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## SLOVENIA

### REPORT OF THE INDIVIDUAL REVIEW OF THE GREENHOUSE GAS INVENTORY SUBMITTED IN THE YEAR 2003<sup>1</sup>

#### (Centralized review)

#### I. OVERVIEW

##### A. Introduction

1. In accordance with decision 19/CP.8 of the Conference of the Parties (COP), the United Nations Framework Convention on Climate Change (UNFCCC) secretariat coordinated a centralized review of the 2003 greenhouse gas (GHG) inventory submission of Slovenia. The review took place from 8 to 12 September 2003 in Bonn, Germany, and was conducted by the following team of nominated experts from the roster of experts: Generalists – Ms. Helen Plume (New Zealand) and Mr. Paul Filliger (Switzerland), Energy – Ms. Chia Ha (Canada), Mr. Riad Chedid (Lebanon) and Mr. Dario Gomez (Argentina), Industrial Processes – Ms. Kristina Saarinen (Finland) and Ms. Kristine Zommere (Latvia), Agriculture – Mr. Sergio González (Chile) and Mr. Vlad Trusca (Romania), Land-use Change and Forestry – Mr. Wojciech Galinski (Poland) and Mr. Göran Ståhl (Sweden), Waste – Mr. Philip Acquah (Ghana) and Mr. Takashi Morimoto (Japan). Ms. Helen Plume and Mr. Sergio González were the lead reviewers of this review. The review was coordinated by Mr. Javier Hanna (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 for its approval, prior to publication of this final version of the report.

##### B. Inventory submission and other sources of information

3. In its 2003 submission, Slovenia submitted a national inventory report (NIR) and inventory data for the years 1986 (base year) and 1990–1996 using the Intergovernmental Panel on Climate Change (IPCC) summary and sectoral tables. The expert review team (ERT) received additional information during the review from Ms. Tajda Mekinda-Majaron, from the Ministry of the Environment and Spatial Planning and Energy of the Republic of Slovenia, and this has been incorporated into the review report as appropriate. The full list of materials used during the review is provided in annex 1 to this report.

##### C. Emission profiles and trends

4. In 1996 (the most recent year reported) the most important GHG in Slovenia was carbon dioxide (CO<sub>2</sub>), contributing 78.4 per cent to total<sup>2</sup> national GHG emissions expressed in CO<sub>2</sub> equivalent,

<sup>1</sup> In the symbol for this document, 2003 refers to the year in which the inventory was submitted, and not to the year of publication. The number (3) indicates that this is a centralized review report.

<sup>2</sup> In this report, the term total emissions refers to the aggregated national GHG emissions expressed in terms of CO<sub>2</sub> equivalent excluding Land-use Change and Forestry, unless otherwise specified.

followed by methane (CH<sub>4</sub>) – 11.9 per cent, and nitrous oxide (N<sub>2</sub>O) – 8.3 per cent. Perfluorocarbons (PFCs), hydrofluorocarbons (HFCs) and sulphur hexafluoride (SF<sub>6</sub>) taken together contributed 1.4 per cent of the overall GHG emissions in the country. The Energy sector accounted for 77.1 per cent of total GHG emissions, followed by Agriculture (11.7 per cent), Waste (5.7 per cent) and Industrial Processes (5.5 per cent). Total GHG emissions (excluding Land-use Change and Forestry (LUCF)) amounted to 19,958 Gg CO<sub>2</sub> equivalent and decreased by 1 per cent from 1986 (base year) to 1996. Total emissions decreased by 12 per cent from 1986 to 1992. From 1992 to 1996 there has been a steady increasing trend. Some sectoral trends differ strongly from the general trend. From 1986 to 1996 emissions from energy industries decreased by 15 per cent, and those from industry and construction decreased by 43 per cent, whereas emissions from the transport sector more than doubled. These trends seem reasonable for a country with an economy in transition.

#### **D. Key sources**

5. Slovenia has not reported a key source analysis as part of its 2003 submission. The Party commented that a level key source analysis had been performed, but was not included in the NIR. The secretariat<sup>3</sup> performed a key source analysis. Slovenia is encouraged to include the key source analysis in its next NIR and use this as a basis for addressing inventory improvements.

