



COMPLIANCE COMMITTEE

CC/ERT/ARR/2009/10
16 February 2009

**Report of the individual review of the greenhouse gas inventories of
Slovenia submitted in 2007 and 2008**

Note by the secretariat

The report of the individual review of the greenhouse gas inventories of Slovenia submitted in 2007 and 2008 was published on 16 February 2009. For purposes of rule 10, paragraph 2, of the rules of procedure of the Compliance Committee (annex to decision 4/CMP.2, as amended by decision 4/CMP.4), the report is considered received by the secretariat on the same date. This report, FCCC/ARR/2008/SVN, contained in the annex to this note, is being forwarded to the Compliance Committee in accordance with section VI, paragraph 3, of the annex to decision 27/CMP.1.



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**Report of the individual review of the greenhouse gas inventories of Slovenia
submitted in 2007 and 2008***

* In the symbol for this document, 2008 refers to the year in which the inventory was submitted, and not to the year of publication.

CONTENTS

	<i>Paragraphs</i>	<i>Page</i>
I. OVERVIEW	1–19	4
A. Introduction	1–2	4
B. Inventory submission and other sources of information	3	4
C. Emission profiles and trends	4–5	4
D. Key categories	6	5
E. Main findings	7–8	5
F. Cross-cutting topics	9–16	7
G. Areas for further improvement	17–19	8
II. ENERGY	20–30	9
A. Sector overview	20–23	9
B. Reference and sectoral approaches	24–27	10
C. Key categories	28–29	11
D. Non-key categories	30	11
III. INDUSTRIAL PROCESSES AND SOLVENT AND OTHER PRODUCT USE	31–44	11
A. Sector overview	31–35	11
B. Key categories	36–41	12
C. Non-key categories	42–44	13
IV. AGRICULTURE	45–58	14
A. Sector overview	45–50	14
B. Key categories	51–57	14
C. Non-key categories	58	15
V. LAND USE, LAND-USE CHANGE AND FORESTRY	59–66	15
A. Sector overview	59–61	15
B. Key categories	62–66	16

VI.	WASTE.....	67–74	17
	A. Sector overview.....	67–69	17
	B. Key categories.....	70–71	17
	C. Non-key categories.....	72–74	18
VII.	OTHER ISSUES	75–77	18
VIII.	CONCLUSIONS AND RECOMMENDATIONS.....	78–81	18
IX.	QUESTIONS OF IMPLEMENTATION.....	82	19

Annex

	Documents and information used during the review		20
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I. Overview

A. Introduction

1. This report covers the centralized review of the 2007 and 2008 greenhouse gas (GHG) inventory submissions of Slovenia, coordinated by the UNFCCC secretariat, in accordance with decision 22/CMP.1. In accordance with the conclusions of the Subsidiary Body for Implementation at its twenty-seventh session,¹ the focus of the review is on the most recent (2008) submission. The review took place from 15 to 20 September 2008 in Bonn, Germany, and was conducted by the following team of nominated experts from the UNFCCC roster of experts: generalist – Mr. Justin Goodwin (United Kingdom of Great Britain and Northern Ireland), Mr. Jan Pretel (Czech Republic); energy – Mr. Javier Gonzalez (Spain), Mr. Simon Wear (New Zealand), Mr. Scott McKibbin (Canada); industrial processes – Mr. Stanford Mwakasonda (South Africa), Mr. Eilev Gjerald (Norway); agriculture – Mr. Tom Wirth (United States of America), Mr. Jorge Alvarez (Peru); land use, land-use change and forestry (LULUCF) – Ms. Thelma Krug (Brazil), Mr. Chris Cameron (New Zealand); and waste – Mr. Mark Hunstone (Australia), Mr. Qingxian Gao (China). Mr. Goodwin and Mr. Mwakasonda were the lead reviewers. The review was coordinated by Ms. Astrid Olsson and Mr. Vitor Gois Ferreira (UNFCCC secretariat).

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

B. Inventory submission and other sources of information

3. The 2008 annual inventory was submitted on 15 April 2008; it contains a complete set of common reporting format (CRF) tables for the period 1986–2006 and a national inventory report (NIR). This is in line with decision 15/CMP.1. The Party indicated that the 2008 submission is also its voluntary submission under the Kyoto Protocol.² In its 2007 submission, Slovenia included a complete set of CRF tables for the period 1990–2005 and an NIR. Where needed the expert review team (ERT) also used the 2006 submission, additional information provided during the review and other information. The full list of materials used during the review is provided in the annex to this report.

C. Emission profiles and trends

4. In 2006 (as reported in the 2008 annual inventory submission), the main GHG in Slovenia was carbon dioxide (CO₂), accounting for 82.0 per cent of total GHG emissions³ expressed in CO₂ eq, followed by methane (CH₄) (10.5 per cent) and nitrous oxide (N₂O) (6.4 per cent). Hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF₆) collectively accounted for 1.2 per cent of the overall GHG emissions in the country. The energy sector accounted for 80.5 per cent of the total GHG emissions, followed by agriculture (9.9 per cent), industrial processes (6.0 per cent), waste (3.4 per cent) and solvent and other product use (0.2 per cent). Total GHG emissions amounted to

¹ FCCC/SBI/2007/34, paragraph 104.

² Parties may start reporting information under Article 7, paragraph 1, of the Kyoto Protocol from the year following the submission of the initial report, on a voluntary basis (decision 15/CMP.1).

³ In this report, the term “total GHG emissions” refers to the aggregated national GHG emissions expressed in terms of CO₂ eq excluding LULUCF, unless otherwise specified.

20,591.35 Gg CO₂ eq and decreased by 1.0 per cent between the base year⁴ and 2006. In 2005 as reported in the 2007 inventory submission), total GHG emissions amounted to 20,283.61 Gg CO₂ eq. The shares of gases and sectors in 2006 (2008 annual inventory submission) were similar to those of 2005 (2007 inventory submission).

