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**Report of the individual review of the greenhouse gas inventory of Slovenia
submitted in 2006***

* In the symbol for this document, 2006 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 in-country review of the initial report of Slovenia, coordinated by the United Nations Framework Convention on Climate Change (UNFCCC) secretariat, in accordance with the guidelines for review under Article 8 of the Kyoto Protocol (decision 22/CMP.1). The review took place from 21 May to 26 May 2007 in Ljubljana, Slovenia, and was conducted by the following team of nominated experts from the roster of experts: generalist – Mr. Klaus Radunsky (Austria); energy – Mr. Christo Christov (Bulgaria); industrial processes – Ms. Sonia Petrie (New Zealand); agriculture – Mr. Marcelo Rocha (Brazil); land use, land-use change and forestry (LULUCF) – Mr. Walter Oyhantçabal (Uruguay); waste – Mr. Carlos Lopez (Cuba). Mr. Walter Oyhantçabal and Mr. Klaus Radunsky were the lead reviewers. The review was coordinated by Ms. Ruta Bubniene (UNFCCC secretariat).
2. In accordance with the “UNFCCC Guidelines for the technical review of greenhouse gas inventories from Parties included in Annex I to the Convention”, a draft version of this report was communicated to the Government of Slovenia.

B. Inventory submission and other sources of information

3. In its 2006 submission, Slovenia submitted a set of common reporting format (CRF) tables for the years 1986 and 1990–2004 and a national inventory report (NIR). Where needed, the expert review team (ERT) also used the previous year’s submission, additional information provided during the review and other information. The full list of materials used during the review is provided in the annex to this report. In its response to the issues raised during the review by the ERT, Slovenia submitted the CRF tables for the years 1987, 1988 and 1989 and revised CRF tables for the years 1986 and 1990–2004 in the course of the review.

C. Emission profiles and trends

4. In 2004, the most important greenhouse gas (GHG) in Slovenia was carbon dioxide (CO₂), contributing 82.2 per cent to total¹ national GHG emissions expressed in CO₂ equivalent², followed by methane (CH₄), 10.6 per cent, and nitrous oxide (N₂O), 6.2 per cent. Hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulphur hexafluoride (SF₆) taken together contributed 1.0 per cent of overall GHG emissions in the country. The energy sector accounted for 80.9 per cent of total GHG emissions, followed by industrial processes (5.7 per cent), agriculture (9.9 per cent), waste (3.3 per cent) and solvent and other product use (0.2 per cent). Total national GHG emissions decreased by 1.1 per cent between 1986 (20,314.41 Gg CO₂ equivalent) and 2004 (20,071.83 Gg CO₂ equivalent).
5. Tables 1 and 2 show GHG emissions by gas and by sector, respectively.

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

² In this report, the values for total and sectoral emissions in the base year and in 2004 reflect the revised estimates submitted by Slovenia in the course of the review. These estimates differ from Slovenia’s GHG inventory submitted in 2006.

Table 1. Greenhouse gas emissions by gas, 1990–2004

GHG emissions	Gg CO ₂ equivalent								Change BY–2004 (%)
	Base year Convention ^a	1990	1995	2000	2001	2002	2003	2004 ^a	
CO ₂ (with LULUCF)	14 692.58	11 547.24	10 046.56	9 940.81	10 809.70	10 738.21	10 718.06	10 840.30	–26.2
CO ₂ (without LULUCF)	16 281.84	14 732.98	14 951.80	15 115.97	16 084.31	16 233.89	16 036.29	16 484.02	1.2
CH ₄	2 376.29	2 289.37	2 118.18	2 136.06	2 083.21	2 161.65	2 123.17	2 108.72	–11.3
N ₂ O	1 369.75	1 246.52	1 197.25	1 293.50	1 290.60	1 346.49	1 309.81	1 261.28	–7.9
HFCs	NA	NA,NO	28.96	31.13	38.43	47.50	56.91	79.50	NA
PFCs	276.29	257.44	285.68	105.61	105.61	116.44	118.99	120.01	–56.6
SF ₆	10.24	10.30	11.52	15.74	16.11	17.33	17.92	18.31	78.8

BY = Base year; LULUCF = Land use, land-use change and forestry; NA = Not applicable; NO = Not occurring.

^a Slovenia submitted revised estimates for the base year and 1990–2004 in the course of the initial review on 28 June 2007. These estimates differ from Slovenia's GHG inventory submitted in 2006.

Table 2. Greenhouse gas emissions by sector, 1990–2004

Sectors	Gg CO ₂ equivalent								Change BY–2004 (%)
	Base year Convention ^a	1990	1995	2000	2001	2002	2003	2004 ^a	
Energy	16 043.96	14 366.41	14 807.39	15 032.17	15 936.53	16 058.56	15 808.88	16 231.54	1.2
Industrial processes	1 288.06	1 292.16	1 109.47	970.14	1 017.46	1 028.27	1 104.65	1 147.84	–10.9
Solvent and other product use	81.90	43.40	17.25	42.73	36.37	36.53	33.33	39.25	–52.1
Agriculture	2 334.30	2 242.73	2 117.36	2 162.34	2 127.39	2 182.97	2 092.46	1 998.54	–14.4
LULUCF	–1 589.25	–3 185.75	–4 905.24	–5 175.16	–5 274.61	–5 495.68	–5 318.23	–5 643.72	255.1
Waste	566.19	591.92	541.93	596.46	600.22	614.38	623.78	654.67	15.6
Other	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total (with LULUCF)	18 725.16	15 350.87	13 688.16	13 628.69	14 443.37	14 425.02	14 344.87	14 428.11	–22.9
Total (without LULUCF)	20 314.41	18 536.61	18 593.40	18 803.85	19 717.98	19 920.70	19 663.10	20 071.83	–1.2

BY= Base year; LULUCF = Land use, land-use change and forestry; NA = Not applicable; NO = Not occurring.

^a Slovenia submitted revised estimates for the base year and 1990–2004 in the course of the initial review on 28 June 2007. These estimates differ from Slovenia's GHG inventory submitted in 2006.

D. Key categories

6. Slovenia has reported a tier 1 key category analysis, both level and trend assessment, as part of its 2006 inventory submission for the years 1986 and 2004. It has not included the LULUCF sector in its key category analysis. The key category analysis performed by the Party and the secretariat³ produced somewhat different results. Slovenia has identified 27 key categories in 1986 and 34 key categories in 2004, whereas the secretariat has identified 16 key categories in 1986 and 22 in 2004. The main reasons for the differences are the non-inclusion of the LULUCF sector and a different level of aggregation in the key category analysis of Slovenia. The ERT encourages Slovenia to include the LULUCF sector in the analysis of key categories.

E. Main findings

7. Total national GHG emissions in 2004 amounted to 20 071.83 Gg CO₂ equivalent and they decreased by 1.1 per cent between 1986 and 2004. The energy sector is the dominant sector and accounted for 80.9 per cent of total national GHG emissions in 2004. Carbon dioxide (CO₂) is the most important GHG, contributing 82.2 per cent of total national GHG emissions in 2004.