#### **E. Main findings**

6. Slovenia has reported an incomplete series, has not performed a key source analysis, and has not reported on any quality assurance/quality control (QA/QC) procedures that have been implemented. However, it has provided an NIR with much detailed information together with GHG inventory data using the IPCC tables. The ERT recommends that Slovenia submit its annual GHG inventory using the common reporting format (CRF) tables, following the UNFCCC reporting guidelines, as it is difficult to do a complete technical review without these tables. To further improve its reporting, Slovenia is encouraged also to follow the NIR layout recommended in the UNFCCC reporting guidelines adopted at COP 8, which requires Annex I Parties to begin using these guidelines for reporting the annual inventories due in the year 2004. Slovenia is encouraged to complete the time series, to resolve the inconsistencies between the inventory calculation tables and the NIR, and to incorporate more information on methodological issues to improve the transparency of its submission. The Party is also encouraged to improve the activity data (AD) collecting process and quality, and to provide information in the NIR about planned improvements for future submissions. The ERT encourages Slovenia to continue its efforts to present an inventory that fulfils the UNFCCC reporting guidelines.

#### **F. Cross-cutting topics**

##### Completeness

7. Because CRF tables are missing, the completeness of the inventory cannot be properly assessed. The IPCC files submitted are fairly complete. A transfer of the information in the IPCC files to the CRF is strongly recommended. In addition the NIR presents a large number of tables, which contain information that can also be incorporated into the CRF in future. The ERT is of the view that the basic information for the base year (1986) and 1990–1996 is available to produce a thorough inventory using the CRF. No information is available in the NIR for the years 1997–2001. Slovenia has communicated that for the next submission it plans to include the latest year (or the year before if background data for 2002 are not available in time) and the base year in the CRF.

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<sup>3</sup> The secretariat had identified, for each individual Party, those source categories which are key sources in terms of their absolute level of emissions, applying the tier 1 level assessment as described in the IPCC good practice guidance. Key sources according to the tier 1 trend assessment were also identified for those Parties providing a full CRF for the year 1990. Where the Party has performed a key source analysis, the key sources presented in this report follow the Party's analysis. However, they are presented at the level of aggregation corresponding to a tier 1 key source assessment conducted by the secretariat.

Transparency

8. The NIR contains a large amount of information and data including specific emission factors (EFs) and AD at the subsector level, and detail on the approaches taken and the methodologies applied. It also explains gaps in the reporting and gaps in the data. The ERT recommends that Slovenia apply the UNFCCC reporting guidelines and the CRF in a systematic way in order to increase the transparency of its reporting.

Recalculations and time-series consistency

9. No recalculations are presented in the NIR. However, when comparing the NIR totals with data previously reported in the first national communication, the ERT noted that some recalculations have taken place since that submission. The NIR noted that the *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories* (hereinafter referred to as the IPCC Guidelines) have been used for this report, which may have resulted in some differences between the data in this report and previously reported data. Use of the CRF recalculation tables would make the reporting of recalculations transparent.

Uncertainties

10. Some quantitative estimates of uncertainty for EFs and AD based on expert judgement are available in the NIR. However, an uncertainty estimate using the method recommended by the *IPCC Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories* (hereinafter referred to as the IPCC good practice guidance) is not available. The Party's representative informed the ERT that a project will be launched together with other countries to investigate topics of GHG inventories, such as uncertainty estimates and QA/QC, but these aspects are not of first priority for Slovenia and will not be included in its next NIR submission. The ERT encourages Slovenia to expand its work on uncertainties to help in the prioritization of further improvements to the inventory and to follow the requirements of the UNFCCC reporting guidelines.

Verification and quality assurance/quality control approaches

11. No explicit QA/QC plan is documented in the NIR. The Party refers to the project dealing with this topic (see paragraph 10 above). The ERT encourages Slovenia to continue its efforts in this area to meet the requirements of the UNFCCC reporting guidelines.

Follow-up to previous reviews

12. This is the first review of Slovenia. Slovenia has not supplied a written response to the previous 2003 review activities, but contact with the Party during the review clarified many of the topics raised in that report, which have been taken into account in this review.

**G. Areas for further improvement**Identified by the Party

13. There is no information in the NIR about improvements, but information received from the Party outlined the future tasks to be done and their priority. Of greatest importance to Slovenia for its next submission is the compilation of GHG inventories using the CRF for the latest year and the base year. The rest of the time series is scheduled for later submissions. Another important point is the revision of the NIR to include the key source analysis, which will be used to prioritize the work of the inventory.

