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

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

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## I. Overview

### A. Introduction

1. This report covers the centralized review of the 2007 and 2008 greenhouse gas (GHG) inventory submissions of Slovakia, 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,<sup>1</sup> the focus of the review is on the most recent (2008) submission. The review took place from 22 to 27 September 2008 in Bonn, Germany, and was conducted by the following team of nominated experts from the UNFCCC roster of experts: generalists – Mr. Michael McGettigan (Ireland) and Mr. Paul Filliger (Switzerland); energy – Mr. Tinus Pulles (Netherlands) and Mr. Hongwei Yang (China); industrial processes – Mr. Dušan Vacha (Czech Republic) and Mr. Koen Smekens (Netherlands); agriculture – Mr. Steen Gyldenkaerne (Denmark) and Mr. Mahmoud Medany (Egypt); land use, land-use change and forestry (LULUCF) – Mr. Sandro Federici (Italy) and Mr. Peter Stephens (New Zealand); and waste – Mr. Jose Villarin (Philippines) and Mr. Hiroyuki Ueda (Japan). Mr. McGettigan and Mr. Villarin were the lead reviewers. The review was coordinated by Mr. Vitor Gois Ferreira and Ms. Astrid Olsson (UNFCCC secretariat).

2. In accordance with the “Guidelines for review under Article 8 of the Kyoto Protocol” (decision 22/CMP.1), a draft version of this report was communicated to the Government of Slovakia, 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 inventory was submitted on 15 April 2008. It contains a complete set of common reporting format (CRF) tables for the period 1990–2006 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.<sup>2</sup> In its 2007 submission, Slovakia included a complete set of CRF tables for the period 1990–2005 and an NIR. The CRF tables were submitted on 16 April 2007 and the NIR was submitted on 9 November 2007. 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 Slovakia was carbon dioxide (CO<sub>2</sub>), accounting for 81.8 per cent of total GHG emissions<sup>3</sup> expressed in CO<sub>2</sub> eq, followed by methane (CH<sub>4</sub>) (9.5 per cent) and nitrous oxide (N<sub>2</sub>O) (8.3 per cent). Hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF<sub>6</sub>) collectively accounted for 0.5 per cent of the overall GHG emissions in the country. The energy sector accounted for 76.0 per cent of the total GHG emissions, followed by industrial processes (12.2 per cent), agriculture (6.5 per cent), waste (5.2 per cent) and solvent and other product use (0.2 per cent). Total GHG emissions amounted to 48,902.42 Gg CO<sub>2</sub> eq and decreased by 33.6 per cent between the base year<sup>4</sup> and 2006. In 2005 (as reported in the 2007 inventory submission), total GHG emissions amounted to 47,866.31 Gg CO<sub>2</sub> eq. The shares of gases and sectors were similar to those of 2006 (2008 inventory submission).

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<sup>1</sup> FCCC/SBI/2007/34, paragraph 104.

<sup>2</sup> 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).

<sup>3</sup> In this report, the term “total GHG emissions” refers to the aggregated national GHG emissions expressed in terms of CO<sub>2</sub> eq excluding LULUCF, unless otherwise specified.

<sup>4</sup> “Base year” refers to the base year under the Kyoto Protocol, which is 1990 for all gases. 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.

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

#### **D. Key categories**

6. Slovakia has reported a key category tier 1 analysis, both level and trend assessment, as part of its 2008 submission. The key category analysis for stationary combustion performed by the Party differs from that performed by the secretariat:<sup>5</sup> Slovakia identified its key categories for stationary combustion at a detailed disaggregated category level but does not consider different fuels, while the secretariat identified key categories at an aggregated category level split by fuel. There are also quantitative differences in category levels between the two analyses, suggesting that Slovakia did not account correctly for removals in terms of their absolute value when the LULUCF sector was included in the analysis. Slovakia should address this problem and ensure that the key category analysis is 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).

7. Slovakia's key category analysis for 2006 (2008 submission) identified 17 key categories, three more than for 2005 (2007 submission). The additional key categories are coal mining and coal handling, limestone and dolomite use and aluminium production. Slovakia disaggregated combustion key categories by subcategory but not by fuel type. The ERT encourages Slovakia to take account of fuel type in its next annual submission.

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

8. The inventory is generally in line with 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. The 2008 annual submission covers all sectors and categories, includes all the required elements in accordance with the 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" (hereinafter referred to as the UNFCCC reporting guidelines) and shows improvement in important areas such as recalculations, completeness and time-series consistency. The ERT noted that the methodologies and data treatment for many categories in the NIR need further elaboration. It recommends that Slovakia give high priority to the development and implementation of an improved quality assurance/quality control (QA/QC) plan.

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<sup>5</sup> The secretariat identified, for each Party, the categories that are key categories in terms of their absolute level of emissions, applying the tier 1 level assessment as described in the IPCC *Good Practice Guidance for Land Use, Land-Use Change and Forestry*. Key categories according to the tier 1 trend assessment were also identified for Parties that provided a full set of CRF tables for the base year. 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.

