UNITED
NATIONS

UNFCCC Framework Convention on Climate Change

Distr.
GENERAL

FCCC/ARR/2005/SVN*
9 March 2006

ENGLISH ONLY

Report of the individual review of the greenhouse gas inventory of Slovenia submitted in 2005**

* Reissued for technical reasons.

** In the symbol for this document, 2005 refers to the year in which the inventory was submitted, and not to the year of publication.

CONTENTS

I. Overview

A. Introduction

1. This report covers the centralized review of the 2005 greenhouse gas (GHG) inventory submission of Slovenia, coordinated by the United Nations Framework Convention on Climate Change (UNFCCC) secretariat, in accordance with decision 19/CP.8. The review took place from 3 to 8 October 2005 in Bonn, Germany, and was conducted by the following team of nominated experts from the roster of experts: Generalist –Ms. Ruta Bubniene (Lithuania) and Ms. Anke Herold (European Community); Energy – Mr. Leif Hockstad (USA), Mr. Steven Oliver (Australia) and Mr. Michael Strogies (Germany); Industrial Processes – Ms. Ionela Draghici (Romania), Ms. Sonia Petrie (New Zealand), and Mr. Kiyoto Tanabe (Japan); Agriculture – Mr. Erda Lin (China) and Mr. Marcelo Rocha (Brazil); Land Use, Land-use Change and Forestry (LULUCF) – Mr. Jozef Mindas (Slovakia) and Mr. Justin Ford-Robertson (New Zealand); Waste – Mr. Ayite-Lo Ajavon (Togo) and Ms. Anke Herold. Mr. Ayite-Lo Ajavon and Ms. Anke Herold were the lead reviewers. The review was coordinated by Ms. Rocio Lichte (UNFCCC secretariat).

2. In accordance with the "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, which provided comments that were considered and incorporated, as appropriate, in this final version of the report.

B. Inventory submission and other sources of information

3. In its 2005 submission, Slovenia submitted common reporting format (CRF) tables for the base year 1986 and for the years 1990–2003 and a national inventory report (NIR). Slovenia has not provided the tables of the CRF for LULUCF as required by decision 13/CP.9. The full list of materials used during the review is provided in the annex to this report.

C. Emission profiles and trends

4. In 2003, the most important GHG in Slovenia was carbon dioxide (CO_2), contributing 81.3 per cent to total[1] national GHG emissions expressed in CO_2 equivalent, followed by methane (CH_4), 10.0 per cent, and nitrous oxide (N_2O), 7.6 per cent. Hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulphur hexafluoride (SF_6) taken together contributed 1.1 per cent of the overall GHG emissions in the country. The Energy sector accounted for 79.7 per cent of the total GHG emissions, followed by Agriculture (9.9 per cent), Industrial Processes (5.9 per cent) and Waste (4.1 per cent). The Land-use Change and Forestry (LUCF) sector accounted for a removal of 5,561 Gg CO_2 equivalent, or 28.1 per cent of total national GHG emissions. Total GHG emissions in 2003 amounted to 19,803 Gg CO_2 equivalent and decreased by 1.9 per cent from 1986 to 2003. Over the period 1986–2002, total CO_2 emissions (without LUCF) remained constant. CH_4 emissions decreased during the same period by 12.2 per cent, mainly due to a reduction in CH_4 emissions from agriculture and energy industries, and N_2O emissions decreased by 9.4 per cent over the same period due to a decline of emissions in the Agriculture sector.

[1] In this report, the term total emissions refers to the aggregated national GHG emissions expressed in terms of CO_2 equivalent excluding LULUCF, unless otherwise specified. Because Slovenia has not provided estimates for LULUCF using the tables of the CRF for LULUCF but has reported estimates for Land-use Change and Forestry according to the tables as contained in the CRF adopted by 18/CP.8, this report refers to LUCF instead of LULUCF, as appropriate.

D. Key categories

5. Slovenia has reported a key category tier 1 and tier 2 analysis, both level and trend assessment, as part of its 2005 submission. LUCF is not included in the key category analysis. The key category analyses performed by the Party and the secretariat[2] produced similar results. As a result of a higher level of disaggregation in the tier 1 analysis, the Party identified 39 key categories by level assessment whereas the secretariat identified only 20 sources as key. Some inconsistencies were noticed in the estimation of the uncertainties for key categories, which are explained in the section on uncertainties of this report (paragraphs 12 and 13).

E. Main findings

6. In general, both the NIR and the CRF are largely complete and transparent. The inventory includes information on key categories, methods, data sources, emission factors (EFs), uncertainty estimates and quality assurance/quality control (QA/QC) procedures, and contains most of the relevant information needed for replication of the inventory. The methodologies used for estimating GHG emissions are consistent with the *Revised 1996 Intergovernmental Panel on Climate Change (IPCC) Guidelines for National Greenhouse Gas Inventories* (hereinafter referred to as the Revised 1996 IPCC Guidelines) and the *IPCC Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories* (hereinafter referred to as the IPCC good practice guidance). Many additional descriptions have been added to the NIR compared to previous submissions. However, the transparency of the NIR could be considerably enhanced by providing more detailed explanations. Improved transparency is in particular necessary for the estimation of feedstocks and non-energy fuel use. Frequently, references to data sources or country-specific parameters are not provided. Considerable improvements and revisions are still outstanding in the LULUCF sector, for which data have not been estimated and reported according to the land use categories of the IPCC *Good Practice Guidance for Land Use, Land-use Change and Forestry* (hereinafter referred to as the IPCC good practice guidance for LULUCF).