Identified by the ERT

14. The ERT identifies the following major areas for improvement related to cross-cutting topics in the Slovenian inventory: applying the UNFCCC reporting guidelines, including the use of the CRF, and extending the time series. The ERT is aware that, because of the volume of work involved here, Slovenia

has only been able to address the necessary improvements step by step as it has outlined (see paragraph 13 above). It emphasizes the importance of having CRF files (at least for the base year and the latest year) and an NIR, which gives priority to detailed discussion. The ERT encourages Slovenia to go ahead in the way it plans. By applying the UNFCCC reporting guidelines and completing all the tables in the CRF, many of the topics identified in this review will likely be resolved.

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

## **II. ENERGY**

### **A. Sector overview**

16. In 1996 the Energy sector contributed 77 per cent (15,382 Gg CO<sub>2</sub> equivalent) of Slovenia's total greenhouse gas emissions. Slovenia's base year is 1986, and since then emissions from the Energy sector have grown by 1.6 per cent, largely because of an 111.2 per cent increase in emissions from the transport source category (mainly road transportation) and a 36 per cent increase in emissions from other sectors source category (commercial/institutional, residential, and agriculture/forestry/fishing). During this period, emissions from energy industries and manufacturing industries and construction decreased by 15 per cent and 42.6 per cent, respectively.

17. Detailed data provided in the NIR for the Energy sector cover additional information such as fuel-specific consumption and EFs that are not included in the IPCC reporting tables (table 8A). A transparent and consistent series of IPCC tables has been provided for the Energy sector, including estimations of direct and indirect greenhouse gas emissions. In the overview part of the IPCC reporting tables notation keys are used. Information as to the quality of data in the Energy sector, as requested in table 8A of the IPCC tables has not been provided.

18. The energy consumption data used by Slovenia for 1986, 1990–1991 and 1992–1996 come from various government agencies (including the former Yugoslavia government), energy producers (electricity and refineries) and other sources and are discussed in the NIR. Owing to the particular national circumstances of Slovenia, no consistent source of data is available for the entire time series. Prior to 1992, Slovenia's energy data were collected by a centralized agency in the former Yugoslavia. Since 1992, the energy data used to compiled emission estimates have been collected from various data sources ranging from individual facilities to electricity producers and available energy statistics. To ensure a consistent and comparable set of emission estimates, the ERT suggests that Slovenia should have its energy statistics agency evaluate the energy data and produce a more consistent set of energy information (from 1986 to 2001). The ERT appreciates that this will be a very challenging task.

19. The NIR provides a comprehensive set of quantitative uncertainty estimates based on expert judgement by subcategory, by fuel type and by gas for the AD.

### **B. Reference and sectoral approaches**

#### Comparison of the reference approach with the sectoral approach and international statistics

20. Slovenia has calculated CO<sub>2</sub> emissions from fuel combustion using the IPCC reference approach for 1986 and 1990–1996. It has used the IPCC sectoral approach with default EFs to estimate GHG emissions for the Energy sector and, where applicable, used country-specific EFs. A 1.55 per cent difference is observed between the sectoral and reference approaches for Slovenia in 1996.

#### International bunker fuels

21. The treatment of bunker fuels for aviation is discussed in the NIR, including information on fuel consumption, EFs and emissions of CO<sub>2</sub> and N<sub>2</sub>O. Slovenia disaggregates international and domestic transport by the type of fuel consumed. Jet kerosene consumption is allocated to international aviation,

while all other aviation gasoline or kerosene is used for domestic aviation. For purposes of completeness of reporting, the ERT recommends that, in addition to CO<sub>2</sub> and N<sub>2</sub>O emissions from international and domestic aviation, Slovenia should also provide estimates of CH<sub>4</sub> emissions.

22. For marine transport, Slovenia's annual energy statistics do not report separately fuel purchased for international and for domestic use. Official statistical data as reported in the NIR also indicate that all fuels were purchased for international navigation, although emissions are not reported in the NIR or the IPCC tables. The ERT recommends Slovenia to include a discussion of the national circumstances regarding marine transport and provide emission estimates for international navigation.