**Table 1. Greenhouse gas emissions by gas, 1990–2006**

Greenhouse gas emissions	Gg CO <sub>2</sub> eq								Change base year–2006 (%)
	Base year <sup>a</sup>	1990	1995	2000	2003	2004	2005	2006	
CO <sub>2</sub>	61 838.17	61 838.17	43 916.61	40 195.16	41 359.36	41 065.33	40 704.28	39 984.02	–35.3
CH <sub>4</sub>	5 395.63	5 395.63	4 644.44	4 684.81	4 958.52	4 925.83	4 628.16	4 627.49	–14.2
N <sub>2</sub> O	6 173.58	6 173.58	4 083.62	3 519.08	3 717.93	3 818.86	3 791.45	4 039.04	–34.6
HFCs	NA,NO	NA,NO	22.15	75.59	131.96	152.88	172.34	198.90	NA
PFCs	271.37	271.37	114.32	11.65	21.65	19.91	20.25	35.82	–86.8
SF <sub>6</sub>	0.03	0.03	9.91	13.25	15.39	15.89	16.61	17.15	55 967.2

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

<sup>a</sup> Base year refers to the base year under the Kyoto Protocol, which is 1990 for all gases. 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, 1990–2006**

Sector	Gg CO <sub>2</sub> eq								Change base year–2006 (%)
	Base year <sup>a</sup>	1990	1995	2000	2003	2004	2005	2006	
Energy	59 786.90	59 786.90	42 353.36	38 330.44	39 536.37	38 369.08	37 956.00	37 187.34	–37.8
Industrial processes	5 261.27	5 261.27	4 431.47	4 634.66	4 681.38	5 672.68	5 616.41	5 942.42	12.9
Solvent and other product use	17.05	17.05	30.99	20.14	59.25	80.28	86.35	82.43	383.5
Agriculture	7 035.53	7 035.53	4 388.57	3 482.13	3 411.52	3 226.78	3 219.46	3 162.32	–55.1
LULUCF	NA	–2 388.50	–2 684.09	–2 386.20	–4 814.73	–4 230.16	–849.56	–3 028.72	NA
Waste	1 578.04	1 578.04	1 586.66	2 032.17	2 516.29	2 649.87	2 454.87	2 527.90	60.2
Other	NA	NA	NA	NA	NA	NA	NA	NA	NA
<b>Total (with LULUCF)</b>	NA	71 290.29	50 106.96	46 113.34	45 390.08	45 768.53	48 483.53	45 873.70	NA
<b>Total (without LULUCF)</b>	73 678.78	73 678.78	52 791.05	48 499.54	50 204.81	49 998.69	49 333.09	48 902.42	–33.6

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

<sup>a</sup> Base year refers to the base year under the Kyoto Protocol, which is 1990 for all gases. 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 issues**

### **1. Completeness**

9. The inventory covers all source and sink categories for the period 1990–2006 and is complete in terms of gases and geographical coverage. Slovakia has provided all CRF tables for all years. The CRF tables show that emissions in a number of minor categories in the LULUCF sector are reported as not estimated (“NE”), such as emissions from wildfires and carbon stock change in some carbon pools in wetlands converted to grassland and in forest land converted to wetlands. Any such categories for which IPCC methods are available should be addressed in future submissions, with a view to avoiding problems and possible underestimation of emissions during the commitment period.

### **2. Transparency**

10. Slovakia’s institutional arrangements for dealing with inventories are complex, with a large number of support institutions and contributors involved at various levels on a contract basis. The approach to inventory preparation and reporting used in Slovakia requires considerable control, and further guidance and collaboration must be ensured in order to achieve harmonization and consistency among the bodies and personnel involved in preparing the different components of the inventory and the NIR.

11. The description in the NIR of the national system is not complete; more detail is needed on how the various bodies and contributors carry out their functions as part of the inventory submission and how the process is coordinated and managed by the Slovak Hydrometeorological Institute (SHMI) to ensure completion of the annual submission. The NIR has improved but it still lacks the clarity and detail necessary to enable the ERT to fully understand the way methods and data are applied in the compilation of the GHG inventory. The National Emission Information System (NEIS) database is a key component of the wider inventory process in Slovakia, but its overall application to the GHG inventory and relationship to the national energy balance needs further explanation in order to enhance transparency. The NIR would also benefit from the inclusion of the time series of the pertinent activity data (AD) to facilitate the review and analysis of the CRF tables and emission trends.