F. Cross-cutting topics

1. Completeness

7. The Party has provided an inventory that is largely complete in terms of sectors and geographical coverage. CRF tables for the base year (1986) and the years 1990–2003 are provided for all sources and categories except with regard to the new CRF tables for LULUCF. Emissions estimates for the years 1987–1989 are not provided. In terms of geographical coverage the inventory is complete.

2. Transparency

8. The NIR and the CRF are largely consistent and provide general information on methodologies and data sources used, emission estimates and trends, the process of inventory preparation, the institutional arrangements in place, and information on the national energy balance. The information on the application of the reference approach and the detailed methodological description for the Agriculture

[2] 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 *Intergovernmental Panel on Climate Change Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories*. 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 year 1990. 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.

sector which are included in the annex to the NIR provide valuable additional information and improve the transparency of the reporting considerably.

9. However, there are several cases of inconsistency in reporting as between the NIR and the CRF, in particular concerning fugitive emissions from oil distribution. Slovenia is also encouraged to provide more information on the methodology used for its uncertainty calculations, the development of EFs for lignite, the calculation of the time series for road traffic, and the recalculations of emissions from pulp and paper. Further improvements to the transparency of the reporting are addressed in the sectoral sections of this report below.

10. Notation keys are not used throughout the CRF and gaps in the reporting are not explained either in the documentation box or in CRF table 9. Moreover, in some cases the notation keys are used in an incorrect way. In particular, the ERT advises Slovenia to consider changing the notation key "not estimated" ("NE") for the category Field Burning of Agricultural Residues to "not occurring" ("NO") (as open-field burning is not practised in the country) and to reconsider the use of "included elsewhere" ("IE") for emissions from domestic navigation, for which the use of "NE" would be more appropriate (given that no data were available, as explained in table 9). The Party notes in the NIR (annex 4) that it is currently working on the clarification of sources that are not yet estimated and examining whether they should be classified as "NE" or "NO".

3. Recalculations and time-series consistency

11. The ERT noted that recalculations reported by the Party of the time series 1986–2002 have been undertaken to take into account improved methods, revised EFs, updated activity data (AD) or new emission sources. Comparison of the summary of emissions submitted in 2005 with the corresponding data submitted in 2004 showed that the Party's reported recalculations generally match those identified by the secretariat, except for CO_2 from energy in the year 2002, for which Slovenia does not report any recalculations. However, according to the comparison of submissions, the energy CO_2 estimates have been revised downwards by 0.6 per cent since the 2004 submission. Table 8(a) shows that recalculations were performed for category 1.A.2 Manufacturing Industries and Construction, but there are no explanations in table 8(b) or in the NIR. Furthermore, the sectoral description states that no recalculations were performed. Slovenia explained that this was due to an error during the CRF processing: the reporting of these recalculations in table 8(b) was omitted. The remaining recalculations are explained in the NIR. Slovenia should provide further information on these recalculations. The effect of the recalculations on the estimates for the base year (as reported in the CRF tables) is a decrease by 2.0 per cent in total CO_2 equivalent emissions. The major changes include the following improvements: the inclusion of new data sources for CH_4 recovery from solid waste disposal sites; improved AD on biomass use in the Energy sector; the inclusion of country-specific EFs; and corrections.

4. Uncertainties

12. The NIR, in annex 7, provides the results of an uncertainty assessment undertaken for 2002, but there are no explanations of the methodology used for this assessment and no indication is given as to which methodological tier has been used. The NIR does not explain how the uncertainty estimates have been derived, information on distributions assumed and correlations is missing, and units of values are not provided. Assuming that annex 7 reports a tier 1 uncertainty assessment, the data reported show that correlations have not been taken into account in the assessment, as the level of disaggregation is much too detailed, in particular in the Energy sector. All categories that use the same fuel-specific EF are correlated and should be treated at a higher level of aggregation in order to produce sensible results from the tier 1 assessment. The tables assign AD and EF uncertainties to source categories that do not produce emissions of certain GHGs, for example, for CO_2 emissions from nitric acid production and adipic acid production, and for CH_4 emissions from cement production. Uncertainty estimates are also provided for

many source categories for which Slovenia does not estimate emissions but reports "NO" or "not applicable" ("NA"), for example, for CO_2 from ammonia production. The uncertainties of the CH_4 and N_2O EFs in the Energy sector are low compared with those reported by other Parties, in particular for fuels such as biomass or other fuels. The ERT recommends that Slovenia revise the uncertainty assessment as the method of assigning uncertainties to the source categories seems not to be in line with the IPCC good practice guidance, and to add information on the methods used and descriptions on the expert judgements applied.

13. In the section on uncertainties in the NIR, Slovenia explains that in 2003 the uncertainties of the AD and EFs in category 1.A.1a Public Electricity and Heat Production were reduced because of the introduction of CO_2 emissions trading within the European Union (EU). However, in the Energy sector Slovenia explains that, starting from 2005, all thermal power plants will carry out regular coal sampling and determine the carbon contents under the EU Emissions Trading Scheme (ETS). The ERT noted that there are no recalculations of AD or EFs in the Energy sector for 2003 due to improved data from the ETS becoming available. It is therefore not clear how these activities could already have contributed in 2003 to a reduction of uncertainties. This should be further explained.

