loaded in tankers)</i>								
iv. Refining / Storage	<i>(e.g. PJ oil refined)</i>								
v. Distribution of Oil Products	<i>(e.g. PJ oil refined)</i>								
vi. Other									
I. B. 2. b. Natural Gas									
i. Exploration									
ii. Production ⁽⁴⁾ / Processing	<i>(e.g. PJ gas produced)</i>								
iii. Transmission	<i>(e.g. PJ gas consumed)</i>								
iv. Distribution	<i>(e.g. PJ gas consumed)</i>								
v. Other Leakage	<i>(e.g. PJ gas consumed)</i>								
<i>at industrial plants and power stations</i>									
<i>in residential and commercial sectors</i>									
I. B. 2. c. Venting ⁽⁵⁾									
i. Oil	<i>(e.g. PJ oil produced)</i>								
ii. Gas	<i>(e.g. PJ gas produced)</i>								
iii. Combined									
Flaring									
i. Oil	<i>(e.g. PJ gas consumption)</i>								
ii. Gas	<i>(e.g. PJ gas consumption)</i>								
iii. Combined									
I.B.2.d. Other <i>(please specify)</i> ⁽⁶⁾									

⁽¹⁾ Specify the activity data used in the Description column (see examples). Specify the unit of the activity data in the Unit column using one of the following units: PJ, Tg, 10⁶ m³, 10⁶ bbl/yr, km, number of sources (e.g. wells).

⁽²⁾ The unit of the implied emission factor will depend on the unit of the activity data used, and is therefore not specified in this column.

⁽³⁾ Use the category also to cover emissions from combined oil and gas production fields. Natural gas processing and distribution from these fields should be included under 1.B.2.b.ii and 1.B.2.b.iv, respectively.

⁽⁴⁾ If using default emission factors, these categories will include emissions from production other than venting and flaring.

⁽⁵⁾ If using default emission factors, emissions from Venting and Flaring from all oil and gas production should be accounted for under Venting.

⁽⁶⁾ For example, fugitive CO₂ emissions from production of geothermal power could be reported here.

Documentation box:

- Parties should provide detailed explanations on the fugitive emissions from source category 1.B.2 Oil and Natural Gas, in the corresponding part of Chapter 3: Energy (CRF source category 1.B.2) of the NIR. Use this documentation box to provide references to relevant sections of the NIR if any additional information and/or further details are needed to understand the content of this table.
- Regarding data on the amount of fuel produced entered in this table, specify in this documentation box whether the fuel amount is based on the raw material production or on the saleable production. Note cases where more than one type of activity data is used to estimate emissions.
- Venting and Flaring: Parties using the IPCC software could report venting and flaring emissions together, indicating this in this documentation box.
- If estimates are reported under "1.B.2.d Other", use this documentation box to provide information regarding activities covered under this category and to provide a reference to the section in the NIR where background information can be found.

TABLE 1.C SECTORAL BACKGROUND DATA FOR ENERGY
International Bunkers and Multilateral Operations
 (Sheet 1 of 1)

Country
 Year
 Submission

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	ACTIVITY DATA	IMPLIED EMISSION FACTORS			EMISSIONS		
	Consumption (TJ)	CO ₂	CH ₄	N ₂ O	CO ₂	CH ₄	N ₂ O
		(t/TJ)			(Gg)		
Aviation Bunkers							
Jet Kerosene							
Gasoline							
Marine Bunkers							
Gasoline							
Gas/Diesel Oil							
Residual Fuel Oil							
Lubricants							
Coal							
Other (<i>please specify</i>)							
Multilateral Operations⁽¹⁾							

Additional information

Fuel consumption	Distribution ^(a) (per cent)	
	Domestic	International
Aviation		
Marine		

^(a) For calculating the allocation of fuel consumption, the sums of fuel consumption for domestic navigation and aviation (table 1.A(a)) and for international bunkers (table 1.C) are used.

⁽¹⁾ Parties may choose to report or not report the activity data and implied emission factors for multilateral operations consistent with the principle of confidentiality stated in the UNFCCC reporting guidelines. In any case, Parties should report the emissions from multilateral operations, where available, under the Memo Items section of the Summary tables and in the Sectoral report table for energy.

Note: In accordance with the IPCC Guidelines, international aviation and marine bunker fuel emissions from fuel sold to ships or aircraft engaged in international transport should be excluded from national totals and reported separately for information purposes only.

Documentation box:

- Parties should provide detailed explanations on the fuel combustion sub-sector, including international bunker fuels, in the corresponding part of Chapter 3: Energy (CRF sub-sector 1.A) of the NIR. Use this documentation box to provide references to relevant sections of the NIR if any additional information and/or further details are needed to understand the content of this table.
- Provide in this documentation box a brief explanation on how the consumption of international marine and aviation bunker fuels was estimated and separated from domestic consumption, and include a reference to the section of the NIR where the explanation is provided in more detail.

TABLE 2(I) SECTORAL REPORT FOR INDUSTRIAL PROCESSES
(Sheet 1 of 2)

Country
Year
Submission

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO ₂	CH ₄	N ₂ O	HFCs ⁽¹⁾		PFCs ⁽¹⁾		SF ₆		NO _x	CO	NMVOC	SO ₂
				P	A	P	A	P	A				
	(Gg)			CO ₂ equivalent (Gg)				(Gg)					
Total Industrial Processes													
A. Mineral Products													
1. Cement Production													
2. Lime Production													
3. Limestone and Dolomite Use													
4. Soda Ash Production and Use													
5. Asphalt Roofing													
6. Road Paving with Asphalt													
7. Other (as specified in table 2(I)A-G)													
B. Chemical Industry													
1. Ammonia Production													
2. Nitric Acid Production													
3. Adipic Acid Production													
4. Carbide Production													
5. Other (as specified in table 2(I)A-G)													
C. Metal Production													
1. Iron and Steel Production													
2. Ferroalloys Production													
3. Aluminium Production													
4. SF ₆ Used in Aluminium and Magnesium Foundries													
5. Other (as specified in table 2(I)A-G)													

Note: P = Potential emissions based on Tier 1 approach of the IPCC Guidelines. A = Actual emissions based on Tier 2 approach of the IPCC Guidelines. This applies only to source categories where methods exist for both tiers.

⁽¹⁾ The emissions of HFCs and PFCs are to be expressed as CO₂ equivalent emissions. Data on disaggregated emissions of HFCs and PFCs are to be provided in Table 2(II).

TABLE 2(I) SECTORAL REPORT FOR INDUSTRIAL PROCESSES
(Sheet 2 of 2)

Country
Year
Submission

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO ₂	CH ₄	N ₂ O	HFCs ⁽¹⁾		PFCs ⁽¹⁾		SF ₆		NO _x	CO	NM VOC	SO ₂
				P	A	P	A	P	A				
	(Gg)			CO ₂ equivalent (Gg)				(Gg)					
D. Other Production													
1. Pulp and Paper													
2. Food and Drink ⁽²⁾													
E. Production of Halocarbons and SF₆													
1. By-product Emissions													
Production of HCFC-22													
Other													
2. Fugitive Emissions													
3. Other (as specified in table 2(II))													
F. Consumption of Halocarbons and SF₆													
1. Refrigeration and Air Conditioning Equipment													
2. Foam Blowing													
3. Fire Extinguishers													
4. Aerosols/ Metered Dose Inhalers													
5. Solvents													
6. Other applications using ODS ⁽³⁾ substitutes													
7. Semiconductor Manufacture													
8. Electrical Equipment													
9. Other (as specified in table 2(II))													
G. Other (as specified in tables 2(I).A-G and 2(II))													

Note: P = Potential emissions based on Tier 1 approach of the IPCC Guidelines. A = Actual emissions based on Tier 2 approach of the IPCC Guidelines. This applies only to source categories where methods exist for both tiers.

⁽¹⁾ The emissions of HFCs and PFCs are to be expressed as CO₂ equivalent emissions. Data on disaggregated emissions of HFCs and PFCs are to be provided in Table 2(II).

⁽²⁾ CO₂ from Food and Drink Production (e.g. gasification of water) can be of biogenic or non-biogenic origin. Only information on CO₂ emissions of non-biogenic origin should be reported.

⁽³⁾ ODS: ozone-depleting substances.

Documentation box:

Parties should provide detailed explanations on the industrial processes sector in Chapter 4: Industrial processes (CRF sector 2) of the NIR. Use this documentation box to provide references to relevant sections of the NIR if any additional information and/or further details are needed to understand the content of this table.

TABLE 2(I).A-G SECTORAL BACKGROUND DATA FOR INDUSTRIAL PROCESSES
Emissions of CO₂, CH₄ and N₂O
(Sheet 1 of 2)

Country
Year
Submission

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	ACTIVITY DATA		IMPLIED EMISSION FACTORS ⁽²⁾			EMISSIONS					
	Production/Consumption quantity		CO ₂	CH ₄	N ₂ O	CO ₂		CH ₄		N ₂ O	
	Description ⁽¹⁾	(kt)				(t/t)	Emissions ⁽³⁾	Recovery ⁽⁴⁾	Emissions ⁽³⁾	Recovery ⁽⁴⁾	Emissions ⁽³⁾
			(Gg)								
A. Mineral Products											
1. Cement Production	<i>(e.g. cement or clinker production)</i>										
2. Lime Production											
3. Limestone and Dolomite Use											
4. Soda Ash											
Soda Ash Production											
Soda Ash Use											
5. Asphalt Roofing											
6. Road Paving with Asphalt											
7. Other <i>(please specify)</i>											
Glass Production											
B. Chemical Industry											
1. Ammonia Production ⁽⁵⁾											
2. Nitric Acid Production											
3. Adipic Acid Production											
4. Carbide Production											
Silicon Carbide											
Calcium Carbide											
5. Other <i>(please specify)</i>											
Carbon Black											
Ethylene											
Dichloroethylene											
Styrene											
Methanol											

⁽¹⁾ Where the IPCC Guidelines provide options for activity data, e.g. cement production or clinker production for estimating the emissions from Cement Production, specify the activity data used (as shown in the example in parentheses) in order to make the choice of emission factor more transparent and to facilitate comparisons of implied emission factors.

⁽²⁾ The implied emission factors (IEF) are estimated on the basis of gross emissions as follows: IEF = (emissions plus amounts recovered, oxidized, destroyed or transformed) / activity data.

⁽³⁾ Final emissions are to be reported (after subtracting the amounts of emission recovery, oxidation, destruction or transformation).

⁽⁴⁾ Amounts of emission recovery, oxidation, destruction or transformation.

⁽⁵⁾ To avoid double counting, make offsetting deductions for fuel consumption (e.g. natural gas) in Ammonia Production, first for feedstock use of the fuel, and then for a sequestering use of the feedstock.

TABLE 2(I).A-G SECTORAL BACKGROUND DATA FOR INDUSTRIAL PROCESSES
Emissions of CO₂, CH₄ and N₂O
(Sheet 2 of 2)

Country
Year
Submission

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	ACTIVITY DATA		IMPLIED EMISSION FACTORS ⁽²⁾			EMISSIONS					
	Production/Consumption quantity		CO ₂	CH ₄	N ₂ O	CO ₂		CH ₄		N ₂ O	
	Description ⁽¹⁾	(kt)				Emissions ⁽³⁾	Recovery ⁽⁴⁾	Emissions ⁽³⁾	Recovery ⁽⁴⁾	Emissions ⁽³⁾	Recovery ⁽⁴⁾
						(Gg)					
C. Metal Production											
1. Iron and Steel Production											
Steel											
Pig Iron											
Sinter											
Coke											
Other (please specify)											
2. Ferroalloys Production											
3. Aluminium Production											
4. SF ₆ Used in Aluminium and Magnesium Foundries											
5. Other (please specify)											
D. Other Production											
1. Pulp and Paper											
2. Food and Drink											
G. Other (please specify)											

⁽¹⁾ Where the IPCC Guidelines provide options for activity data, e.g. cement production or clinker production for estimating the emissions from Cement Production, specify the activity data used (as shown in the example in parentheses) in order to make the choice of emission factor more transparent and to facilitate comparisons of implied emission factors.

⁽²⁾ The implied emission factors (IEF) are estimated on the basis of gross emissions as follows: IEF = (emissions + amounts recovered, oxidized, destroyed or transformed) / activity data.

⁽³⁾ Final emissions are to be reported (after subtracting the amounts of emission recovery, oxidation, destruction or transformation).

⁽⁴⁾ Amounts of emission recovery, oxidation, destruction or transformation.

Documentation box:

- Parties should provide detailed explanations on the industrial processes sector in Chapter 4: Industrial processes (CRF sector 2) of the NIR. Use this documentation box to provide references to relevant sections of the NIR if any additional information and/or further details are needed to understand the content of this table.
- In relation to metal production, more specific information (e.g. data on virgin and recycled steel production) could be provided in this documentation box, or in the NIR, together with a reference to the relevant section.
- Confidentiality: Where only aggregate figures for activity data are provided, e.g. due to reasons of confidentiality, a note indicating this should be provided in this documentation box.

TABLE 2(II) SECTORAL REPORT FOR INDUSTRIAL PROCESSES - EMISSIONS OF HFCs, PFCs AND SF₆
(Sheet 1 of 2)

Country
Year
Submission

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	HFC-23	HFC-32	HFC-41	HFC-43-10mee	HFC-125	HFC-134	HFC-134a	HFC-152a	HFC-143	HFC-143a	HFC-227ea	HFC-236fa	HFC-245ea	Unspecified mix of listed HFCs ⁽¹⁾	Total HFCs	CF ₄	C ₂ F ₆	C ₃ F ₈	C ₄ F ₁₀	e-C ₄ F ₈	C ₃ F ₁₂	C ₆ F ₁₄	Unspecified mix of listed PFCs ⁽¹⁾	Total PFCs	SF ₆	
	(t) ⁽²⁾													CO ₂ equivalent (Gg)	(t) ⁽²⁾						CO ₂ equivalent (Gg)	(t) ⁽²⁾				
Total Actual Emissions of Halocarbons (by chemical) and SF₆																										
C. Metal Production																										
Aluminium Production																										
SF ₆ Used in Aluminium Foundries																										
SF ₆ Used in Magnesium Foundries																										
E. Production of Halocarbons and SF₆																										
1. By-product Emissions																										
Production of HCFC-22																										
Other																										
2. Fugitive Emissions																										
3. Other (as specified in table 2(II).C.E)																										
F(a). Consumption of Halocarbons and SF₆ (actual emissions - Tier 2)																										
1. Refrigeration and Air Conditioning Equipment																										
2. Foam Blowing																										
3. Fire Extinguishers																										
4. Aerosols/Metered Dose Inhalers																										
5. Solvents																										
6. Other applications using ODS ⁽³⁾ substitutes																										
7. Semiconductor Manufacture																										
8. Electrical Equipment																										
9. Other (as specified in table 2(II).F)																										
G. Other (please specify)																										

Note:

1. All footnotes for this table are given at the end of the table on sheet 2.
2. Gases with global warming potential (GWP) values not yet agreed upon by the Conference of the Parties should be reported in table 9(b).