5. Tables 1 and 2 show GHG emissions by gas and by sector, respectively.

D. Key categories

6. Slovenia has reported a key category tier 1 analysis, both level and trend assessment, as part of its 2008 submission. The key category analysis performed by the Party (26 key categories) and performed by the secretariat (22 key categories) produced similar results; small differences can be explained by a more detailed level of aggregation used by the Party. Slovenia has included the LULUCF sector in its key category analysis, following the recommendations of the ERT that conducted the previous review. The analysis has been performed in accordance with the Intergovernmental Panel on Climate Change (IPCC) *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories* (hereinafter referred to as the IPCC good practice guidance) and the IPCC *Good Practice Guidance for Land Use, Land-Use Change and Forestry* (hereinafter referred to as the IPCC good practice guidance for LULUCF), and did not show any substantial differences from the analysis submitted in 2007. Slovenia is using the key category analysis as a driving factor for the preparation of the inventory and to prioritize future developments and improvements. The ERT recommends that Slovenia explore the possibility of compiling a tier 2 key category analysis.

E. Main findings

7. Slovenia has submitted a complete set of CRF tables for the years 1986–2006 and an NIR. The 2008 submission is complete in terms of geographical coverage, years and sectors. However, the ERT noted that Slovenia has reported only land remaining forest land in the LULUCF sector. The inventory is generally in line with the UNFCCC reporting guidelines, the *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories* (hereinafter referred to as the Revised 1996 IPCC Guidelines), the IPCC good practice guidance and the IPCC good practice guidance for LULUCF; however, transparency still needs to be improved. Based on a recommendation from the previous review, Slovenia has significantly enhanced its reporting of recalculations, and the structure of the NIR and the transparency of the methodology descriptions show an improvement over previous submissions. Nevertheless, the structure does not fully follow the recommended format (e.g. detailed background of uncertainty analysis, etc.), and further improvements are required in the NIR to include detailed descriptions of methodology and identification of the emission factors (EFs) used.

8. During the review the Party provided additional information on its quality assurance/quality control (QA/QC) plan (in Slovenian). To improve the overall transparency of the inventory, this information should be included as part of Slovenia's next submission, with the main characteristics of the QA/QC plan translated into English.

⁴ Base year refers to the base year under the Kyoto Protocol, which is 1986 for CO₂, CH₄ and N₂O, and 1995 for HFCs, PFCs and SF₆. The base year emissions do not include any possible emissions from deforestation; however, if applicable, these are taken into account when the assigned amount is calculated.

Table 1. Greenhouse gas emissions by gas, 1986–2006

Greenhouse gas emissions	Gg CO ₂ eq								Change base year–2006 (%)
	Base year ^a	1990	1995	2000	2003	2004	2005	2006	
CO ₂	16 293.52	14 751.14	14 980.49	15 223.45	16 060.71	16 427.49	16 759.10	16 878.46	3.6
CH ₄	2 383.83	2 303.41	2 167.12	2 228.68	2 212.13	2 185.54	2 190.90	2 157.67	–9.5
N ₂ O	1 376.20	1 256.03	1 213.32	1 318.30	1 299.20	1 260.92	1 279.69	1 308.78	–4.9
HFCs	28.96	0.00	28.96	31.13	64.29	80.03	95.62	112.05	286.9
PFCs	285.68	257.44	285.68	105.61	118.99	120.01	123.53	115.55	–59.6
SF ₆	10.24	10.30	11.52	15.74	17.92	18.31	18.84	18.84	63.5

Abbreviation: NA = not applicable.

^a Base year refers to the base year under the Kyoto Protocol, which is 1986 for CO₂, CH₄ and N₂O, and 1995 for HFCs, PFCs and SF₆. The base year emissions do not include any possible emissions from deforestation; however, if applicable, these are taken into account when the assigned amount is calculated.

Table 2. Greenhouse gas emissions by sector, 1986–2006

Sectors	Gg CO ₂ eq								Change base year–2006 (%)
	Base year ^a	1990	1995	2000	2003	2004	2005	2006	
Energy	16 069.63	14 402.74	14 866.72	15 074.02	15 835.19	16 180.12	16 480.54	16 573.21	3.1
Industrial processes	1 327.69	1 292.16	1 109.47	970.14	1 112.02	1 148.38	1 208.54	1 242.61	–6.4
Solvent and other product use	81.90	43.40	17.25	42.73	33.33	39.25	43.32	44.15	–46.1
Agriculture	2 334.30	2 242.73	2 117.36	2 162.34	2 092.46	1 998.54	2 005.80	2 029.21	–13.1
LULUCF	NA	–3 185.75	–4 905.24	–5 175.16	–5 318.23	–5 643.72	–5 430.37	–4 733.09	NA
Waste	566.19	597.29	576.29	673.68	700.22	726.03	729.47	702.17	24.0
Other	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total (with LULUCF)	NA	15 392.57	13 781.86	13 747.76	14 455.00	14 448.58	15 037.31	15 858.26	NA
Total (without LULUCF)	20 379.71	18 578.32	18 687.10	18 922.92	19 773.23	20 092.30	20 467.68	20 591.35	1.0

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

^a Base year refers to the base year under the Kyoto Protocol, which is 1986 for CO₂, CH₄ and N₂O, and 1995 for HFCs, PFCs and SF₆. The base year emissions do not include any possible emissions from deforestation; however, if applicable, these are taken into account when the assigned amount is calculated.

F. Cross-cutting topics

1. Completeness

9. The inventory is complete in terms of years, sectors, gases and geographical coverage. Slovenia has provided complete CRF tables for the entire time series. However, table 7 (key categories) has not been provided. Also, Slovenia reports only forest land remaining forest land in the LULUCF sector. The ERT recommends that the Party estimate emissions and removals for the whole LULUCF sector in its next annual submission. During the review Slovenia explained that work is ongoing to collect data on above- and below-ground biomass and soils for the calculation of emissions and sinks of CO₂ and non-CO₂ gases for non-forest land-use categories. Soil samples are being analysed, and results should be ready in 2009. In addition, final data from the 2007 national forestry inventory are going through quality control and logical testing, and will be used after the approval of the Ministry of Agriculture, Forestry and Food of Slovenia. Data on forest fires have been gathered, and some estimates of biomass losses and related CO₂, CH₄ and N₂O emissions are in preparation. Regarding other categories currently reported as not estimated ("NE"), Slovenia indicated that potential emissions of HFCs, PFCs and SF₆ from consumption of halocarbons and SF₆ will be reported in the 2010 annual submission, but that for other categories reported as "NE" in the other inventory sectors, no IPCC methodologies for estimating emissions are available. The ERT encourages Slovenia to explore alternative methods and activity data (AD) for those categories that have no IPCC methodology in order to further improve the completeness of the inventory submissions.

