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**Report of the individual review of the annual submission of Slovenia
submitted in 2009***

* In the symbol for this document, 2009 refers to the year in which the inventory was submitted, and not to the year of publication.

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I. Overview

A. Introduction

1. This report covers the centralized review of the 2009 annual submission of Slovenia, coordinated by the UNFCCC secretariat, in accordance with decision 22/CMP.1. The review took place from 14 to 19 September 2009 in Bonn, Germany, and was conducted by the following team of nominated experts from the UNFCCC roster of experts: generalists – Mr. Domenico Gaudioso (Italy) and Mr. Dennis Rudov (Belarus); energy – Mr. Leif Hockstad (United States of America) and Mr. Ole-Kenneth Nielsen (Denmark); industrial processes – Mr. Stanford Mwakasonda (South Africa) and Mr. Dušan Vacha (Czech Republic); agriculture – Mr. Donald Kamdonyo (Malawi) and Mr. Chang Liang (Canada); land use, land-use change and forestry (LULUCF) – Ms. Oksana Butrym (Ukraine), Mr. Walter Oyhatcabal (Uruguay) and Mr. Richard Volz (Switzerland); and waste – Ms. Violeta Hristova (Bulgaria) and Mr. Jose Ramon Villarin (Philippines). Mr. Hockstad and Mr. Mwakasonda were the lead reviewers. The review was coordinated by Mr. Sabin Guendehou and Ms. Astrid Olsson (UNFCCC secretariat).

2. In accordance with the “Guidelines for review under Article 8 of the Kyoto Protocol” (decision 22/CMP.1), a draft version of this report was communicated to the Government of Slovenia, which provided comments that were considered and incorporated, as appropriate, into this final version of the report.

B. Emission profiles and trends

3. In 2007, the main greenhouse gas (GHG) in Slovenia was carbon dioxide (CO₂), accounting for 82.0 per cent of total GHG emissions¹ expressed in CO₂ eq, followed by methane (CH₄) (10.5 per cent) and nitrous oxide (N₂O) (6.4 per cent). Hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF₆) collectively accounted for 1.2 per cent of the overall GHG emissions in the country. The energy sector accounted for 80.5 per cent of the total GHG emissions, followed by agriculture (10.0 per cent), industrial processes (5.9 per cent), waste (3.3 per cent) and solvent and other product use (0.2 per cent). Total GHG emissions amounted to 20,722.18 Gg CO₂ eq and increased by 1.7 per cent between the base year² and 2007.

4. Tables 1 and 2 show total GHG emissions by gas and by sector, respectively. Table 1 includes emissions from Annex A sources only and excludes emissions and removals from the LULUCF sector.

¹ In this report, the term “total GHG emissions” refers to the aggregated national GHG emissions expressed in terms of CO₂ eq excluding LULUCF, unless otherwise specified.

² “Base year” refers to the base year under the Kyoto Protocol, which is 1986 for CO₂, CH₄ and N₂O, and 1995 for HFCs, PFCs and SF₆. The base year emissions include emissions from Annex A sources only.

Table 1. Total greenhouse gas emissions by gas, 1986–2007^a

Greenhouse gas	Gg CO ₂ eq							Change base year–2007 (%)
	Base year ^b	1990	1995	2000	2005	2006	2007	
CO ₂	16 292.56	14 743.92	15 007.05	15 210.84	16 670.67	16 853.81	16 989.17	4.3
CH ₄	2 384.02	2 303.59	2 167.34	2 228.86	2 184.41	2 160.42	2 172.12	–8.9
N ₂ O	1 376.50	1 256.18	1 213.67	1 319.33	1 284.18	1 309.29	1 319.45	–4.1
HFCs	28.96	NA, NO	28.96	31.13	95.62	112.05	130.91	352.1
PFCs	285.68	257.44	285.68	105.61	123.53	115.55	91.69	–67.9
SF ₆	11.52	10.30	11.52	15.74	18.84	18.84	18.84	63.5

Abbreviations: NA = not applicable, NO = not occurring.

^a “Total GHG emissions” includes emissions from Annex A sources only (excludes emissions/removals from the LULUCF sector).

^b “Base year” refers to the base year under the Kyoto Protocol, which is 1986 for CO₂, CH₄ and N₂O, and 1995 for HFCs, PFCs and SF₆. The base year emissions include emissions from Annex A sources only.

Table 2. Greenhouse gas emissions by sector, 1986–2007

Sector	Gg CO ₂ eq							Change base year–2007 (%)
	Base year ^a	1990	1995	2000	2005	2006	2007	
Energy	16 069.02	14 395.81	14 893.77	15 062.61	16 419.50	16 574.18	16 688.36	3.9
Industrial processes	1 327.69	1 292.16	1 109.47	970.14	1 185.69	1 217.45	1 225.49	–7.7
Solvent and other product use	81.90	43.40	17.25	42.73	43.32	44.15	42.16	–48.5
Agriculture	2 334.30	2 242.73	2 117.36	2 162.34	2 005.80	2 029.22	2 082.08	–10.8
LULUCF	NA	–3 185.75	–4 905.24	–5 175.16	–5 430.37	–4 733.09	–5 774.35	NA
Waste	566.34	597.35	576.37	673.67	722.94	704.96	684.09	20.8
Other	NA	NA	NA	NA	NA	NA	NA	NA
Total (with LULUCF)	NA	15 385.69	13 808.98	13 736.34	14 946.88	15 836.87	14 947.83	NA
Total (without LULUCF)	20 379.24	18 571.44	18 714.22	18 911.50	20 377.25	20 569.96	20 722.18	1.7

Abbreviations: LULUCF = land use, land-use change and forestry, NA = not applicable.

^a “Base year” refers to the base year under the Kyoto Protocol, which is 1986 for CO₂, CH₄ and N₂O, and 1995 for HFCs, PFCs and SF₆. The base year emissions include emissions from Annex A sources only.

C. Annual submission and other sources of information

5. The 2009 annual inventory submission was submitted on 15 April 2009; it contains a complete set of common reporting format (CRF) tables for the period 1986–2007, and a national inventory report (NIR). Slovenia also submitted information required under Article 7, paragraph 1, of the Kyoto Protocol, including accounting of Kyoto Protocol units, and information on changes in the national system and in the national registry. The standard electronic format (SEF) tables were also submitted on 15 April 2009. The annual submission was submitted in accordance with decision 15/CMP.1. The Party indicated that the 2009 submission is also its voluntary submission under the Kyoto Protocol.

6. In response to questions raised by the expert review team (ERT) during the review, on 21 October 2009 Slovenia submitted revised information on the completeness of its annual inventory submission (see para. 10 below). Where necessary, the ERT also used the previous years' submissions during the review.

7. In addition, the ERT used the Standard Independent Assessment Report (SIAR), Parts I and II, to review information on the accounting of Kyoto Protocol units (including the SEF tables and the SEF comparison report) and on the national registry.³

8. During the review, Slovenia provided the ERT with additional information. The documents concerned are not part of the annual submission but are in many cases referenced in the NIR. The full list of materials used during the review is provided in annex I to this report.

D. Completeness of the inventory

9. The inventory is complete in terms of years, sectors and geographic coverage. Slovenia has provided all CRF tables for the years 1986–2007. However, the ERT found that the completeness of Slovenia's inventory could be improved in respect of the Party's reporting of a number of categories as not estimated ("NE"), including: CO₂ emissions from transmission of natural gas; consumption of halocarbons and SF₆ (for refrigeration and air-conditioning equipment, foam blowing, and fire extinguishers); and CO₂ emissions from agricultural lime application for cropland and grassland. The ERT recommends that Slovenia improve the completeness of its inventory by reporting estimates for the categories currently reported as "NE" in its next annual submission.

10. In response to a question raised by the ERT during the review, the Party indicated that it would address the completeness of its inventory with regard to the energy sector, in its next annual submission (see para. 45 below). The ERT recommends that Slovenia improve the completeness of its next annual submission, especially by providing estimates for those categories in which emissions are known to occur in the country and for which methodologies for estimating emissions are available in the Intergovernmental Panel on Climate Change (IPCC) *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories* (hereinafter referred to as the IPCC good practice guidance) and/or in the *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories* (hereinafter referred to as the Revised 1996 IPCC Guidelines). In order to estimate emissions from categories for which estimation methodologies are not prescribed in the Revised 1996 IPCC Guidelines or in the IPCC good practice guidance, the ERT encourages the Party to explore approaches contained in scientific literature, with a view to further enhancing, to the extent possible, the completeness and

³ The SIAR, Parts I and II, is prepared by an independent assessor in line with decision 16/CP.10 (paras. 5 (a), 6 (c) and 6 (k)), under the auspices of the international transaction log administrator using procedures agreed in the Registry System Administrators Forum. Part I is a completeness check of the submitted information relating to the accounting of Kyoto Protocol units (including the SEF tables and the SEF comparison report) and to national registries. Part II contains a substantive assessment of the submitted information and identifies any potential problem regarding information on the accounting of Kyoto Protocol units and the national registry. The SIAR is not publicly available.

accuracy of its inventory. The ERT also recommends that the Party, when reporting data on emissions for the first time for a given category, ensure that these data are provided for the entire inventory time series, and that the choice of methods and emission factors (EFs) is clearly explained in the NIR.