5. Verification and quality assurance/quality control approaches

14. The ERT welcomes the application of the manual of QA/QC procedures for the preparation of the GHG inventory and ongoing activities to formalize a QA/QC plan. The NIR states that the sectoral AD and methodologies applied are verified and some intermediate and final calculations are reviewed. However, the ERT noticed inconsistencies between the NIR and the CRF and therefore encourages the development and employment of the QA/QC plan for Slovenia's future submissions.

6. Follow-up to previous reviews

15. The ERT commends Slovenia for implementing the large number of improvements to methods, data or transparency recommended in previous reviews. Compared with the findings resulting from the reviews of previous submissions, the 2005 inventory submission has been improved thanks to a number of activities, such as the inclusion of table 8(a) on recalculations, changes to higher-tier methods (e.g. for solid waste disposal, CO_2 from cement production, carbide production, iron and steel production and ferroalloys production), improvements in time-series consistency and the transparency of the information provided.

16. Cross-cutting issues identified in previous review reports that are still pending are the provision of CRF data for the years 1987–1989 and the full operationalization of the QA/QC management system.

G. Areas for further improvement

1. Identified by the Party

17. In the NIR, Slovenia indicates that it is working to improve its estimates of fugitive emissions from the transport and distribution of natural gas for the period 1986–2004 and of the consumption of HFCs and SF_6 for the period 1986–2004; examining the source categories that are currently not estimated and their reclassification as "NE" or "NO"; and considering the use of plant-specific data in the Energy sector and the revision of the fuel consumption data of certain plants, the inclusion of emissions from fuel combustion by pipeline compressors, the updating of the EFs used for road transport, improved data on consumption of woody biomass in households, improved collection of data on all major sources of HFCs, the inclusion of emissions from solvents, the implementation of the IPCC good practice guidance for LULUCF and the collection of data on CH_4 recovery from waste-water treatment.

2. Identified by the ERT

18. The ERT recognized that the Party has already identified many areas of improvement. Regarding cross-cutting issues it considered the following improvements to be relevant:

(a) The revision of the quantitative uncertainty estimation in accordance with the recommendations and the IPCC good practice guidance;

(b) The provision of CRF data for the missing years 1987–1989 in order to enable a full assessment of the time series back to the base year (1986);

(c) Continued implementation of the QA/QC management system.

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

II. Energy

A. Sector overview

20. The Energy sector is the largest source of GHG emissions in Slovenia, representing almost 80 per cent of total national emissions in 2003. In 2003, emissions from the sector in Slovenia totalled 15,787 Gg CO_2 equivalent, an increase of 130 Gg CO_2 equivalent, or approximately 1 per cent, compared with the base year (1986). Within the Energy sector, the largest contributions in 2003 arose from the energy industries (39 per cent) and transport (26 per cent). Major sources include public thermal power plants, road transportation and residential fuel combustion. Fugitive emissions, while considered minor in Slovenia (at 2 per cent of the Energy total in 2003), are also accounted for in this sector, and include emissions arising from coal mining and the production of oil and natural gas.

21. The reporting of the Energy sector is mostly complete, consistent and comparable. The Energy chapter of the NIR is quite transparent, providing major details on source category calculations and a time series of AD, and annex 4 of the NIR provides more details with respect to the derivation of the EFs. The ERT encourages Slovenia to cite the exact sources from which the EFs are derived (the NIR text states generally where they are taken from, but it is not transparent for each EF) and to reference the oxidation factors used to calculate fuel combustion emissions.

22. In the NIR Slovenia mentions a detailed study of emissions from the natural gas industry. The ERT encourages Slovenia to continue with the study and to use the results, where appropriate, to improve the estimation of the natural gas subcategories of production/processing, transmission and distribution and the transparency of its reporting.

B. Reference and sectoral approaches

1. Comparison of the reference approach with the sectoral approach

23. Slovenia has calculated CO_2 emissions from fossil fuel combustion using the reference and the sectoral approaches for the base year and the years 1990–2003. For the year 2003, there is a difference of less than 0.2 per cent in the CO_2 emissions estimates and a difference of approximately 3 per cent in the fuel consumption estimates between the two approaches. This pattern – of a very small difference in the emissions estimates and a larger difference in the consumption estimates – is consistent throughout the time series. Slovenia does provide an explanation in the CRF table documentation box, noting that the difference between the two approaches is caused by the non-energy uses of natural gas in Slovenia.

2. International bunker fuels

24. Slovenia assumes that all jet kerosene fuel consumption is to be considered as international aviation bunker fuels (the NIR states that there are no commercial domestic flights in Slovenia), while all aviation gasoline is considered to be domestic fuel consumption. The NIR further states that Slovenia had no international marine bunkers in 2003. The ERT questioned this statement, as there appear to be international shipping operations based in the port of Luka Koper in Slovenia which would account for some portion of international marine bunkers. In response to questions raised during the review, Slovenia explained that all ships are (re)fuelled in international waters by Italian ships (under the Panamanian flag) and that the harbour is not used to refuel any international ships. The ERT recommends that Slovenia add more explanations on this issue in its next NIR.