8. The ERT acknowledges the improvements that have been made in the inventory based on the recommendations of the previous GHG inventory reviews. With the exception of the years 1987, 1988 and 1989 an almost complete set of CRF tables and a NIR were submitted in 2006.

9. The ERT noted that the revised LULUCF tables in accordance with decision 13/CP.9 were submitted for the first time. However, there are several categories for which GHG emissions still have not been estimated, such as fugitive emissions (CO₂ and CH₄ from venting and flaring of oil and gas, or CO₂ emissions from coal mining and handling) and CH₄ and N₂O emissions from field burning of agricultural residues.

10. The ERT noted the need for further improvement of the transparency of the reporting by including adequate documentation, descriptions and justification of the assumptions, methods and data used for estimating GHG inventory estimates in the NIR of the future submissions. The ERT advised Slovenia to follow closely the *IPCC Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories* (IPCC good practice guidance), which recommends the use of country-specific data and emission factors (EFs), if available, particularly for key categories.

F. Cross-cutting topics

1. Completeness

11. The 2006 inventory submission covers the years 1986 and 1990–2004, and all sectors and gases including actual emissions of HFCs, PFCs and SF₆ (the fluorinated gases (F-gases)). The ERT noted several categories for which GHG emissions occur in Slovenia but no emissions have been estimated. The Party explained that in such cases either not enough information was available to calculate emissions or the emissions were only minor. Moreover, Slovenia has not submitted the following CRF tables: 7 Summary overview for key categories, 9(a) Completeness – information on notation keys and 8(b) Recalculations – explanatory information. There are reporting gaps in some of the sectoral tables (e.g. in

³ The secretariat identified, for each Party, those source categories that are key categories in terms of their absolute level of emissions, applying the tier 1 level assessment as described in the *Good Practice Guidance for Land Use, Land-Use Change and Forestry* (IPCC good practice guidance for LULUCF). Key categories according to the tier 1 trend assessment were also identified for those 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.

the energy sector). The ERT encouraged Slovenia to provide estimates for all categories where emissions occur in the country, even if they are minor, by using simple but reasonable approaches and expert judgement as necessary.

2. Transparency

12. The ERT encourages Slovenia to improve the transparency of the inventory by including additional information in the NIR with regard to the assessment of completeness, the identification of the EFs used, improved descriptions of individual sectors (for example, the more detailed description of the LULUCF methodology), explanations of the selection of methodologies, and information on the sources of activity data (AD). The most relevant background material that is available in Slovenian should be summarized in the NIR in English. The methodological descriptions provided in the NIR should be more detailed, any country-specific data should be identified and referenced in the NIR, and rationales should be provided for the selection of specific default EFs.

13. The ERT found that in table 9(a) Completeness – information on notation keys, only very limited information is provided to explain the use of the notation keys. Furthermore, the use of the notation keys is not consistent across all the CRF tables. The ERT encourages Slovenia to provide some explanation of the use of all the notation keys and to use them in a manner that is consistent 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, Part I).

3. Recalculations and time-series consistency

14. In its 2006 submission Slovenia reports recalculations for energy, agriculture and waste sectors, but the ERT noted that it does not provide explanations for those recalculations in CRF table 8(b). The ERT also noted that the Party’s recalculations of its 1986 emissions between the first national communication (2002) and the 2006 submission resulted in an increase in the estimates of total national GHG emissions by 0.6 per cent.

15. The ERT recommends that Slovenia report recalculations in a more transparent manner in its future GHG inventory submissions. It emphasizes the need to establish a transparent and well documented process with regard to recalculations, and report the recalculations comprehensively in the NIR.

4. Uncertainties

16. Slovenia has provided a tier 1 uncertainty analysis for most categories except the LULUCF sector and for the GHG inventory in total. The NIR does not explain how the uncertainty estimates have been made and why information on correlations is missing and units of values are not provided. The level of disaggregation is too detailed, in particular in the energy sector, thus resulting in significant correlations of the emission estimates within the energy sub-sectors and between the energy and the industrial processes sectors. The ERT recommends that Slovenia follow the advice of the 2005 inventory review and revise the uncertainty assessment following the IPCC good practice guidance more closely, as well as including information on the methods used and description of the expert judgement applied in the NIR of the future inventory submissions.

5. Verification and quality assurance/quality control approaches

17. Slovenia has developed a quality assurance/quality control manual (QA/QC manual) and a manual of procedures as part of a Global Environmental Facility project. Both documents were published in December 2004. The ERT noted that the planned installation and use of the new emissions database for GHG and ambient air pollutants would significantly improve QA/QC including verification. The ERT encourages Slovenia to update those documents and to implement their provisions. The ERT

recommends that Slovenia identify a QA/QC coordinator to supervise and manage QA/QC (including maintaining the QA/QC manual). The ERT recommends that Slovenia provide further information about an overall QA/QC at the Environmental Protection Agency of the Republic of Slovenia (ARSO) as well as about the QA/QC of each sector in its next inventory submission.

18. The Statistical Office of the Republic of Slovenia (SORS) plans to use some of the emissions data under the European Union emissions trading scheme (EU ETS) for verification purposes. Such independent assessment of emissions data will contribute considerably to the quality of the data, and the ERT therefore suggests that Slovenia use independent assessment for all data that are not yet covered by such verification, consistent with the IPCC good practice guidance. In addition, the results of such verification should be reported in the NIR.

19. The draft inventory data are usually checked by the ARSO experts before they are forwarded to the UNFCCC secretariat, and an additional review is carried out by the Ministry of Environment and Spatial Planning, but these reviews are not well documented. The ERT suggests that Slovenia document in more detail the quality control process at all stages of the inventory preparation, both within the ARSO and for other institutions and expert reports that contribute to the inventory preparation.

6. Follow-up to previous reviews

20. The ERT acknowledges that some improvements have been made in the inventory of Slovenia based on the recommendations of the previous reviews. This particularly relates to improving AD for coke combustion in the manufacturing industry, disaggregating between iron and steel and non-ferrous metals for the years 1997–2003, recalculating fugitive emissions from transport, distribution and use of natural gas and development of country-specific EFs for CO₂ emissions from lime production. However, due to significant constraints in the available resources at the ARSO, several important recommendations of the previous reviews (e.g. CRF tables for the years 1987, 1988 and 1989, new uncertainty estimates, full implementation of QA/QC) were not followed. The ERT recommends that Slovenia strengthen the resources of the ARSO and suggests that the Party introduce more accurate documentation of the process for further improvement of the inventory, both within the ARSO and for the other institutions and experts involved. This could be done, for example, by development and implementation of a GHG inventory improvement plan.

G. Areas for further improvement

1. Identified by the Party

21. The NIR identifies several areas for improvement. These relate in particular to:

- (a) Final implementation of quality assurance procedures including independent peer review of the GHG inventory;
- (b) Revision of uncertainty estimates;
- (c) Preparation of CRF tables for the years 1987, 1988 and 1989;
- (d) Further improvement of AD and EFs in the LULUCF sector.