E. Main findings

11. The inventory is in line with the Revised 1996 IPCC Guidelines, the IPCC good practice guidance and the IPCC *Good Practice Guidance for Land Use, Land-use Change and Forestry* (hereinafter referred to as the IPCC good practice guidance for LULUCF). The inventory covers the period 1986–2007 and is complete in terms of years, sectors and geographic coverage. Slovenia has submitted a complete set of CRF tables for the years 1986–2007 and an NIR.
12. In its 2009 annual submission, Slovenia's inventory continues to be generally of a good quality and covers all sectors and most categories. The ERT found that its completeness could be improved in respect of the Party's reporting of a number of non-LULUCF categories as "NE", especially those categories that are included in either the Revised 1996 IPCC guidelines or the IPCC good practice guidance, and for which methods are prescribed therein.
13. The Party's NIR shows improvement compared with its previous annual submission, in terms of the additional reporting on implemented quality assurance (QA) activities, on the peer review conducted of the energy sector and on the planned peer review of the industrial processes sector. A report on the peer review of the energy sector was provided to the ERT during the review week (see para. 26 below). Other improvements compared with the previous inventory submission include: the addition in the NIR of a summary of the quality assurance/quality control (QA/QC) plan in English and information on sector-specific QA/QC procedures; the assignment of a QA/QC manager; and the provision in the NIR of information on the Party's process of approving the national GHG inventory.
14. By supplying additional information requested by the ERT, Slovenia has demonstrated sufficient capacity to comply with 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" (hereinafter referred to as the UNFCCC reporting guidelines) and the IPCC good practice guidance.
15. The Party has submitted, in part, on a voluntary basis supplementary information required under Article 7, paragraph 1, of the Kyoto Protocol in accordance with Part I of the annex to decision 15/CMP.1. The Party has not submitted information on activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, nor information on the minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol.
16. Slovenia has reported information on its accounting of Kyoto Protocol units in accordance with section I.E of the annex to decision 15/CMP.1, and used the SEF tables as required by decision 14/CMP.1.
17. The national system continues to perform its required functions as set out in the annex to decision 19/CMP.1.
18. The national registry continues to perform the functions set out in the annex to decision 13/CMP.1 and the annex to decision 5/CMP.1, and continues to adhere to the technical standards for data exchange between registry systems in accordance with relevant decisions of the Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol (CMP). However, the ERT reiterates the finding contained in the SIAR indicating that Slovenia does not have the public information referred to in paragraphs 45–48 of the annex to decision 13/CMP.1 available on the website of its national registry.

19. The ERT encourages Slovenia to explore the possibility of structuring its reporting, in its next annual submission, following the annotated outline of the NIR, and the guidance contained therein, that can be found on the UNFCCC website.⁴

20. In the course of the review, the ERT formulated a number of recommendations relating to: the completeness of Slovenia's annual submission (see paras. 9 and 10 above); its transparency (see para. 35 below); the underlying assumptions for expert judgments used to estimate uncertainties (see para. 29 below); the explanations provided for recalculations (see para. 31 below); and the description of QA/QC procedures (see paras. 32, 33 and 34 below). For all sector-specific recommendations, the relevant sector chapters of this report should be consulted.

F. A description of the institutional arrangements for inventory preparation, including the legal and procedural arrangements for inventory planning, preparation and management

1. Overview

21. The ERT concluded that the national system continued to perform its required functions.

22. The NIR and additional information submitted by the Party during the review describe the national system and institutional arrangements for the preparation of the inventory. The Environmental Agency of the Republic of Slovenia is the single national entity with overall responsibility for the national inventory. Other organizations are also involved in the preparation of the inventory: for energy statistics, the Ministry of Energy and Energy Directorate; the Statistical Office of the Republic of Slovenia as the main source of all statistical information; the Ministry of Transport, Directorate for National Roads, and Ministry of Internal affairs for information relating to transport, including on vehicle fleet; and the Agricultural Institute of Slovenia and Slovenian Forestry Institute for information relevant to the agriculture and LULUCF sectors. A memorandum of understanding was concluded with the institutions that participate in the preparation of the inventory, binding these institutions to submit to the Environmental Agency good-quality and verified data in a timely manner.

23. During the review week, in response to questions raised by the ERT, Slovenia provided information on its staff arrangements for the preparation of its inventory and on the public availability of its inventory online. Slovenia also provided, during the review week, information indicating that its arrangements to report on activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol are the same as for its reporting on the LULUCF sector.

24. In addition, the NIR provides information on a change in the national system since the previous annual submission, which is discussed in chapter VII.B of this report.

2. Inventory planning

25. The Environmental Agency of the Republic of Slovenia is in charge of Slovenia's GHG inventories. It cooperates with other institutions and administrative bodies, which provide activity data (AD) and other parameters needed in the inventory development process (see para. 22 above). Slovenia indicated in its NIR that the chief sources of data are the Statistical Office of the Republic of Slovenia and the Ministry of Environment and Spatial Planning.

26. In 2009, Slovenia continued to implement its QA/QC plan, as recommended by the IPCC good practice guidance. This plan includes a number of QC checks, incorporated into an Oracle database, which allows for the collection and archiving of AD, EFs and other parameters used in the inventory, including a description of the data sources used since 1986 for the calculation of the Party's GHG emission estimates. A function to enable the automatic transfer of data to the CRF tables is under

⁴ <http://unfccc.int/files/national_reports/annex_i_ghg_inventories/reporting_requirements/application/pdf/annotated_nir_outline.pdf>.

development. During the review week, in response to questions raised by the ERT, Slovenia provided information regarding an independent peer review of the energy sector by the Energy Efficiency Centre of Slovenia, and indicated that the outcomes of this peer review would be used to plan improvements to the inventory. The ERT recommends that Slovenia report in its next annual submission on how it intends to ensure that all sectors are considered in the peer review, while at the same time ensuring the continuation of the peer review activities for the rest of the commitment period.

3. Inventory preparation

Key categories

27. Slovenia has reported a key category tier 1 analysis, both level and trend assessment, as part of its 2009 submission. The key category analysis performed by the Party and that performed by the secretariat⁵ produced different results, owing to the more detailed level of disaggregation used by the Party. Slovenia has included the LULUCF sector in its key category analysis, which was performed in accordance with the IPCC good practice guidance and the IPCC good practice guidance for LULUCF. Slovenia uses its key category analysis as a driving factor for the preparation of its inventory and to prioritize its future development and improvement.

28. Slovenia is planning to implement a tier 2 key category analysis for its 2010 submission. The ERT welcomes this plan and encourages the Party to implement this improvement.

Uncertainties

29. Slovenia has provided a tier 1 uncertainty analysis in an annex to its NIR. The uncertainties of AD and EFs were estimated mostly using expert judgment. Total uncertainties, both level and trend assessment, were calculated. Detailed results of this analysis have been included in an annex to the NIR. Since expert judgments vary between experts, the highest individual uncertainties were taken into account. However, a clear description of the judgments and assumptions made has not been presented in the NIR. Slovenia explained that it is planning to improve in its 2010 submission some descriptions of the expert judgments used, but considerable improvement to the uncertainty estimates and the descriptions of the approaches used is not expected until the 2011 submission. The previous ERT recommended that Slovenia include in its NIR information on the methods used and descriptions of the expert judgment applied in its uncertainty analysis. The present ERT reiterates this recommendation and also recommends that Slovenia use its uncertainty analysis to prioritize improvements to its inventory.

Recalculations and time-series consistency

30. Recalculations have been performed and reported in accordance with the IPCC good practice guidance. The ERT noted that the main recalculations reported by the Party occurred in the energy sector for the whole time series (1986–2006). The ERT also noted that: the aforementioned recalculations included more detailed calorific values obtained from individual thermal power plants; some AD have been slightly changed owing to the harmonization process between the reporting to Convention on Long Range Transboundary Air Pollution and the UNFCCC, and to the availability of new data on vehicle fleet; in the industrial processes sector, errors in the calculation of CO₂ emissions from ferroalloys and aluminium production for 2003–2006 have been corrected; in the waste sector, changes have been made to N₂O emissions from human sewage for 1986–1995 and

⁵ The secretariat identified, for each Party, the categories that are key categories in terms of their absolute level of emissions, applying the tier 1 level assessment as described in the IPCC good practice guidance for LULUCF. Key categories according to the tier 1 trend assessment were also identified for Parties that provided a full set of CRF tables for the base year or period. Where the Party performed a key category analysis, the key categories presented in this report follow the Party's analysis. However, they are presented at the level of aggregation corresponding to a tier 1 key category assessment conducted by the secretariat.