TABLE 2(II) SECTORAL REPORT FOR INDUSTRIAL PROCESSES - EMISSIONS OF HFCs, PFCs AND SF₆
(Sheet 2 of 2)

Country
Year
Submission

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	HFC-23	HFC-32	HFC-41	HFC-43-10mee	HFC-125	HFC-134	HFC-134a	HFC-152a	HFC-143	HFC-143a	HFC-227ea	HFC-236fa	HFC-245ea	Unspecified mix of listed HFCs ⁽¹⁾	Total HFCs	CF ₄	C ₂ F ₆	C ₃ F ₈	C ₄ F ₁₀	e-C ₄ F ₈	C ₅ F ₁₂	C ₆ F ₁₄	Unspecified mix of listed PFCs ⁽¹⁾	Total PFCs	SF ₆	
	(t) ⁽²⁾													CO ₂ equivalent (Gg)	(t) ⁽²⁾						CO ₂ equivalent (Gg)	(t) ⁽²⁾				
F(p). Total Potential Emissions of Halocarbons (by chemical) and SF₆⁽⁴⁾																										
Production ⁽⁵⁾																										
Import:																										
In bulk																										
In products ⁽⁶⁾																										
Export:																										
In bulk																										
In products ⁽⁶⁾																										
Destroyed amount																										

GWP values used	11700	650	150	1300	2800	1000	1300	140	300	3800	2900	6300	560			6500	9200	7000	7000	8700	7500	7400			23900	
Total Actual Emissions⁽⁷⁾ (CO₂ equivalent (Gg))																										
C. Metal Production																										
E. Production of Halocarbons and SF ₆																										
F(a). Consumption of Halocarbons and SF ₆																										
G. Other																										

Ratio of Potential/Actual Emissions from Consumption of Halocarbons and SF₆																										
Actual emissions - F(a) (Gg CO ₂ eq.)																										
Potential emissions - F(p) ⁽⁸⁾ (Gg CO ₂ eq.)																										
Potential/Actual emissions ratio																										

⁽¹⁾ In accordance with the UNFCCC reporting guidelines, HFC and PFC emissions should be reported for each relevant chemical. However, if it is not possible to report values for each chemical (i.e. mixtures, confidential data, lack of disaggregation), these columns could be used for reporting aggregate figures for HFCs and PFCs, respectively. Note that the unit used for these columns is Gg of CO₂ equivalent.

⁽²⁾ Note that the units used in this table differ from those used in the rest of the Sectoral report tables, i.e. t instead of Gg.

⁽³⁾ ODS: ozone-depleting substances

⁽⁴⁾ Potential emissions of each chemical of halocarbons and SF₆ estimated using Tier 1a or Tier 1b of the IPCC Guidelines (Volume 3. Reference Manual, pp. 2.47-2.50). Where potential emission estimates are available in a disaggregated manner for the source categories F.1 to F.9, these should be reported in the NIR and a reference should be provided in the documentation box. Use table Summary 3 to indicate whether Tier 1a or Tier 1b was used.

⁽⁵⁾ Production refers to production of new chemicals. Recycled substances could be included here, but avoid double counting of emissions. An indication as to whether recycled substances are included should be provided in the documentation box to this table.

⁽⁶⁾ Relevant only for Tier 1b.

⁽⁷⁾ Total actual emissions equal the sum of the actual emissions of each halocarbon and SF₆ from the source categories 2.C, 2.E, 2.F and 2.G as reported in sheet 1 of this table multiplied by the corresponding GWP values.

⁽⁸⁾ Potential emissions of each halocarbon and SF₆ taken from row F(p) multiplied by the corresponding GWP values.

Note: As stated in the UNFCCC reporting guidelines, Parties should report actual emissions of HFCs, PFCs and SF₆, where data are available, providing disaggregated data by chemical and source category in units of mass and in CO₂ equivalent. Parties reporting actual emissions should also report potential emissions for the sources where the concept of potential emissions applies, for reasons of transparency and comparability. Gases with GWP values not yet agreed upon by the COP should be reported in Table 9 (b).

Documentation box:

- Parties should provide detailed explanations on the industrial processes sector in Chapter 4: Industrial processes (CRF sector 2) of the NIR. Use this documentation box to provide references to relevant sections of the NIR if any additional information and/or further details are needed to understand the content of this table.
- If estimates are reported under "2.G Other", use this documentation box to provide information regarding activities covered under this category and to provide reference to the section in the NIR where background information can be found.

TABLE 2(II). C, E SECTORAL BACKGROUND DATA FOR INDUSTRIAL PROCESSES
Metal Production, Production of Halocarbons and SF₆
 (Sheet 1 of 1)

Country
 Year
 Submission

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	ACTIVITY DATA		IMPLIED EMISSION FACTORS ⁽²⁾			EMISSIONS					
			CF ₄	C ₂ F ₆	SF ₆	CF ₄		C ₂ F ₆		SF ₆	
	Description ⁽¹⁾	(t)	(kg/t)	Emissions ⁽³⁾	Recovery ⁽⁴⁾	Emissions ⁽³⁾	Recovery ⁽⁴⁾	Emissions ⁽³⁾	Recovery ⁽⁴⁾		
				(t)							
C. PFCs and SF₆ from Metal Production											
PFCs from Aluminium Production											
SF ₆ used in Aluminium and Magnesium Foundries											
Aluminium Foundries	(SF ₆ consumption)										
Magnesium Foundries	(SF ₆ consumption)										

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	ACTIVITY DATA		IMPLIED EMISSION FACTORS ⁽²⁾			EMISSIONS					
			HFC-23	SF ₆	HFCs/PFCs (as specified)	HFC-23		SF ₆		HFCs/PFCs	
	Description ⁽¹⁾	(t)	(kg/t)	Emissions ⁽³⁾	Recovery ⁽⁴⁾	Emissions ⁽³⁾	Recovery ⁽⁴⁾	(specify chemical)	Emissions ⁽³⁾	Recovery ⁽⁴⁾	
				(t)							
E. Production of Halocarbons and SF₆											
1. By-product Emissions											
Production of HCFC-22											
Other (please specify activity)											
2. Fugitive Emissions (please specify activity)											
3. Other (please specify activity)											

- ⁽¹⁾ Specify the activity data used as shown in the examples in parentheses.
- ⁽²⁾ The implied emission factors (IEFs) are estimated on the basis of gross emissions as follows: IEF = (emissions + amounts recovered, oxidized, destroyed or transformed) / activity data.
- ⁽³⁾ Final emissions (after subtracting the amounts of emission recovery, oxidation, destruction or transformation).
- ⁽⁴⁾ Amounts of emission recovery, oxidation, destruction or transformation.

Documentation box:

- Parties should provide detailed explanations on the industrial processes sector in Chapter 4: Industrial processes (CRF sector 2) of the NIR. Use this documentation box to provide references to relevant sections of the NIR if any additional information and/or further details are needed to understand the content of this table.
- Where only aggregate figures for activity data are provided, e.g. due to reasons of confidentiality (see footnote 1 to table 2(II)), a note indicating this should be provided in this documentation box.
- Where applying Tier 1b (for source category 2.C), Tier 2 (for source category 2.E) and country-specific methods, specify any other relevant activity data used in this documentation box, including a reference to the section of the NIR where more detailed information can be found.
- Use this documentation box for providing clarification on emission recovery, oxidation, destruction and/or transformation, and provide a reference to the section of the NIR where more detailed information can be found.

TABLE 2(II).F SECTORAL BACKGROUND DATA FOR INDUSTRIAL PROCESSES
Consumption of Halocarbons and SF₆
(Sheet 1 of 2)

Country
Year
Submission

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	ACTIVITY DATA <i>Amount of fluid</i>			IMPLIED EMISSION FACTORS			EMISSIONS		
	Filled into new manufactured products	In operating systems (average annual stocks)	Remaining in products at decommissioning	Product manufacturing factor	Product life factor	Disposal loss factor	From manufacturing	From stocks	From disposal
	(t)			(% per annum)			(t)		
1. Refrigeration⁽¹⁾									
Air Conditioning Equipment									
Domestic Refrigeration <i>(please specify chemical)</i> ⁽¹⁾									
Commercial Refrigeration									
Transport Refrigeration									
Industrial Refrigeration									
Stationary Air-Conditioning									
Mobile Air-Conditioning									
2. Foam Blowing⁽¹⁾									
Hard Foam									
Soft Foam									

⁽¹⁾ Under each of the listed source categories, specify the chemical consumed (*e.g. HFC-32*) as indicated under category Domestic Refrigeration; use one row per chemical.

Note: This table provides for reporting of the activity data and emission factors used to calculate actual emissions from consumption of halocarbons and SF₆ using the "bottom-up approach" (based on the total stock of equipment and estimated emission rates from this equipment). Some Parties may prefer to estimate actual emissions following the alternative "top-down approach" (based on annual sales of equipment and/or gas). Those Parties should indicate the activity data used and provide any other information needed to understand the content of the table in the documentation box at the end of sheet 2 to this table, including a reference to the section of the NIR where further details can be found. Those Parties should provide the following data in the NIR:

1. the amount of fluid used to fill new products,
2. the amount of fluid used to service existing products,
3. the amount of fluid originally used to fill retiring products (the total nameplate capacity of retiring products),
4. the product lifetime, and
5. the growth rate of product sales, if this has been used to calculate the amount of fluid originally used to fill retiring products.

In the NIR, Parties may provide alternative formats for reporting equivalent information with a similar level of detail.

TABLE 2(II).F SECTORAL BACKGROUND DATA FOR INDUSTRIAL PROCESSES
Consumption of Halocarbons and SF₆
 (Sheet 2 of 2)

Country
 Year
 Submission

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	ACTIVITY DATA <i>Amount of fluid</i>			IMPLIED EMISSION FACTORS			EMISSIONS		
	Filled into new manufactured products	In operating systems (average annual stocks)	Remaining in products at decommissioning	Product manufacturing factor	Product life factor	Disposal loss factor	From manufacturing	From stocks	From disposal
	(t)			(% per annum)			(t)		
3. Fire Extinguishers <i>(please specify chemical)⁽¹⁾</i>									
4. Aerosols⁽¹⁾									
Metered Dose Inhalers									
Other									
5. Solvents⁽¹⁾									
6. Other applications using ODS⁽²⁾ substitutes⁽¹⁾									
7. Semiconductors⁽¹⁾									
8. Electric Equipment⁽¹⁾									
9. Other <i>(please specify)⁽¹⁾</i>									

⁽¹⁾ Under each of the listed source categories, specify the chemical consumed (e.g. HFC-32) as indicated under category Fire Extinguishers; use one row per chemical.

⁽²⁾ ODS: ozone-depleting substances.

Documentation box:

- Parties should provide detailed explanations on the industrial processes sector in Chapter 4: Industrial processes (CRF sector 2) of the NIR. Use this documentation box to provide references to relevant sections of the NIR if any additional information and/or further details are needed to understand the content of this table.
- Where only aggregate figures for activity data are provided, e.g. due to reasons of confidentiality (see footnote 1 to table 2(II)), a note indicating this should be provided in this documentation box.
- With regard to data on the amounts of fluid that remained in retired products at decommissioning, use this documentation box to provide a reference to the section of the NIR where information on the amount of the chemical recovered (recovery efficiency) and other relevant information used in the emission estimation can be found.
- Parties that estimate their actual emissions following the alternative top-down approach might not be able to report emissions using this table. As indicated in the note to sheet 1 of this table, Parties should in these cases provide, in the NIR, alternative formats for reporting equivalent information with a similar level of detail. References to the relevant section of the NIR should be provided in this documentation box.

TABLE 3 SECTORAL REPORT FOR SOLVENT AND OTHER PRODUCT USE
(Sheet 1 of 1)

Country
Year
Submission

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO ₂	N ₂ O	NM VOC
	(Gg)		
Total Solvent and Other Product Use			
A. Paint Application			
B. Degreasing and Dry Cleaning			
C. Chemical Products, Manufacture and Processing			
D. Other			
1. Use of N ₂ O for Anaesthesia			
2. N ₂ O from Fire Extinguishers			
3. N ₂ O from Aerosol Cans			
4. Other Use of N ₂ O			
5. Other (as specified in table 3.A-D)			

Note: The quantity of carbon released in the form of NMVOCs should be accounted for in both the NMVOC and the CO₂ columns. The quantities of NMVOCs should be converted into CO₂ equivalent emissions before being added to the CO₂ amounts in the CO₂ column.

Documentation box:

- Parties should provide detailed explanations about the Solvent and Other Product Use sector in Chapter 5: Solvent and Other Product Use (CRF sector 3) of the NIR. Use this documentation box to provide references to relevant sections of the NIR if any additional information and/or further details are needed to understand the content of this table.
- The IPCC Guidelines do not provide methodologies for the calculation of emissions of N₂O from Solvent and Other Product Use. If reporting such data, Parties should provide in the NIR additional information (activity data and emission factors) used to derive these estimates, and provide in this documentation box a reference to the section of the NIR where this information can be found.

TABLE 3.A-D SECTORAL BACKGROUND DATA FOR SOLVENT AND OTHER PRODUCT USE
(Sheet 1 of 1)

Country
 Year
 Submission

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	ACTIVITY DATA		IMPLIED EMISSION FACTORS ⁽¹⁾	
	Description	(kt)	CO ₂ (t/t)	N ₂ O (t/t)
A. Paint Application				
B. Degreasing and Dry Cleaning				
C. Chemical Products, Manufacture and Processing				
D. Other				
1. Use of N ₂ O for Anaesthesia				
2. N ₂ O from Fire Extinguishers				
3. N ₂ O from Aerosol Cans				
4. Other Use of N ₂ O				
5. Other <i>(please specify)</i> ⁽²⁾				

⁽¹⁾ The implied emission factors will not be calculated until the corresponding emission estimates are entered directly into table 3.

⁽²⁾ Some probable sources to be reported under 3.D Other are listed in this table. Complement the list with other relevant sources, as appropriate.

Documentation box:

Parties should provide detailed explanations on the Solvent and Other Product Use sector in Chapter 5: Solvent and Other Product Use (CRF sector 3) of the NIR. Use this documentation box to provide references to relevant sections of the NIR if any additional information and/or further details are needed to understand the content of this table.

TABLE 4 SECTORAL REPORT FOR AGRICULTURE
(Sheet 1 of 2)

Country
Year
Submission

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CH ₄	N ₂ O	NO _x	CO	NMVOC
	(Gg)				
Total Agriculture					
A. Enteric Fermentation					
1. Cattle ⁽¹⁾					
<i>Option A:</i>					
Dairy Cattle					
Non-Dairy Cattle					
<i>Option B:</i>					
Mature Dairy Cattle					
Mature Non-Dairy Cattle					
Young Cattle					
2. Buffalo					
3. Sheep					
4. Goats					
5. Camels and Llamas					
6. Horses					
7. Mules and Asses					
8. Swine					
9. Poultry					
10. Other (as specified in table 4.A)					
B. Manure Management					
1. Cattle ⁽¹⁾					
<i>Option A:</i>					
Dairy Cattle					
Non-Dairy Cattle					
<i>Option B:</i>					
Mature Dairy Cattle					
Mature Non-Dairy Cattle					
Young Cattle					
2. Buffalo					
3. Sheep					
4. Goats					
5. Camels and Llamas					
6. Horses					
7. Mules and Asses					
8. Swine					
9. Poultry					
10. Other livestock (as specified in table 4.B(a))					

Note: All footnotes for this table are given at the end of the table on sheet 2.