2. Identified by the ERT

22. The ERT identifies the following cross-cutting issues for improvement. The Party should:

- (a) Improve transparency by:
 - (i) Providing a complete explanation of the use of notation keys and using them more consistently;

- (ii) Providing more detailed information on all data sources used;
 - (iii) Integrating relevant information requested by the ERT during the in-country visit into the NIR;
- (b) Provide more precise descriptions of the methodologies other than the IPCC methodology, including summaries in English of background material that is available only in Slovenian;
 - (c) Improve the key category analysis by including the LULUCF sector;
 - (d) Update the QA/QC manual and assign a QA/QC coordinator;
 - (e) Improve the documentation of quality control at all stages of inventory preparation;
 - (f) Improve the completeness and robustness of record-keeping and archiving (for example, by protecting the electronic data base against changes and by introducing a library system for hard copies);
 - (g) Provide necessary resources to accelerate further improvements of the national GHG inventory (including QA/QC, uncertainty analyses, key category analysis and calculation of emissions from missing categories);
 - (h) Implement a documented process for approving the GHG inventory;
 - (i) Improve the uncertainty assessment;
 - (j) Develop a national GHG inventory improvement plan which will address the issues identified above.

23. Recommended improvements relating to specific source/sink categories are presented in the relevant sector sections of this report.

II. Energy

A. Sector overview

24. In 2004, the energy sector accounted for 80.9 per cent of Slovenia's total national GHG emissions. Emissions increased by 1.2 per cent between 1986 and 2004. In 2004, emissions from fuel combustion contributed 97.7 per cent to total emissions for the energy sector. Between the base year and 2004, emissions from fuel combustion increased by 1.7 per cent, from 15,508.30 Gg CO₂ equivalent in the base year to 15,768.37 Gg CO₂ equivalent in 2004, due to significant growth in emissions from transport (by 112.2 per cent) and the category other sectors (1.A.4) (by 19.5 per cent), offset by significant decreases in emissions from energy industries (by 6.2 per cent) and manufacturing industries and construction (by 46.3 per cent).

25. The level of disaggregation for the allocation of fuel consumption to individual end-use sectors in the manufacturing industries and construction and other sectors (1.A.4) categories is not in accordance with the *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories* (hereinafter referred to as the Revised 1996 IPCC Guidelines) and the UNFCCC reporting guidelines, Part I. Some data series are not always consistent with the IPCC emission sub-categories. For example, the categories iron and steel and non-ferrous metals as reported by Slovenia include only metal production, while metal products are included in the category other (1.A.2(f)). Within the national statistics time series, data for specific categories have been moved to different statistical categories (e.g. the data for auto-producers have been moved from public electricity and heat production to manufacturing industries and construction). It was not always possible for the ERT to disaggregate and aggregate the mixed data in a transparent manner.

Nevertheless, there is no double counting of emissions and no emissions are missing. Despite reporting under different categories in the national statistics, the emissions' estimates are correct. In the course of the review, the Party justified that a consistency of the time series is assured. The ERT encourages Slovenia to provide this justification in its next inventory submission. However, the ERT noted that a potentially significant number of categories are reported as not estimated ("NE") (e.g. fugitive emissions from oil and natural gas venting and flaring) and included elsewhere ("IE") (e.g. emissions from navigation). The ERT recommends that Slovenia make efforts to collect data, estimate these emissions and include these estimates at a disaggregated level in its next inventory submission.

26. Values for almost all AD before 2004 have been published by the Ministry of Energy of the Republic of Slovenia and since 2004 the data have been obtained from the SORS. The data sources are considered by Slovenia to be the most appropriate choice for calculating inventory estimates.

27. Significant discrepancies can be found when the data in the GHG inventory are compared to the data reported to the International Energy Agency (IEA). The specific fuels consumption reported in the CRF differs significantly from the data of the IEA for 1986 and 2004, with different, compensating errors. For example, the growth rate of total apparent energy consumption from 1986 to 2004 is reported as 14 per cent in the CRF and 17 per cent by the IEA; the imports of lignite reported in the CRF are 30 per cent lower than the imports reported by the IEA; the imports of residual fuel oil in 1986 reported in the CRF are three times larger than the data reported by the IEA; imports of coking coal and sub-bituminous coal in 1986 are reported by the IEA, but are not reported in the CRF; exports of crude oil are reported in the CRF and not reported by the IEA; and production of lignite (equivalent to 38 per cent of total apparent consumption in 1986) is about 30 per cent higher in the CRF than the IEA data for all years up to 1996 (partly due to different net calorific values). Sub-bituminous coal production is not reported under a separate category in the CRF, but under the category lignite. The ERT encourages Slovenia to provide explanations for the differences between these data sets in the next inventory submission, to improve the coordination among its statistical agencies and to reconcile the provision of data to international organizations.

28. The reporting of the energy sector estimates is transparent as the calculation methodologies are well documented in the NIR. Extensive studies have been carried out on the issues that were raised in previous review reports (e.g. on the AD of fugitive emissions from coal mining and handling) and the results are appropriately reflected in the GHG estimates. However, the NIR does not provide sufficient background information to make it possible to follow the calculations. The ERT encourages Slovenia to report the yearly national energy balance and the EFs used in annexes to the NIR of its future inventory submissions.

29. The changes of historical data that are due to errors in data collection or to the filling of data gaps are reflected as recalculations. However, the recalculations have not always been applied for entire time series in the official documentation of the data sources (SORS, Ministry of Energy of the Republic of Slovenia).

30. As a result of the recalculations, the estimates of total sectoral emissions in 2003 increased by 1.4 per cent in the 2006 submission compared to the 2005 submission. The reasons for recalculations were: the availability of improved AD (manufacturing industry and construction), improved EF (country-specific annual estimates for the CO₂ EF for natural gas) and estimating a missing source (CO₂ emissions from coal mines). However, the recalculations are not well documented in the NIR or in the CRF. The ERT recommends that Slovenia improve the reporting of recalculations in its next inventory submission.

B. Reference and sectoral approaches

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

31. CO₂ emissions from fuel combustion were calculated using the reference approach and the sectoral approach. For the year 2004, there is a difference of 0.6 per cent in CO₂ emissions between the reference approach and the sectoral approach. Explanations are not provided in the documentation box in the CRF, but short explanations for the difference are provided in the NIR.

32. The annual apparent consumption of natural gas (NG) between the reference and sectoral approaches differs significantly (from 4.5 per cent to 16.6 per cent) due to non-energy use of NG for production of methanol, while the difference of emissions from NG consumption is small (from 4.1 per cent to 0.2 per cent). This inconsistency may occur due to overestimation of NG emissions in the sectoral approach or due to underestimation of emissions from natural gas consumption in the reference approach, the latter being caused by incorrect estimation of the non-energy use of fuels. The ERT encourages Slovenia to explain this difference in its next inventory submission.

33. The ERT noted that the values of the fractions of carbon stored (0.5 in produced oil and lubricants and 1.00 in produced methanol) applied for the non-energy use in the reference approach are not in line with the IPCC good practice guidance. Slovenia is advised to use the IPCC default value (0.3) of a carbon oxidation fraction in its next inventory submission.