2003–2006 on the basis of a new data set on population; and that changes have been made to data on wastewater handling and any errors in the sector corrected.

31. The major changes, and the magnitude of the impact, include decreases in the estimates of total GHG emissions for the base year (0.002 per cent) and for 2006 (0.1 per cent). The rationale for these recalculations has been provided in the chapter on recalculations in the NIR and in CRF table 8(b). However, the ERT noted that category-specific explanations for the recalculations in the sectors referred to in paragraph 30 above were poor and not transparent and the ERT was not able to assess in comprehensive way the impact of the recalculations on time-series consistency and inventory improvement. Therefore, the ERT recommends that Slovenia provide more category-specific information on the reasons for recalculations and the underlying data, in its next inventory submission. For further information on recalculations, the relevant sector chapters of this report should be consulted (see paras. 46, 60, 95 below).

Verification and quality assurance/quality control approaches

32. The NIR includes the QA/QC plan and provides a description of the Party's QA/QC and verification procedures, which follow the tier 1 approach of the IPCC good practice guidance and are in line with the UNFCCC reporting guidelines. Slovenia reported that it is finalizing the development of a database where the following QC checks will be performed automatically: checks of changes to methodology and data resulting in recalculations; completeness checks; checks of AD, EFs and other parameters; and checks of emission estimates. During the review, Slovenia informed the ERT that it is planning to implement tier 2 QA/QC procedures for key categories for its 2011 submission. The ERT recommends that Slovenia include a detailed description of the aforementioned database in its next annual submission.

33. Slovenia partly followed the recommendation made in the previous review report⁶ by adding subchapters in its NIR with information on sector-specific QA/QC procedures for: fuel combustion, the industrial processes sector, emissions from agricultural soils, and the waste sector. However, during the review, the ERT noted that the description of sector-specific QA/QC procedures is very general and could be improved, for example by expanding on the description of QC activities. The present ERT recommends that the Party follow the recommendation of the previous ERT further, by adding category-specific descriptions of QA/QC and providing a sample of the completed tier 1 QC tables in an annex to the NIR.

34. The ERT found a number of inconsistencies between the descriptions provided in the CRF tables and those in the NIR of the methods used for inventory development. The Party took note of this finding and promised to correct it in its next annual submission. The ERT recommends that Slovenia increase its efforts to implement its QA/QC plan, including sector-specific QA/QC activities, and document how the QA/QC procedures have been implemented, in its next annual submission.

Transparency

35. The NIR, together with the information provided by the Party during the review, provides much of the information necessary to assess the inventory. Slovenia has completed CRF table 9(a) on categories reported as "NE" and included elsewhere, and has provided information on its use of the notation keys, which increased the transparency of the reporting. However, there is still room for improvement. The most common problem in this inventory submission is a lack of transparency, as the NIR lacks explanations for AD, EFs and other parameters used in the inventory, with the exception of those used in the energy sector. The ERT recommends that Slovenia continue to improve the transparency of its inventory by providing more detailed methodological descriptions and the rationale

⁶ FCCC/ARR/2008/SVN.

for its selection of specific EFs. Sector-specific recommendations identified by the ERT in relation to the transparency of Slovenia's inventory are described in detail in the sector chapters of this report.

4. Inventory management

36. Slovenia has a centralized archiving system at its Environmental Agency, which includes the archiving of supporting data and references, and of the inventory submissions, stored in electronic format and/or in hard copy. The ERT noted that a more elaborate description of what is archived and how it is stored was given by the Party in its 2008 submission. Therefore, the ERT recommends that Slovenia include and expand on this description in its next annual submission.

37. The NIR also contains a description of a GHG database (Emission Inventory Information System) under development, which will include the archiving of disaggregated EFs and AD, and documentation on how these factors and data have been generated and aggregated for the preparation of the inventory. The archived information will also include internal documentation on QA/QC procedures, external and internal reviews, and documentation on annual key categories and key category identification and planned inventory improvements. During the review, the ERT was provided with the requested additional archived information. The ERT recommends that Slovenia include a full description of the new database in its next annual submission.

G. Follow-up to previous reviews

38. The ERT found that, in its 2009 inventory submission, Slovenia did implement some of the recommendations made in the previous review report, thus improving its inventory, such as:

- (a) The inclusion in the NIR of a summary of the QA/QC plan in English and the assignment of a QA/QC manager;
- (b) The addition in the NIR of subchapters with information on sector-specific QA/QC procedures;
- (c) The completion of CRF table 7 on key categories for the base year and for 2006 and 2007, thus improving completeness;
- (d) The performance of an independent peer review of the energy sector;
- (e) The presentation in the NIR of information on the Party's process for approving the national GHG inventory.

39. The main recommendations made in the previous review report which have not been implemented by Slovenia in its 2009 inventory submission include:

- (a) The revision of the uncertainty assessment, following the IPCC good practice guidance more closely, and the inclusion in the NIR of information on the methods used in this assessment and descriptions of the expert judgment applied;
- (b) The inclusion of a complete and consistent time series for fluorinated gases (F-gases).

H. Areas for further improvement

1. Identified by the Party

40. The 2009 NIR identifies several areas for improvement. Slovenia indicated that it is working toward:

- (a) The provision of more detailed information in the NIR on estimation methodologies and EFs used;

- (b) The improvement of the documentation of QC at all stages of inventory preparation;
- (c) The inclusion in the NIR of more descriptions of the fluctuations in trends;
- (d) The performance of an independent peer review of estimated emissions from wastewater in 2009;
- (e) The continued implementation of sectoral QC procedures;
- (f) The improvement and documentation of uncertainty estimates;
- (g) The QC of the uncertainty analysis;
- (h) The preparation of a tier 2 key category analysis and its use to prioritize inventory improvements;
- (i) The use of chemical analyses of the natural gas distributed in the country to calculate the country-specific EF for CO₂ emissions from combustion of natural gas;
- (j) The estimation of CH₄ emissions from closed coal mines;
- (k) The separation of the amount of fuel used by the military and police from international bunker fuels;
- (l) The improvement of the reporting on the LULUCF sector;
- (m) The estimation of the amount of waste incinerated from clinics and international flights.

2. Identified by the expert review team

41. The ERT identifies the following cross-cutting issues for improvement:
- (a) The use of the uncertainty analysis to prioritize improvements to the Party's GHG inventory;
 - (b) The continuation of peer review activities for the remaining non-reviewed sectors;
 - (c) The inclusion in the next annual submission of an improved description of the Party's institutional arrangements with regard to staff arrangements for inventory preparation and the public availability of the inventory;
 - (d) The enhancement of the availability of the public information referred to in paragraphs 45 to 48 of the annex to decision 13/CMP.1, and the reporting, in the Party's next annual submission, of any changes to that public information;
 - (e) The improvement of transparency by providing more explanation of trends, AD, EFs and other parameters used in the inventory.
42. Recommended improvements relating to specific categories are presented in the relevant sector chapters of this report.

II. Energy

A. Sector overview

43. The energy sector is the main sector in the GHG inventory of Slovenia. In 2007, emissions from the energy sector amounted to 16,688.36 Gg CO₂ eq, or 80.5 per cent of total GHG emissions (stated as 80.6 per cent in the NIR). Since 1986, emissions have increased by 3.9 per cent. The key driver for the

rise in emissions is the growth in emissions from road transportation, which rose by 165.3 per cent from 1986 to 2007. Within the sector, 39.5 per cent of the emissions were from energy industries, followed by 32.3 per cent from transport, 14.0 per cent from manufacturing industries and construction and 11.4 per cent from other sectors. Fugitive emissions from solid fuels accounted for 2.6 per cent and fugitive emissions from oil and natural gas for 0.2 per cent of the sectoral emissions.

44. With regard to the energy sector, the reporting of EFs and AD is generally transparent. Tables of the EFs used by Slovenia have been provided throughout the NIR, generally with appropriate citations (with the exception of CO₂ emissions from transport). Data on fuel consumption for the entire time series have been provided for relevant categories in the annexes to the NIR, except for the category other sectors. The ERT recommends that Slovenia include this currently missing information in its next annual submission.

45. The ERT identified a number of categories that have been reported as “NE” by the Party. In response to a question raised by the ERT on this issue, the Party indicated that it would address in its next annual submission the completeness of its inventory with regard to the energy sector, by reporting estimates of CO₂ emissions from transmission of natural gas, which is currently reported as “NE”.

46. Limited information has been provided in the Party’s NIR on the drivers for the trends observed in the energy sector, which does reduce transparency. In addition, Slovenia has provided limited explanation for any recalculations, and the level of information provided does vary between categories. The quantitative results of the recalculations for the categories in the energy sector have been provided in the chapter of the NIR on recalculations, whereby the energy sector shows the largest changes in emission estimates. Very little information has been provided at the relevant category level on these recalculations. The ERT recommends that Slovenia provide more information, including information justifying any recalculations that reduced, in particular, the emission estimates in the energy sector, in its next annual submission.