### **3. Recalculations and time-series consistency**

12. Slovakia has provided recalculated estimates (CRF table 8(a)) for the years 1990 to 2005; the reasons are given in the sectoral descriptions of the NIR. The effect of the recalculations for the base year and 2005 (as reported in the CRF tables) was an increase of 2.26 per cent and 3.06 per cent, respectively, in GHG emission estimates, with larger increases or decreases occurring in some intervening years. Information on recalculations was not provided in CRF table 8(b). The major changes related to fuel combustion activities in, for example, energy industries, manufacturing industries and construction and other sectors (1.A.4), and to emissions from the production of cement, nitric acid and ammonia (these categories were also subject to recalculations in previous submissions). The approach of providing recalculations for the whole time series maintains consistency; however, the reasons for all recalculations should also be provided in the CRF tables.

### **4. Uncertainties**

13. Slovakia included tier 1 level and trend uncertainty estimates in its 2008 submission. Uncertainty levels of 12.7 and 7.8 per cent are indicated for level and trend, respectively, in 2006, compared with 10.5 and 6.0 for the 2005 analysis (in the 2007 submission). Changes have been made to the uncertainty values of AD and emission factors (EFs) since the 2007 submission, and additional categories were included in the analysis for 2006 (2008 submission). During the review, Slovakia indicated that some of the changes are the result of a tier 2 analysis for the energy and waste sectors, but it is unclear how this analysis was conducted. The contribution of the category forest land to overall

uncertainty in 2006 (2008 submission) is much higher than in 2005 (2007 submission), reflecting the four-fold increase in net removals from forest lands in 2006. The ERT noted that for many categories, the input uncertainty value for AD differs between gases; this is unusual and the reason is not given in the NIR. Slovakia is encouraged to provide explanations in the NIR of its next annual submission for its choice of uncertainty values for AD and the detected differences between gases for the same category, or to reassess its uncertainty analysis.

#### 5. Verification and quality assurance/quality control approaches

14. Neither the 2007 NIR nor the 2008 NIR provide sufficient information to show that QA/QC procedures are being carried out to the level required by the guidelines for national systems (decision 19/CMP.1). The comprehensive QA/QC plan referred to in Slovakia's initial review report<sup>6</sup> was not included in either submission. No information was provided on the QA/QC procedures to be applied by contributing institutions and consultants in the preparation of their respective emissions estimates for delivery to SHMI, or on the extent of the review by independent experts from the Czech Republic and how their findings are used.

15. In response to questions from the ERT regarding QA/QC, Slovakia officially submitted its revised QA/QC plan on 10 November 2008. The document provides an overview of the national system and the process of inventory preparation and approval, and sets out further improvements on a sectoral basis. However, the ERT noted that the plan does not contain a description of specific QA/QC responsibilities, tasks and procedures for annual GHG inventory compilation. From the information available to the ERT, it is very difficult to identify and understand the manner in which QA/QC is currently being conducted and how Slovakia can assess its own performance in this regard. Considerable work is still needed to develop a full description of the QA/QC responsibilities, tasks and procedures across the many institutions, consultants and individuals involved in the Slovak national system. The description of the plan should be updated as necessary to account for structural changes and other developments that continue to affect the national system.

16. The ongoing development and application of the NEIS database has a major bearing on emissions inventories in Slovakia. It is stated in the NIR that in future submissions it will be difficult to develop functionalities so that NEIS can provide GHG data for the inventory and ensure that NEIS data are consistent with those of the CRF tables and from the European Union emissions trading scheme (EU ETS). The national system should address this problem as soon as possible. Slovakia apparently makes little direct use of the EU ETS as a source of data for the GHG inventory. The ERT notes that the EU ETS offers a reliable source of data, which has the potential to provide CO<sub>2</sub> estimates for complete coverage of some categories and could enhance the quality of the inventory. The ERT encourages Slovakia to evaluate its use of this data source.

#### 6. Follow-up to previous reviews

17. Slovakia has undertaken considerable work to recalculate and improve its emissions estimates for many categories following the review of the initial report (in-country review in March 2007), ensuring greater completeness and time-series consistency and providing a basis for some improvement in the NIR. Many other areas of improvement recommended in previous reviews have not been fully addressed and are reiterated in this report.

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<sup>6</sup> FCCC/IRR/2007/SVK, paragraph 22.

## G. Areas for further improvement

### 1. Identified by the Party

18. Slovakia has outlined in chapter 9 of the NIR the improvements that it has undertaken in completing its 2008 submission. However, there is little indication in the NIR of improvements or changes being planned for the coming years. The Party also provided information during the review that outlines improvements undertaken and planned in all sectors of the GHG inventory. However, the date of implementation of these is not clear and it is difficult to identify from this outline precisely which improvements are already reflected in the 2007 and 2008 submissions.