34. The CO₂ EFs for all fuels that are reported in the NIR are expressed as carbon content EFs multiplied by the specific IPCC default oxidation factors. However, the calculation formulas presented in the NIR include separate oxidation factors. In the course of the review, Slovenia explained that there is no double counting of oxidation factors while estimating emissions from solid and liquid fuels as the calculations of emissions using the reference approach excludes oxidation factors. The ERT noted that the application of the country-specific non-calorific values (NCVs) and the IPCC default carbon content and oxidation factors has led to different CO₂ IEF in the sectoral and reference approach. Slovenia may wish to provide a more detailed explanation of the reasons for this difference in its next inventory submission.

2. International bunker fuels

35. Slovenia has not reported international marine bunkers in 2004. It has only one international port and all ships are fuelled in international waters by foreign suppliers. The entire consumption of jet kerosene in Slovenia is counted as international aviation bunker fuel, since there are no commercial domestic flights. The entire consumption of aviation gasoline for piston-engine aircraft is counted as consumption and emissions within Slovenia, since it is assumed that this is fuel for small piston aircraft which fly between the smaller regional airports in the country. The Party is recommended to consider whether it is possible to improve the data for aviation gasoline (as the first or last leg of international flights could be performed by smaller piston aircraft) and for jet kerosene (as small private jet aircraft could start flying between domestic airports).

3. Feedstocks and non-energy use of fuels

36. The use of coke as feedstock for 1986 is reported together with energy use in the energy sector, while for the period between 1990 and 2000 it is reported in the sector of industrial processes. The data from the industrial processes and energy sectors were cross-checked by the ERT and no double counting of emissions was identified. The ERT recommends cross-checking of the allocation of the coke feedstock in the 1987–1989 period in its next submission.

C. Key categories

1. Stationary combustion: solid fuel – CO₂

37. The trend of the EF for CO₂ from lignite in public electricity and heat production fluctuates over the entire time series. A study conducted in 2004 analyses the data from regular fuel tests that were performed by accredited laboratories while mining was going on at the biggest underground mines and at the Šoštanj Power Plant over the period 1986–2003. The results of the study show that the quality of the lignite mined, its ash, moisture and carbon content and the net calorific value vary across a very wide range. As a result the EF of CO₂ varies across the entire time series. The NIR refers to the EFs and calorific values reported in the study. Slovenia considers that the study provides convincing support for the inventory calculations for emissions from lignite for the whole time series.

2. Stationary combustion: gas – CO₂

38. A constant EF for CO₂ from natural gas combustion is used for the entire time series in energy industries and in manufacturing industries and construction. Its value (55.00 t/TJ) is 2 per cent lower than the IPCC default EF (56.1 t/TJ). However, the Party has all the data on natural gas (calorific value and carbon content by year and broken down by the two suppliers) that would be needed to enable it to calculate the annual weighted value of a country-specific EF. The ERT recommends that Slovenia apply country-specific EFs for each year. Following this recommendation, in the course of the review Slovenia submitted revised estimates (1,891.82 Gg CO₂ equivalent) for CO₂ from fuel combustion of gaseous fuels, which resulted in an increase in estimated CO₂ emissions from fuel combustion by 0.52 Gg CO₂ equivalent.

3. Road transportation: liquid fuel – CO₂

39. The Party has adjusted the COPERT III model to Slovenian needs. The model is annually calibrated to the car fleet changes and to the quantity of consumed refined petroleum products. The exercise was performed for the period until 2003. The car fleet was not adjusted to the data of 2004 and EFs used in 2003 were reapplied to the 2004 fuel data. The ERT recommends that Slovenia run the model for the year 2004 and revise these estimates in its next inventory submission.

4. Fugitive emissions: coal mining and handling – CH₄

40. The implied emission factor (IEF) for the fugitive emissions of CH₄ from underground coal mines (2.59–2.68 kg/t) is well below the range of the IPCC default IEFs (4.5–16.75 kg/t). In the course of the review a national study was presented that reports results delivered by online measurements at the mines' ventilation systems. The results of this study are used directly for inventory preparation. The ERT considers that the study provides adequate justification for the use of the country-specific EF.

41. Most of the coal mines in Slovenia have been closed. The last remaining coal mine will be closed soon. The Party is recommended to consider assessment of CH₄ emissions from the closed coal mines in its future inventory submissions.

D. Non-key categories (fuel combustion and fugitives)

Fugitive emissions: coal mining and handling – CO₂

42. CO₂ fugitive emissions from coal mining and handling are reported as "NE". Slovenia has carried out a special study on CO₂ emissions from this category. The results from the online measurements of the CO₂ content in the ventilation systems of the mines were analysed for all the mines in operation and show an almost constant concentration of CO₂ in the ventilation systems. The emissions are mine-specific and do not depend on the volume of coal production. Following the ERT's

recommendation that it should report this category in the inventory, Slovenia provided estimates for mining activities in underground mines (86.25 Gg equivalent) for 2004.

III. Industrial processes and solvent and other product use

A. Sector overview

43. The industrial processes and solvent and other product use sectors together accounted for 5.9 per cent (5.7 per cent and 0.2 per cent, respectively) of Slovenia's total national GHG emissions in 2004. CO₂ was the largest contributor of the industrial processes sector in 2004, accounting for 81.5 per cent of sectoral emissions. Actual emissions of F-gases contributed 18.0 per cent and CH₄ contributed 0.5 per cent of the industrial processes sector emissions. N₂O contributed 0.02 per cent of emissions from industrial processes and 100.0 per cent of emissions from the solvent and product use sector. Emissions from the industrial processes sector decreased by 14.5 per cent between 1986 and 2004. This decrease was largely due to a reduction in PFC emissions from aluminium production (a reduction of 58.0 per cent) and in CO₂ emissions from lime production (a reduction of 60.0 per cent).

44. Recalculations in the industrial processes sector have been performed for CO₂ emissions from lime production, HFC consumption in mobile air conditioning and SF₆ emissions from electrical equipment. These recalculations are the result of improvements to EFs and AD. The ERT commends Slovenia for these improvements to the inventory. The ERT encourages Slovenia to provide explanations of recalculations in CRF table 8(b) as well as in the NIR of its future inventory submission.

45. Estimates are provided for most categories, and notation keys are used, where required. "NE" is reported for CO₂ from soda ash production, potential emissions for F-gases and non-methane volatile organic compound (NMVOC) emissions for the solvent and other product use sector for the entire time series. As resources allow, the ERT encourages Slovenia to report emissions for these categories.

46. No formal QA/QC procedures are undertaken in the industrial processes and solvent and other product use sectors. The ERT encourages Slovenia to undertake formal tier 1 QC checks on the data and where possible undertake independent verification for all AD and EFs.

47. Uncertainty estimates are based on expert judgement but there is no reference in the NIR to indicate how this judgement was assessed. The ERT recommends that Slovenia undertake some studies to provide the basis for sound uncertainty estimates, especially for key categories.

48. Transparency in the NIR has improved since the 2005 inventory submission. However, there are areas where transparency could be improved in the NIR and these are listed under the specific categories detailed below.