3. Feedstocks and non-energy use of fuels

25. Slovenia considers a certain portion of natural gas to be a feedstock in methanol production, and natural gas used for non-energy purposes is considered to be 100 per cent stored (the IPCC default for natural gas as a feedstock is 33 per cent stored). Data are also provided for engine oil and lubricants (although outside the reference approach), but it is not clear where the corresponding emissions are accounted for in the CRF tables. The ERT encourages Slovenia to improve the transparency of its feedstock calculations and either to apply the IPCC default storage factors to the non-energy uses of fuels or to justify the 100 per cent storage factors being used.

4. Country-specific issues

26. Slovenia has included detailed discussions in its NIR on changes to the systems for collecting national statistics from 1986 to 2003 and its efforts to coordinate the data. Some trends exhibit large inter-annual variations. Details have been provided on the synthesizing of data collection procedures in Slovenia, but it is difficult to discern whether the fluctuations are driven by the need to categorize the AD or the result of inter-annual changes in conditions in certain energy source categories. The ERT commends Slovenia for providing details on its difficulties with its data collection systems over the time series, and encourages Slovenia to further describe where trends are driven by differing data sets or by country-specific conditions.

27. Slovenia has indicated in the NIR that it plans to develop country-specific EFs for fugitive emissions from the transport and distribution of natural gas, and that preliminary results from the study are expected in time for the 2006 inventory submission.

C. Key categories

1. Stationary combustion: Liquid fuels – CO_2

28. The EFs used for all liquid fuels across all combustion sources appear to be the IPCC default EFs, although liquid fuel combustion represents a key category for many Energy sources. In response to questions from the ERT, Slovenia stated that it had been determined during the inventory improvement process that the quality and characteristics of its liquid fuels are similar to the basis of the IPCC default values. The ERT encourages Slovenia to document these facts better in the NIR in order to improve transparency regarding why the IPCC defaults have been used.

29. The Energy chapter in the NIR does not specify the oxidation factors used in the calculations of CO_2 emissions from stationary fossil fuel combustion. In a response to questions raised during the review, Slovenia explained that for solid fuels an oxidation factor of 0.98 was used. However, in its next inventory submission, Slovenia plans to use a 0.99 oxidation factor for the time series in order to avoid discrepancies between data collected under the ETS and the GHG inventory. The ERT recommends that,

if a new country-specific oxidation factor is used, Slovenia reference the source of the factor and the justification for using it.

2. Manufacturing industries and construction: Solid fuels – CO_2

30. Recalculations performed for the year 2002 have led to a decrease in the estimated stationary combustion emissions compared with the 2004 submission. The NIR states that no recalculations were performed for 1.A.2 in the Energy chapter; and the CRF table 8(b) only states that a correction for solid fuels was applied to 1.A.2d Pulp, Paper and Print. While there was a reduction in the estimates of emissions from solid fuels in 1.A.2d, other subcategories under 1.A.2 have as well been revised downwards due to recalculations (including 1.A.2c, which has been changed from having solid fuel consumption in the 2004 submission to having none in the 2005 submission). In response to questions from the ERT, Slovenia explained that recalculations in Manufacturing Industries are expected due to a project that is being run jointly with the Slovenian Statistical Office to allocate fuel use for this sector correctly. The ERT recommends that Slovenia include a more detailed explanation of this recalculation and any further recalculations in its future inventory submissions.

3. Transport: Liquid fuels

31. The information provided for transport emissions is not sufficient to make it possible to check time-series consistency. As an example, table 3.60 of the NIR provides a very detailed overview of the fleet composition in Slovenia for 2003, which is the basis of the estimation for the category Road Transportation for all years of the time series. Given the complex changes Slovenia saw in the early 1990s, the ERT is of the view that the data currently used for 1986 and 1990, which are essentially unchanged, may not be an appropriate basis for an accurate calculation for Road Transportation in those years. In response to a question raised during the review, Slovenia indicated that similar detailed overviews for the fleet composition in the early years are available. The ERT recommends Slovenia to include in the NIR an improved description of the data sources (or the methods of interpolation or extrapolation used, or expert judgement applied) and to include overview tables in order to improve the transparency of the reporting.

32. In addition, CRF table Summary 3 indicates that the emissions for transport (including road transport) are estimated using a tier 1 approach. However, the NIR states that the road transport emissions in Slovenia have been estimated for the entire time series by applying the COPERT model. This model is considered a tier 2 or tier 3 approach, which would be more appropriate because road traffic is considered to be a key category in Slovenia. The ERT encourages Slovenia to clarify this point in the CRF and NIR of its next submission.

4. Fugitive emissions from coal mining – CH_4

33. The coal-mining EFs for individual mines are relatively low compared to the IPCC default range for underground mines. However, Slovenia is an unusual case in that there are underground lignite mines. In addition, the individual mine EFs do vary substantially over time. Neither of these issues is necessarily a problem, as it may be possible to understand them in the context of the individual mines' operations. However, transparency would be greatly assisted if more details could be included from the relevant source paper, particularly the method used to derive the EFs. The previous (2004) review recommended that Slovenia's coal EF study be submitted to peer review, or that the national EFs be submitted to the IPCC EF database. It is not clear whether these actions have been pursued.