2. Transparency

10. The NIR, together with the information provided during the review period, provides much of the information necessary to assess the inventory. This is an improvement on the previous submission, and made it much easier for the ERT to understand the major underlying assumptions and rationales behind the choices of data and methods and of other inventory parameters.

11. Since the previous review, Slovenia has completed table 9(a) and provided comprehensive information on the use of notation keys, which has increased the transparency of reporting. Acknowledging the significant progress made, the ERT recommends that Slovenia build on this work by providing more detailed methodological descriptions in the NIR (particularly for the LULUCF sector) and rationales for the selection of specific EFs. Further options to enhance transparency, identified by the ERT, are described in detail in the sector chapters below.

3. Recalculations and time-series consistency

12. The ERT noted that the main recalculations reported by Slovenia of the time series from the base year to 2005 have been performed in the road transportation category within the energy sector, in order to reflect corrections to AD and EFs derived from the COPERT III model. In the industrial processes sector, minor recalculations of HFC emission estimates for the period 2001–2005 have been made, without any significant impact on total emissions. Minor recalculations were also made in agriculture (enteric fermentation, manure management) and waste (solid waste disposal, wastewater handling) for the entire period of 1986–2005. Recalculations have been sufficiently justified and resulted in a real improvement in the inventory. The effect of the recalculations was a 0.13 per cent increase in the estimate of total GHG emissions in 1986 and a 0.37 per cent increase in the estimate for 2005.

4. Uncertainties

13. Slovenia has provided an uncertainty analysis in an annex to its NIR following the tier 1 method. The uncertainties of AD and EFs are mostly estimated using expert judgement. Since expert judgements vary between experts, the highest individual uncertainties have been taken into account. Total uncertainties have been derived for both level and trend. Detailed results of the analysis are included in

the annex of the NIR. Slovenia explained that owing to a lack of human resources, it had not been able to change the methods used to provide estimates, although the previous ERT had recommended that Slovenia revise its uncertainty assessment by following the IPCC good practice guidance more closely, and include information on the methods used and descriptions of the expert judgement applied. The ERT reiterates this recommendation from the previous review and also recommends that Slovenia use the analysis to prioritize improvements in the GHG inventory.

5. Verification and quality assurance/quality control approaches

14. The ERT was not able to confirm from the submission alone that the QA/QC plan meets requirements, as only very general information is provided in the NIR. During the review, Slovenia provided a more detailed “Manual of Procedures” (in Slovenian) showing the current state of implementation of QA/QC procedures. The manual includes only those GHG inventory related procedures that are undertaken by the Environmental Agency of the Republic of Slovenia and does not include activities of other institutions. The ERT also noted that Slovenia has not provided any information on sector- or category-specific QA/QC procedures in the NIR, except for the LULUCF sector, for which some information is provided. The ERT recommends that Slovenia include a clear summary of the QA/QC plan in the next NIR submission, clarifying how it applies to other agencies involved in preparation of the inventory. The ERT further recommends that Slovenia provide information on sector- and category-specific QA/QC procedures in its next NIR.

6. Follow-up to previous reviews

15. The ERT commends the improvements that Slovenia has made in response to previous reviews in a number of areas of its inventory methodology, such as: including the LULUCF sector in its key category analysis, providing more complete explanations of the use of the notation keys and using them with greater consistency, and reporting recalculations in a more transparent manner.

16. The ERT noted that Slovenia has not followed up on some of the recommendations from previous reviews, such as providing more detailed information on its QA/QC system and on how the uncertainty estimates have been derived, as discussed in paragraphs 13 and 14 above.

G. Areas for further improvement

1. Identified by the Party

17. The 2008 NIR identifies areas for improvement. Slovenia indicated that it is working on:
- (a) Finalizing the work on the national database to enable automatic reporting;
 - (b) Providing more detailed information on all data sources used;
 - (c) Improving the documentation of quality control at all stages of inventory preparation;
 - (d) Updating the QA/QC manual and implementing sectoral QC procedures;
 - (e) Documenting QA/QC procedures at all stages of inventory preparation;
 - (f) Implementing a documented process for approving the GHG inventory;
 - (g) Including more descriptions of fluctuations in the trend of emissions data in the NIR;
 - (h) Performing an independent peer review of the energy sector in 2008 and the waste sector in 2009;
 - (i) Estimating CH₄ emissions from closed coal mines;

- (j) Obtaining chemical analyses of natural gas distributed in Slovenia in order to calculate country-specific CO₂ EFs from combustion of natural gas;
- (k) Improving estimates of HFC emissions from refrigeration and mobile air-conditioning;
- (l) Estimating the amount of clinical waste incinerated.

2. Identified by the expert review team

18. The ERT identifies the following cross-cutting issues for improvement:
- (a) Implementation of the documented process for approving the national GHG inventory, and documentation of this in the NIR;
 - (b) Moving to a tier 2 key category analysis;
 - (c) Inclusion in the next NIR of more detailed methodological descriptions (particularly for the LULUCF sector) and rationales for the selection of EFs;
 - (d) Inclusion of a more detailed description of the approaches and underlying assumptions used for the uncertainty analysis and use of the analysis to prioritize improvements in the GHG inventory;
 - (e) Inclusion of a summary of the QA/QC plan;
 - (f) Inclusion of sector- and/or category-specific information on QA/QC.
19. Recommended improvements relating to specific source/sink categories are presented in the relevant sector chapters of this report.

II. Energy

A. Sector overview

20. The energy sector is the main sector in the GHG inventory of Slovenia. In 2006, the energy sector accounted for 16,573.21 Gg CO₂ eq, or 80.5 per cent of total GHG emissions. Emissions from the sector increased by 3.1 per cent between 1986 and 2006.