B. Key categories

1. Cement production – CO₂

49. The IEF for CO₂ from clinker production is 0.54 t CO₂/t clinker. This is higher than the IPCC default value (0.51 t CO₂/t clinker). Slovenia explains in the NIR that this is due to the presence of magnesium carbonate (MgCO₃) and that a cement kiln dust correction factor is not used in calculating these emissions because the dust is returned in the process in both cement plants. To increase transparency in the reporting of CO₂ emissions from cement production, the ERT recommends that Slovenia include a sentence in its next NIR explaining that the decrease in production of clinker from 2001–2002 is due to the modernization of one of the cement plants.

2. Lime production – CO₂

50. The ERT commends Slovenia for updating the time series with the country-specific EF for lime production. The NIR does not describe the different types of lime produced in Slovenia but this information was provided during the in-country review. The ERT recommends that Slovenia include this information on the types of lime produced in Slovenia in its next inventory submission.

3. Aluminium production – CO₂ PFCs

51. The IEF of CO₂ from aluminium production decreased over the time series 1986–2004 (from 2.01 to 1.74 t CO₂/t aluminium produced) due to the modernization of the aluminium plant. There are two cases where the IEF increased during this period against the trend (1994–1995 and 2001–2002). The ERT encourages Slovenia to provide information in the next NIR to explain these anomalies in the trend.

4. Aluminium production – PFCs

52. Explanations of PFC EFs used and how they were derived was not provided in the NIR but additional information was provided during the in-country review. To increase transparency, the ERT recommends that Slovenia provide information in the next NIR explaining what methodology tier is used to calculate the PFC emissions (currently tier 3b) and the EFs used (including the parameters for the Perchinye overvoltage method).

5. ODS substitutes – HFCs

53. The ERT commends Slovenia for improving its reporting of HFCs from refrigeration and air-conditioning equipment by using the appropriate notation keys rather than “0”, as was reported in the 2005 submission. The ERT recommends that Slovenia enhance the transparency of its reporting for this category by indicating which EFs are based on country-specific research. The ERT also recommends that Slovenia consider undertaking a research project to update AD and EFs for mobile air-conditioning and refrigeration.

54. Potential emissions for HFCs are reported for the period 1995–1997 but not for subsequent years. Slovenia explained that it is currently very difficult to obtain accurate import and export HFC data to calculate potential emissions. To assist with completeness for this category, the ERT recommends that Slovenia multiply actual HFC emissions by the average actual/potential ratio for years 1995–1997 to obtain an estimate of potential emissions for all years since 1995.

6. Solvent and other product use – N₂O

55. N₂O use in the solvent and other product use sector is a key category (by trend analysis) for Slovenia. Emissions have decreased by 52.1 per cent since 1986 but the reason for this decrease is not explained in the NIR. The ERT recommends that Slovenia provide some information explaining the factors influencing the trend in N₂O consumption over the time series.

56. The NIR explains that N₂O consumption was calculated from export and import data and was based on a 1999 study by the Chamber of Commerce and Industry of Slovenia. The NIR does not clearly explain how or where N₂O is produced in Slovenia. This information was provided during the review, although Slovenia indicated that some relevant data might be confidential. The ERT recommends that Slovenia provide the N₂O data and include some additional information explaining where the N₂O production data come from, if this is possible.

C. Non-key categories

1. Carbide production – CO₂

57. The ERT commends Slovenia for increasing transparency in reporting of this category by including a paragraph on silicon carbide production in the NIR. To increase transparency for calcium carbide production the ERT encourages Slovenia to specify which reducing agents are used in the production of calcium carbide.

2. Nitric acid production – N₂O

58. Slovenia states in the NIR that an EF of 5.5 kg N₂O/t nitric acid is used for estimating N₂O emissions from nitric acid production but it is unclear where this EF has been sourced. The ERT recommends that Slovenia state in the NIR of its next submission the source of the EF.

3. Iron and steel production – CO₂

59. Slovenia explains in the NIR that pig iron was only produced in 1986 and since 1990 steel production is based on the utilization of scrap iron and steel. The NIR explains that in 1986 it was impossible to disaggregate the amount of reducing agent used for reducing the iron and the amount used for energy combustion. Coke consumption is reported in the industrial processes sector under steel production. There is no double counting between the energy and industrial processes sectors. The notation keys used in the iron and steel category in the CRF are unclear for coke consumption. The ERT recommends that Slovenia either report emissions from coke consumption separately from steel production or use the notation key “IE” to indicate that all emissions are reported under steel production.

4. Ferroalloy production – CO₂

60. The CO₂ IEF for ferroalloy production fluctuates quite widely over the time series (a range of 1.5–3.5 t/t). The ERT encourages Slovenia to provide an explanation for these fluctuations in the NIR in the future inventory submissions.

5. Glass production – CO₂

61. CO₂ emissions from glass production are reported in 2004 but “NE” is reported for all other years (1986–2003). However, the NIR explains that data on carbonate use in glass production are available. Following the ERT recommendation, in the course of the review, Slovenia provided an estimate of CO₂ emissions from glass production for 1986–2003. This estimate has been calculated in line with the IPCC good practice guidance.

IV. Agriculture

A. Sector overview

62. The agriculture sector accounted for 10.0 per cent (1,998.54 Gg of CO₂ equivalent) of total national GHG emissions in 2004, and 11.5 per cent (2,334.30 Gg of CO₂ equivalent) of total GHG emissions in 1986. Emissions decreased by 14.4 per cent between 1986 and 2004. The main drivers of the decrease were economic developments and changes in agricultural and management practices.

63. The NIR is complete in the agriculture sector, with two minor exceptions: cultivation of histosols and field burning of agricultural residues. Compared to the 2005 inventory submission, Slovenia has improved the transparency of its reporting for the sector but there is still room for further improvement, especially regarding the collection of AD, documentation of the trends, and the provision of summaries in English of the references that are currently in Slovenian.

64. Slovenia uses default EFs and a combination of country-specific and default parameters to estimate N₂O emissions from agricultural soils. The ERT recommends that Slovenia apply a tier 2 approach, taking into consideration the methodology for the estimation of ammonia (NH₃). The ERT also encourages Slovenia to explain in its next inventory submission how the AD were collected.

65. There is “informal QA/QC” between the Agricultural Institute of Slovenia and the ARSO. The ERT recommends that Slovenia review the national QA/QC plan and prepare sector specific procedures, based on the already existing informal process. The ERT also recommends that Slovenia elaborate the institutional, legal and procedural arrangements between the Agricultural Institute of Slovenia and the ARSO to explain the time frame, their respective responsibilities, the methods to be used and the data to be provided.

66. Due to these improvements the entire time series has been recalculated. The impact, in 2003, of these recalculations was an increase of 5.1 per cent in sectoral emissions, resulting mainly from a decrease in CH₄ emissions from dairy cattle enteric fermentation (–26.4 per cent); N₂O emissions from liquid systems (–28.5 per cent); solid storage and dry lot (–28.7 per cent); animal manure applied to soils (–28.3 per cent); pasture, range and paddock (–18.8 per cent); atmospheric deposition (–20.8 per cent); and nitrogen leaching (–16.8 per cent). However, there were also increases in CH₄ emissions from non-dairy cattle fermentation (41.3 per cent) and increases in CH₄ emissions from manure management: dairy cattle (162.6 per cent); non-dairy cattle (358.5 per cent) and swine (166.5 per cent). The ERT recommends that in all the subchapters of the NIR, Slovenia should provide better descriptions of recalculations made and their impact.