TABLE 4 SECTORAL REPORT FOR AGRICULTURE
(Sheet 2 of 2)

Country
Year
Submission

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CH ₄	N ₂ O	NO _x	CO	NM VOC
	(Gg)				
B. Manure Management (continued)					
11. Anaerobic Lagoons					
12. Liquid Systems					
13. Solid Storage and Dry Lot					
14. Other (please specify)					
C. Rice Cultivation					
1. Irrigated					
2. Rainfed					
3. Deep Water					
4. Other (as specified in table 4.C)					
D. Agricultural Soils⁽²⁾					
1. Direct Soil Emissions					
2. Pasture, Range and Paddock Manure ⁽³⁾					
3. Indirect Emissions					
4. Other (as specified in table 4.D)					
E. Prescribed Burning of Savannas					
F. Field Burning of Agricultural Residues					
1. Cereals					
2. Pulses					
3. Tubers and Roots					
4. Sugar Cane					
5. Other (as specified in table 4.F)					
G. Other (please specify)					

⁽¹⁾ The sum for cattle would be calculated on the basis of entries made under either option A (dairy and non-dairy cattle) or option B (mature dairy cattle, mature non-dairy cattle and young cattle).

⁽²⁾ See footnote 4 to Summary 1.A of this common reporting format. Parties which choose to report CO₂ emissions and removals from agricultural soils under 4.D Agricultural Soils of the sector Agriculture should report the amount (in Gg) of these emissions or removals in table Summary 1.A of the CRF. References to additional information (activity data, emissions factors) reported in the NIR should be provided in the documentation box to table 4.D. In line with the corresponding table in the IPCC Guidelines (i.e. IPCC Sectoral Report for Agriculture), this table does not include provisions for reporting CO₂ estimates.

⁽³⁾ Direct N₂O emissions from pasture, range and paddock manure are to be reported in the 4.D Agricultural Soils category. All other N₂O emissions from animal manure are to be reported in the 4.B Manure Management category. See also chapter 4.4 of the IPCC good practice guidance report.

Note: The IPCC Guidelines do not provide methodologies for the calculation of CH₄ emissions and CH₄ and N₂O removals from agricultural soils, or CO₂ emissions from prescribed burning of savannas and field burning of agricultural residues. Parties that have estimated such emissions should provide, in the NIR, additional information (activity data and emission factors) used to derive these estimates and include a reference to the section of the NIR in the documentation box of the corresponding Sectoral background data tables.

Documentation box:

• Parties should provide detailed explanations on the agriculture sector in Chapter 6: Agriculture (CRF sector 4) of the NIR. Use this documentation box to provide references to relevant sections of the NIR if any additional information and/or further details are needed to understand the content of this table.

• If estimates are reported under "4.G Other", use this documentation box to provide information regarding activities covered under this category and to provide reference to the section in the NIR where background information can be found.

TABLE 4.A SECTORAL BACKGROUND DATA FOR AGRICULTURE
Enteric Fermentation
(Sheet 1 of 1)

Country
Year
Submission

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	ACTIVITY DATA AND OTHER RELATED INFORMATION			IMPLIED EMISSION FACTORS ⁽³⁾
	Population size ⁽¹⁾ (1000s)	Average gross energy intake (GE) (MJ/head/day)	Average CH ₄ conversion rate (Y _m) ⁽²⁾ (%)	CH ₄ (kg CH ₄ /head/yr)
1. Cattle				
<i>Option A:</i>				
Dairy Cattle ⁽⁴⁾				
Non-Dairy Cattle				
<i>Option B:</i>				
Mature Dairy Cattle				
Mature Non-Dairy Cattle				
Young Cattle				
2. Buffalo				
3. Sheep				
4. Goats				
5. Camels and Llamas				
6. Horses				
7. Mules and Asses				
8. Swine				
9. Poultry				
10. Other (<i>please specify</i>)				

⁽¹⁾ Parties are encouraged to provide detailed livestock population data by animal type and region, if available, in the NIR, and provide in the documentation box below a reference to the relevant section. Parties should use the same animal population statistics to estimate CH₄ emissions from enteric fermentation, CH₄ and N₂O from manure management, N₂O direct emissions from soil and N₂O emissions associated with manure production, as well as emissions from the use of manure as fuel, and sewage-related emissions reported in the Waste sector.

⁽²⁾ Y_m refers to the fraction of gross energy in feed converted to methane and should be given in per cent in this table.

⁽³⁾ The implied emission factors will not be calculated until the corresponding emission estimates are entered directly into Table 4.

⁽⁴⁾ Including data on dairy heifers, if available.

Additional information (only for those livestock types for which Tier 2 was used)^(a)

Disaggregated list of animals ^(b)		Dairy Cattle	Non-Dairy Cattle	Other (<i>specify</i>)	
Indicators:					
Weight	(kg)				
Feeding situation ^(c)					
Milk yield	(kg/day)				
Work	(h/day)				
Pregnant	(%)				
Digestibility of feed	(%)				

^(a) See also Tables A-1 and A-2 of the IPCC Guidelines (Volume 3. Reference Manual, pp. 4.31-4.34). These data are relevant if Parties do not have data on average feed intake.

^(b) Disaggregate to the split actually used. Add columns to the table if necessary.

^(c) Specify feeding situation as pasture, stall fed, confined, open range, etc.

Documentation box:

• Parties should provide detailed explanations on the Agriculture sector in Chapter 6: Agriculture (CRF sector 4) of the NIR. Use this documentation box to provide references to relevant sections of the NIR if any additional information and/or further details are needed to understand the content of this table.

• Indicate in this documentation box whether the activity data used are one-year estimates or three-year averages.

• Provide a reference to the relevant section in the NIR, in particular with regard to:

(a) disaggregation of livestock population (e.g. according to the classification recommended in the IPCC good practice guidance), including information on whether these data are one-year estimates or three-year averages.

(b) parameters relevant to the application of IPCC good practice guidance.

TABLE 4.B(a) SECTORAL BACKGROUND DATA FOR AGRICULTURE
CH₄ Emissions from Manure Management
 (Sheet 1 of 1)

Country
 Year
 Submission

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	ACTIVITY DATA AND OTHER RELATED INFORMATION						IMPLIED EMISSION FACTORS ⁽⁴⁾	
	Population size (1000s)	Allocation by climate region ⁽¹⁾			Typical animal mass (average) (kg)	VS ⁽²⁾ daily excretion (average) (kg dm/head/day)		CH ₄ producing potential (Bo) ⁽²⁾ (average) (m ³ CH ₄ /kg VS)
		Cool	Temperate	Warm				
			(%)			CH ₄ (kg CH ₄ /head/yr)		
1. Cattle								
Option A:								
Dairy Cattle ⁽³⁾								
Non-Dairy Cattle								
Option B:								
Mature Dairy Cattle								
Mature Non-Dairy Cattle								
Young Cattle								
2. Buffalo								
3. Sheep								
4. Goats								
5. Camels and Llamas								
6. Horses								
7. Mules and Asses								
8. Swine								
9. Poultry								
10. Other livestock (please specify)								

(1) Climate regions are defined in terms of annual average temperature as follows: Cool = less than 15°C; Temperate = 15 - 25°C inclusive; and Warm = greater than 25°C (see table 4.2 of the IPCC Guidelines (Volume 3, Reference Manual, p. 4.8)).
 (2) VS = Volatile Solids; Bo = maximum methane producing capacity for manure IPCC Guidelines (Volume 3, Reference Manual, p.4.23 and p.4.15); dm = dry matter. Provide average values for VS and Bo where original calculations were made at a more disaggregated level of these livestock categories.
 (3) Including data on dairy heifers, if available.
 (4) The implied emission factors will not be calculated until the corresponding emission estimates are entered directly into table 4.

Additional information (for Tier 2)^(a)

Animal category	Indicator	Climate region	Animal waste management system							
			Anaerobic lagoon	Liquid system	Daily spread	Solid storage	Dry lot	Pasture range paddock	Other	
Dairy Cattle	Allocation (%)	Cool								
		Temperate								
		Warm								
	MCF ^(b)	Cool								
		Temperate								
		Warm								
Non-Dairy Cattle	Allocation on (%)	Cool								
		Temperate								
		Warm								
	MCF ^(b)	Cool								
		Temperate								
		Warm								
Swine	Allocation on (%)	Cool								
		Temperate								
		Warm								
	MCF ^(b)	Cool								
		Temperate								
		Warm								
Other livestock (please specify)	Allocation (%)	Cool								
		Temperate								
		Warm								
	MCF ^(b)	Cool								
		Temperate								
		Warm								

(a) The information required in this table may not be directly applicable to country-specific methods developed for MCF calculations. In such cases, information on MCF derivation should be described in the NIR and references to the relevant sections of the NIR should be provided in the documentation box.
 (b) MCF = Methane Conversion Factor (IPCC Guidelines, (Volume 3, Reference Manual, p. 4.9)). If another climate region categorization is used, replace the entries in the cells with the climate regions for which the MCFs are specified.

Documentation box:

- Parties should provide detailed explanations on the Agriculture sector in Chapter 6: Agriculture (CRF sector 4) of the NIR. Use this documentation box to provide references to relevant sections of the NIR if any additional information and further details are needed to understand the content of this table.
- Indicate in this documentation box whether the activity data used are one-year estimates or three-year averages.
- Provide a reference to the relevant section in the NIR, in particular with regard to:
 - disaggregation of livestock population (e.g. according to the classification recommended in the IPCC good practice guidance), including information on whether these data are one-year estimates or three-year averages.
 - parameters relevant to the application of IPCC good practice guidance;
 - information on how the MCFs are derived, if relevant data could not be provided in the additional information box.

TABLE 4.B(b) SECTORAL BACKGROUND DATA FOR AGRICULTURE
N₂O Emissions from Manure Management
(Sheet 1 of 1)

Country
Year
Submission

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	ACTIVITY DATA AND OTHER RELATED INFORMATION								IMPLIED EMISSION FACTORS ⁽¹⁾	
	Population size (1000s)	Nitrogen excretion (kg N/head/yr)	Nitrogen excretion per animal waste management system (AWMS) (kg N/yr)						Emission factor per animal waste management system	
			Anaerobic lagoon	Liquid system	Daily spread	Solid storage and dry lot	Pasture range and paddock	Other	(kg N ₂ O-N/kg N)	
Cattle									Anaerobic lagoon	
Option A:									Liquid system	
Dairy Cattle									Solid storage and dry lot	
Non-Dairy Cattle									Other AWMS	
Option B:										
Mature Dairy Cattle										
Mature Non-Dairy Cattle										
Young Cattle										
Sheep										
Swine										
Poultry										
Other livestock (<i>please specify</i>)										
Total per AWMS										

⁽¹⁾ The implied emission factor will not be calculated until the emissions are entered directly into table 4.

<p>Documentation box:</p> <ul style="list-style-type: none"> Parties should provide detailed explanations on the Agriculture sector in Chapter 6: Agriculture (CRF sector 4) of the NIR. Use this documentation box to provide references to relevant sections of the NIR if any additional information and/or further details are needed to understand the content of this table. Indicate in this documentation box whether the activity data used are one-year estimates or three-year averages. Provide a reference to the relevant section in the NIR, in particular with regard to: <ul style="list-style-type: none"> (a) disaggregation of livestock population (e.g. according to the classification recommended in the IPCC good practice guidance), including information on whether these data are one-year estimates or three-year averages. (b) information on other AWMS, if reported.
--

TABLE 4.C SECTORAL BACKGROUND DATA FOR AGRICULTURE

Rice Cultivation
(Sheet 1 of 1)

Country
Year
Submission

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	ACTIVITY DATA AND OTHER RELATED INFORMATION			IMPLIED EMISSION FACTOR ⁽¹⁾ CH ₄ (g/m ²)	EMISSIONS CH ₄ (Gg)
	Harvested area ⁽²⁾ (10 ⁹ m ² /yr)	Organic amendments added ⁽³⁾			
		type	(t/ha)		
1. Irrigated					
Continuously Flooded					
Intermittently Flooded					
Single Aeration					
Multiple Aeration					
2. Rainfed					
Flood Prone					
Drought Prone					
3. Deep Water					
Water Depth 50-100 cm					
Water Depth > 100 cm					
4. Other (please specify)					
Upland Rice ⁽⁴⁾					
Total ⁽⁴⁾					

- (1) The implied emission factor implicitly takes account of all relevant corrections for continuously flooded fields without organic amendment, the correction for the organic amendments and the effect of different soil characteristics, if considered in the calculation of methane emissions.
- (2) Harvested area is the cultivated area multiplied by the number of cropping seasons per year.
- (3) Specify dry weight or wet weight for organic amendments in the documentation box.
- (4) These rows are included to allow comparison with international statistics. Methane emissions from upland rice are assumed to be zero.

Documentation box:

- Parties should provide detailed explanations on the Agriculture sector in Chapter 6: Agriculture (CRF sector 4) of the NIR. Use this documentation box to provide references to relevant sections of the NIR if any additional information and/or further details are needed to understand the content of this table.
- When disaggregating by more than one region within a country, and/or by growing season, provide additional information on disaggregation and related data in the NIR and provide a reference to the relevant section in the NIR.
- Where available, provide activity data and scaling factors by soil type and rice cultivar in the NIR.

TABLE 4.D SECTORAL BACKGROUND DATA FOR AGRICULTURE
Agricultural Soils
(Sheet 1 of 1)

Country
Year
Submission

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	ACTIVITY DATA AND OTHER RELATED INFORMATION		IMPLIED EMISSION FACTORS kg N ₂ O-N/kg N ⁽²⁾	EMISSIONS N ₂ O (Gg)
	Description	Value kg N/yr		
1. Direct Soil Emissions	N input to soils			
1. Synthetic Fertilizers	Nitrogen input from application of synthetic fertilizers			
2. Animal Manure Applied to Soils	Nitrogen input from manure applied to soils			
3. N-fixing Crops	Nitrogen fixed by N-fixing crops			
4. Crop Residue	Nitrogen in crop residues returned to soils			
5. Cultivation of Histosols ⁽¹⁾	Area of cultivated organic soils (ha/yr)			
6. Other direct emissions (please specify)				
2. Pasture, Range and Paddock Manure	N excretion on pasture range and paddock			
3. Indirect Emissions				
1. Atmospheric Deposition	Volatized N from fertilizers, animal manures and other			
2. Nitrogen Leaching and Run-off	N from fertilizers, animal manures and other that is lost through leaching and run-off			
4. Other (please specify)				

⁽¹⁾ To convert from N₂O-N to N₂O emissions, multiply by 44/28. Note that for cultivation of Histosols the unit of the IEF is kg N₂O-N/ha.

Documentation box:
<ul style="list-style-type: none"> Parties should provide detailed explanations on the Agriculture sector in Chapter 6: Agriculture (CRF sector 4) of the NIR. Use this documentation box to provide references to relevant sections of the NIR if any additional information and/or further details are needed to understand the content of this table. Provide a reference to the relevant section in the NIR, in particular with regard to: <ul style="list-style-type: none"> (a) Background information on CH₄ emissions from agricultural soils, if accounted for under the Agriculture sector; (b) Disaggregated values for Frac_{GRAZ} according to animal type, and for Frac_{BURN} according to crop types; (c) Full list of assumptions and fractions used.