### 2. Identified by the expert review team

19. The ERT identified the following cross-cutting issues for improvement, many of which reiterate recommendations from previous reviews:

- (a) Mandatory provisions and functions of the national system need to be strengthened for more efficient and effective implementation on a long-term basis. Clarification is needed on how the completion of the consultants' questionnaires is guaranteed and what the procedure is for updating the NEIS database in a timely manner. Slovakia may wish to seek alternatives to the system of annual contracts with an October deadline that underpin major parts of the inventory compilation. The Party needs to show what controls are in place to secure timely and complete annual returns under these contracts and what arrangements are in place to ensure that the various consultants obtain the data they require to fulfil their respective contractual obligations with SHMI;
- (b) A QA/QC plan that defines specific quality management responsibilities, tasks and procedures across the many institutions, consultants and individuals involved in the Slovak national system must be developed and completed. The Party should implement the overall QA/QC management system rigorously and describe its operation in future submissions;
- (c) The NIR should give full details of the QA/QC procedures to be applied by contributing institutions and consultants in the preparation of their respective estimates for SHMI. The single national entity should ensure that all contributors are aware of the requirements necessary to ensure an adequate level of transparency. Institutions and consultants should also be aware of the necessary content and format of the partial reports that they should return to SHMI for use in compiling the NIR;
- (d) Further improvement of the NIR with respect to methodological descriptions and the inclusion of summary supporting tabular information on key AD and EFs;
- (e) Development of procedures to use EU ETS data in the annual GHG inventory;
- (f) Updating of uncertainty analyses, using appropriate input values of AD uncertainty for all categories and gases;
- (g) Inclusion of the rationale and explanations for all recalculations and indication of the link to recommendations from reviews or from Slovakia's listed improvements in the categories concerned;
- (h) Provision of information on any changes in the national system and in the national registry as distinct items in the NIR;

- (i) Investigation of the availability of methods and data for those categories which are currently reported as “NE” and inclusion of relevant estimates to avoid potential underestimation of national emissions in future years.

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

## II. Energy

### A. Sector overview

21. The energy sector is the main sector in the GHG inventory of Slovakia. In 2006, the energy sector accounted for 37,187.34 Gg CO<sub>2</sub> eq, or 76.0 per cent of total GHG emissions. Since 1990, emissions have decreased by 37.8 per cent, reflecting the economic transition in the early 1990s. Within the sector, 36.0 per cent of the emissions were from manufacturing industries and construction, followed by 30.1 per cent from energy industries and 16.1 per cent from transport. Other sectors accounted for 12.3 per cent and the category other (1.A.5) accounted for 2.8 per cent. The remaining 2.6 per cent were from fugitive emissions. Following up on the recommendations of the initial review report, Slovakia has performed a major recalculation of the emissions from the energy sector, leading to an increase in the estimated emissions of 2.0 per cent in 1990 and 1.5 per cent in 2005 as compared with the figures in the 2007 inventory submission. The ERT welcomes the changes made, which include:

- (a) Reallocation of several fuels as defined in the NEIS system to the fuel classifications as used in the CRF tables. During the compilation of the 2008 inventory submission, following the recommendations from the initial review report, Slovakia reallocated the fuels defined in the NEIS system, in accordance with the fuels defined in the Revised 1996 IPCC Guidelines;
- (b) Reallocation of emissions from waste incinerated with energy recovery from the waste sector (waste incineration) to the energy sector (public electricity and heat production – other fuels);
- (c) Removal of time-series inconsistencies in AD caused by a change of the database system in 2000;
- (d) Use of data from the EU ETS system as source data for specific EFs; for example, the recalculated EF for brown coal is much higher than previous values;
- (e) Discontinuation of double counting of blast furnace gas use and the associated emissions.

22. The description in the NIR of the methods used in the energy sector is relatively brief. Although the IPCC good practice guidance (section 2.2.3) requires national experts to “compare energy statistics with those provided to international organisations to identify any inconsistencies that require explanation”, the NIR does not provide information on how fuel-use data, collected by means of the NEIS system or as input to the COPERT III model for road transportation, corresponds to national fuel-use statistics as reported to the International Energy Agency (IEA) and the Statistical Office of the European Commission (Eurostat). The ERT therefore recommends that Slovakia provide this information in its next NIR.

## B. Reference and sectoral approaches

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

23. The CO<sub>2</sub> emissions from fuel combustion were calculated using the reference approach and the sectoral approach. For the year 2006, CO<sub>2</sub> emissions calculated using the reference approach are 3.4 per cent higher than those calculated using the sectoral approach. Explanations are not provided in the documentation box of CRF table 1.A(c), although the NIR does provide explanations for the fluctuations in the differences between the two approaches over the years. The ERT recommends that Slovakia provide a summary of the explanations in table 1.A(c).

### 2. International bunker fuels

24. As fuel consumption data from air transport statistics prior to 1994 were applicable to the former Czechoslovakia, the data for the period 1990–1993 for Slovakia were based on expert judgement, taking into account the actual landing and take-off cycles in the period.

25. No data are available to split the fuel used in aviation between international and domestic flights. Following expert judgement, a fuel consumption ratio of 90:10 for jet kerosene and 10:90 for aviation gasoline was used. The ERT reiterates the encouragement in the previous review reports that Slovakia provide detailed reasoning to support this expert judgement in its next annual submission.