#### Feedstocks and non-energy use of fuels

23. Slovenia estimated non-energy use of lubricants and the use of natural gas as a feedstock, particularly for the production of methanol. The specific methodologies (IPCC tier 1) and assumptions used in estimating carbon stored in products are documented in the NIR. The inherent limitations in the availability of appropriate AD are also discussed in the NIR.

### **C. Key sources**

#### Energy industries: coal, oil and gas – CO<sub>2</sub>

24. The figures for CO<sub>2</sub> emissions for the period 1990–1996 fluctuate considerably and show three minima – in 1991 (9.8 per cent lower than the 1990 value), in 1994 (7.4 per cent lower than the 1990 value) and in 1996 (9.3 per cent lower than the 1990 value). These CO<sub>2</sub> emissions are strongly correlated with lignite consumption, where the trend fluctuates in a similar manner. It is recommended that Slovenia review the data on fuel consumption by the energy industries, particularly the consumption of coal, and discuss in the NIR the relationship between fuel consumption trends and the observed pattern of CO<sub>2</sub> emissions.

#### Manufacturing industries and construction: coal, oil, gas and other fuels – CO<sub>2</sub>

25. There is a significant decrease in CO<sub>2</sub> emissions between 1990 and 1993. Estimated emissions for 1993 are 21.8 per cent lower than those for 1990. The emission trend is rather flat in the period 1993–1996. In the period 1990–1996, CO<sub>2</sub> emissions from natural gas combustion contributed between 42.5 per cent and 46.9 per cent of the total CO<sub>2</sub> emissions of this sector. Apart from natural gas, four types of liquid fuels, four types of solid fuels and industrial waste are combusted within this subcategory. The ERT recommends that Slovenia discuss in its NIR the relationship between fuel consumption trends and the observed pattern in CO<sub>2</sub> emissions.

#### Transport: coal and oil – CO<sub>2</sub>

26. There is a significant increase in CO<sub>2</sub> emissions in the period 1990–1996. The 1996 value is 21.6 per cent more than the 1990 value. During this period, CO<sub>2</sub> emissions from gasoline combustion amounted to between 63.5 per cent and 71.2 per cent of the total CO<sub>2</sub> emissions of this sector, which confirms gasoline consumption as the dominant factor in the emission trend. The ERT recommends that Slovenia describe in the NIR the evolution of its transport sector with a special focus on road transportation.

#### Fugitive emissions: coal mining and handling – CH<sub>4</sub>

27. The EFs for mining and post-mining activities in underground mines vary within a wide range in the period 1990–1996. Estimates of EFs for individual coal mines in Slovenia were made at the Ecological Research Institute and are presented in the NIR. The ERT recommends that Slovenia include in its NIR a discussion on the variability of these EFs.

#### **D. Non-key sources**

##### Transport: coal and oil – N<sub>2</sub>O

28. Estimated N<sub>2</sub>O emissions increased from 0.06 Gg in 1986 to 0.27 Gg in 1996. The ERT recommends that Slovenia describe in the NIR the evolution of its N<sub>2</sub>O emission estimates related to the transport source category with a special focus on road transportation.

##### Fugitive emissions: coal mining and handling – CO<sub>2</sub>

29. Estimates of EFs for individual coal mines in Slovenia were made at the Ecological Research Institute and are presented in the NIR. EFs for the Zagorje, Senovo and Kajžarica pits vary considerably between 1994 and 1995. The ERT recommends that Slovenia include in its NIR a discussion on the variability of these EFs.

##### Fugitive emissions: oil and gas operations – CH<sub>4</sub>

30. The trend in CH<sub>4</sub> emissions between 1990 and 1996 is unusual and is related to the AD, since the values of the EFs used are constant over this period. There is a sharp decrease in the amount of oil processed in 1994. The production of natural gas shows fluctuations in this period. The ERT recommends that Slovenia include in its NIR a discussion on the variability of these AD.

##### Biomass – CO<sub>2</sub>

31. There is a discrepancy between the CO<sub>2</sub> emission estimates presented in the NIR and those in the IPCC reporting tables. While CO<sub>2</sub> emissions from biomass for the period 1990–1996 are reported as constant (819.22 Gg each year) in the IPCC reporting table, they are reported as variable in tables 55 and 56 of the NIR, but the AD reported in both reports are the same. The ERT recommends that Slovenia reconcile this information and provide the correct estimates in the IPCC reporting table.