Additional information

Fraction ^(a)	Description	Value
Frac _{BURN}	Fraction of crop residue burned	
Frac _{FUEL}	Fraction of livestock N excretion in excrements burned for fuel	
Frac _{GASF}	Fraction of synthetic fertilizer N applied to soils that volatilizes as NH ₃ and NO _x	
Frac _{GASM}	Fraction of livestock N excretion that volatilizes as NH ₃ and NO _x	
Frac _{GRAZ}	Fraction of livestock N excreted and deposited onto soil during grazing	
Frac _{LEACH}	Fraction of N input to soils that is lost through leaching and run-off	
Frac _{NCRBF}	Fraction of total above-ground biomass of N-fixing crop that is N	
Frac _{NCRO}	Fraction of residue dry biomass that is N	
Frac _R	Fraction of total above-ground crop biomass that is removed from the field as a crop product	
Other fractions (please specify)		

^(a) Use the definitions for fractions as specified in the IPCC Guidelines (Volume 3. Reference Manual, pp. 4.92-4.113) as elaborated by the IPCC good practice guidance (pp. 4.54-4.74).

TABLE 4.E SECTORAL BACKGROUND DATA FOR AGRICULTURE
Prescribed Burning of Savannas
(Sheet 1 of 1)

Country
Year
Submission

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	ACTIVITY DATA AND OTHER RELATED INFORMATION					IMPLIED EMISSION FACTORS		EMISSIONS	
	Area of savanna burned (kha/yr)	Average above-ground biomass density (t dm/ha)	Fraction of savanna burned	Biomass burned (Gg dm)	Nitrogen fraction in biomass	CH ₄	N ₂ O	CH ₄	N ₂ O
						(kg/t dm)		(Gg)	
<i>(specify ecological zone)</i>									

Additional information

	Living Biomass	Dead Biomass
Fraction of above-ground biomass		
Fraction oxidized		
Carbon fraction		

Documentation box:

Parties should provide detailed explanations on the Agriculture sector in Chapter 6: Agriculture (CRF sector 4) of the NIR. Use this documentation box to provide references to relevant sections of the NIR if any additional information and/or further details are needed to understand the content of this table.

TABLE 4.F. SECTORAL BACKGROUND DATA FOR AGRICULTURE
Field Burning of Agricultural Residues
 (Sheet 1 of 1)

Country
 Year
 Submission

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	ACTIVITY DATA AND OTHER RELATED INFORMATION								IMPLIED EMISSION FACTORS		EMISSIONS	
	Crop production	Residue-crop ratio	Dry matter (dm) fraction of residue	Fraction burned in fields	Fraction oxidized	Total biomass burned (Gg dm)	C fraction of residue	N-C ratio in biomass residues	CH ₄	N ₂ O	CH ₄	N ₂ O
	(t)								(kg/t dm)		(Gg)	
1. Cereals												
Wheat												
Barley												
Maize												
Oats												
Rye												
Rice												
Other (<i>please specify</i>)												
2. Pulses												
Dry bean												
Peas												
Soybeans												
Other (<i>please specify</i>)												
3. Tubers and Roots												
Potatoes												
Other (<i>please specify</i>)												
4. Sugar Cane												
5. Other (<i>please specify</i>)												

Documentation box:
 Parties should provide detailed explanations on the Agriculture sector in Chapter 6: Agriculture (CRF sector 4) of the NIR. Use this documentation box to provide references to relevant sections of the NIR if any additional information and/or further details are needed to understand the content of this table.

TABLE 5 SECTORAL REPORT FOR LAND USE, LAND-USE CHANGE AND FORESTRY
(Sheet 1 of 1)

Country
Year
Submission

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	Net CO ₂ emissions/ removals ^{(1), (2)}	CH ₄	N ₂ O	NO _x	CO
	(Gg)				
Total Land-Use Categories					
A. Forest Land					
1. Forest Land remaining Forest Land					
2. Land converted to Forest Land					
B. Cropland					
1. Cropland remaining Cropland					
2. Land converted to Cropland					
C. Grassland					
1. Grassland remaining Grassland					
2. Land converted to Grassland					
D. Wetlands⁽³⁾					
1. Wetlands remaining Wetlands					
2. Land converted to Wetlands					
E. Settlements⁽³⁾					
1. Settlements remaining Settlements					
2. Land converted to Settlements					
F. Other Land⁽⁴⁾					
1. Other Land remaining Other Land					
2. Land converted to Other Land					
G. Other (please specify)⁽⁵⁾					
<i>Harvested Wood Products⁽⁶⁾</i>					
Information items⁽⁷⁾					
Forest Land converted to Other Land-Use Categories					
Grassland converted to Other Land-Use Categories					

⁽¹⁾ According to the Revised 1996 IPCC Guidelines, for the purposes of reporting, the signs for removals are always negative (-) and for emissions positive (+). Net changes in carbon stocks are converted to CO₂ by multiplying C by 44/12 and by changing the sign for net CO₂ removals to be negative (-) and for net CO₂ emissions to be positive (+).

⁽²⁾ CO₂ emissions from liming and biomass burning are included in this column.

⁽³⁾ Parties do not have to prepare estimates for categories contained in appendices 3a.2, 3a.3 and 3a.4 of the IPCC good practice guidance for LULUCF, although they may do so if they wish and report in this row.

⁽⁴⁾ Parties do not have to prepare estimates for this category contained in Chapter 3.7 of the IPCC good practice guidance for LULUCF, although they may do so if they wish and report in this row. This land-use category is to allow the total of identified land area to match the national area.

⁽⁵⁾ May include other non-specified sources and sinks.

⁽⁶⁾ Parties do not have to prepare estimates for this category contained in appendix 3a.1 of the IPCC good practice guidance for LULUCF, although they may do so if they wish and report in this row.

⁽⁷⁾ These items are listed for information only and will not be added to the totals, because they are already included in subcategories 5.A.2 to 5.F.2.

Note: The totals for N₂O (5.A and 5.D), CO₂ (5.B and 5.C) and CO₂, CH₄, N₂O (5.E and 5.F) may not equal the summation of the subcategories included in this table, because these totals include data from tables 5(II), 5(IV) and 5(V), where the subcategories are not available. Emissions of CO₂, CH₄, N₂O from 5.G Other are estimated based on the information provided in the background data tables.

Documentation box:

- Parties should provide detailed explanations on the Land Use, Land-Use Change and Forestry sector in Chapter 7: Land Use, Land-Use Change and Forestry (CRF sector 5) of the NIR. Use this documentation box to provide references to relevant sections of the NIR if any additional information and/or further details are needed to understand the content of this table.
- If estimates are reported under 5.G Other, use this documentation box to provide information regarding activities covered under this category and to provide reference to the section in the NIR where background information can be found.

TABLE 5.A SECTORAL BACKGROUND DATA FOR LAND USE, LAND-USE CHANGE AND FORESTRY
Forest Land
 (Sheet 1 of 1)

Country
 Year
 Submission

GREENHOUSE GAS SOURCE AND SINK CATEGORIES		ACTIVITY DATA	IMPLIED EMISSION FACTORS					EMISSIONS/REMOVALS				
Land-Use Category	Subdivision ⁽¹⁾	Total area (kha)	Carbon stock change in living biomass per area ^{(2),(3)}			Net carbon stock change in dead organic matter per area ⁽³⁾	Net carbon stock change in soils per area ⁽³⁾	Carbon stock change in living biomass ^{(2),(3)}			Net carbon stock change in dead organic matter ⁽³⁾	Net carbon stock change in soils ⁽³⁾
			Increase	Decrease	Net change			Increase	Decrease	Net change		
			(Mg C/ha)					(Gg C)				
A. Total Forest Land												
1. Forest Land remaining Forest Land												
2. Land converted to Forest Land ⁽⁴⁾												
2.1 Cropland converted to Forest Land												
2.2 Grassland converted to Forest Land												
2.3 Wetlands converted to Forest Land												
2.4 Settlements converted to Forest Land												
2.5 Other Land converted to Forest Land												

⁽¹⁾ Land categories may be further divided according to climate zone, management system, soil type, vegetation type, tree species, ecological zone or national land classification.

⁽²⁾ CO₂ emissions and removals (carbon stock increase and decrease) should be listed separately except where, due to the methods used, it is technically impossible to separate information on increases and decreases.

⁽³⁾ The signs for estimates of increases in carbon stocks are positive (+) and of decreases in carbon stocks are negative (-).

⁽⁴⁾ A Party may report aggregate estimates for all conversions of land to forest land when data are not available to report them separately. A Party should specify in the documentation box which types of land conversion are included. Separate estimates for grassland conversion should be provided in table 5 as an information item.

Documentation box:

Parties should provide detailed explanations on the Land Use, Land-Use Change and Forestry sector in Chapter 7: Land Use, Land-Use Change and Forestry (CRF sector 5) of the NIR. Use this documentation box to provide references to relevant sections of the NIR if any additional information and/or further details are needed to understand the content of this table.

TABLE 5.B SECTORAL BACKGROUND DATA FOR LAND USE, LAND-USE CHANGE AND FORESTRY

Cropland
(Sheet 1 of 1)

Country
Year
Submission

GREENHOUSE GAS SOURCE AND SINK CATEGORIES		ACTIVITY DATA	IMPLIED EMISSION FACTORS				EMISSIONS/REMOVALS					
Land-Use Category	Subdivision ⁽¹⁾	Total area (kha)	Carbon stock change in living biomass per area ^{(2), (3)}			Net carbon stock change in dead organic matter per area ⁽³⁾	Net carbon stock change in soils per area ⁽³⁾	Carbon stock change in living biomass ^{(2), (3), (4)}			Net carbon stock change in dead organic matter ^{(3), (5)}	Net carbon stock change in soils ⁽³⁾
			Increase	Decrease	Net change			Increase	Decrease	Net change		
			(Mg C/ha)					(Gg C)				
B. Total Cropland												
1. Cropland remaining Cropland												
2. Land converted to Cropland ⁽⁶⁾												
2.1 Forest Land converted to Cropland												
2.2 Grassland converted to Cropland												
2.3 Wetlands converted to Cropland												
2.4 Settlements converted to Cropland												
2.5 Other Land converted to Cropland												

⁽¹⁾ Land categories may be further divided according to climate zone, management system, soil type, vegetation type, tree species, ecological zone or national land classification.

⁽²⁾ CO₂ emissions and removals (carbon stock increase and decrease) should be listed separately except in cases where, due to the methods used, it is technically impossible to separate information on increases and decreases.

⁽³⁾ The signs for estimates of increases in carbon stocks are positive (+) and of decreases in carbon stocks are negative (-).

⁽⁴⁾ For category 5.B.1 Cropland remaining Cropland this column includes only changes in perennial woody biomass.

⁽⁵⁾ No reporting on dead organic matter pools is required for category 5.B.1. Cropland remaining Cropland.

⁽⁶⁾ A Party may report aggregate estimates for all land conversions to cropland, when data are not available to report them separately. A Party should specify in the documentation box which types of land conversion are included. Separate estimates for forest and grassland conversion should be provided in table 5 as an information item.

Documentation box:

Parties should provide detailed explanations on the Land Use, Land-Use Change and Forestry sector in Chapter 7: Land Use, Land-Use Change and Forestry (CRF sector 5) of the NIR. Use this documentation box to provide references to relevant sections of the NIR if any additional information and/or further details are needed to understand the content of this table.

TABLE 5.C SECTORAL BACKGROUND DATA FOR LAND USE, LAND-USE CHANGE AND FORESTRY

Grassland
(Sheet 1 of 1)

Country
Year
Submission

GREENHOUSE GAS SOURCE AND SINK CATEGORIES		ACTIVITY DATA	IMPLIED EMISSION FACTORS			EMISSIONS/REMOVALS						
Land-Use Category	Subdivision ⁽¹⁾	Total area (kha)	Carbon stock change in living biomass per area ^{(2), (3)}			Net carbon stock change in dead organic matter per area ⁽²⁾	Net carbon stock change in soils per area ⁽²⁾	Carbon stock change in living biomass ^{(2), (3), (4)}			Net carbon stock change in dead organic matter ^{(2), (5)}	Net carbon stock change in soils ⁽²⁾
			Increase	Decrease	Net change			Increase	Decrease	Net change		
			(Mg C/ha)			(Gg C)						
C. Total Grassland												
1. Grassland remaining Grassland												
2. Land converted to Grassland ⁽⁶⁾												
2.1 Forest Land converted to Grassland												
2.2 Cropland converted to Grassland												
2.3 Wetlands converted to Grassland												
2.4 Settlements converted to Grassland												
2.5 Other Land converted to Grassland												

⁽¹⁾ Land categories may be further divided according to climate zone, management system, soil type, vegetation type, tree species, ecological zone or national land classification.

⁽²⁾ The signs for estimates of increases in carbon stocks are positive (+) and of decreases in carbon stocks are negative (-).

⁽³⁾ CO₂ emissions and removals (carbon stock increase and decrease) should be listed separately except in cases where, due to the methods used, it is technically impossible to separate information on increases and decreases.

⁽⁴⁾ For category 5.C.1 Grassland remaining Grassland this column includes only changes in perennial woody biomass.

⁽⁵⁾ No reporting on dead organic matter pools is required for category 5.C.1 Grassland remaining Grassland.

⁽⁶⁾ A Party may report aggregate estimates for all land conversions to grassland, when data are not available to report them separately. A Party should specify in the documentation box which types of land conversion are included. Separate estimates for forest conversion should be provided in table 5 as an information item.

Documentation box:

Parties should provide detailed explanations on the Land Use, Land-Use Change and Forestry sector in Chapter 7: Land Use, Land-Use Change and Forestry (CRF sector 5) of the NIR. Use this documentation box to provide references to relevant sections of the NIR if any additional information and/or further details are needed to understand the content of this table.

TABLE 5.D SECTORAL BACKGROUND DATA FOR LAND USE, LAND-USE CHANGE AND FORESTRY

Wetlands⁽¹⁾
(Sheet 1 of 1)

Country
Year
Submission

GREENHOUSE GAS SOURCE AND SINK CATEGORIES		ACTIVITY DATA	IMPLIED EMISSION FACTORS			EMISSIONS/REMOVALS						
Land-Use Category	Subdivision ⁽²⁾	Total area (kha)	Carbon stock change in living biomass per area ^{(3), (4)}			Net carbon stock change in dead organic matter per area ⁽⁴⁾	Net carbon stock change in soils per area ⁽⁴⁾	Carbon stock change in living biomass ^{(3), (4)}			Net carbon stock change in dead organic matter ⁽⁴⁾	Net carbon stock change in soils ⁽⁴⁾
			Increase	Decrease	Net change			Increase	Decrease	Net change		
			(Mg C/ha)					(Gg C)				
D. Total Wetlands												
1. Wetlands remaining Wetlands												
2. Land converted to Wetlands ⁽⁵⁾												
2.1 Forest Land converted to Wetlands												
2.2 Cropland converted to Wetlands												
2.3 Grassland converted to Wetlands												
2.4 Settlements converted to Wetlands												
2.5 Other Land converted to Wetlands												

⁽¹⁾ Parties do not have to prepare estimates for categories contained in appendices 3a.2, 3a.3 and 3a.4 of the IPCC good practice guidance for LULUCF, although they may do so if they wish.

⁽²⁾ Land categories may be further divided according to climate zone, management system, soil type, vegetation type, tree species, ecological zone or national land classification.

⁽³⁾ CO₂ emissions and removals (carbon stock increase and decrease) should be listed separately except in cases where, due to the methods used, it is technically impossible to separate information on increases and decreases.

⁽⁴⁾ The signs for estimates of increases in carbon stocks are positive (+) and of decreases in carbon stocks are negative (-).

⁽⁵⁾ A Party may report aggregate estimates for all land conversions to wetlands, when data are not available to report them separately. A Party should specify in the documentation box which types of land conversion are included. Separate estimates for forest and grassland conversion should be provided in table 5 as an information item.