34. The source for AD for coal mined is referred to in the NIR table as "LEG", but it cannot be found in the reference list. More details regarding the coal production data source should be provided in the NIR.

35. In the cases of some individual mines the EFs for Coal – Post Mining are higher than those for Coal Mining. This is unusual, and, for the sake of transparency, improved explanations should be provided from the source study as to how these EFs have been derived.

D. Non-key categories

1. Manufacturing industries and construction

36. The NIR states that incineration of semi-finished products in industrial stokers for energy recovery occurs, but waste incineration is not described in the Waste chapter, and no details on the composition of "Other fuels" included in the CRF tables under 1.A.2 are provided in the NIR. The ERT recommends that Slovenia investigate this fuel combustion source and provide more detailed information.

2. Other: Military

37. The ERT recommends that emissions from military fuel combustion be included in the CRF tables under the category 1.A.5 Other. Even though it appears that Slovenia has a small military (army, navy and air force), for this particular source category no estimates have been provided. In response to questions raised by the ERT during the review Slovenia provided additional information about the allocation of the fuel consumption data and the plans for improved, transparent reporting for this source category.

3. Fugitive emissions from oil and natural gas – CH_4

38. The formula for estimating emissions from the transmission of natural gas is given, but the EF is not presented or referenced. The implied emission factor (IEF) is low compared to those reported by other Parties and needs some further explanation in the NIR.

39. For the distribution of natural gas, factors such as the length of pipeline by pipeline type and EFs should be made explicit. Some justification of the EF applied is presented in the NIR. As with the transmission of natural gas, the IEF is very low compared to those reported by other Parties. The 2004 review report highlighted this and recommended that the IPCC tier 1 approach should be used as a first basis. Some additional justification of the EF has been presented in the 2005 NIR, and Slovenia acknowledges that it is in the process of preparing a detailed study of natural gas emissions. The ERT encourages Slovenia to continue with the study and use the results where appropriate to improve the estimation and transparency of the Natural Gas subcategory in its 2006 inventory submission.

40. A small amount of CH_4 is reported for other leakage of natural gas, but no EF is given or explained. Slovenia is encouraged to provide an explanation in the NIR of how the emissions were estimated.

III. Industrial Processes and Solvent and Other Product Use

A. Sector overview

41. In 2003 the Industrial Processes and Solvent and Other Product Use sectors together accounted for 6.2 per cent of Slovenia's total GHG emissions. CO_2 represented 78.7 per cent of the two sectors' emissions. Actual emissions of fluorinated gases (F-gases) contributed 18.1 per cent of the sectors' emissions and N_2O 2.7 per cent. From 1986 to 2003, emissions from the two sectors decreased by 14 per cent mainly due to decreases in PFC emissions from aluminium production (a reduction of 57 per cent) and in CO_2 from lime production (a reduction of 59 per cent).

42. Estimates are provided for most categories, or notation keys are used, where required. The ERT noted that actual emissions are reported but not potential emissions for the F-gases. The ERT recommends Slovenia to estimate and report potential emissions as well.

43. Recalculations have been performed for CO_2 from cement production, carbide production, iron and steel production and ferroalloys production. These are a result of the implementation of higher-tier methodologies and improvements to the EFs and/or AD. The recalculations have resulted in a 0.26 per cent reduction in the estimates of emissions in the base year (1986) compared to the figures for Industrial Processes in Slovenia's 2004 submission. The ERT commends Slovenia for these improvements to the inventory.

B. Key categories

1. Cement production – CO_2

44. The ERT commends Slovenia for updating the methodology from tier 1 to tier 2 and developing a country-specific EF based on detailed plant-specific data. To increase the transparency of the inventory the ERT encourages Slovenia to specify in the NIR the cement kiln dust (CKD) correction factor used in the calculations.

2. Lime production – CO_2

45. Slovenia notes in the NIR that a country-specific EF has been calculated from data obtained from lime production companies from the past five years but not for the entire time series. Slovenia has not used this country-specific EF, but has applied instead the IPCC default EF for all years in order to ensure time-series consistency. According to the NIR, this country-specific EF is likely to be lower than the IPCC default because of the high magnesium (Mg) content in the lime. This may result in emissions being approximately 5 per cent lower than currently reported. As this source is a key category, the ERT encourages Slovenia to develop a country-specific EF for all years for the next submission, as the NIR (section 4.2.4 on source-specific planned improvements) states.

3. Aluminium production – CO_2

46. CO_2 emissions from this source in 2003 had more than doubled since 1986. Slovenia explains the estimation method used and the reason for this increase in the NIR.

4. Aluminium production – PFCs

47. The IEFs for hexafluoroethane (C_2F_6) and tetrafluoromethane (CF_4) have decreased by 88 per cent and 85 per cent, respectively, over the period 1986–2003. Slovenia explains in the NIR that this is due to the modernization of the aluminium plant.

5. Refrigeration and air-conditioning equipment – HFCs

48. For this category Slovenia provides estimates for only HFC 134a, which is reported in table 2.(II) of the CRF. However, in the corresponding background data table (2(II).F) no AD or underlying information have been provided; instead, all refrigeration and air-conditioning-related categories are reported as "NE". Furthermore, while in table 2(II).F all other F-gases and sources are reported as "NE", they have been reported using "0" in table 2(II). The ERT requests Slovenia to use the notation keys instead of "0" and to improve consistency as between the CRF tables.