### **III. INDUSTRIAL PROCESSES AND SOLVENT USE**

#### **A. Sector overview**

32. Emissions from the Industrial Processes and Solvent Use sectors contributed approximately 5.5 per cent of total national GHG emissions in 1996. Compared to 1986, emissions in 1996 decreased by 17.9 per cent. The NIR provides information on the methodologies, EFs and AD used for the Industrial Processes sector. It presents calculation of both direct and indirect GHGs and provides summary tables of the emissions and EFs. Information is provided for 1986 and 1990–1996. Data on the consumption of fuels as non-energy feedstocks are available only for some products, but the ERT noted that where these data are missing Slovenia has used consumption data in order to estimate emissions. Emissions from combustion processes in the Industrial Processes sector are reported under the Energy sector.

33. The NIR does not indicate where QA/QC procedures are currently applied in the calculation of Industrial Processes emissions, and no information on the planned improvements for the industrial sources inventory is documented. In addition, the ERT recommends that Slovenia provide a trend analysis for this sector.

#### **B. Key sources**

##### Cement and lime production – CO<sub>2</sub>

34. The calculation of CO<sub>2</sub> emissions in the production of clinker for cement production is based on the IPCC Guidelines. AD are taken from the annual industry survey. For lime production, the EF used is in line with the recommended IPCC Guidelines, and AD come from *Statistics of the Republic of Slovenia*. The ERT observed a declining trend in emissions from these activities between 1986 and 1996

(a 13 per cent decrease for cement production and a 54 per cent decrease for lime production), but no explanation is offered in the NIR.

#### Aluminium production – PFCs

35. The NIR provides background information on the estimation of PFCs from aluminium smelting, but the documentation on the choice of EFs is not entirely transparent. Slovenia provides data on tetrafluoromethane (CF<sub>4</sub>) and hexafluoroethane (C<sub>2</sub>F<sub>6</sub>) emissions for 1986 and 1990–1996. The ERT recommends that Slovenia provide information in its NIR regarding the trends in emissions of these gases and also an explanation of why aluminium production in 1995 and 1996 was much lower than in 1994 (by about 29 per cent).

### **C. Non-key sources**

#### Production of carbide – CO<sub>2</sub>

36. Petroleum coke is used as a source of carbon for silicon carbide production. The emissions have been estimated on the basis of the IPCC methodology as well as input data provided by industry. Emissions of CO<sub>2</sub> from this source decreased from 8.8 Gg CO<sub>2</sub> in 1986 to 0 Gg in 1996. The NIR noted the reason for this as being that there was no production of silicon carbide in Slovenia in 1996.

37. Coke is also used as a reductant for the production of calcium carbide. The IPCC methodology has been used to estimate CO<sub>2</sub> emissions from calcium carbide production, and these emissions decreased by 26 per cent from 1986 to 1996. The ERT encourages Slovenia to provide information in the NIR on the reasons behind this reduction.

#### Production of iron and steel – CO<sub>2</sub>

38. Emissions from electrode consumption and emissions from fuel use are provided separately, in accordance with the IPCC Guidelines. The ERT acknowledges the difficulties for Slovenia in separating these emissions and encourages it to provide further information in the NIR on the approach used to estimate them. Emissions of CO<sub>2</sub> from the production of iron and steel decreased by 60 per cent from 1986 to 1996. The ERT encourages Slovenia to provide information in the NIR on the reasons behind this reduction.

#### Production of ferroalloys – CO<sub>2</sub>

39. The NIR makes it clear that only process-related emissions of CO<sub>2</sub> are included in this subsector, according to the IPCC Guidelines; emissions associated with fuel use are reported in the Energy sector. However, the NIR does not provide transparent information on the choice of EFs and AD. There is a gap in the AD for chips consumed for the years 1986 and 1990–1991. As this causes a significant increase of emissions in the following years, the ERT encourages Slovenia to report the missing data in order to achieve a consistent time series.