Documentation box:

Parties should provide detailed explanations on the Land Use, Land-Use Change and Forestry sector in Chapter 7: Land Use, Land-Use Change and Forestry (CRF sector 5) of the NIR. Use this documentation box to provide references to relevant sections of the NIR if any additional information and/or further details are needed to understand the content of this table.

TABLE 5.E SECTORAL BACKGROUND DATA FOR LAND USE, LAND-USE CHANGE AND FORESTRY

Settlements⁽¹⁾
(Sheet 1 of 1)

Country
Year
Submission

GREENHOUSE GAS SOURCE AND SINK CATEGORIES		ACTIVITY DATA	IMPLIED EMISSION FACTORS				EMISSIONS/REMOVALS					
Land-Use Category	Subdivision ⁽²⁾	Total area (kha)	Carbon stock change in living biomass per area ^{(3), (4)}			Net carbon stock change in dead organic matter per area ⁽⁴⁾	Net carbon stock change in soils per area ⁽⁴⁾	Carbon stock change in living biomass ^{(3), (4) (5)}			Net carbon stock change in dead organic matter ⁽⁴⁾	Net carbon stock change in soils ⁽⁴⁾
			Increase	Decrease	Net change			Increase	Decrease	Net change		
			(Mg C/ha)			(Gg C)						
E. Total Settlements												
1. Settlements remaining Settlements												
2. Land converted to Settlements ⁽⁶⁾												
2.1 Forest Land converted to Settlements												
2.2 Cropland converted to Settlements												
2.3 Grassland converted to Settlements												
2.4 Wetlands converted to Settlements												
2.5 Other Land converted to Settlements												

⁽¹⁾ Parties do not have to prepare estimates for categories contained in appendices 3a.2, 3a.3 and 3a.4 of the IPCC good practice guidance for LULUCF, although they may do so if they wish.

⁽²⁾ Land categories may be further divided according to climate zone, management system, soil type, vegetation type, tree species, ecological zone or national land classification.

⁽³⁾ CO₂ emissions and removals (carbon stock increase and decrease) should be listed separately except in cases where, due to the methods used, it is technically impossible to separate information on increases and decreases.

⁽⁴⁾ The signs for estimates of increases in carbon stocks are positive (+) and of decreases in carbon stocks are negative (-).

⁽⁵⁾ For category 5.E.1 Settlements remaining Settlements this column includes only changes in perennial woody biomass.

⁽⁶⁾ A Party may report aggregate estimates for all land conversions to settlements, when data are not available to report them separately. A Party should specify in the documentation box which types of land conversion are included. Separate estimates for forest and grassland conversion should be provided in table 5 as an information item.

Documentation box:

Parties should provide detailed explanations on the Land Use, Land-Use Change and Forestry sector in Chapter 7. Land Use, Land-Use Change and Forestry (CRF sector 5) of the NIR. Use this documentation box to provide references to relevant sections of the NIR if any additional information and/or further details are needed to understand the content of this table.

TABLE 5.F. SECTORAL BACKGROUND DATA FOR LAND USE, LAND-USE CHANGE AND FORESTRY

Other land⁽¹⁾
(Sheet 1 of 1)

Country
Year
Submission

GREENHOUSE GAS SOURCE AND SINK CATEGORIES		ACTIVITY DATA	IMPLIED EMISSION FACTORS				EMISSIONS/REMOVALS					
Land-Use Category	Subdivision ⁽²⁾	Total area (kha)	Carbon stock change in living biomass per area ^{(3), (4)}			Net carbon stock change in dead organic matter per area ⁽⁴⁾	Net carbon stock change in soils per area ⁽⁴⁾	Carbon stock change in living biomass ^{(3), (4)}			Net carbon stock change in dead organic matter ⁽⁴⁾	Net carbon stock change in soils ⁽⁴⁾
			Increase	Decrease	Net change			Increase	Decrease	Net change		
						(Mg C/ha)			(Gg C)			
F. Total Other Land												
1. Other Land remaining Other Land												
2. Land converted to Other Land ⁽⁵⁾												
2.1 Forest Land converted to Other Land												
2.2 Cropland converted to Other Land												
2.3 Grassland converted to Other Land												
2.4 Wetlands converted to Other Land												
2.5 Settlements converted to Other Land												

⁽¹⁾ Parties do not have to prepare estimates for this category contained in Chapter 3.7 of the IPCC good practice guidance for LULUCF, although they may do so if they wish. This land-use category is to allow the total of identified land area to match the national area.

⁽²⁾ Land categories may be further divided according to climate zone, management system, soil type, vegetation type, tree species, ecological zone or national land classification.

⁽³⁾ CO₂ emissions and removals (carbon stock increase and decrease) should be listed separately except in cases where, due to the methods used, it is technically impossible to separate information on increases and decreases.

⁽⁴⁾ The signs for estimates of increases in carbon stocks are positive (+) and of decreases in carbon stocks are negative (-).

⁽⁵⁾ A Party may report aggregate estimates for all land conversions to other land, when data are not available to report them separately. A Party should specify in the documentation box which types of land conversion are included. Separate estimates for forest and grassland conversion should be provided in Table 5 as an information item.

Documentation box:

Parties should provide detailed explanations on the Land Use, Land-Use Change and Forestry sector in Chapter 7: Land Use, Land-Use Change and Forestry (CRF sector 5) of the NIR. Use this documentation box to provide references to relevant sections of the NIR if any additional information and/or further details are needed to understand the content of this table.

TABLE 5 (I) SECTORAL BACKGROUND DATA FOR LAND USE, LAND-USE CHANGE AND FORESTRY

Direct N₂O emissions from N fertilization⁽¹⁾

(Sheet 1 of 1)

Country

Year

Submission

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	ACTIVITY DATA	IMPLIED EMISSION FACTORS	EMISSIONS
Land-Use Category ⁽²⁾	Total amount of fertilizer applied	N ₂ O-N emissions per unit of fertilizer	N ₂ O
	(Gg N/yr)	(kg N ₂ O-N/kg N) ⁽³⁾	(Gg)
Total for all Land Use Categories			
A. Forest Land^{(4), (5)}			
1. Forest Land remaining Forest Land			
2. Land converted to Forest Land			
G. Other (please specify)			

⁽¹⁾ Direct N₂O emissions from fertilization are estimated using equations 3.2.17 and 3.2.18 of the IPCC good practice guidance for LULUCF based on the amount of fertilizer applied to forest land. The indirect N₂O emissions from forest land are estimated as part of the total indirect emissions (Agriculture sector and Forest Land) in the Agriculture sector based on the total fertilizers used in the country.

⁽²⁾ N₂O emissions from N fertilization of cropland and grassland are reported in the Agriculture sector; therefore only forest land is included in this table.

⁽³⁾ In the calculation of the implied emission factor, N₂O emissions are converted to N₂O-N by multiplying by 28/44.

⁽⁴⁾ If a Party is not able to separate the fertilizer applied to forest land from that applied to agriculture, it may report all N₂O emissions from fertilization in the Agriculture sector. This should be explicitly indicated in the documentation box.

⁽⁵⁾ A Party may report aggregate estimates for all N fertilization on forest land when data are not available to report forest land remaining forest land and land conversion to forest land separately.

Documentation box:

Parties should provide detailed explanations on the Land Use, Land-Use Change and Forestry sector in Chapter 7: Land Use, Land-Use Change and Forestry (CRF sector 5) of the NIR. Use this documentation box to provide references to relevant sections of the NIR if any additional information and/or further details are needed to understand the content of this table.

TABLE 5 (II) SECTORAL BACKGROUND DATA FOR LAND USE, LAND-USE CHANGE AND FORESTRY
N₂O emissions from drainage of soils⁽¹⁾
(Sheet 1 of 1)

Country
Year
Submission

GREENHOUSE GAS SOURCE AND SINK CATEGORIES		ACTIVITY DATA	IMPLIED EMISSION FACTORS	EMISSIONS
Land-Use Category ⁽²⁾	Subdivision ⁽³⁾	Area of drained soils	N ₂ O-N per area drained ⁽⁴⁾	N ₂ O
		(kha)	(kg N ₂ O-N/ha)	(Gg)
Total all Land-Use Categories				
A. Forest Land				
Organic Soil				
Mineral Soil				
D. Wetlands				
Organic Soil				
Mineral Soil				
G. Other (please specify)				

⁽¹⁾ Methodologies for estimating N₂O emissions from drainage of soils are not addressed in the Revised 1996 IPCC Guidelines, but are addressed for forest soils in Appendix 3a.2 of the IPCC good practice guidance for LULUCF (equation 3a.2.1) and for wetland soils in appendix 3a.3.

⁽²⁾ N₂O emissions from drained cropland and grassland soils are covered in the Agriculture tables of the CRF under Cultivation of Histosols.

⁽³⁾ A Party should report further disaggregations of drained soils corresponding to the methods used. Tier 1 disaggregates soils into "nutrient rich" and "nutrient poor" areas, whereas higher-tier methods can further disaggregate into different peatland types, soil fertility or tree species.

⁽⁴⁾ In the calculation of the implied emission factor, N₂O emissions are converted to N₂O-N by multiplying by 28/44.

Documentation box:

Parties should provide detailed explanations on the Land Use, Land-Use Change and Forestry sector in Chapter 7: Land Use, Land-Use Change and Forestry (CRF sector 5) of the NIR. Use this documentation box to provide references to relevant sections of the NIR if any additional information and/or further details are needed to understand the content of this table.

TABLE 5 (III) SECTORAL BACKGROUND DATA FOR LAND USE, LAND-USE CHANGE AND FORESTRY
N₂O emissions from disturbance associated with land-use conversion to cropland⁽¹⁾
 (Sheet 1 of 1)

Country
 Year
 Submission

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	ACTIVITY DATA	IMPLIED EMISSION FACTORS	EMISSIONS
Land-Use Category ⁽²⁾	Land area converted	N ₂ O-N emissions per area converted ⁽³⁾	N ₂ O
	(kha)	(kg N ₂ O-N/ha)	(Gg)
Total all Land-Use Categories⁽⁴⁾			
B. Cropland			
2. Lands converted to Cropland ⁽⁵⁾			
Organic Soils			
Mineral Soils			
2.1 Forest Land converted to Cropland			
Organic Soils			
Mineral Soils			
2.2 Grassland converted to Cropland			
Organic Soils			
Mineral Soils			
2.3 Wetlands converted to Cropland ⁽⁶⁾			
Organic Soils			
Mineral Soils			
2.5 Other Land converted to Cropland			
Organic Soils			
Mineral Soils			
G. Other (please specify)			

⁽¹⁾ Methodologies for N₂O emissions from disturbance associated with land-use conversion are based on equations 3.3.14 and 3.3.15 of the IPCC good practice guidance for LULUCF. N₂O emissions from fertilization in the preceding land use and new land use should not be reported.

⁽²⁾ According to the IPCC good practice guidance for LULUCF, N₂O emissions from disturbance of soils are only relevant for land conversions to cropland. N₂O emissions from cropland remaining cropland are included in the Agriculture sector of the good practice guidance. The good practice guidance provides methodologies only for mineral soils.

⁽³⁾ In the calculation of the implied emission factor, N₂O emissions are converted to N₂O-N by multiplying by 28/44.

⁽⁴⁾ Parties can separate between organic and mineral soils, if data are available.

⁽⁵⁾ If activity data cannot be disaggregated to all initial land uses, Parties may report some initial land uses aggregated under other lands converted to cropland (indicate in the documentation box what this category includes).

⁽⁶⁾ Parties should avoid double counting with N₂O emissions from drainage and from cultivation of organic soils reported in Agriculture under Cultivation of histosols.

Documentation box:

Parties should provide detailed explanations on the Land Use, Land-Use Change and Forestry sector in Chapter 7: Land Use, Land-Use Change and Forestry (CRF Sector 5) of the NIR. Use this documentation box to provide references to relevant sections of the NIR if any additional information and/or further details are needed to understand the content of this table.

TABLE 5 (IV) SECTORAL BACKGROUND DATA FOR LAND USE, LAND-USE CHANGE AND FORESTRY

Carbon emissions from agricultural lime application⁽¹⁾

(Sheet 1 of 1)

Country
Year
Submission

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	ACTIVITY DATA	IMPLIED EMISSION FACTORS	EMISSIONS
Land-Use Category	Total amount of lime applied	Carbon emissions per unit of lime	Carbon
	(Mg/yr)	(Mg C/Mg)	(Gg)
Total all Land-Use Categories ^{(2), (3), (4)}			
B. Cropland ⁽⁴⁾			
Limestone CaCO ₃			
Dolomite CaMg(CO ₃) ₂			
C. Grassland ⁽⁴⁾			
Limestone CaCO ₃			
Dolomite CaMg(CO ₃) ₂			
G. Other (please specify) ^{(4), (5)}			
Limestone CaCO ₃			
Dolomite CaMg(CO ₃) ₂			

⁽¹⁾ Carbon emissions from agricultural lime application are addressed in equation 3.3.6 and 3.4.11 of the IPCC good practice guidance for LULUCF.

⁽²⁾ If Parties are not able to separate liming application for different land-use categories, they should include liming for all land-use categories in the total.

⁽³⁾ Parties that are able to provide data for lime application to forest land should provide this information under 5.G Other and specify in the documentation box that forest land application is included in this category.

⁽⁴⁾ A Party may report aggregate estimates for total lime applications when data are not available for limestone and dolomite.

⁽⁵⁾ If a Party has data broken down to limestone and dolomite at the national level, it can report these data under 5.G Other.

Documentation box:

Parties should provide detailed explanations on the Land Use, Land-Use Change and Forestry sector in Chapter 7: Land Use, Land-Use Change and Forestry (CRF sector 5) of the NIR. Use this documentation box to provide references to relevant sections of the NIR if any additional information and/or further details are needed to understand the content of this table.

TABLE 5 (V) SECTORAL BACKGROUND DATA FOR LAND USE, LAND-USE CHANGE AND FORESTRY
 Biomass Burning⁽¹⁾
 (Sheet 1 of 1)

Country
 Year
 Submission

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	ACTIVITY DATA			IMPLIED EMISSION FACTOR			EMISSIONS		
	Description ⁽²⁾	Unit (ha or kg dm)	Values	CO ₂	CH ₄ (Mg/activity data unit)	N ₂ O	CO ₂ ⁽⁴⁾	CH ₄ (Gg)	N ₂ O
Land-Use Category⁽³⁾									
Total for Land-Use Categories									
A. Forest Land									
1. Forest Land remaining Forest Land									
Controlled Burning									
Wildfires									
2. Land converted to Forest Land									
Controlled Burning									
Wildfires									
B. Cropland									
1. Cropland remaining Cropland ⁽⁵⁾									
Controlled Burning									
Wildfires									
2. Land converted to Cropland									
Controlled Burning									
Wildfires									
2.1 Forest Land converted to Cropland									
Controlled Burning									
Wildfires									
C. Grassland									
1. Grassland remaining Grassland ⁽⁶⁾									
Controlled Burning									
Wildfires									
2. Land converted to Grassland									
Controlled Burning									
Wildfires									
2.1 Forest Land converted to Grassland									
Controlled Burning									
Wildfires									
D. Wetlands⁽⁷⁾									
1. Wetlands remaining Wetlands									
Controlled Burning									
Wildfires									
2. Land converted to Wetlands									
Controlled Burning									
Wildfires									
2.1 Forest Land converted to Wetlands									
Controlled Burning									
Wildfires									
E. Settlements⁽⁷⁾									
F. Other Land⁽⁸⁾									
G. Other (please specify)									

⁽¹⁾ Methodological guidance on burning can be found in sections 3.2.1.4 and 3.4.1.3 of the IPCC good practice guidance for LULUCF.