47. Incomplete information has been provided with regard to uncertainties. General information has been provided on the overall uncertainty of the energy sector, but this is not complete enough to provide an understanding of the uncertainties for the respective categories. Incomplete information has also been provided on verification procedures and QA/QC in the energy sector. The main QA/QC activity specified is the comparison of data from the European Union emissions trading scheme (EU ETS) with statistical data on fuel consumption. No other QA/QC activities specific to the energy sector have been mentioned. The ERT recommends that Slovenia expand its discussion on uncertainties and QA/QC in relation to the energy sector, in its next annual submission.

48. The ERT noted some transcription errors between Slovenia’s calculations and the information reported by the Party in its NIR. For example, the N₂O EFs presented in table 3.29 and the values for energy intensity presented in table 3.41 of the NIR do not match the actual values used by Slovenia in its calculations. The ERT recommends that Slovenia integrate the checking of the information presented in the NIR into its QA/QC procedures.

B. Reference and sectoral approaches

1. Comparison of the reference approach with the sectoral approach and international statistics

49. Slovenia calculated fuel consumption and CO₂ emissions from fossil fuel combustion using the reference and sectoral approaches for all years in the time series. In 2007, energy consumption calculated using the reference approach is 0.5 per cent higher than energy consumption calculated using the sectoral approach. The estimate of CO₂ emissions is 0.4 per cent higher as calculated using the reference approach than using the sectoral approach. The difference between the approaches varies over the time series, with the greatest convergence shown in 2007. Slovenia has provided a tabular summary for comparison of the estimates calculated using the two approaches in tables 3.2 and 3.3 of the NIR, and

further information in the annexes to the NIR. Detailed explanations for the differences in estimates calculated using the two approaches have not been provided in either the main body of the NIR or in the annexes. Given that generally the estimates calculated by the Party using the reference approach are higher than those calculated using the sectoral approach, the ERT encourages Slovenia to provide more explanation for the differences, especially in relation to the earlier years of the time series, as they could be an indication of a possible underestimation of CO₂ emissions calculated using the sectoral approach.

50. The ERT identified differences between Slovenia's fuel data and the energy balances published by the International Energy Agency. These differences were also identified in previous review reports, but Slovenia has not been able to fully explain the discrepancies. Therefore, the present ERT reiterates the finding of previous ERTs, and encourages Slovenia to investigate these differences and explain them in its next annual submission.

2. International bunker fuels

51. Slovenia has provided limited information, as in previous submissions, on international bunker fuels. For marine bunkers, Slovenia has explained its allocation of fuel to domestic and international use throughout the time series. For aviation bunkers, Slovenia assumed that all jet kerosene was used in international aviation, as there was no domestic commercial air traffic. During the review, the ERT inquired as to the possible use of jet kerosene in domestic aircraft, such as helicopters and turboprop airplanes, as well as in military aircraft on domestic operations. Slovenia responded that, upon further investigation, there were available data on the use of jet kerosene by police and the military. Slovenia indicated that it is planning to exclude jet kerosene used by the military and police from international bunkers and report it under civil aviation, and also to include fuel used by the army on international missions under multilateral operations, in its next inventory submission. Slovenia provided the ERT with a table containing estimates of the emissions from civil aviation, international bunkers and aviation, and multilateral operations, to be reported in its next annual submission. The ERT recommends that Slovenia include this information in its next annual submission.

3. Feedstocks and non-energy use of fuels

52. Slovenia has reported on the non-energy use of oil and lubricants, and of coke and petroleum coke, consistent with the Revised 1996 IPCC Guidelines. Slovenia has also reported on the natural gas used in methanol production, and stated its assumption that 100 per cent of the carbon in natural gas is stored either in the methanol product or emitted as carbon monoxide. As noted in previous review reports, Slovenia has referenced the Revised 1996 IPCC Guidelines, but did not use the IPCC default fraction of carbon stored for natural gas (33 per cent). The ERT reiterates the recommendation made in previous review reports that the Party should justify its use of this 100 per cent storage factor for natural gas used as feedstock in methanol production, especially justifying the reaction efficiency and the limitation of by-products (other than carbon monoxide). The ERT also recommends that Slovenia specify whether emissions from the fraction of carbon not stored in lubricants have been reported in any category. From information provided in response to questions raised by the ERT during the review, it appeared that the emissive fraction of lubricants (i.e. the fraction of carbon that was not stored in the lubricants) was not included under the energy sector, and the ERT recommended that Slovenia report emissions from the 50 per cent fraction of lubricants that is not considered stored, consistent with the Revised 1996 IPCC Guidelines. During the review process, Slovenia provided further information indicating that, according to statistical data, all lubricants in Slovenia were used for non-energy purposes, and that no other use of lubricants as fuel has been recorded in Slovenia until now. The Party indicated that, in the reference approach, it used a default fraction of 50 per cent stored carbon, but that it plans to use country-specific values in the future, which are in the range of 77–95 per cent carbon stored. The ERT recommends that Slovenia include this information in its next annual submission.

C. Key categories

1. Stationary combustion: solid fuels – CO₂

53. Slovenia has presented in its NIR information on the EFs and AD used for solid fuels, including lignite, brown coal and sub-bituminous coal. The values for lignite were based on the domestic production of lignite, and the information presented in the NIR is fairly transparent. For the other types of coal, namely brown coal and sub-bituminous coal, information is lacking in the NIR as to how the AD were used in the calculations and how the EFs were derived. In response to questions raised by the ERT during the review, Slovenia clarified that the brown coal is from a domestic mine, and is actually closer in terms of its composition to lignite, and that the sub-bituminous coal is imported. Slovenia also clarified that the majority of the coal in the country is consumed in four plants, under the category public electricity and heat production, which are now subject to regular sampling of the properties of their fuels, as required by the EU ETS. The EFs used appeared appropriate and in line with the country-specific EFs derived for domestic lignite. However, the ERT recommends that Slovenia increase the transparency of its reporting on coal consumption by expanding its discussion on the coal used in stationary combustion, and provide more detailed information on the exact EU ETS requirements that the four plants mentioned above are subject to.

2. Road transportation: gasoline and diesel oil – CO₂

54. Slovenia used the COPERT III model to calculate emissions from road transportation. The CO₂ implied emission factors (IEFs) for road transportation were very unusual, as the CO₂ IEF for gasoline was higher than that for diesel oil. In addition, the CO₂ IEF for diesel oil was lower than the IPCC default factor (and was used to calculate emissions from the use of diesel oil in other categories in the energy sector). In response to questions raised by the ERT during the review, Slovenia explained that the COPERT III model contains default CO₂ EFs which were used in the calculations. This, however, does not explain why the CO₂ IEF for diesel oil appears to be too low. The ERT recommended during the review process that Slovenia check the EFs applied, ensure that AD were accurately supplied to the COPERT III model, and revise the estimates of emissions from road transportation as appropriate. In response to this recommendation, Slovenia indicated that, after a thorough examination of all of the input data, the model calculation and the data reported in the CRF tables, the estimates of CO₂ emissions from road transportation reported in the CRF tables were accurate. The ERT recommends that Slovenia undertake such an examination as part of its QA/QC procedures for its next annual submission, as well as explain why the CO₂ IEF for diesel oil is lower than expected.

3. Other sectors: all fuel types – CO₂, CH₄ and N₂O

55. For the category other sectors, the AD used to calculate emissions from the subcategories commercial/institutional and residential were not transparent, as these subcategories were the only ones in the energy sector for which data on fuel consumption have not been provided in the annexes to the NIR. In response to a question raised by the ERT during the review, Slovenia provided additional tables showing data on fuel consumption for these subcategories. The ERT found this information useful, and recommends that Slovenia include these tables, alongside the other tables containing data on the energy sector, in annex 2 to the NIR in its next annual submission.

D. Non-key categories

Fugitive emissions: natural gas – CH₄

56. There is a declining trend in the IEF for fugitive CH₄ emissions from natural gas distribution and transmission. In the NIR, Slovenia has reported that a West German EF was used for pipeline built after 1995, on the basis of a research project by the Economic Interest Association of Natural Gas Distributors. In response to a question raised by the ERT during the review, Slovenia provided

additional information showing the trends in pipeline expansion in the country by pipeline material, and proving that all new pipelines had been built in accordance with European Union legislation and standards. The ERT noted that the trend in pipeline expansion for pipelines built using the new material logically matched the declining trend in the IEF. The ERT recommends that Slovenia highlight this relevant information in its next annual submission.

III. Industrial processes and solvent and other product use

A. Sector overview

57. In 2007, emissions from the industrial processes sector amounted to 1,225.49 Gg CO₂ eq, or 5.9 per cent of total GHG emissions, and those from the solvent and other product use sector amounted to 42.16 Gg CO₂ eq, or 0.2 per cent of total GHG emissions. Since the base year (1986 for CO₂, CH₄ and N₂O, and 1995 for HFCs, PFCs and SF₆), emissions have decreased by 7.7 per cent in the industrial processes sector, and decreased by 48.5 per cent in solvent and other product use. The key driver for the fall in emissions in the industrial processes sector is the reported decrease in PFC emissions, down from 285.68 Gg CO₂ eq in 1985 to 91.69 Gg CO₂ eq in 2007 (-67.9 per cent). The fall in emissions has also been explained in the NIR to be due to the use of improved technologies for aluminium production. Within the industrial processes sector, 57.4 per cent of the emissions were from mineral products, followed by 27.1 per cent from metal production, 12.2 per cent from consumption of halocarbons and SF₆, and 3.3 per cent from chemical industry.