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

26. The ERT noted that Slovakia has followed the recommendation in the previous review to report appropriately the apparent energy consumption (excluding energy use and feedstocks) in CRF table 1.A(c). The ERT welcomes this improvement.

## C. Key categories

### 1. Stationary combustion: all fuels – CO<sub>2</sub>, CH<sub>4</sub> and N<sub>2</sub>O

27. Slovakia estimates the emissions from stationary combustion from data collected in the NEIS system, following specific national legislation. It is stated in the NIR that the data for total fuel use in the NEIS correspond well with the statistics on national fuel use, but the result of this comparison is not shown. The ERT recommends that Slovakia include in its next NIR a table presenting this comparison at the level of fuel types (solid, liquid, gaseous, biomass, other).

28. According to the NIR, fuel data are reported to NEIS in units of mass or volume in the case of gases, rather than in energy units. NEIS uses the net calorific values (NCVs) of these fuels derived from measurements by the process operators. During the review, Slovakia provided a spreadsheet with more detailed information on the NCVs and EFs used in the 2006 inventory. From this information the ERT concluded that the NCVs for individual fuels show a significant variability between categories and that not all NCVs are within the ranges that could be expected on the basis of the recognized international data (IEA, Eurostat). The ERT recommends that Slovakia assess the NCVs used for the same fuel in different categories and explain exceptionally high or low values in the NIR of next annual submissions.

29. Slovakia calculates the emissions of CO<sub>2</sub> from plant-level fuel data (type of fuel and quantities combusted). The NIR indicates that Slovakia expects to be able to apply plant-specific EFs by making use of EU ETS data. The ERT encourages Slovakia to pursue potential benefits arising from the use of these data.

30. According to the CRF tables (2008 submission), other fuels (industrial waste) used in the category public electricity and heat production generated 49.13 Gg of CO<sub>2</sub> emissions in 2006, while the amount of fuel combusted (AD) for this category, only available in mass consumed, is reported as included elsewhere (“IE”) and reported in table 8.32 of the NIR in the category waste incineration.

The ERT recommends that Slovakia report AD for this fraction of the waste incinerated with energy recovery, using IPCC default or country-specific NCVs, and subtract this amount from the industrial waste incineration data reported in CRF table 6.C.

## 2. Road transportation: all fuels – CO<sub>2</sub>

31. Slovakia calculates emissions from road transportation and off-road equipment using the COPERT III model. The previous review recommended that Slovakia provide documentation in its next NIR on the methods, AD and EFs used. The COPERT III model calculates fuel use from fleet and vehicle usage and allows for tuning of the relevant parameters to ensure that data on consumed fuel match the independent fuel sales data. During the review, Slovakia informed the ERT that an almost perfect match was obtained. The ERT reiterates the recommendation of the previous ERT that Slovakia include a reference to COPERT III<sup>7</sup> and other background materials and indicate the parameter values that are different from the predefined values in COPERT III.

### D. Non-key categories

#### Road transportation: all fuels – CH<sub>4</sub>

32. The CH<sub>4</sub> implied emission factor (IEF) for this category decreased by 37.7 per cent between 1990 and 2006. Between 2005 and 2006 alone, the CH<sub>4</sub> IEF decreased by 13.5 per cent (from 14.6 kg/TJ to 12.8 kg/TJ) decreased by 13.5 per cent), which is an unexpectedly large change. During the review Slovakia indicated that this was the result of changes in driving patterns and renewal of the vehicle fleet. The ERT encourages Slovakia to include in its next submission this explanation and an improved description of how COPERT III was applied.

## III. Industrial processes and solvent and other product use

### A. Sector overview

33. In 2006, emissions from the industrial processes sector amounted to 5,942.42 Gg CO<sub>2</sub> eq, or 12.2 per cent of total GHG emissions, and the solvent and other product use sector amounted to 82.43 Gg CO<sub>2</sub> eq, or 0.2 per cent of total GHG emissions. Between 1990 and 2006 emissions from the industrial processes sector increased by 12.9 per cent and emissions from the solvent and other product use sector increased by 383.5 per cent; emissions from these sectors together have increased by 14.1 per cent. The key drivers of the rise in emissions are changes in the chemical industry (mainly nitric acid production) and consumption of halocarbons and SF<sub>6</sub>. Reductions in emissions from mineral products and metal production partially offset those increases. Within the industrial processes and solvent and other product use sectors, 68.5 per cent of GHG emissions were from CO<sub>2</sub>, followed by 27.4 per cent from N<sub>2</sub>O, 3.3 per cent from HFCs and 0.6 per cent from PFCs. SF<sub>6</sub> accounted for 0.3 per cent and CH<sub>4</sub> accounted for less than 0.1 per cent.

34. Most of the emissions came from the mineral products sub-sector, which accounted for 50.0 per cent of the sectoral emissions, while the chemical industry sub-sector accounted for 31.8 per cent, metal production for 13.2 per cent, consumption of halocarbons and SF<sub>6</sub> for 3.6 per cent and solvent and other product use for 1.4 per cent.