⁽²⁾ Parties should report both Controlled/Prescribed Burning and Wildfires emissions, where appropriate, in a separate manner.

⁽³⁾ For each category activity data should be selected between area burned or biomass burned. Units for area will be ha and for biomass burned kg dm. The implied emission factor will refer to the selected activity data with an automatic change in the units.

⁽⁴⁾ If CO₂ emissions from biomass burning are not already included in tables 5.A - 5.F, they should be reported here. This should be clearly documented in the documentation box and in the NIR. Double counting should be avoided. Parties that include all carbon stock

⁽⁵⁾ Biomass burning on cropland remaining cropland is reported in the Agriculture sector.

⁽⁶⁾ Only includes emissions from controlled biomass burning on grasslands outside the tropics (prescribed savanna burning is reported under the Agriculture sector).

⁽⁷⁾ Parties do not have to prepare estimates for categories contained in appendices 3a.2, 3a.3 and 3a.4 of the IPCC good practice guidance for LULUCF, although they may do so if they wish.

⁽⁸⁾ Parties do not have to prepare estimates for this category contained in Chapter 3.7 of the IPCC good practice guidance for LULUCF, although they may do so if they wish. This land-use category is to allow the total of identified land area to match the national area.

Documentation box:

Parties should provide detailed explanations on the Land Use, Land-Use Change and Forestry sector in Chapter 7: Land Use, Land-Use Change and Forestry (CRF sector 5) of the NIR. Use this documentation box to provide references to relevant sections of the NIR if any additional information and/or further details are needed to understand the content of this table.

TABLE 6 SECTORAL REPORT FOR WASTE
(Sheet 1 of 1)

Country
Year
Submission

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO ₂ ⁽¹⁾	CH ₄	N ₂ O	NO _x	CO	NMVOC	SO ₂
	(Gg)						
Total Waste							
A. Solid Waste Disposal on Land							
1. Managed Waste Disposal on Land							
2. Unmanaged Waste Disposal Sites							
3. Other (as specified in table 6.A)							
B. Waste-Water Handling							
1. Industrial Waste Water							
2. Domestic and Commercial Waste Water							
3. Other (as specified in table 6.B)							
C. Waste Incineration							
D. Other (please specify)							

⁽¹⁾ CO₂ emissions from source categories Solid Waste Disposal on Land and Waste Incineration should only be included if they derive from non-biological or inorganic waste sources.

Documentation box:

- Parties should provide detailed explanations on the Waste sector in Chapter 8: Waste (CRF sector 6) of the NIR. Use this documentation box to provide references to relevant sections of the NIR if any additional information and/or further details are needed to understand the content of this table.
- If estimates are reported under 6.D Other, use this documentation box to provide information regarding activities covered under this category and to provide reference to the section in the NIR where background information can be found.

TABLE 6.A SECTORAL BACKGROUND DATA FOR WASTE
Solid Waste Disposal
(Sheet 1 of 1)

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	ACTIVITY DATA AND OTHER RELATED INFORMATION			IMPLIED EMISSION FACTOR		EMISSIONS		
	Annual MSW at the SWDS (Gg)	MCF	DOC degraded %	CH ₄ ⁽¹⁾	CO ₂	CH ₄		CO ₂ ⁽⁴⁾
				(t/t MSW)		Emissions ⁽²⁾	Recovery ⁽³⁾	
1 Managed Waste Disposal on Land								
2 Unmanaged Waste Disposal Sites								
a. Deep (>5 m)								
b. Shallow (<5 m)								
3 Other (please specify)								

Note: MSW - Municipal Solid Waste, SWDS - Solid Waste Disposal Site, MCF - Methane Correction Factor, DOC - Degradable Organic Carbon (IPCC Guidelines (Volume 3. Reference Manual, section 6.2.4)). MSW includes household waste, yard/garden waste, commercial/market waste and organic industrial solid waste. MSW should not include inorganic industrial waste such as construction or demolition materials.

- ⁽¹⁾ The CH₄ implied emission factor (IEF) is calculated on the basis of gross CH₄ emissions, as follows: IEF = (CH₄ emissions + CH₄ recovered)/annual MSW at the SWDS.
⁽²⁾ Actual emissions (after recovery).
⁽³⁾ CH₄ recovered and flared or utilized.
⁽⁴⁾ Under Solid Waste Disposal, CO₂ emissions should be reported only when the disposed waste is combusted at the disposal site as a management practice. CO₂ emissions from non-biogenic wastes are included in the total emissions, whereas the CO₂ emissions from biogenic wastes are not included in the total emissions.

TABLE 6.C SECTORAL BACKGROUND DATA FOR WASTE
Waste Incineration
(Sheet 1 of 1)

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	ACTIVITY DATA Amount of incinerated wastes (Gg)	IMPLIED EMISSION FACTOR			EMISSIONS		
		CO ₂	CH ₄	N ₂ O	CO ₂ ⁽¹⁾	CH ₄	N ₂ O
	(kg/t waste)			(Gg)			
Waste Incineration							
a. Biogenic ⁽¹⁾							
b. Other (non-biogenic - please specify) ^{(1), (2)}							

- ⁽¹⁾ Under Solid Waste Disposal, CO₂ emissions should be reported only when the disposed waste is combusted at the disposal site as a management practice. CO₂ emissions from non-biogenic wastes are included in the total emissions, while the CO₂ emissions from biogenic wastes are not included in the total emissions.
⁽²⁾ Enter under this source category all types of non-biogenic wastes, such as plastics

Note: Only emissions from waste incineration without energy recovery are to be reported in the Waste sector. Emissions from incineration with energy recovery are to be reported in the Energy sector, as Other Fuels (see IPCC good practice guidance, page 5.23).

Documentation box:
<ul style="list-style-type: none"> Parties should provide detailed explanations on the Waste sector in Chapter 8: Waste (CRF sector 6) of the NIR. Use this documentation box to provide references to relevant sections of the NIR if any additional information and/or further details are needed to understand the content of this table. Parties that use country-specific models should provide a reference in the documentation box to the relevant section in the NIR where these models are described, and fill in only the relevant cells of tables 6.A and 6.C. Provide a reference to the relevant section in the NIR, in particular with regard to: <ul style="list-style-type: none"> (a) Population size (total or urban population) used in the calculations and the rationale for doing so; (b) Composition of landfilled waste; (c) Amount of incinerated wastes (specify whether the reported data relate to wet or dry matter).

Additional information

Description	Value
Total population (1000s) ^(a)	
Urban population (1000s) ^(a)	
Waste generation rate (kg/capita/day)	
Fraction of MSW disposed to SWDS	
Fraction of DOC in MSW	
CH ₄ oxidation factor ^(b)	
CH ₄ fraction in landfill gas	
CH ₄ generation rate constant (k) ^(c)	
Time lag considered (yr) ^(c)	

- ^(a) Specify whether total or urban population is used and the rationale for doing so.
^(b) See IPCC Guidelines (Volume 3. Reference Manual, p. 6.9).
^(c) Only for Parties using Tier 2 methods.

TABLE 6.B SECTORAL BACKGROUND DATA FOR WASTE
Waste-Water Handling
 (Sheet 1 of 1)

Country
 Year
 Submission

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	ACTIVITY DATA AND RELATED INFORMATION ⁽¹⁾		IMPLIED EMISSION FACTOR		EMISSIONS		
	Total organic product (Gg DC ⁽¹⁾ /yr)		CH ₄ ⁽²⁾	N ₂ O ⁽³⁾	CH ₄		N ₂ O ⁽³⁾
					Emissions ⁽⁴⁾	Recovery ⁽⁵⁾	
		(kg/kg DC)		(Gg)			
1. Industrial Waste Water							
a. Waste Water							
b. Sludge							
2. Domestic and Commercial Waste Water							
a. Waste Water							
b. Sludge							
3. Other (please specify)							
⁽⁶⁾							
a. Waste Water							
b. Sludge							
⁽⁶⁾							

Additional information

	Domestic	Industrial
Total waste water (m ³):		
Treated waste water (%):		

Waste-water streams:	Waste-water output (m ³)	DC (kgCOD/m ³)
Industrial waste water		
Iron and steel		
Non-ferrous		
Fertilizers		
Food and beverage		
Paper and pulp		
Organic chemicals		
Other (please specify)		
DC (kg BOD/1000 person/yr)		
Domestic and Commercial		
Other		

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	ACTIVITY DATA AND OTHER RELATED INFORMATION			IMPLIED EMISSION FACTOR	EMISSIONS
	Population (1000s)	Protein consumption (kg/person/yr)	N fraction (kg N/kg protein)	N ₂ O (kg N ₂ O-N/kg sewage N produced)	N ₂ O (Gg)
N ₂ O from human sewage ⁽³⁾					

- ⁽¹⁾ DC - degradable organic component. DC indicators are COD (Chemical Oxygen Demand) for industrial waste water and BOD (Biochemical Oxygen Demand) for Domestic/Commercial waste water/sludge (IPCC Guidelines (Volume 3. Reference Manual, pp. 6.14, 6.18)).
- ⁽²⁾ The CH₄ implied emission factor (IEF) is calculated on the basis of gross CH₄ emissions, as follows: IEF = (CH₄ emissions + CH₄ recovered or flared) / total organic product.
- ⁽³⁾ Parties using methods other than those from the IPCC for estimating N₂O emissions from human sewage or waste-water treatment should provide aggregate data in this table.
- ⁽⁴⁾ Actual emissions (after recovery).
- ⁽⁵⁾ CH₄ recovered and flared or utilized.
- ⁽⁶⁾ Use these cells to specify each activity covered under "6.B.3 Other". Note that under each reported activity, data for waste water and sludge are to be reported separately.

Handling systems:	Industrial waste water treated (%)	Industrial sludge treated (%)	Domestic waste water treated (%)	Domestic sludge treated (%)
Aerobic				
Anaerobic				
Other (please specify)				

Documentation box:

- Parties should provide detailed explanations on the Waste sector in Chapter 8: Waste (CRF sector 6) of the NIR. Use this documentation box to provide references to relevant sections of the NIR if any additional information and/or further details are needed to understand the content of this table.
- Regarding the estimates for N₂O from human sewage, specify whether total or urban population is used in the calculations and the rationale for doing so. Provide explanation in the documentation box.
- Parties using methods other than those from the IPCC for estimating N₂O emissions from human sewage or waste-water treatment should provide, in the NIR, corresponding information on methods, activity data and emission factors used, and should provide a reference to the relevant section of the NIR in this documentation box.

SUMMARY 1.A SUMMARY REPORT FOR NATIONAL GREENHOUSE GAS INVENTORIES (IPCC TABLE 7A)

(Sheet 1 of 3)

Country
Year
Submission

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	Net CO ₂ emissions/removals	CH ₄	N ₂ O	HFCs ⁽¹⁾		PFCs ⁽¹⁾		SF ₆		NO _x	CO	NMVOC	SO ₂
				P	A	P	A	P	A				
	(Gg)		CO ₂ equivalent (Gg)						(Gg)				
Total National Emissions and Removals													
1. Energy													
A. Fuel Combustion	Reference Approach ⁽²⁾												
	Sectoral Approach ⁽²⁾												
1. Energy Industries													
2. Manufacturing Industries and Construction													
3. Transport													
4. Other Sectors													
5. Other													
B. Fugitive Emissions from Fuels													
1. Solid Fuels													
2. Oil and Natural Gas													
2. Industrial Processes													
A. Mineral Products													
B. Chemical Industry													
C. Metal Production													
D. Other Production ⁽³⁾													
E. Production of Halocarbons and SF ₆													
F. Consumption of Halocarbons and SF ₆													
G. Other													

Note: A = Actual emissions based on Tier 2 approach of the IPCC Guidelines.
P = Potential emissions based on Tier 1 approach of the IPCC Guidelines.

Note: All footnotes for this table are given at the end of the table on sheet 3.

SUMMARY 1.A SUMMARY REPORT FOR NATIONAL GREENHOUSE GAS INVENTORIES (IPCC TABLE 7A)
(Sheet 2 of 3)

Country
Year
Submission

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	Net CO ₂ emissions/removals	CH ₄	N ₂ O	HFCs ⁽¹⁾		PFCs ⁽¹⁾		SF ₆		NO _x	CO	NMVOC	SO ₂
				P	A	P	A	P	A				
	CO ₂ equivalent (Gg)								(Gg)				
3. Solvent and Other Product Use													
4. Agriculture													
A. Enteric Fermentation													
B. Manure Management													
C. Rice Cultivation													
D. Agricultural Soils ⁽⁴⁾													
E. Prescribed Burning of Savannas													
F. Field Burning of Agricultural Residues													
G. Other													
5. Land Use, Land-Use Change and Forestry	⁽⁵⁾												
A. Forest Land	⁽⁵⁾												
B. Cropland	⁽⁵⁾												
C. Grassland	⁽⁵⁾												
D. Wetlands	⁽⁵⁾												
E. Settlements	⁽⁵⁾												
F. Other Land	⁽⁵⁾												
G. Other	⁽⁵⁾												
6. Waste													
A. Solid Waste Disposal on Land	⁽⁶⁾												
B. Waste-water Handling													
C. Waste Incineration	⁽⁶⁾												
D. Other													
7. Other (please specify)⁽⁷⁾													

Note: All footnotes for this table are given at the end of the table on sheet 3.

SUMMARY 1.A SUMMARY REPORT FOR NATIONAL GREENHOUSE GAS INVENTORIES (IPCC TABLE 7A)

(Sheet 3 of 3)

Country
Year
Submission

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	Net CO ₂ emissions/removals	CH ₄	N ₂ O	HFCs		PFCs		SF ₆		NO _x	CO	NMVOC	SO ₂
				P	A	P	A	P	A				
	(Gg)			CO ₂ equivalent (Gg)					(Gg)				
Memo Items:⁽⁸⁾													
International Bunkers													
Aviation													
Marine													
Multilateral Operations													
CO₂ Emissions from Biomass													

- ⁽¹⁾ The emissions of HFCs and PFCs are to be expressed as CO₂ equivalent emissions. Data on disaggregated emissions of HFCs and PFCs are to be provided in Table 2(II) of this common reporting format.
- ⁽²⁾ For verification purposes, countries are asked to report the results of their calculations using the Reference approach and to explain any differences with the Sectoral approach in the documentation box to Table 1.A.(c). For estimating national total emissions, the results from the Sectoral approach should be used, where possible.
- ⁽³⁾ Other Production includes Pulp and Paper and Food and Drink Production.
- ⁽⁴⁾ Parties which previously reported CO₂ from soils in the Agriculture sector should note this in the NIR.
- ⁽⁵⁾ For the purposes of reporting, the signs for removals are always negative (-) and for emissions positive (+).
- ⁽⁶⁾ CO₂ from source categories Solid Waste Disposal on Land and Waste Incineration should only be included if it stems from non-biogenic or inorganic waste streams. Only emissions from Waste Incineration Without Energy Recovery are to be reported in the Waste sector, whereas emissions from Incineration With Energy Recovery are to be reported in the Energy sector.
- ⁽⁷⁾ If reporting any country-specific source category under sector "7. Other", detailed explanations should be provided in Chapter 9: Other (CRF sector 7) of the NIR.
- ⁽⁸⁾ Countries are asked to report emissions from international aviation and marine bunkers and multilateral operations, as well as CO₂ emissions from biomass, under Memo Items. These emissions should not be included in the national total emissions from the energy sector. Amounts of biomass used as fuel are included in the national energy consumption but the corresponding CO₂ emissions are not included in the national total as it is assumed that the biomass is produced in a sustainable manner. If the biomass is harvested at an unsustainable rate, net CO₂ emissions are accounted for as a loss of biomass stocks in the Land Use, Land-use Change and Forestry sector.