21. The key driver for the rise in emissions is road transportation. Emissions from this category increased by 143.1 per cent between 1986 and 2006, and represented 28.7 per cent of all 2006 energy emissions. Emissions from the residential sector increased by 15.7 per cent from 1986 to 2006, and made up 8.8 per cent of 2006 energy emissions. Emissions from manufacturing industries and the construction sector decreased by 41.2 per cent over the same period and represented 15.6 per cent of energy emissions in 2006, having accounted for 27.4 per cent in 1986. Emissions from public electricity and heat production have decreased by 2.9 per cent, and in 2006 accounted for 38.4 per cent of energy sector emissions. Fugitive emissions accounted for 2.8 per cent of 2006 energy emissions.

22. The ERT acknowledges that Slovenia plans several improvements to its reporting in this sector, including obtaining chemical analysis of natural gas distributed in Slovenia in order to calculate country-specific EFs for CO₂ emissions from combustion of natural gas and estimating CH₄ emissions from closed coal mines. The independent peer review of the energy sector planned for 2008 has been delayed to 2009. The ERT encourages Slovenia to proceed with this review.

23. Minor recalculations were carried out following the review of the 2006 inventory. An error in the estimate of consumption of natural gas in other industries in 2004 has been corrected, which raised estimates of energy sector emissions by 0.8 per cent for 1986 and 0.1 per cent for 2004. Between submission of the 2007 and 2008 annual inventories, the COPERT model was used to estimate road

transportation emissions for all years. The resulting data increased estimates of energy sector emissions by about 0.2 per cent for 1986 and 2005. These recalculations are small and reflect Slovenia's efforts to improve the accuracy and consistency of the GHG inventory for the energy sector. The recalculations are fully documented in the appropriate sections of the NIRs for 2007 and 2008.

B. Reference and sectoral approaches

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

24. For the year 2005 (as reported in the 2007 submission), the figure for apparent energy consumption calculated using the reference approach is 3.6 per cent higher than the figure calculated using the sectoral approach. CO₂ emissions are 0.1 per cent higher. A disparity is also noticeable for the year 2006 (as reported in the 2008 annual submission), with estimates derived from the reference approach for apparent energy consumption and CO₂ emissions being 4.1 per cent and 0.1 per cent higher, respectively, than the estimates from the sectoral approach. For 2005, the disparity in CO₂ emission estimates is explained by a larger estimate under the reference approach for emissions from liquid fuels. For 2006, no single gas estimate is responsible for the higher figure derived under the reference approach (the difference between all fuel estimates is <0.4 per cent). As regards energy consumption, a bigger estimate for consumption of gaseous fuels largely explains the higher figure from the reference approach for both years. In the 2007 submission, the Party provided a very brief discussion of the causes of this disparity in both chapter 3 and annex 4, but the text of the annex does not reflect the most recent values identified in chapter 3. In the 2008 submission, a very brief discussion of disparity causes is given in chapter 3 and annex 4. The ERT encourages Slovenia to align and update all aspects of its reporting that addresses the reconciliation of the reference and sectoral approaches to better illustrate the underlying drivers for the discrepancies.

25. In response to issues identified in previous review stages for both submissions, Slovenia states that it "does not know why the difference has occurred in the past" with regard to gaps between CRF data (Statistical Office of the Republic of Slovenia) and corresponding data from the International Energy Agency. The ERT encourages the Party to investigate and reconcile these disparities.

2. International bunker fuels

26. The 2008 submission includes a brief and not very clear discussion on bunker fuel use. For marine bunkers, Slovenia describes the economic and geographical circumstances which provide the rationale for its domestic/international fuel allocation throughout the time series. For aviation bunkers, Slovenia allocates all jet kerosene to international aviation, owing to what it identifies as a complete absence of domestic commercial air traffic, but also indicates that aviation gasoline consumption is considered domestic and therefore allocated to civil aviation. There is a comment in the NIR identifying aviation gas use "for small jet aircraft, which fly between smaller regional airports in Slovenia". The ERT recommends that the Party consult aviation experts to establish the fuel type consumed by these "small jet aircraft", as these engines typically operate on a jet-type fuel. Additionally, previous ERTs have suggested a review of domestic flight information, the completion of which is not yet apparent. The ERT reiterates the recommendation from the previous ERT that this review be completed to improve understanding of domestic use of aviation fuels.

3. Feedstocks and non-energy use of fuels

27. The NIR includes a discussion of the use of natural gas for methanol production. In the NIR, Slovenia states that it is "assumed that all methane used for methanol production is stored in the product or in CO [carbon monoxide] in emitted gas". The ERT encourages the Party to establish a reference for this 100 per cent assumption, as it does not exist in the Revised 1996 IPCC Guidelines, which suggest a fraction of carbon stored for natural gas as feedstock (table 1-5) of 33 per cent. The ERT also recommends that the Party reconcile its assumption with general estimation methods as it appears to

underestimate the emissions from methanol production. The ERT noted no reference in annex 4 to the 2008 NIR to support the assumption that 100 per cent of carbon is stored in the natural gas used as a feedstock. Additionally, the ERT found information in this annex to be out of date (1986–2005).

C. Key categories

Stationary combustion: all fuels – CO₂

28. For the category other (manufacturing industries and construction), the CO₂ implied emission factor (IEF) increased over the period 1990–2006, with the 2006 value (78.67 t/TJ) being 5.9 per cent higher than the 1990 value (74.30 t/TJ). The lowest value in the time series is the 1996 value (72.95 t/TJ). The ERT encourages Slovenia to report in the NIR data on fuel consumption by industry type, fuel type and year in order to improve the understanding of the trend of these IEFs.

29. For other sectors, the description of the methodology used to disaggregate the subcategories commercial/institutional and residential is not transparent. While the IEFs lie within the range of IEFs of other reporting Parties, clarity is lacking on how fuel consumption is allocated to these subcategories. Additionally, according to the 2008 submission the IEFs for the commercial/institutional category have increased sharply while the corresponding IEFs for the residential category have sharply decreased. The NIR suggests that “the disaggregation of fuels between households and other commercial/institutional usage needs to be renewed”. The ERT agrees with this and recommends that Slovenia undertake this work prior to its next annual submission and report thereon in the next NIR.