58. Slovenia's inventory for 2007 is satisfactorily complete, incorporating emission estimates for all categories in the industrial processes sector, with the exception of potential emissions of F-gases. Slovenia has continued to report emissions of HFCs as "NE" for some subcategories, while reporting emissions from the other subcategories, as well as emissions of PFCs and SF₆, as not occurring ("NO"), citing lack of data as the reason. The ERT recommends that Slovenia report potential emissions of F-gases, and emissions from subcategories which are currently reported as "NE", in its next annual submission. Other categories reported as "NE" in the CRF tables include CO₂ and N₂O emissions from degreasing, dry cleaning, and manufacture and processing of chemical products; and N₂O emissions from fire extinguishers and aerosol cans. It has been noted in the CRF tables that methodologies for these categories are not provided in either the Revised 1996 IPCC Guidelines or the IPCC good practice guidance.

59. With regard to the industrial processes sector, the methodological sections of Slovenia's NIR have been improved, although further improvement could be made to the description of data sources and EFs. The description of the division of emissions from metal production between the energy and industrial processes sectors could be more detailed. The ERT encourages Slovenia to provide clear information on how emissions from iron and steel production are divided between the energy and industrial processes sectors, in its next annual submission.

60. The ERT noted that any issues with the time series have not been clearly explained in Slovenia's NIR, such as the reasons behind significant changes in the emission trends. In some categories, different EFs were used over different time periods, but no clear explanation for this has been provided. The ERT also noted that Slovenia has not provided sufficient reasons for any recalculations made. The ERT recommends that Slovenia provide clear explanations for emission trends and EFs used, and the reasons for recalculations in the industrial processes sector, in its next annual submission.

61. Uncertainty estimates have been provided consistently for the industrial processes sector. However, these uncertainty estimates were based mainly on expert judgment, rather than being calculated using the statistical methods documented in the IPCC good practice guidance. Also, Slovenia has not provided any sector-specific information on verification, quality control and assessment procedures. The ERT encourages Slovenia to use statistical methods to quantify uncertainties, and recommends that

Slovenia include sector-specific information on quality control and uncertainty assessment in the NIR of its next annual submission.

62. Slovenia has not followed up on the majority of the recommendations made in previous review reports in relation to the industrial processes sector. Examples of the main recommendations made by the previous ERT that remain to be implemented are the inclusion of: information provided during the previous review, such as documentation on EFs before 2005 and information showing that the estimated CO₂ emissions from cement production are comparable and consistent with the emissions reported under the EU ETS, in the Party's NIR (see para. 63 below); a complete and consistent time series for F-gases in the Party's next annual submission (see para. 66 below); and the explanations provided during the previous review in response to questions raised by the ERT, in the NIR of the Party's next inventory submission.

B. Key categories

1. Cement production – CO₂

63. Slovenia has reported in its NIR estimates of CO₂ emissions from cement production, calculated using data on clinker in accordance with the IPCC tier 2 methodology. Data on clinker were obtained from the Statistical Office of the Republic of Slovenia for the period 1986–1998, and directly from the two plants that produce cement for the years 1999–2007. Slovenia used the average plant-specific EF for the period 1999–2004 (541 kg CO₂/t clinker), but the Party used a different approach to calculate the annual EF for 2005–2007 on the basis of plant-specific conditions of production, reported under the EU ETS. In order to ensure time-series consistency, the ERT reiterates the recommendation made in the previous review report that Slovenia include in its next annual submission documentation on EFs for both before and after 2005, and information to show that the estimated CO₂ emissions from cement production are comparable and consistent with the emissions reported under the EU ETS.

2. Lime production – CO₂

64. The ERT noted that the Party has indicated in its NIR that the EF for lime production (0.749 t CO₂/t lime) for 1986–2004 was based on country-specific raw materials. The ERT also noted that changes in the CO₂ IEF from 2004 to 2005 and 2006 were large compared with other inter-annual changes. In response to questions raised during the review in relation to the time-series consistency of these data, Slovenia indicated that data on lime production after 2005 were obtained from the EU ETS, and that these data had been verified annually by independent verifiers. In addition, Slovenia explained that the EFs for lime production were calculated annually on the basis of data obtained from the country's three lime producers, giving rise to fluctuation in the EF over the period 2005–2007. The ERT was satisfied with Slovenia's response, and recommends that the Party include the explanation provided during the review as part of the methodological description for this category in its next annual submission.

3. Aluminium production – CO₂ and PFCs

65. Slovenia has reported in its NIR that there is one aluminium producer in the country and that data on the emissions from aluminium production are submitted by this producer on a regular basis. The ERT noted the decreasing trend in the tetrafluoromethane and hexafluoroethane EFs from 1995 to 2005, from 0.519 kg/t to 0.109 kg/t and 0.0519 kg/t to 0.0125 kg/t, respectively. In response to questions raised by the ERT, Slovenia provided information to account for these changes in the EFs, indicating technological changes and improved operating conditions in the aluminium production process as the reasons. The ERT strongly recommends that Slovenia include this information in its next annual submission.

4. Refrigeration and air-conditioning equipment – HFCs

66. The ERT noted that Slovenia has not provided in its NIR a complete inventory for F-gases. Potential emissions have been reported only for 1995–1997, and actual emissions from fire extinguishers and from refrigeration and air-conditioning equipment have generally been kept constant for the period 1999–2007. In response to these issues of completeness raised by previous ERTs, Slovenia indicated that there were not enough data available to estimate these emissions. The ERT reiterates the recommendations of the previous ERTs with regard to these issues, and strongly recommends that Slovenia complete its inventory for F-gases, in its next annual submission.

C. Non-key categories

1. Soda ash production – CO₂

67. The ERT noted that Slovenia has reported in its NIR a negligible amount of soda ash produced. Emissions from soda ash production have not been included in the 2009 annual submission. In response to questions raised during the review as to whether information on the amounts of soda ash produced was available, Slovenia provided a table with data on soda ash production for 2000–2007. The Party also indicated that these emissions had not been estimated because it did not know the soda ash production process or what EFs should be used. The ERT recommends that Slovenia find a way of estimating emissions from soda ash production, if applicable, and that the Party use IPCC default values if country-specific EFs are not available.

2. Ferroalloys production – CO₂

68. The ERT noted that Slovenia has reported recalculations of the emissions from ferroalloys production, resulting in decreases in the emission estimates. According to the Party, these recalculations were prompted by the existence of errors in the previous data. In response to questions raised by the ERT as to the transparency of these recalculations, Slovenia explained that the recalculations were due to new data being received from the ferroalloys producers. The ERT recommends that Slovenia provide the reasons for these recalculations, along with information on the checks on the quality of the corresponding data, in its next annual submission.

3. Consumption of halocarbons and sulphur hexafluoride – SF₆

69. The ERT noted a discrepancy in the CRF tables for 1986 between the total potential SF₆ emissions reported and the potential SF₆ emissions reported under electrical equipment. The total is twice the amount reported under electric equipment. The ERT recommends that Slovenia correct this discrepancy in its next annual submission.

IV. Agriculture

A. Sector overview

70. In 2007, emissions from the agriculture sector amounted to 2,082.08 Gg CO₂ eq, or 10.0 per cent of total GHG emissions. Since 1986, emissions have decreased by 10.8 per cent. The key driver for the fall in emissions is the decrease in the animal population. Within the sector, 36.7 per cent of the emissions were from agricultural soils, followed by 32.9 per cent from enteric fermentation and 30.4 per cent from manure management. CH₄ contributed 54.9 per cent while N₂O contributed 45.1 per cent of the total sectoral emissions.

71. The reporting on the agriculture sector lacks clarity in Slovenia's NIR: none of the 10 figures and two tables included in the agriculture section of the NIR has been explicitly referred to in the text. These figures are useful because they explain trends in emissions or in AD, but the fact that they have not always been explained or referred to in the text makes it difficult for the reader. Therefore, the ERT

recommends that, in order to improve the readability of the NIR, Slovenia explain or refer to all of the incorporated figures in the main text of the NIR, in its next annual submission.

72. Slovenia is planning improvements to the methodologies and EFs applied in the categories enteric fermentation and manure management; for example, the methodology for deriving CH₄ EFs for dairy and non-dairy cattle will be revised for the 2010 submission. The Party is encouraged to make these improvements and report on them in its 2010 annual submission.