6. Paint application – CO_2

49. Slovenia reports CO_2 emissions arising from oxidation of non-methane volatile organic compounds (NMVOCs) in the atmosphere and this is identified as a key category. The methodology

used to estimate these emissions is described in the NIR but there is no explanation as to how the conversion factor (3.19 mass units of CO_2 per mass unit of NMVOC) was derived. There is also no information on uncertainty or time-series consistency for this source. As this is a key category, the ERT recommends Slovenia to provide explanations and information on these issues in its next NIR. The ERT noted that Slovenia had improved the provision of AD in the CRF of the latest submission following the recommendation from the previous (2004) review and the ERT welcomes this improvement.

7. Other (solvent and other product use) – N_2O

50. Slovenia reports N_2O emissions from anaesthesia in this source category, and this has been identified as key category. The emissions in 2003 were 58 per cent lower than those in the base year, although there was an unusual increase between 1998 and 1999. The ERT could not find any information in the NIR that would explain this emissions trend. In information provided later to the ERT, Slovenia explained there was a change in the statistical agency collecting N_2O data after N_2O production ceased in 1999. Slovenia acknowledged the unusual trend and fluctuations but indicated that it was not in a position to explain the trend and that the current data were the best available. The ERT encourages Slovenia to investigate this issue further. For example, Slovenia may need to consider the use of the splicing methods described in the IPCC good practice guidance.

C. Non-key categories

1. Carbide production – CO_2

51. The AD for calcium carbide production have been recalculated for all years using plant-specific data. This has resulted in a reduction in the estimates, of 3 Gg CO_2 equivalent, for the base year (1986) compared to the previous (2004) inventory submission. This has made the complete time-series methodology consistent and the ERT commends this improvement.

52. For 1986 and 1990–1995, CO_2 emissions from silicon carbide production are reported but there is no description in the NIR of the methodology used (the NIR only mentions that silicon carbide production was discontinued in 1995). The ERT recommends Slovenia to provide a brief explanation of the method used to estimate CO_2 emissions from silicon carbide production in its next NIR.

2. Iron and steel production – CO_2

53. CO_2 emissions from coke consumption are allocated to this source as process emissions for the years 1990–2003, but for the base year (1986) these emissions are allocated to the Energy sector as fuel consumption. Slovenia explains in the NIR why it has allocated CO_2 emissions in this way, but the ERT does not consider the explanation sufficiently clear. The ERT recommends Slovenia to provide a more detailed explanation (as provided to the ERT during the review) in its next NIR.

54. In the previous (2004) inventory submission, CO_2 emissions from coke consumption were allocated to this source only for the year 2002. This means that emissions from this source have been recalculated (by the inclusion of emissions from coke consumption) for the years 1990–2001 in the present inventory submission. However, this recalculation is neither clearly nor exactly explained in the CRF (table 8(b) of the CRF for the years 1990–2001 refers to improved AD but does not explicitly mention the inclusion of coke consumption. The same table for the base year also refers to improved AD, in spite of the fact that no recalculations were made for that year.) This recalculation is not mentioned in the NIR at all. The ERT recommends Slovenia to elaborate clearly and precisely on any recalculations of this kind both in the CRF and in the NIR in its next inventory submission. The ERT also recommends Slovenia to clarify in its next NIR that there is no double counting of emissions from coke consumption between this source and the Energy sector, as it explained to the ERT during the review.

IV. Agriculture

A. Sector overview

55. In 2003 the Agriculture sector was responsible for 41.0 per cent of total CH_4 emissions and 76.9 per cent of total N_2O emissions in Slovenia, and accounted for 9.9 per cent of total national emissions. Since the base year (1986), emissions had decreased by 16.9 per cent. The causes of these reductions, as well as some inter-annual fluctuations, are not well explained in the NIR. Emissions from agricultural soils represented 46.6 per cent of the sector's emissions, followed by enteric fermentation with 33.1 per cent and manure management with 20.4 per cent.

56. Following the recommendations of previous reviews, Slovenia has updated its AD, recalculated emissions and provided more explanation on the collection of AD (mainly from the Agricultural Institute of Slovenia and the Statistical Office of the Republic of Slovenia), including information on the time series. It has not implemented the recommendation of the 2004 in-country review that it should use three-year averages for animal statistics in livestock characterization over the entire time series, and does not give sufficient information about the reasons for not doing so in the 2005 NIR. During the review Slovenia explained that one-year averages have been used because these do not fluctuate very much, thus avoiding the need for frequent recalculations, and because they provide greater transparency for quality checking. The ERT recommends that Slovenia incorporate these explanations in its 2006 inventory submission.

57. The uncertainties in this sector have been calculated using expert judgement. Slovenia recognized during the review that the uncertainty estimates are not well defined and should be improved. Slovenia should also provide more specific information and a description of the expert judgements used.

B. Key categories

1. Enteric fermentation in domestic livestock – CH_4

58. Slovenia uses a tier 2 method for calculating emissions from cattle and tier 1 for other animals. More information is needed to clarify the calculation of the EFs and to explain the differences between the country-specific EFs and the IPCC values. This information should be included in the 2006 inventory submission.