## **IV. AGRICULTURE**

### **A. Sector overview**

40. In terms of individual gases (and excluding LUCF), CH<sub>4</sub> and N<sub>2</sub>O emissions from the Agriculture sector represented 42 per cent and 84.6 per cent, respectively, of the total emissions for those gases in 1986; these figures were 37.9 per cent and 85.6 per cent, respectively, for 1996. In terms of the contribution to total national emissions (excluding LUCF), the Agriculture sector contributed 13.1 per cent in 1986 and 11.7 per cent in 1996. The CH<sub>4</sub> and N<sub>2</sub>O emission trends show some fluctuations over the period, and the information provided in the NIR is not sufficient to explain them. The ERT recommends that Slovenia improve the transparency of its future submissions by providing more information on the trends observed.

41. Slovenia has not reported a key source analysis. However, the secretariat's analysis identified N<sub>2</sub>O emissions from agricultural soils, N<sub>2</sub>O from manure management and CH<sub>4</sub> emissions from enteric fermentation as key sources.

42. Inventory data are provided in the IPCC tables but exclude 1991, for which only global source category estimates are reported. Field burning of agricultural residues, prescribed burning of savannas and rice cultivation are reported as "not occurring" ("NO"). The NIR provides general information on methods, EFs and AD sources but more information is needed on the methodological issues, as well as national circumstances, to make it possible to understand the AD and emission trends.

43. A series of inconsistencies were found between the data in the IPCC tables and the NIR, which the ERT understands will be improved for the next submission; for example, in the EF for non-dairy cattle, and the 1990 and 1996 values for N<sub>2</sub>O emissions. No information is provided on recalculations performed or QA/QC procedures for the Agriculture sector. The ERT noted that quantitative uncertainty estimates are provided in the NIR, linked to CH<sub>4</sub> and N<sub>2</sub>O EFs and input data, but no supporting information on the source categories covered and methodological approaches is provided. No sectoral information is provided on institutional arrangements, archiving or documentation, although a list of references is included as a chapter of the NIR.

## **B. Key sources**

### Enteric fermentation – CH<sub>4</sub> emissions

44. The IPCC tier 2 method has been applied for cattle, whereas the IPCC tier 1 method has been applied for all other animal species, being in line with the IPCC good practice guidance. Default EFs have been applied for those animal species that are estimated using the IPCC tier 1 methodology with the exception of swine, for which a weighted average between country-specific and default EFs is used. AD were collected from official agencies but Slovenia recognizes that there are some gaps in the information collected.

45. The ERT detected some inconsistencies related to animal population trends along the time series, as the cattle population showed a significant decrease from 1986 to 1992, and then stabilized until 1996, and the sheep population showed the same value for 1986 and 1990, and then an increase up to and including 1996. The ERT recommends that inconsistencies be checked and more information be provided regarding calculations and EF sources.

### Manure management – N<sub>2</sub>O emissions

46. The NIR provides only a general statement that IPCC methods have been followed, and that N<sub>2</sub>O emissions are based on the number of animals, but there is no supporting information on methods and EFs. According to the IPCC tables, a part of the N<sub>2</sub>O emissions from manure management may have been double counted because emissions from pasture, range and paddock are included under both manure management and agricultural soils. The ERT encourages Slovenia to provide more information in the NIR and to explain this issue.

### Agricultural soils – N<sub>2</sub>O emissions

47. The NIR provides a general statement about the use of AD from the official statistical agencies and states that IPCC methods have been followed. Although the EFs used are reported, there is no supporting information about the rationale for their selection. The ERT detected a possible underestimation of N<sub>2</sub>O emissions that may come from some inconsistencies in the use of equations to estimate nitrogen (N) from N-fixing crops and crop residues. The ERT encourages Slovenia to provide more information in the NIR and to explain this issue.



### **C. Non-key sources**

#### **Manure management – CH<sub>4</sub> emissions**

48. The Party has estimated CH<sub>4</sub> emissions from manure management following the IPCC tier 2 methodology for cattle and swine and the IPCC tier 1 methodology for the other animal species. The methodological approach is far more detailed and accurate than the one suggested by the IPCC good practice guidance for a non-key source category. The ERT encourages Slovenia to provide more information about this detailed approach in its NIR in order to facilitate the exchange of information with other Parties.

#### **Field burning of agricultural residues – CH<sub>4</sub> and N<sub>2</sub>O emissions**

49. The NIR provides a general statement about the burning of crop residues, which is not practised in Slovenia; consequently the emissions are not considered. CH<sub>4</sub> and N<sub>2</sub>O emissions are not reported for the years 1990–1994 and 1996, and no notation keys are provided. For the year 1995, the CH<sub>4</sub> and N<sub>2</sub>O emissions are reported as “not estimated” (“NE”). The ERT recommends a consistent use of notation keys for these sources.