73. During the previous review, the previous ERT recommended that Slovenia review the national QA/QC plan and prepare specific procedures for the agriculture sector. The Party was also asked to provide information on or references for the sectoral uncertainty analysis. These two issues have not been addressed in the 2009 inventory submission; therefore, the present ERT reiterates the above-mentioned recommendations of the previous ERT and asks that Slovenia provide the requested information in its next NIR.

B. Key categories

1. Enteric fermentation – CH₄

74. Average milk production per cow doubled between 1986 and 2007; however, although an equation was developed for this purpose, this factor was not taken into consideration when calculating emissions from enteric fermentation. Slovenia has indicated in its NIR that it plans to revise its present estimation methodology for the 2010 submission, which will necessitate the annual reporting of all supplementary parameters, such as gross energy intake, body weight of the cows and digestibility of their feed. The ERT welcomes this development and encourages the Party to begin using the revised methodology for the 2010 submission as planned. The present ERT reiterates the recommendation of the previous ERT that the Party provide an explanation for the aforementioned increase in milk production and explain how time-series consistency is ensured, in its next annual submission.

75. During the previous review, the previous ERT recommended that Slovenia review the CH₄ IEF for swine (1.61 kg/head/year), which was high in comparison with the IPCC default value (1.5 kg/head/year). The Party has since validated its value, giving the reason that swine on family farms have higher body masses than those on commercial market-oriented farms. The ERT accepts this value on the understanding that the Party does not have data available on the slaughter weights of its pigs, which would result in more accurate IEFs. The ERT encourages the Party to start collecting these data and provide information on its progress in its next annual submission.

2. Manure management – CH₄

76. The ERT noted that Slovenia has not followed the recommendation made in the previous review report that it review the estimation methods used and improve transparency by explaining the high value of the CH₄ IEF for non-dairy cattle (20.91 kg/head/year) for 2006. The Party indicated that this was because it has reported emissions from suckling cows together with emissions from non-dairy cattle, and because it used a CH₄ conversion factor for liquid animal waste management systems in a cool climate of 39 per cent, as recommended in the IPCC good practice guidance. The present ERT reiterates the recommendation of the previous ERT that the Party review its estimation methods for this category and improve transparency by explaining the reason for the high IEF, in its next annual submission.

3. Manure management – N₂O

77. The present ERT noted that Slovenia has not followed the recommendation of the previous ERT that it provide clear information on its collection of AD and the methodology used for ammonia accounting. The ERT reiterates this recommendation and requests that Slovenia provide this information in its next annual submission.

4. Direct soil emissions – N₂O

78. The ERT noted that Slovenia has not followed the recommendation made in the previous review report regarding the Party's use of a constant value for the area of organic soils cultivated (6,665 ha) for the entire period 1996–2007. The Party indicated that this value was determined in 2002. The present ERT reiterates the recommendation of the previous ERT that the Party update the information on cultivation of organic soils, in its next annual submission, in order to account for any changes that might have occurred since 2002.

5. Indirect soil emissions – N₂O

79. The ERT noted the recommendation made in the previous review report regarding Slovenia providing information on further improvements to the estimates of indirect N₂O emissions from agricultural soils by considering using a higher leaching and run-off factor for big farms and by differentiating between areas of intensive and non-intensive livestock production. In response to the draft report, Slovenia clarified that improvement of the estimates of indirect N₂O emissions from agricultural soils has been excluded from the improvement plans due to the lack of financial and human resources. The present ERT, noting that N₂O emissions from agricultural soils is a key category, encourages Slovenia to consider possibilities to improve the estimates if resources are made available and to communicate any such possibilities in future inventory submissions.

V. Land use, land-use change and forestry

A. Sector overview

80. In 2007, net removals from the LULUCF sector amounted to 5,774.35 Gg CO₂ eq. Slovenia has reported a 263.3 per cent increase in net removals from 1986 to 2007. The driver for the rise in removals is the increase in living biomass in forests. Initially, Slovenia reported on the category forest land remaining forest land only. All other categories in the LULUCF sector were reported as not applicable ("NA"), "NE" and/or "NO". The ERT noted that the NIR included information for until 2006 only.

81. However, during the review Slovenia presented updated information on the LULUCF sector, and the ERT noted that this updated information included a more elaborate inventory. Therefore, the analysis provided in the LULUCF chapter of this report is based on the updated information, as this will provide the basis for the Party's future reporting.

82. Slovenia included estimates for the categories land converted to forest land, cropland remaining cropland, land converted to cropland, grassland remaining grassland, and land converted to grassland for the years 1998–2007 in the updated information. The ERT welcomes this development. The estimate of net removals in the revised submission was 10,952.58 Gg CO₂ eq. Within the sector, 11,371.27 Gg CO₂ eq of the removals were from forest land. The other reported land-use categories acted as net sources. For wetlands, settlements and other land, as well as for agricultural lime application, emissions and removals have been reported as "NE", "NO" and/or "NA".

83. Slovenia provided revised data from its national forest inventories and from updated maps of agricultural land use. From these two data sources a land-use change matrix has been developed for the period 1998–2007 and provided in the NIR. A linear interpolation was applied to the data within this time period.

84. To increase transparency, the ERT recommends that Slovenia provide land-use matrices in a form recommended in the IPCC good practice guidance for LULUCF, indicating clearly the initial and final stage of the land-use conversion and including figures for the unchanged area of land under a given land-use category. The ERT found that some minor land-use changes (e.g. the conversions of the whole area of wetlands) were not reflected in the land-use change matrix, which might be the reason why the

ERT found inconsistencies in the data on land use. The ERT recommends that Slovenia ensure that the method of land use determination include all land-use changes in the land-use matrix for the sake of consistency, even if Slovenia judges them to be of high uncertainty. The ERT also recommends that the Party complete the time series for as far back as the base year and, if appropriate, provide recalculations on the basis of this updated time series. The ERT further recommends that Slovenia make the data provided in the NIR fully consistent with those reported in the CRF tables.

85. Slovenia has provided information on planned improvements and recalculations for the LULUCF sector. It expects the time series 1986–1997 to be completed in the next reporting year. In addition, Slovenia indicated that it is working on improving its soil database. It will also improve its emission and removals estimates and uncertainty analysis for the LULUCF sector thanks to ongoing projects. The ERT welcomes these planned efforts, as the currently reported uncertainty estimates are rather high and incomplete.

B. Key categories

Forest land remaining forest land – CO₂

86. The estimate of removals provided by Slovenia in the updated information is almost 90 per cent higher than the estimate in the original official submission. This increase is due to the use of newly available data from the Party's second national forest inventory. Having data from its forest inventories for 2000 and 2007 at its disposal, Slovenia decided to change from the default method to a stock-change approach to estimate the change in carbon stock in living biomass. Using the stock-change approach, Slovenia has reported data on net changes in carbon stock only, reporting no data on gains and losses in living biomass. Since Slovenia has statistics on the harvested volume of its forest, for the sake of transparency, the ERT invites Slovenia to provide this information. To make clear that the information on harvesting has been provided for reasons of transparency only, the information or an explanatory note could be included in the documentation box of CRF table 5.A.

87. Slovenia has made progress by distinguishing between forest land remaining forest land and land converted to forest land. The Party included, in its reporting, changes in carbon stock in dead organic matter and changes in carbon stocks in mineral soils under forest land remaining forest land and land converted to forest land, but constant values of these changes were used, which were derived from the default values contained in the IPCC good practice guidance for LULUCF. Also included in the reporting under this category are data on forest fires for the period 1998–2007, ranging from 124 to 2,100 ha/year forest area burnt. Slovenia plans to improve the estimates for this category, applying the results of ongoing research projects and calculating removals and emissions for the period 1986–1997 as far as time-series consistent data are available. The ERT welcomes the Party's planned efforts and encourages Slovenia to report on its progress, in its next annual inventory submission.

C. Non-key categories

1. Land converted to cropland – CO₂

88. Slovenia has reported estimates of carbon stock changes in mineral soils for land converted to cropland and of carbon stock changes in living biomass for forest land converted to cropland. These estimates were based on default values provided in the IPCC good practice guidance for LULUCF. In response to a question raised by the ERT, Slovenia indicated that it plans to apply country-specific data in its estimations of carbon stock changes caused by the conversion from forest land to cropland. Slovenia also indicated that it would include emissions from liming in its next annual submission. The ERT welcomes these efforts and encourages Slovenia to report thereon in its next annual inventory submission.

2. Grassland remaining grassland – CO₂

89. Slovenia has reported emissions from organic soils as having been included under the agriculture sector, which could not be confirmed by the ERT. In response to questions raised by the ERT, Slovenia indicated that it would include estimates of emissions from organic soils under the LULUCF sector in its next annual submission.

3. Land converted to grassland – CO₂

90. Slovenia has reported estimates of emissions and removals from land converted to grassland based on the default values provided in the IPCC good practice guidance for LULUCF. In response to a question raised by the ERT during the review, Slovenia indicated that it would use country-specific information to estimate carbon stock changes caused by the conversion from forest land to grassland. The ERT welcomes these efforts and encourages Slovenia to report thereon in its next annual inventory submission.