59. The ERT identified some specific problems for the EF for non-dairy cattle in 1992, which led to an increase in the estimates of emissions by 8.5 per cent between 1991 and 1992. Slovenia indicated that it is making the necessary improvements.

2. Manure management – CH_4

60. Slovenia uses a tier 2 method for calculating emissions from cattle and tier 1 for other animals. More information is needed to clarify the calculation of the EFs and to explain the differences between the country-specific EF and the IPCC values. Emissions from this category have decreased by 38.6 per cent since 1986 due to a reduction in the cattle population.

3. Manure management – N_2O

61. Slovenia uses a tier 1 method for this key category. As already suggested in a previous review, Slovenia should make the necessary improvements to apply a tier 2 method for this key category and the EFs should be either revised or better explained, since West European default values for nitrogen excretion rates have been used instead of East European values. During the review, Slovenia explained that it was never a typical East European country and that the methods of breeding and managing animals

have always been much closer to the methods used in Western Europe. The ERT recommends Slovenia to include these explanations in its 2006 inventory submission.

62. For many inter-annual changes in this category no explanation can be found in the NIR. According to explanations provided during the review, the inter-annual changes observed were attributed to changes from anaerobic lagoons to anaerobic digesters for some big pig farms, changes from solid to liquid animal waste management systems (AWMS) for cattle, and an increased share of cattle on pasture. The ERT recommends that Slovenia incorporate the explanations that were provided during the review in its next inventory submission.

4. Direct and indirect soil emissions – N_2O

63. Slovenia uses the default IPCC method and default values for the estimation of direct and indirect N_2O emissions from soils. The AD show large inter-annual fluctuations between 1991 and 1992. During the review Slovenia explained that the national statistics show high fertilizer consumption in 1992.

64. Some values for $Frac_{GRAZ}$, $Frac_{NCRO}$, $Frac_R$ and $Frac_{NCRBF}$ were identified as very different from the defaults or from the values reported by other Parties; it was explained that these discrepancies were due to errors which occurred during the completion of the additional information boxes in the CRF and that the values have been corrected. The ERT recommends Slovenia to correct these values in its 2006 inventory submission and to do QC checks for the additional information boxes of the CRF.

65. Direct emissions from histosols have not been estimated. Even if all soil with high contents of organic material were ploughed, the emissions from that source would present only 0.6 per cent of total emissions of N_2O. Because it would only represent such a small fraction, this source has not been considered.

V. Land Use, Land-use Change and Forestry

A. Sector overview

66. Slovenia has not provided the LULUCF reporting tables as required by decision 13/CP.9 and following the land-use categories of the IPCC good practice guidance for LULUCF. Instead it has reported categories 5.A Changes in Forest and Other Woody Biomass Stocks, 5.C Abandonment of Managed Lands and 5.D CO_2 Emissions and Removals from Soil according to the LUCF reporting tables as contained in the CRF adopted by decisions 3/CP.5 and 18/CP.8 which are based on the Revised 1996 IPCC Guidelines.

67. Slovenia has reported a net sink for the LUCF sector, increasing from 2,950 Gg CO_2 equivalent in the base year (1986) to 4,339 in 1990, and peaking at 5,675 Gg CO_2 equivalent in 1995. The inventory reports removals of 5,561 Gg CO_2 equivalent for each year from 1996 to 2003, which represents an increase of 47 per cent over the base year estimate. At this level, the LUCF sector removals represent 28 per cent of the total emissions reported for 2003 (19,803 Gg CO_2 equivalent). Due to the size of sector in relation to total national emissions, the ERT for the 2004 in-country review recommended that Slovenia give priority to improving the emissions estimates from LUCF.

68. Slovenia identified a need for major improvement of the reporting in this sector as a result of the 2004 in-country review, largely due to the new requirements in the IPCC good practice guidance for LULUCF. It stated during the review that this is planned for the 2006 submission. Hence the data and information reported in 2005 for this sector (in both the NIR and the CRF) are almost identical to those reported in the 2004 submission. The ERT encourages Slovenia in its intention to review its estimates using new data and methods, and following the new guidance for LULUCF.

69. The ERT encourages Slovenia to consider the recommendations made by the 2004 in-country review. Few additional issues were raised in the present review in this sector.

B. Sink and source categories

Changes in forest and other woody biomass stocks – CO_2

70. The carbon stock in wood products is estimated to be approximately 10 per cent of that in forest biomass. The ERT encourages Slovenia to report more detailed information on this category in its next submission.

71. The ERT recommends that Slovenia provide information to support the adoption of the conversion factors (volume to dry matter of stem wood only) given in the NIR, of 0.4 and 0.6 for coniferous and deciduous species, respectively.

VI. Waste

A. Sector overview

72. In 2003 the Waste sector contributed approximately 4.1 per cent of the total GHG emissions in Slovenia. CH_4 from landfills is the most important GHG emitted in the sector, contributing 71.7 per cent to total sectoral emissions. Between the base year 1986 and 2003 emissions in the sector increased by 12.2 per cent. This increase is explained as a consequence of the increase in the amount of municipal waste disposed. Emissions from waste water have fallen since the base year by 13.8 per cent, which is explained as being due to the recovery of gas in waste-water treatment plants and the decrease in industrial production.