## **V. LAND-USE CHANGE AND FORESTRY**

### **A. Sector overview**

50. According to the NIR, the LUCF sector acted in 1996 as a net sink equal to about 28 per cent of total gross GHG emissions (expressed as CO<sub>2</sub> equivalent). During the period 1986–1996, the net sink increased from 2,950 to 5,560 Gg CO<sub>2</sub> (i.e., by 88 per cent).

51. The submission covers GHG source and sink estimates for the years 1986 and 1990–1996. The NIR consists of the IPCC GHG inventory tables together with explanatory text. Slovenia uses the IPCC methodology but does not report removal/emission estimates for all categories. In addition, the categories reported do not include information on all activities requested by the CRF. The supplementary text to the NIR is transparent, enabling the ERT to discover some mistakes and incorrect applications of the methods of the IPCC Guidelines. No recalculations, QA/QC procedures or planned improvements are mentioned for this sector. The uncertainties are assessed in a qualitative and general way. The GHG inventory is focused on changes in forest biomass with much less attention being paid to the remaining categories.

### **B. Sink and source categories**

#### **Changes in forest and other woody biomass stocks – CO<sub>2</sub>**

52. Slovenia uses a methodology, which is generally based on the IPCC Guidelines. The ERT has, however, observed some inconsistencies between the IPCC methodology and the NIR. The conversion and expansion coefficients for coniferous and deciduous tree species are roughly equal to the respective wood densities, thus not providing an estimation of biomass that is not covered by forestry statistics (e.g., branches and subdimensional trees). This leads to an underestimation of GHG emissions and removals in the forest biomass, and possibly to an underestimation of the net change. Where national data on biomass expansion factors (BEFs) are lacking, the ERT recommends the use of IPCC defaults. In the IPCC table 5-1s1, the net biomass increment serves as the gross increment, thus resulting in a decrease of the true net sink. The ERT recommends the use of the following equation: gross increment = net increment + harvest + mortality.

53. Changes in non-forest tree biomass are not covered in the NIR. Slovenia is encouraged to report woody biomass changes other than those occurring in forests or else to provide an explanation in the NIR as to why they are not included in the estimation of GHG emissions and removals.

Forest and grassland conversion – CO<sub>2</sub>

54. Slovenia does not report estimates within this category. The reason given in the NIR is that this is in order to avoid double counting. To improve reporting in this category, the ERT recommends that Slovenia distinguish between forest harvest and forest clearing that leads to a permanent change in land use.

Abandonment of managed lands – CO<sub>2</sub>

55. The estimates submitted under this category apparently cover areas that are subjected to afforestation or regenerated naturally, and are subjected to some kind of management, but are not formally classified as forest. The ERT recommends that Slovenia check this assumption and, if it is correct, that it include these estimates under changes in forest and other woody biomass stocks (as this category also covers non-forest woody biomass subject to human intervention).

CO<sub>2</sub> emissions and removals from soil – CO<sub>2</sub>

56. The data for this category are very incomplete as they cover only about a half of the area of the country. The sink reported by the Party results to a great extent from non-matching areas (in the IPCC table 5-5s1, the T area is greater than the (T-20) area). The resulting 6.8 per cent increase in the area has produced an increase of 23.5 times in the sink in mineral soils. The ERT recommends that Slovenia improve its data sources and put QA/QC procedures in place as soon as possible to correct these mistakes.

## **VI. WASTE**

### **A. Sector overview**

57. Emissions from the Waste sector contributed approximately 5.7 per cent to national total emissions in 1996 and increased by 14.8 per cent between 1986 and 1996. CH<sub>4</sub> emissions from solid waste disposal on land are identified as a key source category by the secretariat's level key source assessment.

58. Notation keys have been used in the IPCC tables 6 and 7A. Some notation keys are not appropriate, particularly where the cells are protected. The ERT recommends that Slovenia should be guided by the UNFCCC reporting guidelines when using notation keys. Table 9 (the completeness table) of the CRF should be used to improve the completeness and transparency of reporting.