D. Non-key categories

Coal mining and handling: solid – CO₂

30. Slovenia reports CO₂ emissions from post-mining activities as “NE” and states that “CO₂ emissions in post-mining activities were not assessed due to the lack of data on desorption”. Desorption is the process of releasing the CH₄ (not CO₂) bound to the coal matrix through a reduction in pressure typically associated with mining, crushing or some other action that alters its native configuration or effective surface area. While the notation key is reasonable, the explanation could be “no estimation method available”. The ERT encourages Slovenia to standardize the stated causes of this non-estimate throughout its reporting.

III. Industrial processes and solvent and other product use

A. Sector overview

31. In 2006, the industrial processes sector accounted for 1,242.61 Gg CO₂ eq, or 6.0 per cent of total GHG emissions, and the solvent and other product use sector accounted for 44.15 Gg CO₂ eq, or 0.2 per cent of total GHG emissions. Emissions from the industrial processes sector decreased by 6.4 per cent between the base year and 2006, and in the solvent and other product use sector emissions decreased by 46.1 per cent from the base year to 2006. The key drivers for the decrease in emissions in this sector are a reduction in lime production and improved technology in aluminium production.

32. Slovenia does not have a formal QA/QC plan for the industrial processes sector. However, in response to questions raised by the ERT during the review Slovenia described QC procedures that are followed in the sector. These were judged by the ERT to be adequate, especially procedures for the plant data included in the inventory that are collected from the European Union emissions trading scheme (EU ETS).

33. The ERT makes the general recommendation for the industrial processes sector that Slovenia include the explanations provided in response to questions raised by the ERT during the review in its next NIR.

34. There have been minor recalculations of estimates of category consumption of halocarbons and SF₆, carbide production, ferroalloys production and aluminium production. The recalculations are described in the NIR for all categories except aluminium production and in CRF table 8(b) for all categories except consumption of halocarbons and SF₆.

35. There are minor changes from the 2007 NIR in the description of the different categories. For example, the description of pulp and paper and drink and food in the 2007 NIR has been omitted from the 2008 NIR. Slovenia is invited to explain why it deleted these categories from the NIR when emissions of non-methane volatile organic compounds (NMVOCs) are still included in the inventory. Other changes in the 2008 NIR respond to issues raised in previous reviews. Specifically: NMVOC emissions in the solvent and other product use sector from chemical products, manufacture and processing are now included in the inventory; notation keys have been included for CO₂ and N₂O emissions from degreasing and dry cleaning, for CO₂ emissions from chemical products, manufacture and processing, and for N₂O emissions from fire extinguishers, aerosol cans and other uses of N₂O; and explanations have been provided when no values are reported.

B. Key categories

1. Cement production – CO₂

36. Slovenia uses the IPCC tier 2 methodology to calculate CO₂ emissions from cement production. Clinker production data are collected from the plants via the Statistical Office of the Republic of Slovenia for the period 1986–1998, and directly from the two plants that produce cement for the years 1999–2006. The average EF for 1999–2004 is 0.541 t CO₂ per tonne of clinker and is based on plant-specific content of carbon in raw materials. This EF is used to calculate the CO₂ emissions for 1986–1998. For 2005 and 2006, the EFs reported by the plants to the Ministry of Environment and Spatial Planning, as a competent authority in the EU ETS, are used to calculate emissions. The ERT considers the method and the AD and EFs used to estimate CO₂ emissions to be appropriate. The ERT recommends that Slovenia include in its next NIR information provided during the review, such as documentation of EFs before 2005 and information showing that estimated CO₂ emissions are comparable and consistent with emissions reported under the EU ETS.

2. Lime production – CO₂

37. The EF for lime production in 1986–2004 is based on country-specific raw materials and reported as 0.749 t CO₂ per tonne of lime. The changes in the CO₂ IEF from 2004 to 2005 and 2006 are large compared with other inter-annual changes. The EFs for 2005–2006 are from the EU ETS. The ERT recommends that Slovenia provide more detailed information about basic parameters used in the calculation of the EF and show how the time series of CO₂ emissions is consistent in its next annual submission. It also reiterates the recommendation from the previous review that Slovenia include information on the type of lime produced.

3. Aluminium production – CO₂, PFCs

38. The CO₂ emission levels from aluminium production fluctuate over time, which should be explained by Slovenia in its NIR. Information received during the review showed that CO₂ emissions from anode production are reported together with aluminium production, which might partly explain the fluctuations in emission levels. To improve the accuracy and transparency of the inventory, the ERT recommends that Slovenia report emissions from anode production separately from primary aluminium production, perhaps in the sector other (metal production), and provide an explanation in its next annual submission for fluctuations in the emission levels over the time series.

39. Slovenia reported CO₂ emissions from aluminium production in 2006 to be 206.88 Gg. The ERT requested Slovenia to check this, and the Party responded that the correct figure is 203.20 Gg CO₂.

The ERT recommends that Slovenia rectify this error and confirm that figures in other years of the time series are not also incorrect.

40. Emissions of PFCs from aluminium production, and the corresponding IEF values, have both decreased over time. The Party explained that this is due to a change in technology from Soederberg to prebaked, and improved operating conditions. This explanation is sufficient to understand the changes both in level and in trend. There are some inconsistencies between the IEFs reported in the NIR and CRF tables; for example, the IEF for hexafluoroethane (C_2F_6) is reported in the 2008 NIR to be 0.07 kg C_2F_6 per tonne of aluminium in the base year (1995), but in the same version of the CRF it is reported in table 2(II).C to be 0.0519 kg/t. For carbon tetrafluoride (CF_4), the IEF is 0.74 kg CF_4 per tonne of aluminium in the NIR, and 0.519 kg/t in the CRF table. The ERT recommends that Slovenia include in its next submission the information that it provided during the review on this issue and ensure consistency between the NIR and the CRF tables.

4. Consumption of halocarbons and SF_6

41. The inventory for the fluorinated gases (F-gases) is not complete. Potential emissions are not reported for all years, and the value for HFC emissions from fire extinguishers has been kept constant for the period 1997–2006. The Party explained during the review that since 1997, the Statistical Office of the Republic of Slovenia has not collected data on import and export of HFCs. Slovenia also explained that under a new decree made in August 2008 (Ur.l. RS, št. 78/2008), it is an obligation that the amount of HFCs imported are reported to the customs office and that Slovenia will therefore be able to report data for 2009 emissions. The ERT recommends that Slovenia include a complete and consistent time series for F-gases in its next annual submission.