B. Key categories

1. Enteric fermentation – CH₄

67. In 2004, this category accounted for 32.7 per cent (31.12 Gg CH₄) of sectoral emissions, and 3.3 per cent of Slovenia’s total national emissions. Non-dairy cattle accounted for 52.5 per cent of the emissions, followed by dairy cattle (40.3 per cent). Dairy cattle emissions decreased by 38.6 per cent; non-dairy cattle emissions increased by 13.5 per cent and swine emissions decreased by 20.1 per cent. Emissions from enteric fermentation decreased by 14.6 per cent between 1986 and 2004.

68. A tier 2 method has been improved for dairy, non-dairy cattle and swine. A tier 1 method is used for all other livestock. This is in line with the IPCC good practice guidance. All the necessary data are obtained from the SORS. Disaggregation of dairy cattle is done on the basis of milk recording data, which are collected by the national cattle breeding service. The ERT recommends that Slovenia enhance the transparency of its reporting of this category by providing explanations about the fluctuations in the AD (e.g. the trends in animal population).

2. Manure management – CH₄

69. In 2004, CH₄ emissions from manure management accounted for 21.8 per cent of the total sector emissions, and 2.2 per cent of Slovenia’s national total GHG emissions. In 2004, swine accounted for 37.4 per cent of CH₄ emissions from manure management, followed by non-dairy cattle (31.4 per cent) and dairy cattle (29.7 per cent). Swine emissions decreased by 29.9 per cent, dairy cattle emissions decreased by 22.6 per cent and non-dairy emissions increased by 46.2 per cent. CH₄ emissions from manure management decreased by 14.7 per cent between 1986 and 2004.

70. A tier 2 approach is applied for estimating CH₄ emissions from cattle and swine manure management and tier 1 is applied for CH₄ emissions from other livestock. This approach is consistent with the IPCC good practice guidance. Slovenia uses country-specific or default EFs and AD. The ERT encourages Slovenia to enhance the transparency of its reporting by providing further details about the collection of AD.

3. Manure management – N₂O

71. In 2004, N₂O emissions accounted for 8.31 per cent of total sectoral emissions and 0.8 per cent of Slovenia's total national emissions. They decreased by 39.3 per cent between 1986 and 2004. In 2004, solid storage and dry lot contributed 94.5 per cent to N₂O emissions from manure management.

72. A tier 2 approach is applied to estimate N₂O from manure management. Nitrogen excretion rates for cattle and swine are harmonized with the methodology for NH₃ emissions. Emissions are allocated to different animal waste management systems according to the data of the agriculture censuses (1991 and 2000) and following expert judgement. The ERT recommends that Slovenia improve the transparency of its reporting of this category by providing better explanations of the collection of AD and the methodology used for NH₃ accounting (e.g. by providing summaries in English for the relevant references).

4. Direct soil emissions – N₂O

73. In 2004, direct N₂O emissions from soils accounted for 19.7 per cent (1.27 Gg of N₂O) of total sectoral emissions and 2.0 per cent of Slovenia's total national GHG emissions. Since 1986, these emissions have decreased by 9.3 per cent. The ERT noted that Slovenia does not estimate ("NE" is reported) nitrogen inputs due to the cultivation of organic soils as the associated N₂O emissions are assumed to be negligible. However, the NIR reports cultivation of 4,320 ha in 1998. During the review the ERT recommended that Slovenia estimate N₂O emissions from the cultivation of organic soils. Following the recommendation of the ERT, Slovenia provided estimates for the entire time series and the estimate for 2004 was 25.97 Gg of CO₂ equivalent. This estimate is in line with the IPCC good practice guidance.

5. Indirect soil emissions – N₂O

74. In 2004, indirect N₂O emissions from soil accounted for 15.2 per cent (0.98 Gg of N₂O) of total sectoral emissions and 1.5 per cent of Slovenia's total national GHG emissions. These emissions decreased by 9.1 per cent between 1986 and 2004. Slovenia recognizes the need to make further improvements in estimating emissions by considering a higher leaching and run-off factor for big farms, and by differentiating between areas with intensive and non-intensive livestock production. The ERT commends Slovenia's intention, and encourages it to make this improvement in its future inventory submissions.

C. Non-key categories

Field burning of agricultural residues – CH₄, N₂O

75. In the 2006 submission, CH₄ and N₂O emissions from field burning of agricultural residues are reported as "NE". Field burning of agricultural residues is illegal in Slovenia, but, as the Party explained during the in-country visit, some burning may occur. The ERT recommends that Slovenia estimate the emissions for those crop fields where burning occurs and use the notation key "not occurring" ("NO") for those crop fields where burning does not actually occur (e.g. rice).

V. Land use, land-use change and forestry

A. Sector overview

76. In Slovenia 62 per cent (2,027,000 ha) of the surface area of the country is covered by forests and the LULUCF sector plays a very significant role in its GHG inventory. In 2004, the LULUCF sector represented a net sink of 5,643.72 Gg CO₂ equivalent, corresponding to 28.1 per cent of the total national emissions. In the period 1986–2004 removals by the sector increased by 255.1 per cent and this increase

in removals influenced the trend of total national GHG emissions. The removals have increased throughout the time series; however, the increase is not clearly explained in the NIR. During the in-country review Slovenia clarified that a reduction in harvest rates and increases in forest biomass and forest area are the main drivers of the trend. The ERT recommends that Slovenia explain the trend in its next inventory submission.

77. The reporting of estimates in CRF tables for the LULUCF sector is incomplete. The only LULUCF category for which removals have been estimated is forest land remaining forest land. Removals under the other categories have not been estimated, and AD and EF are reported as “NE” or “IE”. Emissions from limestone are estimated in the NIR, but in the corresponding table of the CRF “NE” is reported. The ERT encourages the Party to complete the CRF tables, even if land-use conversions are not very significant, in order to enhance completeness and transparency.

78. The uncertainties of the estimates of removals at the beginning of the time series are high due to the use of methods that are not accurate. In order to reduce the uncertainties, Slovenia is to undertake a new national forest inventory (NFI) in 2007. Uncertainties are addressed in the NIR in a very brief, incomplete and non-transparent way. The ERT encourages Slovenia to improve documentation of the methods used for calculations of forest parameters in its future inventory submissions and to further improve the consistency of the time series.

79. The NIR presents the recalculations of time series for forest areas made in 2004 and concludes that discrepancies in the data in the time series still persist. The ERT recommends that Slovenia continue efforts to further improve consistency of the time series. Recalculations are not properly documented in the CRF. The ERT noted that similar issues were reported by other Parties and the ERT recommends using a revised version of the software tool in the future.

80. Slovenia has not yet fully developed and implemented a QA/QC plan for the LULUCF sector. In addition, it does not provide information on the areas of different land uses in a summary table, as part of the section on QA/QC. This may lead to omissions or to double counting of emissions or removals. The ERT encourages Slovenia to prepare specific procedures for QA/QC in this sector and to continue working on the implementation of a QA/QC plan following the recommendations of the IPCC.