4. Land converted to settlements – CO₂

91. Slovenia has reported AD on the areas converted from grassland to settlements, but the associated emissions have been reported as “NE”. The Party stated that the AD were preliminary and that it was not possible to calculate emission estimates from these data; however, data collection is in process. The ERT welcomes the Party’s efforts and encourages it to provide these emission estimates in its next annual submission.

5. Biomass burning – CO₂, N₂O and CH₄

92. Slovenia has reported biomass burning on cropland remaining cropland as “NA”. According to the UNFCCC reporting guidelines, this notation key should only be applied to activities that do not result in emissions or removals of a specific gas. Therefore, the ERT invites Slovenia to check whether the use of “NO” or another notation key would be more appropriate in this case.

VI. Waste

A. Sector overview

93. In 2007, emissions from the waste sector amounted to 684.09 Gg CO₂ eq, or 3.3 per cent of total GHG emissions. Since 1986, emissions have increased by 20.8 per cent. The key driver for the rise in emissions is the increase of 51.7 per cent in emissions from solid waste disposal on land, which is a result, in turn, of the increase in the amount of municipal waste disposed. Within the sector, 66.3 per cent of the emissions were from solid waste disposal on land and 33.7 per cent from wastewater handling. Emissions from waste incineration have been reported under the energy sector. Emissions from wastewater handling were 13.8 per cent lower in 2007 than in the base year, which is due mostly to the recovery of CH₄ in wastewater treatment plants and the decrease in the generation of industrial wastewater. CH₄ contributes 90.7 per cent and N₂O 9.3 per cent of the emissions from this sector.

94. The ERT noted that recalculations reported by the Party in the waste sector for the time series 1986–2006 were undertaken to take into account changes in data on wastewater handling and changes in the N₂O emissions from human sewage owing to the availability of a new data set on population; and in order to correct errors previously made when filling in the CRF tables. The rationale for these recalculations has been provided to some extent in the NIR and in CRF table 8(b). The ERT recommends that Slovenia provide a detailed explanation for the recalculations in CRF table 8(b) and in the NIR of its next annual submission. Slovenia indicated during the review that a small amount of collected waste oil is incinerated in the country, and that the emissions arising from this activity would be reported in its next annual submission. The ERT welcomes this development and recommends that Slovenia report recalculations, as appropriate.

95. The Party's reporting on this sector is not transparent in the NIR: there is a lack of information provided on, among other things, the notation keys used and recalculations. The ERT recommends that Slovenia improve transparency in its next annual submission by providing more information on historical emission trends, an overview of the sector (e.g. management system in place, policies which have an effect on the amount of waste landfilled), uncertainty calculations, information on interpolation techniques used on AD, and recalculations.

96. The uncertainties calculated for this sector were based on expert judgment. The uncertainty of the emissions from the waste sector has been reported as ± 45 per cent. The ERT recommends that Slovenia revise its uncertainty assessment, following the IPCC good practice guidance; provide in the NIR descriptions of any expert judgment applied; and use the quantitative approach to estimate uncertainties, in line with the IPCC good practice guidance.

97. Category-specific QA/QC procedures have not been reported for the waste sector. The ERT recommends that Slovenia provide more detailed descriptions of QA/QC and planned improvements in its next annual submission.

B. Key categories

Solid waste disposal on land – CH₄

98. For the estimation of CH₄ emissions from solid waste disposal on land, the first-order decay method (tier 2) was applied, using country-specific degradable organic carbon values based on the new 2005/2006 screening analysis of mixed municipal waste. These values were interpolated for the period 2001–2003, and for the period 1964–1988 the Operational programme of waste disposal was used; however, no transparent information has been presented in the NIR on how the values for the 1989–2000 period were derived. The ERT recommends that Slovenia, in the NIR of its next annual submission, provide detailed explanations of the assumptions and methods used to derive data on municipal waste, and demonstrate how time-series consistency is ensured. AD on the amount of waste for the period 1964–1994 were based on an assumed population derived from the amount of people included in the municipal waste collection system. The AD for 1995–2000 were provided by the Statistical Office of the Republic of Slovenia and those for 2001–2007 by the Environmental Agency of the Republic of Slovenia. In both cases, data were gathered from all solid waste disposal sites (SWDS) in Slovenia. The parameters used (CH₄ generation rate constant, fraction of degradable organic carbon dissimilated, etc.) have been specified in the NIR and in the CRF tables, and were basically default values from the IPCC good practice guidance. Recovery of landfill gas was initiated in 2004 on the Party's three largest SWDS, and the CH₄ recovered is used to generate energy. No explanation has been provided as to where emissions from the landfill gas used to produce energy have been reported in the inventory. Therefore, the ERT recommends that Slovenia explain where these emissions have been reported, in its next annual submission.

C. Non-key categories

Wastewater handling – CH₄ and N₂O

99. The IPCC default methodology was used to calculate CH₄ emissions from municipal and industrial wastewater handling. AD on wastewater handling were obtained from the Environmental Agency of the Republic of Slovenia. Industrial sectors with a large output of wastewater and a high content of degradable organic components were chosen for the calculation of emissions, which is in line with the Revised 1996 IPCC Guidelines. The content of industrial degradable organic components for individual industries was estimated on the basis of data from reports on operational monitoring, cooperation with representatives of the individual industries, or theoretical values outlined in the Revised 1996 IPCC Guidelines.

100. The calculations of N₂O emissions from human sewage were based on statistical data on population obtained from the Statistical Office of the Republic of Slovenia and on data on protein consumption from the Food and Agriculture Organization of the United Nations (FAO). Data on protein consumption from FAO have not been available since 2004; therefore, the data for 2004 have been applied to the years 2005, 2006 and 2007. The ERT recommends that Slovenia collect more up-to-date data on protein consumption in order to improve time-series consistency in its next annual submission.

VII. Supplementary information required under Article 7, paragraph 1, of the Kyoto Protocol

A. Information on Kyoto Protocol units

1. Standard electronic format and reports from the national registry

101. Slovenia has reported information on its accounting of Kyoto Protocol units in the required SEF tables, as required by decisions 15/CMP.1 and 14/CMP.1. The ERT took note of the findings and recommendations included in the SIAR on the SEF tables and the SEF comparison report.⁷ The SIAR was forwarded to the ERT prior to the review, pursuant to decision 16/CP.10. The ERT reiterated the main findings and recommendations contained in the SIAR.

102. Information on the accounting of Kyoto Protocol units has been prepared and reported in accordance with section I.E of the annex to decision 15/CMP.1, and reported in accordance with decision 14/CMP.1 using the SEF tables. This information is consistent with that contained in the national registry and with the records of the international transaction log (ITL) and the clean development mechanism registry, and meets the requirements set out in paragraph 88 (a)–(j) of the annex to decision 22/CMP.1. The transactions of Kyoto Protocol units initiated by the national registry were in accordance with the requirements of the annex to decision 5/CMP.1 and the annex to decision 13/CMP.1. No discrepancies have been identified by the ITL and no non-replacement has occurred. The national registry has adequate procedures in place to minimize discrepancies.

2. National registry

103. The ERT took note of the SIAR and its finding that the reported information on the national registry is complete and has been submitted in accordance with the annex to decision 15/CMP.1. The ERT also took note of the SIAR and its findings that the national registry continues to perform the functions set out in the annex to decision 13/CMP.1 and the annex to decision 5/CMP.1, and continues to adhere to the technical standards for data exchange between registry systems in accordance with decisions 16/CP.10 and 12/CMP.1. In addition, the national registry has adequate security, data safeguard and disaster recovery measures in place, and its operational performance is adequate.

104. The ERT noted from the SIAR that Slovenia has not made publicly available the information referred to in paragraphs 45–48 of the annex to decision 13/CMP.1, and reiterated the recommendation made in the SIAR that Slovenia enhance the availability of this information and report, in its next annual submission, on any changes to that public information. Slovenia should make clear on the website of its national registry which parts of this information are confidential.

3. Calculation of the commitment period reserve

105. Slovenia has reported its commitment period reserve in its 2009 annual submission. The Party reported that its commitment period reserve has not changed since the initial report review

⁷ The SEF comparison report is prepared by the ITL administrator and provides information on the outcome of the comparison of data contained in the Party's SEF tables with corresponding records contained in the ITL.

(84,265,734 t CO₂ eq), as it is based on the assigned amount and not on the most recently reviewed inventory. The ERT agrees with this figure.

B. Changes to the national system

106. Slovenia has reported a change to its national system, namely the designation of a QA/QC manager. The ERT concluded that, taking into account this confirmed change in the national system, Slovenia's national system continues to be in accordance with the requirements of national systems outlined in decision 19/CMP.1. The ERT recommends that the Party, in its next annual submission, report any change(s) in its national system in accordance with section I.F of the annex to decision 15/CMP.1.