C. Non-key categories

1. Soda ash production – CO_2

42. Production of soda ash in Slovenia is reported to be negligible, and emissions are reported as not occurring (“NO”). According to the Party, the amount of soda ash produced in the whole period is in the range of 11–231 t. The ERT recommends that Slovenia include emissions from soda ash production in its next annual submission, even if they are minor.

2. Iron and steel production – CO_2

43. For the years 1986–1987 all coke consumption is allocated to the energy sector, but for 1988–2006 all coke consumption is included in the industrial processes sector. During the review Slovenia informed the ERT that in the period 1986–1987 production of pig iron from ore still occurred, so for these two years the decision was taken to attribute all coke, which is consumed in the production of iron and steel, to the energy sector as fuel consumption. When this production was discontinued and a new electric arc furnace (EAF) started production in 1988, the only source of process emissions in this category was production of steel from scrap iron in the EAF. The ERT recommends that Slovenia include this information in the next NIR.

3. Ferroalloys production – CO_2

44. The trend in the CO_2 IEF is not stable. Slovenia explained that the fluctuations are due to a changing level in consumption of fuels and anodes over time; it also pointed out that emissions from consumption of coal and natural gas are reported in the energy sector, and emissions from other fuels are reported in the process emissions sector. Some additional information was received during the review. However, the information is still too fragmented and Slovenia does not distinguish clearly enough in the inventory for ferroalloys between the use of fuels and the use of reducing agents such as coke, coal and electrodes. The Party is recommended to include more information in its next annual submission and to

explain in detail the fluctuations in the IEFs. The Party is also recommended to consider recalculating the time series to ensure its consistency, if needed.

IV. Agriculture

A. Sector overview

45. In 2006, the agriculture sector accounted for 2,029.21 Gg CO₂ eq, or 9.9 per cent of total GHG emissions. Emissions from the sector decreased by 13.1 per cent between 1986 and 2006. The main driver for the fall in emissions is the decrease in the animal population.

46. Within the sector, 37.4 per cent (759.81 Gg CO₂ eq) of the emissions were from agricultural soils, followed by 32.3 per cent (654.89 Gg CO₂ eq) from enteric fermentation and 30.3 per cent (614.51 Gg CO₂ eq) from manure management.

47. Recalculations were reported by the Party for CH₄ and N₂O emission from manure management and direct soil emission of N₂O from animal manure applied to soil for the period 2002–2005. These recalculations, which were made to reflect revised poultry population estimates provided by the Statistical Office for 2002–2005, resulted in an increase in estimated emissions of 0.8 per cent for 2005. The ERT welcomes the improvements made by the Party to obtain better and more complete national AD.

48. Slovenia has not provided detailed information on the development of legal and procedural arrangements in the agriculture sector for collecting data, which had been recommended by the previous ERT. In its NIR, Slovenia states that the national Agricultural Institute is responsible for preparing the agricultural part of the inventory. It further states that memorandums of understanding have been signed with institutions that participate in preparing the inventory. The ERT recommends that the Party provide further information on this in the next annual submission.

49. The Party has not provided information in the NIR on the status of the QA/QC procedures for the agriculture sector, which the previous ERT had also recommended it to do. The present ERT recommends that Slovenia review the QA/QC national plan and prepare specific procedures for the agriculture sector, based on the informal process that already exists.

50. A comparison of the 2008 submission against the 2007 submission showed that the information provided in the NIR on uncertainties for agricultural soil emissions has changed: values have fallen for the uncertainty in the EFs, from 500.10 to 250.20, and in indirect emissions, from 70 to 250. No information or references regarding the uncertainty analysis were provided. The ERT recommends that Slovenia provide such information in the next NIR.

B. Key categories

1. Enteric fermentation – CH₄

51. The CH₄ IEF from swine (1.61 kg/head/year) is higher than the IPCC default (1.5 kg/head/year), and the highest of all reporting Parties (0.45–1.61 kg/head/year). The ERT recommends that Slovenia review the information used to estimate the EF and emissions and, if they are correct, provide the reasons for the high values in the next submission.

52. The figures for milk yield activity increased significantly over the time series of the inventory (from 6.49 kg/day in 1986 to 14.57 kg/day in 2006). The ERT recommends that the Party check the time-series consistency or explain more clearly the reasons for these changes in the next NIR.

53. While milk yield figures have increased, Slovenia has reported the same annual value for 2001 onwards for digestibility of feed for dairy cattle (65.7 per cent), and the same data for 2000 onwards for

average gross energy intake (237 MJ/head/day) and average weight of dairy cattle (559 kg). The ERT recommends that Slovenia make improvements to update these values in its next annual submission.

2. Manure management – CH₄

54. The CH₄ IEF for non-dairy cattle (20.91 kg/head/year) in 2006 is the highest of all reporting Parties. During the review Slovenia indicated that this is because it reported emissions of suckling cows together with emissions from non-dairy cattle and because it used the value of 39 per cent for the methane conversion factor for liquid systems from animal waste manure system under a cool climate, as recommended in the IPCC good practice guidance. Nevertheless, other Parties use the same practices and values and their EFs are not as high. The ERT recommends that the Party review the estimation methods and improve transparency by explaining the high value in the next annual submission.

3. Manure management – N₂O

55. Emissions from different animal waste management systems were estimated according to the data from national agricultural censuses (1991 and 2000) and using expert judgement. The ERT reiterates the recommendation from the initial review report⁵ that Slovenia improve the transparency of its reporting of this category by providing better explanations of the collection of AD and the methodology used for ammonia accounting. The ERT could not discern any improvements in response to the recommendation of the previous ERT.

4. Direct soil emissions – N₂O

56. Slovenia has reported the same area for cultivation of organic soils for every year from 1996 onwards (6,665 ha). During the review the Party indicated that relevant data are available for 2002. The ERT recommends that the Party update the information on cultivation of organic soils accordingly for the next annual submission.