35. The ERT noted the continued work by the Party on recalculating previous estimates in the sectors lime production (CO<sub>2</sub>) and nitric acid production (N<sub>2</sub>O) and that CO<sub>2</sub> emissions from ammonia production were reallocated from the categories manufacturing industries and construction and chemicals (energy sector) to ammonia production (industrial processes sector) between the 2007 and 2008 submissions.

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<sup>7</sup> <[http://reports.eea.europa.eu/Technical\\_report\\_No\\_50/en](http://reports.eea.europa.eu/Technical_report_No_50/en)>.

## B. Key categories

### 1. Cement production – CO<sub>2</sub>

36. Slovakia uses a tier 2 approach based on data from individual installations for the whole time series, annually updating the main parameters (content of clinker in cement and average values of calcium oxide), except for the period 1990–2002 for which a single value for the average content of clinker in cement is used, based on expert estimation and information received from the cement producers. Keeping in mind confidentiality constraints, the ERT recommends that Slovakia provide more information in future submissions on the increasing EF trend and on QA/QC measures in this category.

### 2. Lime production – CO<sub>2</sub>

37. The NIR does not include information on methodologies used to estimate emissions from the production of dolomitic lime. The emissions from decomposition of magnesium carbonate are derived by stoichiometric balance and recalculated and reported as calcium carbonate (CaCO<sub>3</sub>) in the limestone and dolomite use category. During the review Slovakia explained that a tier 2 methodology is used for lime emissions drawing on information from lime producers for AD and for the content of calcium oxide and magnesium oxide in lime. The ERT recommends that Slovakia describe this approach in its next NIR submission, in order to improve the transparency of reporting.

### 3. Limestone and dolomite use – CO<sub>2</sub>

38. It is stated in the NIR that emissions of CO<sub>2</sub> include the use of limestone and dolomite in the production of glass, calcium carbide and iron and steel. Slovakia uses data provided by operators of individual installations as AD. The IPCC default EF (440 kg/t) is reduced to 427 kg/t to account for a CaCO<sub>3</sub> content of 97.0 per cent.

### 4. Nitric acid production – N<sub>2</sub>O

39. The ERT noted that Slovakia has recalculated the estimates of N<sub>2</sub>O emissions from nitric acid (HNO<sub>3</sub>) production in the 2008 submission following recommendations in the initial review report. Slovakia uses two different EFs for calculating these emissions. The IPCC default EF (13 kg N<sub>2</sub>O/t HNO<sub>3</sub> for atmospheric plant, 7 kg N<sub>2</sub>O/t HNO<sub>3</sub> for medium pressure plant and 9 kg N<sub>2</sub>O/t HNO<sub>3</sub> for high pressure plant) was used to calculate emissions estimates for the period 1990–2004 for all three installations in the country, and an EF derived from direct measurements was used for the years 2005 and 2006 for two of the installations (7.30 and 10.33 kg N<sub>2</sub>O/t HNO<sub>3</sub> for medium pressure plant and 9.10 and 9.02 kg N<sub>2</sub>O/t HNO<sub>3</sub> for high pressure plant). For the third installation, the IPCC default EF (7 kg N<sub>2</sub>O/t HNO<sub>3</sub> medium pressure) is used for the whole period. The ERT encourages Slovakia to document the country-specific EFs in more detail and discuss their influence on the time-series consistency.

### 5. Iron and steel production – CO<sub>2</sub>

40. The values of emissions of CO<sub>2</sub> from iron and steel production refer to steel production from pig iron only. Emissions from coke used in pig iron production are included in the energy sector in the category fuel combustion in manufacturing and construction (iron and steel). The ERT noted that Slovakia's approach to allocating these emissions does not follow the IPCC good practice guidance. It was explained during the review that this is for historical reasons and because data on coke used are not accessible. The ERT encourages Slovakia to improve emissions estimates and reporting by using the appropriate tier 2 methodology and to provide a description in the next NIR of the method used.

### C. Non-key categories

#### 1. Ammonia production – CO<sub>2</sub>

41. Slovakia uses a tier 1 approach with a national EF for estimating emissions from ammonia production, taking into account CO<sub>2</sub> removal by flue gas use during the subsequent urea production process. This approach is inconsistent with the Revised 1996 IPCC Guidelines. The ERT observed that if subtraction of CO<sub>2</sub> used for urea production was not made, this category could become a key category. The ERT recommends that Slovakia account for all CO<sub>2</sub> emissions from ammonia production under this category, without accounting for the CO<sub>2</sub> removal, in its next annual inventory.

#### 2. Ozone-depleting substance substitutes – HFCs and SF<sub>6</sub>

42. Slovakia reported potential and actual emissions from substitutes for ozone-depleting substances based on data from import and export of substances in bulk and of products. The NIR provides explanations of sources of HFCs and SF<sub>6</sub>, indicating that the emissions estimates are based on a structured survey of the potential users of HFCs and SF<sub>6</sub>. The sectoral background data CRF tables for consumption of halocarbons and SF<sub>6</sub> are not provided (table2(II).Fs1 and table2(II).Fs2). The ERT encourages Slovakia to document these background data and to provide evidence that the emissions are not overestimated or underestimated.