SUMMARY 1.B SHORT SUMMARY REPORT FOR NATIONAL GREENHOUSE GAS INVENTORIES (IPCC TABLE 7B)

(Sheet 1 of 1)

Country
Year
Submission

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	Net CO ₂ emissions/removals	CH ₄	N ₂ O	HFCs ⁽¹⁾		PFCs ⁽¹⁾		SF ₆		NO _x	CO	NMVOC	SO ₂
				P	A	P	A	P	A				
	(Gg)		CO ₂ equivalent (Gg)						(Gg)				
Total National Emissions and Removals													
1. Energy													
A. Fuel Combustion	Reference Approach ⁽²⁾												
	Sectoral Approach ⁽²⁾												
B. Fugitive Emissions from Fuels													
2. Industrial Processes													
3. Solvent and Other Product Use													
4. Agriculture⁽³⁾													
5. Land Use, Land-Use Change and Forestry	⁽⁴⁾												
6. Waste													
7. Other													
Memo Items:⁽⁵⁾													
International Bunkers													
Aviation													
Marine													
Multilateral Operations													
CO₂ Emissions from Biomass													

Note: A = Actual emissions based on Tier 2 approach of the IPCC Guidelines.
P = Potential emissions based on Tier 1 approach of the IPCC Guidelines.

- ⁽¹⁾ The emissions of HFCs and PFCs are to be expressed as CO₂ equivalent emissions. Data on disaggregated emissions of HFCs and PFCs are to be provided in Table 2(II) of this common reporting format.
- ⁽²⁾ For verification purposes, countries are asked to report the results of their calculations using the Reference approach and to explain any differences with the Sectoral approach in the documentation box to Table 1.A.(c). For estimating national total emissions, the result from the Sectoral approach should be used, where possible.
- ⁽³⁾ Parties which previously reported CO₂ from soils in the Agriculture sector should note this in the NIR.
- ⁽⁴⁾ For the purposes of reporting, the signs for removals are always negative (-) and for emissions positive (+).
- ⁽⁵⁾ Countries are asked to report emissions from international aviation and marine bunkers and multilateral operations, as well as CO₂ emissions from biomass, under Memo Items. These emissions should not be included in the national total emissions from the energy sector. Amounts of biomass used as fuel are included in the national energy consumption but the corresponding CO₂ emissions are not included in the national total as it is assumed that the biomass is produced in a sustainable manner. If the biomass is harvested at an unsustainable rate, net CO₂ emissions are accounted for as a loss of biomass stocks in the Land Use, Land-use Change and Forestry sector.

SUMMARY 2 SUMMARY REPORT FOR CO₂ EQUIVALENT EMISSIONS

(Sheet 1 of 1)

Country

Year

Submission

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO ₂ ⁽¹⁾	CH ₄	N ₂ O	HFCs ⁽²⁾	PFCS ⁽²⁾	SF ₆ ⁽²⁾	Total
	CO ₂ equivalent (Gg)						
Total (Net Emissions)⁽¹⁾							
1. Energy							
A. Fuel Combustion (Sectoral Approach)							
1. Energy Industries							
2. Manufacturing Industries and Construction							
3. Transport							
4. Other Sectors							
5. Other							
B. Fugitive Emissions from Fuels							
1. Solid Fuels							
2. Oil and Natural Gas							
2. Industrial Processes							
A. Mineral Products							
B. Chemical Industry							
C. Metal Production							
D. Other Production							
E. Production of Halocarbons and SF ₆							
F. Consumption of Halocarbons and SF ₆ ⁽²⁾							
G. Other							
3. Solvent and Other Product Use							
4. Agriculture							
A. Enteric Fermentation							
B. Manure Management							
C. Rice Cultivation							
D. Agricultural Soils ⁽³⁾							
E. Prescribed Burning of Savannas							
F. Field Burning of Agricultural Residues							
G. Other							
5. Land Use, Land-Use Change and Forestry⁽¹⁾							
A. Forest Land							
B. Cropland							
C. Grassland							
D. Wetlands							
E. Settlements							
F. Other Land							
G. Other							
6. Waste							
A. Solid Waste Disposal on Land							
B. Waste-water Handling							
C. Waste Incineration							
D. Other							
7. Other (as specified in Summary I.A)							
Memo Items:⁽⁴⁾							
International Bunkers							
Aviation							
Marine							
Multilateral Operations							
CO₂ Emissions from Biomass							
Total CO ₂ Equivalent Emissions without Land Use, Land-Use Change and Forestry ⁽⁵⁾							
Total CO ₂ Equivalent Emissions with Land Use, Land-Use Change and Forestry ⁽⁵⁾							

⁽¹⁾ For CO₂ from Land Use, Land-use Change and Forestry the net emissions/removals are to be reported. For the purposes of reporting, the signs for removals are always negative (-) and for emissions positive (+).

⁽²⁾ Actual emissions should be included in the national totals. If no actual emissions were reported, potential emissions should be included.

⁽³⁾ Parties which previously reported CO₂ from soils in the Agriculture sector should note this in the NIR.

⁽⁴⁾ See footnote 8 to table Summary I.A.

⁽⁵⁾ These totals will differ from the totals reported in table 10, sheet 5 if Parties report non-CO₂ emissions from LULUCF.

SUMMARY 3 SUMMARY REPORT FOR METHODS AND EMISSION FACTORS USED
(Sheet 1 of 2)

Country
Year
Submission

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO ₂		CH ₄		N ₂ O		HFCs		PFCs		SF ₆	
	Method applied	Emission factor	Method applied	Emission factor	Method applied	Emission factor	Method applied	Emission factor	Method applied	Emission factor	Method applied	Emission factor
1. Energy												
A. Fuel Combustion												
1. Energy Industries												
2. Manufacturing Industries and Construction												
3. Transport												
4. Other Sectors												
5. Other												
B. Fugitive Emissions from Fuels												
1. Solid Fuels												
2. Oil and Natural Gas												
2. Industrial Processes												
A. Mineral Products												
B. Chemical Industry												
C. Metal Production												
D. Other Production												
E. Production of Halocarbons and SF ₆												
F. Consumption of Halocarbons and SF ₆												
G. Other												

Use the following notation keys to specify the method applied:

- | | | |
|--------------------------------|--|------------------------------|
| D (IPCC default) | T1a, T1b, T1c (IPCC Tier 1a, Tier 1b and Tier 1c, respectively) | CR (CORINAIR) |
| RA (Reference Approach) | T2 (IPCC Tier 2) | CS (Country Specific) |
| T1 (IPCC Tier 1) | T3 (IPCC Tier 3) | OTH (Other) |

If using more than one method within one source category, list all the relevant methods. Explanations regarding country-specific methods, other methods or any modifications to the default IPCC methods, as well as information regarding the use of different methods per source category where more than one method is indicated, should be provided in the documentation box. Also use the documentation box to explain the use of notation OTH.

Use the following notation keys to specify the emission factor used:

- | | | |
|-------------------------|------------------------------|--------------------|
| D (IPCC default) | CS (Country Specific) | OTH (Other) |
| CR (CORINAIR) | PS (Plant Specific) | |

Where a mix of emission factors has been used, list all the methods in the relevant cells and give further explanations in the documentation box. Also use the documentation box to explain the use of notation OTH.

SUMMARY 3 SUMMARY REPORT FOR METHODS AND EMISSION FACTORS USED
(Sheet 2 of 2)

Country
Year
Submission

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO ₂		CH ₄		N ₂ O		HFCs		PFCs		SF ₆	
	Method applied	Emission factor	Method applied	Emission factor	Method applied	Emission factor	Method applied	Emission factor	Method applied	Emission factor	Method applied	Emission factor
3. Solvent and Other Product Use												
4. Agriculture												
A. Enteric Fermentation												
B. Manure Management												
C. Rice Cultivation												
D. Agricultural Soils												
E. Prescribed Burning of Savannas												
F. Field Burning of Agricultural Residues												
G. Other												
5. Land Use, Land-Use Change and Forestry												
A. Forest Land												
B. Cropland												
C. Grassland												
D. Wetlands												
E. Settlements												
F. Other Land												
G. Other												
6. Waste												
A. Solid Waste Disposal on Land												
B. Wastewater Handling												
C. Waste Incineration												
D. Other												
7. Other (as specified in Summary 1.A)												

Use the following notation keys to specify the method applied:

- | | | |
|--------------------------------|--|------------------------------|
| D (IPCC default) | T1a, T1b, T1c (IPCC Tier 1a, Tier 1b and Tier 1c, respectively) | CR (CORINAIR) |
| RA (Reference Approach) | T2 (IPCC Tier 2) | CS (Country Specific) |
| T1 (IPCC Tier 1) | T3 (IPCC Tier 3) | OTH (Other) |

If using more than one method within one source category, list all the relevant methods. Explanations regarding country-specific methods, other methods or any modifications to the default IPCC methods, as well as information regarding the use of different methods per source category where more than one method is indicated, should be provided in the documentation box. Also use the documentation box to explain the use of notation OTH.

Use the following notation keys to specify the emission factor used:

- | | | |
|-------------------------|------------------------------|--------------------|
| D (IPCC default) | CS (Country Specific) | OTH (Other) |
| CR (CORINAIR) | PS (Plant Specific) | |

Where a mix of emission factors has been used, list all the methods in the relevant cells and give further explanations in the documentation box. Also use the documentation box to explain the use of notation OTH.

<p>Documentation box:</p> <ul style="list-style-type: none"> Parties should provide the full information on methodological issues, such as methods and emission factors used, in the relevant sections of Chapters 3 to 9 (see section 2.2 of each of Chapters 3–9) of the NIR. Use this documentation box to provide references to relevant sections of the NIR if any additional information and further details are needed to understand the content of this table. Where a mix of methods/emission factors has been used within one source category, use this documentation box to specify those methods/emission factors for the various sub-sources where they have been applied. Where the notation OTH (Other) has been entered in this table, use this documentation box to specify those other methods/emission factors.
--

TABLE 7 SUMMARY OVERVIEW FOR KEY CATEGORIES
(Sheet 1 of 1)

Country
Year
Submission

KEY CATEGORIES OF EMISSIONS AND REMOVALS	GAS	CRITERIA USED FOR KEY CATEGORY IDENTIFICATION			Key category excluding LULUCF ⁽¹⁾	Key category including LULUCF ⁽¹⁾	COMMENTS ⁽¹⁾
		L	T	Q			
Specify key categories according to the national level of disaggregation used:							
<i>For example: 4.B Manure management</i>	<i>CH₄</i>	<i>X</i>			<i>X</i>		

Note: L = Level assessment; T = Trend assessment; Q = Qualitative assessment.

⁽¹⁾ The term “key categories” refers to both the key source categories as addressed in the IPCC good practice guidance and the key categories as addressed in the IPCC good practice guidance for LULUCF.

⁽²⁾ For estimating key categories Parties may chose the disaggregation level presented as an example in table 7.1 of the IPCC good practice guidance (page 7.6) and table 5.4.1 (page 5.31) of the IPCC good practice guidance for LULUCF, the level used in table Summary 1.A of the common reporting format or any other disaggregation level that the Party used to determine its key categories.

Documentation box:

Parties should provide the full information on methodologies used for identifying key categories and the quantitative results from the level and trend assessments (according to tables 7.1–7.3 of the IPCC good practice guidance and tables 5.4.1–5.4.3 of the IPCC good practice guidance for LULUCF) in Annex 1 to the NIR.

TABLE 8(a) RECALCULATION - RECALCULATED DATA
(Sheet 1 of 2)

Recalculated year:

Country
Year
Submission

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO ₂					CH ₄					N ₂ O				
	Previous submission	Latest submission	Difference	Difference ⁽¹⁾	Impact of recalculation on total emissions ⁽²⁾	Previous submission	Latest submission	Difference	Difference ⁽¹⁾	Impact of recalculation on total emissions ⁽²⁾	Previous submission	Latest submission	Difference	Difference ⁽¹⁾	Impact of recalculation on total emissions ⁽²⁾
	CO ₂ equivalent (Gg)			(%)	(%)	CO ₂ equivalent (Gg)			(%)	(%)	CO ₂ equivalent (Gg)			(%)	(%)
Total National Emissions and Removals															
1. Energy															
A. Fuel Combustion Activities															
A.1. Energy Industries															
A.2. Manufacturing Industries and Construction															
A.3. Transport															
A.4. Other Sectors															
A.5. Other															
B. Fugitive Emissions from Fuels															
B.1. Solid Fuel															
B.2. Oil and Natural Gas															
2. Industrial Processes															
A. Mineral Products															
B. Chemical Industry															
C. Metal Production															
D. Other Production															
G. Other															
3. Solvent and Other Product Use															
4. Agriculture															
A. Enteric Fermentation															
B. Manure Management															
C. Rice Cultivation															
D. Agricultural Soils ⁽³⁾															
E. Prescribed Burning of Savannas															
F. Field Burning of Agricultural Residues															
G. Other															
5. Land Use, Land-Use Change and Forestry (net)⁽⁴⁾															
A. Forest Land															
B. Cropland															
C. Grassland															
D. Wetlands															
E. Settlements															
F. Other Land															
G. Other															

Note: All footnotes for this table are given at the end of the table on sheet 2.

TABLE 8(a) RECALCULATION - RECALCULATED DATA
(Sheet 2 of 2)

Recalculated year:

Country
Year
Submission

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO ₂					CH ₄					N ₂ O				
	Previous submission	Latest submission	Difference	Difference ⁽¹⁾	Impact of recalculation on total emissions ⁽²⁾	Previous submission	Latest submission	Difference	Difference ⁽¹⁾	Impact of recalculation on total emissions ⁽²⁾	Previous submission	Latest submission	Difference	Difference ⁽¹⁾	Impact of recalculation on total emissions ⁽²⁾
	CO ₂ equivalent (Gg)			(%)	(%)	CO ₂ equivalent (Gg)			(%)	(%)	CO ₂ equivalent (Gg)			(%)	(%)
6. Waste															
A. Solid Waste Disposal on Land															
B. Waste-water Handling															
C. Waste Incineration															
D. Other															
7. Other (as specified in Summary I.A)															
Memo Items:															
International Bunkers															
Multilateral Operations															
CO ₂ Emissions from Biomass															

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	HFCs				Impact of recalculation on total emissions ⁽²⁾	PFCs				Impact of recalculation on total emissions ⁽²⁾	SF ₆				Impact of recalculation on total emissions ⁽²⁾
	Previous submission	Latest submission	Difference	Difference ⁽¹⁾		Previous submission	Latest submission	Difference	Difference ⁽¹⁾		Previous submission	Latest submission	Difference	Difference ⁽¹⁾	
	CO ₂ equivalent (Gg)			(%)		(%)	CO ₂ equivalent (Gg)				(%)	(%)	CO ₂ equivalent (Gg)		
Total Actual Emissions															
C.3 Aluminium Production															
E. Production of Halocarbons and SF ₆															
F. Consumption of Halocarbons and SF ₆															
G. Other															
Potential Emissions from Consumption of HFCs/PFCs and SF₆															

	Previous submission	Latest submission	Difference	Difference ⁽¹⁾
	CO ₂ equivalent (Gg)			
				(%)
Total CO ₂ Equivalent Emissions with Land Use, Land-Use Change and Forestry ⁽⁵⁾				
Total CO ₂ Equivalent Emissions without Land Use, Land-Use Change and Forestry ⁽⁵⁾				

- ⁽¹⁾ Estimate the percentage change due to recalculation with respect to the previous submission (Percentage change = 100 x [(LS-PS)/PS], where LS = Latest submission and PS = Previous submission. All cases of recalculation of the estimate of the source/sink category should be addressed and explained in table 8(b).
- ⁽²⁾ Total emissions refer to total aggregate GHG emissions expressed in terms of CO₂ equivalent, excluding GHGs from the LULUCF sector. The impact of the recalculation on the total emissions is calculated as follows: impact of recalculation (%) = 100 x [(source (LS) - source (PS))/total emissions (LS)], where LS = Latest submission, PS = Previous submission.
- ⁽³⁾ Parties which previously reported CO₂ from soils in the Agriculture sector should note this in the NIR.
- ⁽⁴⁾ Net CO₂ emissions/removals to be reported.
- ⁽⁵⁾ The information in these rows is requested to facilitate comparison of data, because Parties differ in the way they report emissions and removals from Land Use, Land-Use Change and Forestry.