81. One major improvement compared to Slovenia’s 2005 inventory submission is the use of the CRF tables as required by decision 13/CP.9. However, the NIR reports categories used in the 2005 submission which are not consistent with the CRF of the 2006 submission. The ERT recommends that Slovenia update the methodologies in the NIR for LULUCF in its next inventory submission following the IPCC good practice guidance for LULUCF.

82. Planned improvements include the implementation of a new NFI and research to produce more reliable key data (e.g. country-specific BEFs and wood densities). The Party acknowledges that its forest inventory methods are not in line with the IPCC good practice guidance for LULUCF and that unreliable data (for growing stock) have been used. Slovenia intends to improve data quality by using the outcomes of the large-scale new NFI in 2007 and some specific research is to be undertaken by the Slovenian Forestry Institute. The ERT commends Slovenia’s intentions.

83. The land-use statistics combine different information sources, resulting in inconsistent data. The information provided on the areas of different land use is incomplete or not reliable due to problems in the statistical sources (e.g. land area converted to forest land may be lower than reported, according to information gathered during the in-country review). The ERT considers that developing a better system for tracking land-use changes represents an opportunity to improve the quality of the Party’s data in this sector. Another opportunity for improvement is the generation of some country-specific key data and factors for the calculation of biomass stocks (e.g. biomass expansion factors (BEFs) and wood densities).

84. As the contribution of the LULUCF sector to total national GHG emissions and removals is large, and forest land remaining forest land is the second-largest key category by level assessment, the ERT recommends that Slovenia give priority to improving the estimation of removals and emissions by this sector.

B. Key categories

Forest land remaining forest land – CO₂

85. Carbon stock changes are calculated using the gain-losses method. However, the documentation on the estimates of annual increase of dry matter (in section 7.2.1 of the NIR) is not transparent. Growth rates are explicitly provided in the CRF but they are implicit in the NIR (2.4 Mg C/ha). Living biomass is the only pool estimated, due to lack of data. In order to enhance the transparency and accuracy of its reporting, the ERT encourages the Party to report carbon stock changes due to land-use conversion under the appropriate category; to recalculate time series, if required; to document the EFs explicitly used for the calculation and to include all carbon pools in its next inventory submission.

86. According to the NIR, the implicit average growth rate is 9.6 m³/ha, based on the data of the Slovenian Forestry Service. The NIR states that recalculation is necessary for the period 1986–1995, and that the NFI in 2007 will provide more robust data to estimate the annual growth rate. This could mean that the base year removals could be recalculated in the future. The ERT encourages Slovenia to make a major effort to reduce the uncertainties of the annual growth rates.

87. Slovenia applies default parameters to calculate removals by forests. As Slovenia's forests are mixed ones, with few species dominant, it would not be very difficult to develop country-specific forest parameters such as BEFs, wood densities, and root and shoot ratios. The ERT recognizes Slovenia's intention to generate this information and encourages it to complete this task as soon as possible in order significantly to improve accuracy and reduce uncertainty.

88. Slovenia has used a correction factor of 1.43 for deciduous species while estimating carbon losses due to felling and applying data from national statistics. The ERT notes that Slovenia is aware of the inconsistency between national statistical data and the data required for the GHG inventory and recommends that Slovenia address this inconsistency in its next inventory submission.

C. Non-key categories

Land converted to forest land – CO₂

89. The NIR reports in section 7.2.2 the “regrowth of abandoned managed lands” which corresponds to “land converted to forest land”. Areas under natural conversion from other land to forest land were estimated to be 67, 000 ha in 2004, but the accuracy of this data is very low. According to information provided during the in-country review the actual figure is much lower and will be recalculated in the next inventory submission.

90. Annual growth attributed to land converted to forest land under natural regeneration to forest is estimated to be 3.5 m³/ha/yr, based on an individual expert judgement. This value is about 50 per cent lower than the IPCC default value for similar types of forest and climatic regions. It is also three times smaller than the implicit value used for the calculation of the growth of forest land remaining forest land (9.6 m³/ha/yr). The ERT commends Slovenia's intention to check and revise this figure, if needed, in its next inventory submission.

VI. Waste

A. Sector overview

91. In 2004 the waste sector accounted for 3.3 per cent of total national GHG emissions. CH₄ emissions from the waste sector are the second largest source of CH₄ in the country (representing 28.3 per cent of the total CH₄ emissions of Slovenia). Total emissions from the sector increased by 15.6 per cent over the period 1986–2004. This increase was caused by the growth in emissions of CH₄ from solid waste disposal on land (by 39.1 per cent), which was the result of the growth in the amount of municipal waste disposed. Emissions from wastewater handling decreased by 10.6 per cent mainly due to a decline in industrial production and the recovery of gas in wastewater treatment plants. CH₄ emissions contribute 91.1 per cent and N₂O emissions 8.9 per cent to total GHG emissions from the waste sector.

92. The main contribution of CH₄ in the waste sector comes from solid waste disposal on land (69.7 per cent) and the rest from wastewater handling (30.3 per cent), where 15.9 per cent comes from municipal wastewater and 14.4 per cent from industrial wastewater. The emissions of N₂O come totally from wastewater handling.

93. In the waste sector, Slovenia has introduced several improvements in this inventory submission compared to the 2005 submission, in several cases following recommendations made by the ERTs in previous reviews. However, there are also some issues identified in previous reviews that have not yet been addressed because of the lack of information needed for estimating emissions (e.g. emissions from industrial waste are “NE” due to the lack of data on its composition).

94. The NIR and the CRF in the waste sector are generally complete. Emissions have been estimated in most of the categories, except for solid waste disposal on land, where emissions of CO₂ and precursors are reported as “NE” because of the lack of methodologies for estimating this category in the Revised 1996 IPCC Guidelines and the IPCC good practice guidance. The same applies for the estimating of N₂O emissions from industrial wastewater. The emissions from waste incineration were reported as “IE” because small quantities are combusted in cement plants and the emissions were reported in the energy sector under manufacturing industries and construction.

95. From the information provided, both in the CRF and in the NIR, the ERT was able to replicate the emission estimates in this sector. In several categories, expert judgement is used for selection of parameters. The ERT recommends that Slovenia make more use of the methodological criteria for expert judgement following the IPCC good practice guidance. The information provided in the documentation boxes under all CRF tables of the sector is limited. The ERT recommends that Slovenia provide complete information in the documentation boxes.

96. The NIR explains the recalculation in solid waste disposal on land for all years of the time series. The CRF provided all the recalculated estimates in the waste sector and summarized the changes made for the year 1986 and the period 1990–2003. The estimates have been recalculated because emissions from industrial waste have been included and because the historical data based on the amount and composition of solid waste disposal on land has been changed. The recalculation of emissions from solid waste disposal implies a reduction by 34.9 per cent (159.92 Gg CO₂ equivalent) in the base year. The ERT encourages Slovenia to consider using the techniques recommended in the IPCC good practice guidance to reconstruct the data on industrial waste composition. Slovenia may also wish to consider using the default method included in the latest reviewed scientific literature, which suggests incorporating regional default values for the composition of industrial and municipal waste.