## IV. Agriculture

### A. Sector overview

43. In 2006, total emissions from agriculture amounted to 3,162.32 Gg CO<sub>2</sub> eq, or 6.5 per cent of total GHG emissions. N<sub>2</sub>O accounted for 65.7 per cent and CH<sub>4</sub> for 34.3 per cent of sectoral emissions. During the period 1990–2006, emissions from agriculture decreased by 55.1 per cent. The key driver of the fall in emissions is the reduction in livestock numbers and a two-thirds reduction in the consumption of mineral fertilizers. Within the sector, 38.0 per cent of emissions were from direct soil emissions, followed by 29.4 per cent from enteric fermentation, 18.1 per cent from manure management, 11.6 per cent from indirect emissions and 2.9 per cent from grazing.

44. The ERT noted that reporting in the agriculture sector is complete in terms of gases and categories. Slovakia explained that burning of field residues is prohibited by law and hence reported as not occurring (“NO”) in the inventory. Emissions from histosols are reported as “NO” because cultivation on this soil type is prevented for landscape protection reasons, despite the fact that 4,893 ha of histosols are reported in the LULUCF sector under cropland. The ERT recommends that Slovakia better document the occurrence and use of histosols in the country in its next submission.

45. Several apparent errors were detected by the ERT in the data given in the NIR and in the CRF tables involving, for example, the nitrogen excretion (N<sub>ex</sub>) from dairy cattle, N<sub>ex</sub> from poultry and nitrogen (N) in crop residues. The ERT recommends that Slovakia follow the guidance on the structure of the NIR given in the UNFCCC reporting guidelines and remove redundant data, repetition, errors and scientific inconsistencies in order to increase the transparency of reporting.

46. No recalculations have been made since the initial report, although the NIR indicates the contrary: the ERT believes that this relates to the revised submission of the Slovak inventory during the in-country review of the initial report and should not have been included in this submission. The ERT recommends that Slovakia increase the transparency of its NIR.

47. In some circumstances Slovakia uses higher tier methodologies. This requires an increased use of notation keys for some parameters in CRF tables 4.B(a) and 4.B(b), such as typical animal mass, volatile solids daily excretion, allocation percentages according to climate and stable type allocations,

which are not reported in either the 2007 or the 2008 submission. The ERT recommends that, although they do not affect emissions estimates, they should be reported in the CRF tables.

## **B. Key categories**

### **1. Enteric fermentation – CH<sub>4</sub>**

48. It is stated in the NIR that tier 2 methodologies are used for calculating emissions from enteric fermentation in dairy cattle, non-dairy cattle and sheep. The NIR provides data on milk yield from dairy cattle and energy consumption from non-dairy cattle from 1990 to 2006 (tables 6.2 and 6.3). From 1990 to 2006 average milk production increased from 6.34 to 15.60 kg per dairy cow per day, corresponding to an increase in energy intake from 211.1 to 306.6 MJ/dairy cow/day. Based on these figures, the ERT believes that the EFs used, which increased from 73.5 kg CH<sub>4</sub>/head/year in 1990 to 106.7 kg CH<sub>4</sub>/head/year in 2006, are justified. The higher feed intake will also increase the amount of energy in the manure that is produced and similar increases are expected in emissions of CH<sub>4</sub> from manure management, the amount of Nex in manure and N<sub>2</sub>O emissions from manure management and agricultural soils (from N input to soils). The ERT recommends that the effect of the increased feed consumption on these emissions be considered.

49. A tier 2 methodology is used for non-dairy cattle. The model used is not described in the NIR. From 1990 to 2006 the average energy intake of non-dairy cattle increased from 122.0 to 140.8 MJ/head/day. The average weight of non-dairy cattle is 280 kg per animal compared with 550 kg for dairy cattle. Given this underlying information, the ERT considers that the reported IEF of approximately 55 kg CH<sub>4</sub>/head/year for non-dairy cattle could be too high. Slovakia is recommended to improve the documentation of the model in the NIR in order to increase transparency in the emissions estimates for non-dairy cattle.

50. The NIR indicates that a tier 2 methodology is used for sheep, but it also stated that the IPCC default values are used for all animal categories except cattle, which is in accordance with the IPCC good practice guidance. During the review the Party provided clarification that in the 2008 submission it still uses tier 1 for sheep, although a country-specific value is available and could be used in future submissions

### **2. Direct soil emissions – N<sub>2</sub>O**

51. The Slovak methodology for estimating emissions from N-fixing crops is based on country-specific information and differs from the IPCC good practice guidance. In estimating the N<sub>2</sub>O emissions Slovakia included the N-fixing process and the N turnover of crop residues from N-fixing plants. The N-fixation rate was estimated at 26 kg N/ha and the remaining amount of N/ha reported under N-fixing is the “Nutrition potential in crop residuals in kg of nitrogen per hectare” (table 6.13 of the NIR). The ERT believes that the quantified N amount in N-fixing crops in table 6.13 is within the expected range, but it recommends that Slovakia describe its methodology and the assumptions made in the NIR.