Documentation box:
Parties should provide detailed information on recalculations in Chapter 10: Recalculations and Improvements, and in the relevant sections of Chapters 3 to 9 (see section 2.5 of each of Chapters 3 - 9) of the NIR. Use this documentation box to provide references to relevant sections of the NIR if any additional information and further details are needed to understand the content of this table.

TABLE 8(b) RECALCULATION - EXPLANATORY INFORMATION
(Sheet 1 of 1)

Country
Year
Submission

Specify the sector and source/sink category ⁽¹⁾ where changes in estimates have occurred:	GHG	RECALCULATION DUE TO				
		CHANGES IN:			Addition/removal/ reallocation of source/sink categories	Other changes in data (e.g. statistical or editorial changes, correction of errors)
		Methods ⁽²⁾	Emission factors ⁽²⁾	Activity data ⁽²⁾		

⁽¹⁾ Enter the identification code of the source/sink category (e.g. 1.B.1) in the first column and the name of the category (e.g. Fugitive Emissions from Solid Fuels) in the second column of the table. Note that the source categories entered in this table should match those used in table 8(a).

⁽²⁾ Explain changes in methods, emission factors and activity data that have resulted in recalculation of the estimate of the source/sink as indicated in table 8(a). Include changes in the assumptions and coefficients in the Methods column.

Documentation box:
Parties should provide the full information on recalculations in Chapter 10: Recalculations and Improvements, and in the relevant sections of Chapters 3 to 9 (see section 2.5 of each of chapters 3 - 9) of the NIR. Use this documentation box to provide references to relevant sections of the NIR if any additional information and further details are needed to understand the content of this table. References should point particularly to the sections of the NIR in which justifications of the changes as to improvements in the accuracy, completeness and consistency of the inventory are reported.

TABLE 9(a) COMPLETENESS - INFORMATION ON NOTATION KEYS
(Sheet 1 of 1)

Country
Year
Submission

Sources and sinks not estimated (NE) ⁽¹⁾				
GHG	Sector ⁽²⁾	Source/sink category ⁽²⁾	Explanation	
CO ₂				
CH ₄				
N ₂ O				
HFCs				
PFCs				
SF ₆				
Sources and sinks reported elsewhere (IE) ⁽³⁾				
GHG	Source/sink category	Allocation as per IPCC Guidelines	Allocation used by the Party	Explanation
CO ₂				
CH ₄				
N ₂ O				
HFCs				
PFCs				
SF ₆				

⁽¹⁾ Clearly indicate sources and sinks which are considered in the IPCC Guidelines but are not considered in the submitted inventory. Explain the reason for excluding these sources and sinks, in order to avoid arbitrary interpretations. An entry should be made for each source/sink category for which the notation key NE (not estimated) is entered in the sectoral tables.

⁽²⁾ Indicate omitted source/sink following the IPCC source/sink category structure (e.g. sector: Waste, source category: Waste-Water Handling).

⁽³⁾ Clearly indicate sources and sinks in the submitted inventory that are allocated to a sector other than that indicated by the IPCC Guidelines. Show the sector indicated in the IPCC Guidelines and the sector to which the source or sink is allocated in the submitted inventory. Explain the reason for reporting these sources and sinks in a different sector. An entry should be made for each source/sink for which the notation key IE (included elsewhere) is used in the sectoral tables.

TABLE 9(b) COMPLETENESS - INFORMATION ON ADDITIONAL GREENHOUSE GASES
(Sheet 1 of 1)

Country
Year
Submission

Additional GHG emissions reported ⁽¹⁾						
GHG	Source category	Emissions (Gg)	Estimated GWP value (100-year horizon)	Emissions CO ₂ equivalent (Gg)	Reference to the source of GWP value	Explanation

⁽¹⁾ Parties are encouraged to provide information on emissions of greenhouse gases whose GWP values have not yet been agreed upon by the COP. Include such gases in this table if they are considered in the submitted inventory. Provide additional information on the estimation methods used.

<p>Documentation box: Parties should provide detailed information regarding completeness of the inventory in the NIR (Chapter 1.8: General Assessment of the Completeness, and Annex 5). Use this documentation box to provide references to relevant sections of the NIR if any additional information and further details are needed to understand the content of this table.</p>

TABLE 10 EMISSIONS TRENDS (CO₂)
(Sheet 1 of 5)

Country
Year
Submission

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	Base year ⁽¹⁾	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	Change from 1990 ⁽¹⁾ to latest reported year (%)
	(Gg)															
1. Energy																
A. Fuel Combustion (Sectoral Approach)																
1. Energy Industries																
2. Manufacturing Industries and Construction																
3. Transport																
4. Other Sectors																
5. Other																
B. Fugitive Emissions from Fuels																
1. Solid Fuels																
2. Oil and Natural Gas																
2. Industrial Processes																
A. Mineral Products																
B. Chemical Industry																
C. Metal Production																
D. Other Production																
E. Production of Halocarbons and SF ₆																
F. Consumption of Halocarbons and SF ₆																
G. Other																
3. Solvent and Other Product Use																
4. Agriculture																
A. Enteric Fermentation																
B. Manure Management																
C. Rice Cultivation																
D. Agricultural Soils																
E. Prescribed Burning of Savannas																
F. Field Burning of Agricultural Residues																
G. Other																
5. Land Use, Land-Use Change and Forestry⁽²⁾																
A. Forest Land																
B. Cropland																
C. Grassland																
D. Wetlands																
E. Settlements																
F. Other Land																
G. Other																
6. Waste																
A. Solid Waste Disposal on Land																
B. Waste-water Handling																
C. Waste Incineration																
D. Other																
7. Other (as specified in Summary 1.A)																
Total CO₂ emissions including net CO₂ from LULUCF⁽³⁾																
Total CO₂ emissions excluding net CO₂ from LULUCF⁽³⁾																
Memo Items:																
International Bunkers																
Aviation																
Marine																
Multilateral Operations																
CO₂ Emissions from Biomass																

Note: All footnotes for this table are given at the end of the table on sheet 5.

TABLE 10 EMISSIONS TRENDS (CH₄)
(Sheet 2 of 5)

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	Base year ⁽¹⁾	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	Change from 1990 ⁽¹⁾ to latest reported year
	(Gg)															(%)
Total CH₄ emissions																
1. Energy																
A. Fuel Combustion (Sectoral Approach)																
1. Energy Industries																
2. Manufacturing Industries and Construction																
3. Transport																
4. Other Sectors																
5. Other																
B. Fugitive Emissions from Fuels																
1. Solid Fuels																
2. Oil and Natural Gas																
2. Industrial Processes																
A. Mineral Products																
B. Chemical Industry																
C. Metal Production																
D. Other Production																
E. Production of Halocarbons and SF ₆																
F. Consumption of Halocarbons and SF ₆																
G. Other																
3. Solvent and Other Product Use																
4. Agriculture																
A. Enteric Fermentation																
B. Manure Management																
C. Rice Cultivation																
D. Agricultural Soils																
E. Prescribed Burning of Savannas																
F. Field Burning of Agricultural Residues																
G. Other																
5. Land Use, Land-Use Change and Forestry																
A. Forest Land																
B. Cropland																
C. Grassland																
D. Wetlands																
E. Settlements																
F. Other Land																
G. Other																
6. Waste																
A. Solid Waste Disposal on Land																
B. Waste-water Handling																
C. Waste Incineration																
D. Other																
7. Other (as specified in Summary I.A)																
Memo Items:																
International Bunkers																
Aviation																
Marine																
Multilateral Operations																
CO₂ Emissions from Biomass																

Note: All footnotes for this table are given at the end of the table on sheet 5.

TABLE 10 EMISSIONS TRENDS (N₂O)
(Sheet 3 of 5)

Country
Year
Submission

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	Base year ⁽¹⁾	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	Change from 1990 ⁽¹⁾ to latest reported year
	(Gg)															(%)
Total N₂O emissions																
1. Energy																
A. Fuel Combustion (Sectoral Approach)																
1. Energy Industries																
2. Manufacturing Industries and Construction																
3. Transport																
4. Other Sectors																
5. Other																
B. Fugitive Emissions from Fuels																
1. Solid Fuels																
2. Oil and Natural Gas																
2. Industrial Processes																
A. Mineral Products																
B. Chemical Industry																
C. Metal Production																
D. Other Production																
E. Production of Halocarbons and SF ₆																
F. Consumption of Halocarbons and SF ₆																
G. Other																
3. Solvent and Other Product Use																
4. Agriculture																
A. Enteric Fermentation																
B. Manure Management																
C. Rice Cultivation																
D. Agricultural Soils																
E. Prescribed Burning of Savannas																
F. Field Burning of Agricultural Residues																
G. Other																
5. Land Use, Land-Use Change and Forestry																
A. Forest Land																
B. Cropland																
C. Grassland																
D. Wetlands																
E. Settlements																
F. Other Land																
G. Other																
6. Waste																
A. Solid Waste Disposal on Land																
B. Waste-water Handling																
C. Waste Incineration																
D. Other																
7. Other (as specified in Summary I.A)																
Memo Items:																
International Bunkers																
Aviation																
Marine																
Multilateral Operations																
CO₂ Emissions from Biomass																

Note: All footnotes for this table are given at the end of the table on sheet 5.

TABLE 10 EMISSIONS TRENDS (HFCs, PFCs and SF₆)
(Sheet 4 of 5)

Country
Year
Submission

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	Base year ⁽¹⁾	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	Change from 1990 ⁽¹⁾ to latest reported year
	(Gg)															
Emissions of HFCs⁽⁴⁾ - (Gg CO₂ equivalent)																
HFC-23																
HFC-32																
HFC-41																
HFC-43-10mee																
HFC-125																
HFC-134																
HFC-134a																
HFC-152a																
HFC-143																
HFC-143a																
HFC-227ea																
HFC-236fa																
HFC-245ca																
Unspecified mix of listed HFCs ⁽⁵⁾ - (Gg CO ₂ equivalent)																
Emissions of PFCs⁽⁴⁾ - (Gg CO₂ equivalent)																
CF ₄																
C ₂ F ₆																
C ₃ F ₈																
C ₄ F ₁₀																
c-C ₄ F ₈																
C ₅ F ₁₂																
C ₆ F ₁₄																
Unspecified mix of listed PFCs ⁽⁵⁾ - (Gg CO ₂ equivalent)																
Emissions of SF₆⁽⁴⁾ - (Gg CO₂ equivalent)																
SF ₆																

Chemical	GWP
HFCs	
HFC-23	11700
HFC-32	650
HFC-41	150
HFC-43-10mee	1300
HFC-125	2800
HFC-134	1000
HFC-134a	1300
HFC-152a	140
HFC-143	300
HFC-143a	3800
HFC-227ea	2900
HFC-236fa	6300
HFC-245ca	560
PFCs	
CF ₄	6500
C ₂ F ₆	9200
C ₃ F ₈	7000
C ₄ F ₁₀	7000
c-C ₄ F ₈	8700
C ₅ F ₁₂	7500
C ₆ F ₁₄	7400
SF ₆	23900

Note: All footnotes for this table are given at the end of the table on sheet 5.

TABLE 10 EMISSIONS TRENDS (SUMMARY)
(Sheet 5 of 5)

Country
Year
Submission

GREENHOUSE GAS EMISSIONS	Base year ⁽¹⁾	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	Change from 1990 ⁽¹⁾ to latest reported year
	CO ₂ equivalent (Gg)															(%)
CO ₂ emissions including net CO ₂ from LULUCF ⁽³⁾																
CO ₂ emissions excluding net CO ₂ from LULUCF ⁽³⁾																
CH ₄																
N ₂ O																
HFCs																
PFCs																
SF ₆																
Total (including net CO₂ from LULUCF)⁽³⁾																
Total (excluding net CO₂ from LULUCF)^{(3),(6)}																

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	Base year ⁽¹⁾	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	Change from 1990 ⁽¹⁾ to latest reported year
	CO ₂ equivalent (Gg)															(%)
1. Energy																
2. Industrial Processes																
3. Solvent and Other Product Use																
4. Agriculture																
5. Land Use, Land-Use Change and Forestry ⁽⁷⁾																
6. Waste																
7. Other																
Total (including LULUCF)⁽⁷⁾																

⁽¹⁾ The column "Base year" should be filled in only by those Parties with economies in transition that use a base year different from 1990 in accordance with the relevant decisions of the COP. For these Parties, this different base year is used to calculate the percentage change in the final column of this table.

⁽²⁾ Fill in net emissions/removals as reported in table Summary 1.A. For the purposes of reporting, the signs for removals are always negative (-) and for emissions positive (+).

⁽³⁾ The information in these rows is requested to facilitate comparison of data, because Parties differ in the way they report CO₂ emissions and removals from LULUCF.

⁽⁴⁾ Enter actual emissions estimates. If only potential emissions estimates are available, these should be reported in this table and an indication for this be provided in the documentation box. Only in these rows are the emissions expressed as CO₂ equivalent emissions.

⁽⁵⁾ In accordance with the UNFCCC reporting guidelines, HFC and PFC emissions should be reported for each relevant chemical. However, if it is not possible to report values for each chemical (i.e. mixtures, confidential data, lack of disaggregation), this row could be used for reporting aggregate figures for HFCs and PFCs, respectively. Note that the unit used for this row is Gg of CO₂ equivalent and that appropriate notation keys should be entered in the cells for the individual chemicals.

⁽⁶⁾ These totals will differ from the totals reported in table Summary 2 if Parties report non-CO₂ emissions from LULUCF.

⁽⁷⁾ Includes net CO₂, CH₄ and N₂O from LULUCF.

Documentation box:

• Parties should provide detailed explanations on emissions trends in Chapter 2: Trends in Greenhouse Gas Emissions and, as appropriate, in the corresponding Chapters 3 - 9 of the NIR. Use this documentation box to provide references to relevant sections of the NIR if any additional information and further details are needed to understand the content of this table.
• Use the documentation box to provide explanations if potential emissions are reported.