59. AD and some parameters, such as N<sub>2</sub>O EFs from human sewage, have been obtained from country studies. Other parameters, such as fraction of degradable organic carbon dissimilated and maximum methane producing capacity, are largely IPCC default values. The methodologies used are consistent with the IPCC Guidelines and the IPCC good practice guidance. The ERT noted that Slovenia has used the same figure for total population for each year of the inventory. Slovenia is encouraged to reflect any population change in the estimation of emissions in the Waste sector in order to improve accuracy.

### **B. Key sources**

Solid waste disposal on land – CH<sub>4</sub>

60. In 1996 CH<sub>4</sub> emissions from solid waste disposal on land accounted for 5.1 per cent of total national emissions, representing 89 per cent of emissions from the Waste sector. The CH<sub>4</sub> emissions of this source category increased by 26.4 per cent between 1986 and 1996. The ERT recommends that Slovenia provide an explanation of the trend in the NIR.

61. The ERT noted that information on a country-specific study for CH<sub>4</sub> emissions from solid waste disposal sites (SWDS) is referenced; however, the assumptions behind the choice of specific values of

parameters should be provided in the NIR. CH<sub>4</sub> emissions from solid waste disposal on land are a key source, and Slovenia is therefore encouraged to adopt a tier 2 methodology for this sector in line with the IPCC good practice guidance.

62. CH<sub>4</sub> recovery for flaring is reported in the NIR, but no indication is given as to whether it is associated with energy recovery. The ERT recommends that Slovenia provide information on known CH<sub>4</sub> recovery sites with and/or without energy recovery.

63. Total CH<sub>4</sub> emissions (48.73 Gg) from solid waste disposal on land in 1996 are reported in IPCC table 6. However, the respective contributions of managed and unmanaged sites are not indicated. The notation key “included elsewhere” (“IE”) is used for both source categories. The ERT recommends that Slovenia estimate and document the distribution of waste to managed and unmanaged sites for the purpose of quantifying the methane correction factor.

### **C. Non-key sources**

#### **Waste-water handling – CH<sub>4</sub> and N<sub>2</sub>O**

64. CH<sub>4</sub> emissions from waste-water handling decreased continuously between 1986 and 1996 by 46.8 per cent. The data presented in the IPCC tables show that the reduction can be attributed to an 82 per cent increase in CH<sub>4</sub> recovery from waste-water treatment plants in 1996. However, the NIR does not include any explanation of this and the ERT recommends that Slovenia should include an analysis of the trend information in the NIR.

65. CH<sub>4</sub> emissions from industrial and commercial waste-water, including human waste, are estimated separately in accordance with the IPCC guidelines. However, the same value of N<sub>2</sub>O emissions from domestic and commercial waste-water handling is reported for all years 1986–1996, probably reflecting the use of constant population data (see paragraph 59 above). The ERT recommends using actual population data to improve the reporting in this source category.

### **VII. OTHER SECTORS**

66. Slovenia has not reported emissions/sinks from other sources.

## ANNEX 1: MATERIALS USED DURING THE REVIEW

### A. Support materials used during the review

2002 and 2003 Inventory submission of Slovenia. 2003 submission including IPCC tables for years 1986 and 1990–1996 and an NIR.

UNFCCC secretariat. “Synthesis and assessment report of the greenhouse gas inventories submitted in 2003. Part I.” FCCC/WEB/SAI/2003 (available at

[http://unfccc.int/program/mis/ghg/s\\_a2003.html](http://unfccc.int/program/mis/ghg/s_a2003.html)) and Part II – the section on Slovenia) (unpublished).

UNFCCC secretariat. “Handbook for review of national GHG inventories.” Draft 2003 (unpublished).

UNFCCC secretariat. “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/CP/1999/7 (available at <http://www.unfccc.int/resource/docs/cop5/07.pdf>).

UNFCCC secretariat. “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>).

UNFCCC secretariat. Database search tool – *Locator* (unpublished).

IPCC. *IPCC Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories 2000* (available at <http://www.ipcc-nggip.iges.or.jp/public/gp/gpgaum.htm>).

IPCC/OECD/IEA. *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories, volumes 1–3, 1997* (available at <http://www.ipcc-nggip.iges.or.jp/public/gl/invs1.htm>).

### B. Additional materials

Responses to questions during the review were received from Ms. Tajda Mekinda-Majaron (Ministry of the Environment and Spatial Planning and Energy of the Republic of Slovenia).

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