97. Slovenia has not yet fully developed and implemented a QA/QC plan for the waste sector. There is no information on QA/QC procedures for the sector, and the ERT therefore encourages Slovenia to continue working on the implementation of the QA/QC plan developed in 2005.

98. Slovenia's 2006 submission does not provide calculations of combined uncertainty. The method used to estimate uncertainty used previously is under revision and the combined uncertainty estimates obtained from the 2005 submission are reported in the 2006 NIR. The ERT encourages Slovenia to continue improving the uncertainty assessment, according to the IPCC good practice guidance, in its next submission.

B. Key categories

1. Solid waste disposal on land – CH₄

99. For the estimation of CH₄ emissions the first order decay (FOD) method (tier 2) has been used. The AD used are country-specific and the NIR includes references to the reports and data sources used. The parameters of the method are specified in the NIR and the CRF and are basically default values from the IPCC good practice guidance. Slovenia has adopted an extension of 40 years for the time series. This is in line with the IPCC good practice guidance.

100. The lack of information on the amount and composition of waste for the period 1964–2000 has led to the use of constant values during those years (since 2001, annual data on waste amount and composition have been collected by the SORS). The use of the same degradable organic carbon (DOC) value for the whole period 1964–2000 cannot accurately represent the actual evolution of the composition of solid waste. If the FOD method is used, it is recommended to use different degradable organic carbon dissimilated (DOC_i) values for wastes with different half-lives; however such detailed information on waste composition is not available in Slovenia. The ERT encourages Slovenia to do further work on estimating emissions from solid waste disposal on land and to search for alternative ways to collect data on the composition of waste in order to improve the quality of the data before 2000.

101. The change in the fraction of paper and textiles between 2000 and 2004 seems abrupt. The ERT recommends that Slovenia provide justification of that change and revise those data, if needed.

102. Sludge from wastewater handling is often disposed of on solid waste disposal sites on land. Emissions from this sludge should therefore be included under solid waste disposal on land. According to the information provided by Slovenia, they are reported under wastewater handling. The ERT recommends that Slovenia correct this misallocation and report these emissions under solid waste disposal on land in line with the IPCC good practice guidance.

103. The ERT noted that the trend of IEF of CH₄ emissions from managed waste disposal on land fluctuated in 1990–1993 and 2000–2004. During the review, Slovenia informed the ERT that this was due to a mistake in the units used for the annual amount of municipal solid waste. The ERT encourages Slovenia to correct the units in its next inventory submission.

2. Wastewater handling – CH₄

104. CH₄ emissions from domestic and commercial wastewater handling have been estimated using the IPCC methodology. The assumption that the quantity of recovered CH₄ has remained constant since 1996 was applied. However, the “check method” provided in the IPCC good practice guidance, which would assist in validating the factors used and results obtained, has not been applied. The ERT recommends that Slovenia apply the check method for estimating CH₄ emissions from wastewater handling in its next inventory submission.

105. CH₄ emissions from industrial wastewater have been calculated with a large output of wastewater and a high content of degradable organic component, which is in line with the Revised 1996 IPCC Guidelines. The emissions in the period 1986–2004 mainly follow the trends of industrial production. The greater part of emissions arises from sludge treatment. The trend of IEFs of CH₄ from industrial wastewater treatment for several years during the period has fluctuated. Slovenia explained that the trend correlates with the industrial production which was subject to substantial changes during the

reporting period. The ERT encourages Slovenia to provide this explanation in the next inventory submission.

C. Non-key categories

1. Wastewater handling – N₂O

106. N₂O emissions from discharge of human sewage in the aquatic environment from domestic and commercial wastewater treatment have been estimated for the total population following the Revised 1996 IPCC Guidelines and using the default emission parameters. Data on protein consumption per capita from the Food and Agriculture Organization of the United Nations (FAO) database have been used. The same value of protein consumption is used throughout the period 2001–2004. The ERT recommends that Slovenia provide justification of the use of the constant value for all the years of that period.

2. Waste incineration – CO₂, CH₄, N₂O

107. According to the NIR, Slovenia has no waste incineration plant as yet. The emissions are reported as “IE” in 2004 because a small amount of waste was combusted in cement plants and reported under the energy sector. Certain quantities of clinical waste and waste from international flights (the composition of which is similar to the composition of domestic waste) may also have been incinerated in combustion facilities. The ERT encourages Slovenia to estimate emissions from the incineration of these wastes and thus enhance the completeness of its reporting.

VII. Conclusions and recommendations

108. The institutional arrangement of Slovenia is functional and the ERT considers it to be broadly consistent with the IPCC good practice guidance.

109. Slovenia has provided a full set of CRF tables for the years 1986–2004 and an NIR. The ERT considers the inventory submission to be broadly consistent with the UNFCCC reporting guidelines, the Revised 1996 IPCC Guidelines, the IPCC good practice guidance and the IPCC good practice guidance for LULUCF. Areas for further improvement relate to: the identification of key categories; the reporting of emissions for some missing categories; greater transparency in the reporting on methodologies and data sources; the calculation of uncertainties in line with the IPCC good practice guidance; the implementation of QA/QC procedures; and further improvements in consistency between the NIR and the CRF.

110. In the course of the review, the ERT formulated a number of recommendations relating to the completeness and transparency of Slovenia’s information presented in the 2006 submission. The key recommendations⁴ are that Slovenia:

- Provide updated information on the institutional arrangements in its next inventory submission. This should include the information that was provided to the ERT during the review and should reflect the improvements in QA/QC, archiving, the completeness of the inventory, recalculations and transparency;
- Estimate missing emissions in its next inventory submission. In order to enhance completeness of the inventory within the limits of the available resources, the ERT suggests that Slovenia use only already available country-specific data including uncertainties;
- Ensure consistency of the time series if further improvements of the inventory have been made related to the use of higher-tier methods.

⁴ For a complete list of recommendations, the relevant sections of this report should be consulted.

111. The ERT appreciated the efforts that Slovenia has made to revise its estimates of emissions for CO₂ emissions from the combustion of natural gas and to provide estimates for fugitive emissions of CO₂ from coal mining, CO₂ emissions from glass production and N₂O emissions from cultivation of histosols. The ERT believes that this effort has notably improved the robustness of the estimates of emissions in the time series.

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

- IPCC. Good practice guidance and uncertainty management in national greenhouse gas inventories, 2000. Available at <<http://www.ipcc-nggip.iges.or.jp/public/gp/english/>>.
- IPCC. Good practice guidance for land use, land-use change and forestry, 2003. Available at <<http://www.ipcc-nggip.iges.or.jp/public/gp/landuse/gp/landuse.htm>>.
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B. Additional information provided by the Party

Responses to questions during the review were received from Ms. Tajda Mekinda-Majaron, Ms. Zorana Komar, Ms. Alenka Fritzel (Environmental Agency of the Republic of Slovenia), Mr. Matej Gasperič (Ministry of the Environment and Spatial Planning), Mrs. Nike Krajnc,

Mr. Mitja Piškur (Slovenian Forestry Institute), and Mr. Jože Verbič (Agricultural Institute of Slovenia), including additional material on the methodology, data and assumptions used.

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