57. In previous submissions Slovenia recognized the need to make further improvements in emission estimates by considering a higher leaching and run-off factor for big farms, and by differentiating between areas with intensive and non-intensive livestock production. These improvements were not included in this submission. The ERT recommends that Slovenia provide information in its next annual submission on when the improvements will be ready.

C. Non-key categories

Field burning of agricultural soils – CH₄, N₂O

58. The ERT welcomes the correction in the reporting of CH₄ and N₂O emissions from field burning of agricultural residues. Slovenia now reports these emissions as “NO” in the CRF tables, as field burning of agricultural residues in the country is illegal. The ERT recommends that Slovenia monitor this activity in the future and report these emissions only when and if they occur.

V. Land use, land-use change and forestry

A. Sector overview

59. Slovenia has a total land area of 2,027,300 ha, 58 per cent of which was covered by forest land in 2006 (1,173,847 ha). Within the LULUCF sector, Slovenia reports on only forest land remaining forest land. The ERT noted that carbon stocks in living biomass decreased by 3.8 per cent between 2005 and 2006 and by 12.8 per cent between 2004 and 2005. This decrease is closely linked to a 16 per cent increase in felling between 2005 and 2006 – the second largest annual increase in the 1986–2006 period

⁵ FCCC/IRR/2007/SVN, paragraph 79.

(in 1996, felling increased by approximately 19 per cent). For the entire time series, forest land remaining forest land was consistently a net sink. For 2005 and 2006, the value of this sink was estimated as 5,430.37 Gg CO₂ eq and 4,733.09 Gg CO₂ eq, corresponding to 26.5 and 23.0 per cent of the total annual GHG emissions, respectively. Estimated removals in the base year were appreciably lower – 1,589.25 Gg CO₂ eq – according to the 2008 GHG submission. In the period 1986–2006, net removals by the sector thus increased by 197.9 per cent.

60. The area of forest land remaining forest land increased by 0.4 per cent between 2005 and 2006. Except for the subcategories cropland and grassland converted to forest land, which are reported as “IE” (included elsewhere), Slovenia reports all other LULUCF categories (cropland, grassland, wetland, settlement and other land) as “NE” or “NO”. The use of the notation key “NO” for the category other land is not consistent with the fact that a small fraction (1.4 per cent) of the sampled plots was allocated to this category. The ERT recommends that the Party report on other land, to enhance completeness and transparency of the reporting. The Party indicated in the NIR and in response to questions raised during the review that emissions and removals for all land-use categories will be estimated and reported in its next submission.

61. The fact that Slovenia reported only forest land remaining forest land in the LULUCF sector under the Convention was noted with concern by the ERT. This could create major problems with reporting in 2010 by the Party of mandatory activities under Article 3, paragraph 3, of the Kyoto Protocol. During the review the ERT also raised a number of issues relating to the capacity of the national system to ensure that land areas subject to LULUCF activities under Article 3, paragraph 3, are identifiable. The ERT recommends that Slovenia report a complete inventory for the LULUCF sector under the Convention, ensure that its national system can cover activities under Article 3, paragraph 3 and paragraph 4 (forest management), and report thereon in its next annual submission.

B. Key categories

Forest land remaining forest land – CO₂

62. Carbon stock changes in forest land remaining forest land were estimated using the default method from the IPCC good practice guidance for LULUCF based on annual increases and decreases in carbon stocks due to biomass growth and loss, respectively. The estimates of forest area reported for 1961 to 2006 were derived from official data from forestry management plans (all forests in Slovenia are considered managed, and management plans are prepared for all forests) from the Statistical Office of the Republic of Slovenia (for 1961–1993) and from the Slovenia Forestry Service (SFI) (for 1994–2006). The Party notes that these data differ from the more recent data on land use and land-use changes from 2006 and 2007.

63. Annual increases in carbon stocks for conifers and non-conifers are estimated using the methodology in the IPCC good practice guidance for LULUCF and the IPCC tier 1 default values. Data on felling are based on official statistics from the Statistical Office. However, in order to generate more reliable data on harvesting in private forests, Slovenia also sought data from SFI, based on data collected in permanent plots. As the SFI results for felling of deciduous trees in private forests differ from official Statistical Office data, a correction factor of 1.43 was applied, although it is not clear how this factor was derived. The ERT acknowledges Slovenia’s efforts to generate more reliable data, but recommends that it enhance transparency by providing detailed information on all correction factors used in the inventory.

64. Although the number of conifer trees is reported to have increased steadily overall from 1986 to 2006, an anomalous value of 64.0 per cent is given for the increase during 2006. The ERT recommends that the Party review this figure and provide the method used to generate all the annual increments, to enhance transparency.

65. Slovenia has reported only carbon stock change in living biomass for forest land remaining forest land. Emissions from other pools (dead organic matter and soil organic carbon) are not reported. The ERT recommends that Slovenia strengthen its efforts to report on all pools, acknowledging the ongoing efforts to acquire data and information on litter and mineral soils with a view to including these pools in future submissions.

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

VI. Waste

A. Sector overview

67. In 2006, the waste sector accounted for 702.17 Gg CO₂ eq, or 3.4 per cent of total GHG emissions. Since 1986, emissions have risen by 24.0 per cent and the share of the waste sector in total GHG emissions has grown from 2.8 per cent to 3.4 per cent, which is mostly due to an increase of 59.4 per cent in emissions from solid waste disposal on land. This category, solid waste disposal on land, accounted for 52.8 per cent of the total sectoral emissions in 2006, while emissions from wastewater handling accounted for 47.2 per cent. Emissions from wastewater were 15.5 per cent lower in 2006 than in the base year, which is mostly due to the recovery of gas in wastewater treatment plants and the decline in industrial production.

68. The reporting of this sector in the NIR is not transparent and should be improved in the next submission. A more general description of emissions from the sector is needed, for example, to provide more information on historical trends, an overview of the waste sector, a description of institutional arrangements, etc. The uncertainties are based on expert judgement, but Slovenia has not provided a combined uncertainty estimate for the sector. The ERT recommends that Slovenia do so in its next annual submission.

69. Category-specific QA/QC procedures are not reported for the waste sector. The ERT recommends that Slovenia provide more detailed descriptions on QA/QC and planned improvements in the next submission.