73. Slovenia is commended for having added considerable detail to the information provided in the Waste sector, thus enhancing the understanding of the emissions methodology, as recommended by previous reviews. However, some additional information is still needed in order to make it possible fully to understand the estimations.

74. Slovenia reports waste incineration as "NO". A brief explanation of the summary section on Waste in the NIR should also explain that waste incineration does not occur in the country. Slovenia should clarify whether any waste fuels are used in the Energy sector (e.g. the cement industry) because if they are the notation key "IE" would be more appropriate.

75. No information on sector-specific QA/QC activities is provided. This information should be included in Slovenia's future submissions.

B. Key categories

Solid waste disposal on land – CH_4

76. The previous (2004) review recommended considerable improvements in the Waste sector and Slovenia has made significant efforts to improve the estimation of CH_4 emissions from solid waste disposal. In particular it has adopted a tier 2 method instead of the tier 1 used previously for this key category.

77. For the years 1964–2003 the same composition of industrial waste is assumed as for municipal solid waste, and for 2001–2003 data from Environmental Agency of the Republic of Slovenia (ARSO) are used. Slovenia should investigate whether these data on waste composition can be extrapolated backwards as municipal solid waste is not seen as very comparable to industrial waste. Slovenia could

further improve this part of its estimation method, taking into account the type of industries producing biodegradable waste.

78. The NIR presents a time series of CH_4 recovery from landfills going back to 1990. In many other countries, in 1990 CH_4 recovery was not yet being practised. Further information should be provided on when CH_4 recovery started in Slovenia.

C. Non-key categories

Waste-water handling – CH_4, N_2O

79. The previous review recommended considerable improvements in the Waste sector and Slovenia has made substantial efforts to improve its estimation of CH_4 and N_2O emissions from waste-water handling. These are transparently described in the NIR.

80. CH_4 emissions from sludge landfilled or used in agriculture should not be included under Wastewater Handling but rather reported under 6.A Solid Waste Disposal and under the Agriculture sector, respectively. From the information provided in the NIR, it remains unclear to which source categories CH_4 emissions from sludge landfilled and used in agriculture have been allocated; for example, the NIR explains that "sizeable amounts of sewage are used as fertilizer" (NIR p. 165). It is likely that sludge is meant here, but in the respective section there is no explanation as to whether emissions are estimated and where they are allocated. Further information should be provided in Slovenia's 2006 inventory submission on this allocation and emissions should be allocated appropriately.

81. For CH_4 recovery from sludge from municipal waste water, the AD have remained constant since 1996. As it is likely that the amounts of CH_4 recovered have increased in recent years, Slovenia is encouraged to investigate actual CH_4 recovery in sludge treatment as indicated as a planned improvement in the NIR. The NIR does not explain the data source used for the years 1986–1996 and this information should be included in Slovenia's 2006 inventory submission.

82. For sludge from domestic and commercial waste water, the CH_4 IEF used is high compared to those of other Parties, and further information should be provided in Slovenia's next NIR to explain this value.

83. It would be more transparent to base the methods for estimating emissions from industrial waste water on the amounts of waste water generated per ton of product and the respective chemical oxygen demand (COD) per amount of waste water, as indicated in the Revised 1996 IPCC Guidelines. Slovenia indicated that it intends to acquire these data and to update the estimates of emissions for industrial waste water accordingly.

84. For industrial waste water, it is not clear whether fractions of waste water are assumed to be untreated or how emissions have been estimated for any untreated fractions. The specific data sources for waste-water pathways (table 8.2.5) are not provided in the NIR, and no specific information is provided on how the CH_4 conversion factor of 0.8 for converting from treated waste water in sludge was derived and what exactly this factor represents. Additional information on waste-water treatment and discharge pathways and methods for treating industrial waste water should be provided in Slovenia's next inventory submission, and the linkages between the pathways and the methodological description should be improved.

85. The CH_4 IEF (0.0007) for 2003 is very low compared to those of most other Parties and no explanation for this low value was provided during the review. It is recommended that Slovenia address this issue as part of the planned methodological improvement for emissions from industrial waste water.

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/gpglulucf/gpglulucf.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>.

UNFCCC. Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual inventories. FCCC/SBSTA/2004/8. Available at <http://unfccc.int/resource/docs/2004/sbsta/08.pdf>.

UNFCCC. 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. Status report for Slovenia. 2005. Available at <http://unfccc.int/files/national_reports/annex_i_ghg_inventories/inventory_review_reports/application/pdf/2005_status_report_european_community.pdf>.

UNFCCC secretariat. Synthesis and assessment report of the greenhouse gas inventories submitted in 2005. Available at <http://unfccc.int/files/national_reports/annex_i_ghg_inventories/inventory_review_reports/application/pdf/sa_2005_part_i_final.pdf>.

UNFCCC secretariat (2005). Report of the individual review of the greenhouse gas inventory submitted in the year 2004. FCCC/WEB/IRI/2004/SVN. Available at <http://unfccc.int/files/national_reports/annex_i_ghg_inventories/inventory_review_reports/application/pdf/2004_irr_in-country_review_slovenia.pdf>.

B. Additional information provided by the Party

Responses to questions during the review were received from Ms. Tajda Mekinda Majaron (Environmental Agency of the Republic of Slovenia (ARSO)), including additional material on the methodology and assumptions used.

- - - - -