C. Changes to the national registry

107. Slovenia has reported only a change in the contact information of its national registry compared with the previous annual submission. The ERT concluded that the Party's national registry continues to perform the functions set out in the annex to decision 13/CMP.1 and the annex to decision 5/CMP.1, and continues to adhere to the technical standards for data exchange between registry systems in accordance with relevant CMP decisions.

VIII. Conclusions and recommendations

108. Slovenia made its annual submission on 15 April 2009. The Party indicated that the 2009 annual submission is a voluntary submission under the Kyoto Protocol. The annual submission contains the GHG inventory (CRF tables and NIR) and supplementary information under Article 7, paragraph 1, of the Kyoto Protocol (information on Kyoto Protocol units, and changes to the national system and to the national registry). This is in line with decision 15/CMP.1.

109. The ERT concludes that the inventory submission of Slovenia has been prepared and reported in accordance with the UNFCCC reporting guidelines. The inventory submission is in general complete and the Party has submitted a complete set of CRF tables for the years 1986–2007 and an NIR; these are complete in terms of geographic coverage, years and sectors, as well as generally complete in terms of categories and gases. The following categories, for which methodologies for estimating emissions are available in the Revised 1996 IPCC Guidelines and the IPCC good practice guidance, have been reported as "NE": CO₂ emissions from transmission of natural gas; potential emissions of HFCs from refrigeration and air-conditioning equipment, foam blowing and fire extinguishers and CO₂ emissions from agricultural lime application for cropland and grassland. The ERT recommends that the Party ensure, to the extent possible, the inclusion in its next annual submission of emission estimates for categories currently reported as "NE" for which methods for estimating emissions are available in the Revised 1996 IPCC Guidelines and/or in the IPCC good practice guidance; and, where emissions cannot be estimated for a given category, then the Party is to provide sufficient explanation for this in its NIR.

110. The submission on a voluntary basis of information required under Article 7, paragraph 1, of the Kyoto Protocol has been prepared and reported in accordance with decision 15/CMP.1. Slovenia has not reported on a voluntary basis information on activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, nor information on the minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol.

111. The Party's inventory is generally in line with the UNFCCC reporting guidelines, the Revised 1996 IPCC Guidelines, the IPCC good practice guidance and the IPCC good practice guidance for LULUCF. Slovenia made significant improvements to its inventory compared with the previous submission by: assigning a QA/QC manager; including in the NIR a summary of its QA/QC plan in English; adding information on sector-specific QA/QC procedures; conducting an independent peer review of the energy sector; and presenting information on its process for approving the national GHG

inventory. The ERT commends the Party for all of these efforts. However, the transparency of the reported information on trends in emissions/removals, AD, EFs and some parameters is not sufficient to be in line with the IPCC good practice guidance.

112. The Party has reported information on its accounting of Kyoto Protocol units in accordance with section I.E of the annex to decision 15/CMP.1, and used the required reporting format tables as required by decision 14/CMP.1.

113. The national system continues to perform its required functions as set out in the annex to decision 19/CMP.1.

114. The national registry continues to perform the functions set out in the annex to decision 13/CMP.1 and the annex to decision 5/CMP.1, and continues to adhere to the technical standards for data exchange between registry systems in accordance with relevant CMP decisions. However, Slovenia has not made publicly available the required information referred to in paragraphs 45–48 of the annex to decision 13/CMP.1.

115. In the course of the review, the ERT formulated a number of recommendations⁸ relating to completeness and transparency, underlying assumptions for expert judgments used to estimate uncertainties, recalculations, and the description of QA/QC procedures, in the information presented by Slovenia in its annual submission. The key recommendations are that Slovenia:

- (a) Provide more information explaining the trends in emissions and removals;
- (b) Provide more background information on the EFs used for all sectors except the energy sector;
- (c) Use the uncertainty analysis to prioritize improvements to its GHG inventory;
- (d) Ensure the continuation of peer review activities for the remaining non-reviewed sectors;
- (e) Include in its next annual submission an improved description of the institutional arrangements with regard to staff arrangements for inventory preparation and the public availability of the inventory;
- (f) Enhance the availability of the public information referred to in paragraphs 45–48 of the annex to decision 13/CMP.1, and report, in its next annual submission, on any changes to that public information;
- (g) Ensure, to the extent possible, the inclusion in its next annual submission of estimates of emissions for categories currently reported as “NE” for which methods for estimating emissions are available in the Revised 1996 IPCC Guidelines and/or in the IPCC good practice guidance, and, where emissions cannot be estimated for any category, then the Party is to provide sufficient explanation for this in its NIR.

IX. Questions of implementation

116. No questions of implementation were identified by the ERT during the review.

⁸ For a complete list of recommendations, the relevant chapters of this report should be consulted.

Annex I**Documents and information used during the review****A. Reference documents**

Intergovernmental Panel on Climate Change. *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories*. Available at <<http://www.ipcc-nggip.iges.or.jp/public/gl/invs1.htm>>.

Intergovernmental Panel on Climate Change. *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories*. Available at <<http://www.ipcc-nggip.iges.or.jp/public/gp/english/>>.

Intergovernmental Panel on Climate Change. *Good Practice Guidance for Land Use, Land-Use Change and Forestry*. Available at <http://www.ipcc-nggip.iges.or.jp/public/gp/lulucf/gp_lulucf.htm>.

“Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual inventories”. FCCC/SBSTA/2006/9. Available at <<http://unfccc.int/resource/docs/2006/sbsta/eng/09.pdf>>.

“Guidelines for the technical review of greenhouse gas inventories from Parties included in Annex I to the Convention”. FCCC/CP/2002/8. Available at <<http://unfccc.int/resource/docs/cop8/08.pdf>>.

“Guidelines for national systems under Article 5, paragraph 1, of the Kyoto Protocol”. Decision 19/CMP.1. Available at <<http://unfccc.int/resource/docs/2005/cmp1/eng/08a03.pdf#page=14>>.

“Guidelines for the preparation of the information required under Article 7 of the Kyoto Protocol”. Decision 15/CMP.1. Available at <<http://unfccc.int/resource/docs/2005/cmp1/eng/08a02.pdf#page=54>>.

“Guidelines for review under Article 8 of the Kyoto Protocol”. Decision 22/CMP.1. Available at <<http://unfccc.int/resource/docs/2005/cmp1/eng/08a03.pdf#page=51>>.

Status report for Slovenia 2009. Available at <<http://unfccc.int/resource/docs/2009/asr/svn.pdf>>.

Synthesis and assessment report on the greenhouse gas inventories submitted in 2009. Available at <<http://unfccc.int/resource/webdocs/sai/2009.pdf>>.

FCCC/ARR/2008/SVN. Report of the individual review of the greenhouse gas inventories of Slovenia submitted in 2007 and 2008. Available at <<http://unfccc.int/resource/docs/2009/arr/svn.pdf>>.

UNFCCC. Standard Independent Assessment Report, Parts I and II. Unpublished document.

B. Additional information provided by the Party

Responses to questions during the review were received from Ms. Tajda Mekinda-Majaron (Environmental Agency of the Republic of Slovenia), including additional material on the methodology and assumptions used. The following documents were also provided by Slovenia:

Institut "Jožef Stefan". 2009. *Peer Review of National Inventories of Greenhouse Gas. Emissions for the Energy Sector (CRF sector 1.A)*. Ljubljana: Slovenija Center za energetska učinkovitost.

Reichert J, Schon M and Behnke L. 2000. *Methanemissionen durch den Einsatz von Gas in Deutschland von 1990 bis 1997 mit einem Ausblick auf 2010*. Karlsruhe: Institut Systemtechnik und Innovationsforschung.

Babuder M and Tomšič L. 2004. *National emission factor for lignite from the coal mine of Velenje: A Review of the Chemical Analysis of Lignite*. Ljubljana: Elektroinštitut Milan Vidmar.

Annex II**Acronyms and abbreviations**

AD	activity data	IPCC	Intergovernmental Panel on Climate Change
CH ₄	methane	ITL	international transaction log
CO ₂	carbon dioxide	kg	kilogram (1 kg = 1 thousand grams)
CO ₂ eq	carbon dioxide equivalent	LULUCF	land use, land-use change and forestry
CMP	Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol	NA	not applicable
CRF	common reporting format	NE	not estimated
EF	emission factor	NIR	national inventory report
ERT	expert review team	N ₂ O	nitrous oxide
EU ETS	European Union emissions trading scheme	NO	not occurring
FAO	Food and Agriculture Organization of the United Nations	PFCs	perfluorocarbons
F-gas	fluorinated gas	QA/QC	quality assurance/quality control
GHG	greenhouse gas; unless indicated otherwise, GHG emissions are the sum of CO ₂ , CH ₄ , N ₂ O, HFCs, PFCs and SF ₆ , without GHG emissions and removals from LULUCF	SEF	standard electronic format
HFCs	hydrofluorocarbons	SF ₆	sulphur hexafluoride
IEF	implied emission factor	SIAR	Standard Independent Assessment Report
		SWDS	solid waste disposal sites
		UNFCCC	United Nations Framework Convention on Climate Change