B. Key categories

Solid waste disposal on land – CH₄

70. To calculate CH₄ emissions from solid waste disposal on land, the first order decay approach (IPCC tier 2 method) was used with country-specific degradable organic carbon values based on the new 2006 screening analysis of mixed municipal waste. AD on the amount of waste for the period 1964–1994 are based on the assumption of population included in the municipal waste collection system, which increased from 50 per cent in 1964 to 60 per cent in 1977 and 76 per cent in 1995. The amount of waste per person and year was held constant at 470 kg over this period. Data for the amount of waste in the period 1995–2000 were provided by the Statistical Office of the Republic of Slovenia, and data for 2001–2006 were obtained from the Slovenian Environmental Agency. The ERT recommends that Slovenia provide further information in its next annual submission on how time-series consistency is ensured when different data sets are used.

71. Slovenia carried out a recalculation of CH₄ emissions from solid waste disposal on land to correct a mistake in the historical data set of the amount of biodegradable waste deposits on solid waste

disposal sites. The ERT recommends that Slovenia provide explanation on the effect of the recalculation on the emission time series in its next annual submission.

C. Non-key categories

1. Wastewater handling – CH₄

72. AD for wastewater handling are obtained from the Environmental Agency. The CH₄ emissions from municipal wastewater handling were 7.76 Gg in 2006, representing a decrease of 21.9 per cent from the base year.

73. The emission of CH₄ from industrial wastewater was identified as a non-key category by Slovenia. Industrial sectors with a large output of wastewater and high content of degradable organic components are chosen for the calculation. The IPCC tier 1 method with country-specific activity data was used.

2. Wastewater handling – N₂O

74. Slovenia has provided some description of N₂O emissions from municipal wastewater handling, but its explanation of the methodology used is not sufficient. Country-specific statistical data and data from the United Nations Food and Agriculture Organization were used in the calculation. The ERT recommends that Slovenia provide more information about the methodology and AD used for the calculation of N₂O emissions from municipal wastewater handling in its next annual submission. Emissions have increased slightly since the base year, mostly due to Slovenia's rising population.

VII. Other issues

1. Changes to the national system

75. Slovenia has not reported on any changes to its national system in the 2008 submission. In response to questions raised by the ERT during the review the Party confirmed that no changes to its national system have taken place. The ERT encourages Slovenia to include details of changes, or statements to indicate no changes, in future submissions under the Kyoto Protocol.

2. Changes to the national registry

76. Slovenia has not reported on any changes to its national registry in the 2008 submission. In response to questions raised by the ERT during the review the Party confirmed that no changes to the national registry have taken place. The ERT encourages Slovenia to include details of changes, or statements to indicate no changes, in future submissions under the Kyoto Protocol.

3. Commitment period reserve

77. Slovenia has not reported its commitment period reserve in the 2008 submission. In response to questions raised by the ERT during the review Slovenia reported that its commitment period reserve has not changed since the initial report review (84,265,734 t CO₂ eq). The ERT agrees with this figure. The ERT recommends that the Party include information on its commitment period reserve in its next annual submission.

VIII. Conclusions and recommendations

78. In accordance with the deadline established by the UNFCCC reporting guidelines, Slovenia has submitted a complete set of CRF tables for the years 1986–2006 and an NIR. These are generally complete in terms of years, sectors, gases and geographical coverage; however, Slovenia reports on only forest land remaining forest land in the LULUCF sector. The ERT noted that the Party is undertaking work to be able to report on the other land-use categories in future inventories. It welcomes this

development, and recommends that Slovenia report on the other land-use categories as soon as possible but not later than 2010. Other categories reported as not estimated include potential F-gas emissions from the consumption of halocarbons and SF₆ and minor categories in other sectors of the inventory.

79. The inventory is generally in line with the UNFCCC reporting guidelines, the Revised 1996 IPCC Guidelines, the IPCC good practice guidance and the IPCC good practice guidance for LULUCF; however, there is a need for greater transparency. The structure of the NIR and the transparency of the methodology descriptions have been improved from previous submissions.

80. Slovenia's national system is functional. The ERT identified gaps and improvements with regard to the QA/QC plan and its documentation in the NIR, and a need to implement a documented process to approve the national GHG inventory. The national system has been improved since the previous review: Slovenia now reports LULUCF in its key category analysis, and has improved the transparency and consistency of its explanations for the use of notation keys and recalculations.

81. The ERT made a number of recommendations for further improvement of the inventory and national system, which are included in the relevant chapters of this report. The key recommendations are that Slovenia:

- (a) Move to a tier 2 key category analysis;
- (b) Improve the transparency of the N₂O estimate from manure management;
- (c) Include in the next NIR more detailed methodological descriptions (particularly for the LULUCF sector) and rationales for the selection of specific EFs;
- (d) Include a more detailed description of the approaches and underlying assumptions used for the uncertainty analysis and use the analysis to prioritize improvements of the GHG inventory;
- (e) Include a summary of the QA/QC plans, as well as identify a QA/QC coordinator to manage QA/QC;
- (f) Include sector- and/or category-specific information on QA/QC;
- (g) Revise its uncertainty assessment by following the IPCC good practice guidance more closely, and include information on the methods used and descriptions of the expert judgement applied;
- (h) Improve the completeness of the inventory by exploring methods and AD to estimate emissions from categories currently reported as not estimated on the grounds of no IPCC methodology being available.

IX. Questions of implementation

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

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

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

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

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

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

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

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

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

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

Status report for Slovenia 2007. Available at <<http://unfccc.int/resource/docs/2007/asr/svn.pdf>>.

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Synthesis and assessment report on the greenhouse gas inventories submitted in 2007. Available at <<http://unfccc.int/resource/webdocs/sai/2007.pdf>>.

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FCCC/ARR/2006/SVN. Report of the individual review of the greenhouse gas inventory of Slovenia submitted in 2006. Available at <<http://unfccc.int/resource/docs/2007/arr/svn.pdf>>.

FCCC/IRR/2007/SVN. Report of the review of the initial report of Slovenia. Available at <<http://unfccc.int/resource/docs/2007/irr/svn.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), including additional material on the methodology and assumptions used, and the quality assurance/quality control plan.