52. The estimation of N in crop residues is based on a national methodology. The average amount of N returned to soil in non-fixing crop residues is estimated at 58 kg N/ha/year, which is a reasonable value for the average N content in stubble and roots under European conditions. Table 6.13 in the NIR includes N data for roots only as well as data that include stems and leaves. The NIR indicates that all crop residues such as straw and leaves are removed from the field for feeding and bedding purposes. The ERT recommends that Slovakia provide further information on how much of the above-ground crop residues are returned to soil and describe in a transparent manner the tier 2 methodology that it uses.

### C. Non-key categories

#### 1. Manure management – N<sub>2</sub>O

53. Slovakia uses a Nex ratio for dairy cattle of 100 kg N/head/year for all years, which is the default IPCC value for Western Europe (the default Eastern Europe value is 70 kg N). During the review, Slovakia provided a new country-specific Nex time series, in which values are shown to increase from 82 kg N/head/year in 1990 to 98 kg N/head/year in 2006. The ERT recommends that these data be used in Slovakia's future submissions.

54. For non-dairy cattle, Slovakia uses a default value of 60 kg Nex/head/year. As mentioned above under enteric fermentation, the ERT questions whether this is appropriate for the low average weight reported for non-dairy cattle. Slovakia is therefore recommended to investigate the Nex from non-dairy cattle further and to justify the use of 60 kg Nex/head/year.

#### 2. Manure management – CH<sub>4</sub>

55. The ERT noted that the NIR does not provide an adequate description of the calculation methodology used. According to CRF table Summary 3, the Party used a tier 2 method and IPCC default EFs, whereas according to the NIR some of these EFs are country-specific. For dairy cattle a value of 4 kg CH<sub>4</sub>/head/year is used and for non-dairy cattle 3.8 kg CH<sub>4</sub>/head/year is used. These are lower than the IPCC default values, which are 6 and 4 kg CH<sub>4</sub>/head/year, respectively. The ERT recommends that Slovakia provide an adequate description of the methodology and explanations for the lower EFs.

## V. Land use, land-use change and forestry

### A. Sector overview

56. In 2006, the LULUCF sector was a net sink of 3,028.72 Gg CO<sub>2</sub> eq. Removals from the sector increased by 26.8 per cent between 1990 and 2006. The key driver of the rise in removals is carbon stock changes in cropland, which changed from being a net emitter of 3,286.66 Gg CO<sub>2</sub> eq in 1990 to just 1.08 Gg CO<sub>2</sub> eq in 2006. Within the LULUCF sector, 77.1 per cent of GHG emissions/removals were from forest land, followed by 12.0 per cent from other land and 10.9 per cent from grassland. Most of the emissions and removals (99.4 per cent) were CO<sub>2</sub> while CH<sub>4</sub> accounted for 0.5 per cent and N<sub>2</sub>O for 0.1 per cent.

57. Changes in carbon stock from the following categories are reported as "NE": dead organic matter (DOM) and soil organic matter (SOM) for mineral soils and organic soils for forest land remaining forest land; all stocks for cropland remaining cropland and land converted to cropland; living biomass, DOM and SOM for mineral soils and organic soils for grassland remaining grassland; living biomass and DOM for land converted to grassland; living biomass for land converted to other land (except forest land converted to other land, reported as "IE"); non-CO<sub>2</sub> emissions from drainage of mineral soils in forest lands, N<sub>2</sub>O emissions from N fertilization of forest land and other land (but should be "NO" as a comment in table 5(I) states that this category is not relevant); N<sub>2</sub>O emissions associated with disturbance associated with land-use conversion to cropland; and CO<sub>2</sub> emissions from lime application to grassland (but should be "NO" as a comment in table 5(IV) states that this category is not relevant). The ERT encourages the Party to improve the completeness of its report by providing estimates and relevant information for categories currently reported as "NE".

58. The NIR lacks some critical information such as the definitions, methodologies and assumptions used for land classification and land-use change detection and methodologies, assumptions and data used for carbon stock change estimates for each of the reported land uses. The ERT recommends that Slovakia report this in its next annual submission.

59. The Party's land-use definitions are not provided, and the ERT notes that they may not comply with the IPCC good practice guidance for LULUCF because wetlands and settlements are included under other land. The ERT reiterates the recommendation of the previous ERT that the Party use the land-use category definitions of the IPCC good practice guidance for LULUCF and provide these definitions in its next NIR, or justify the choice of land-use definitions. In addition, reporting an annual land-use change matrix should be included in the next NIR, as suggested in section 2.3.2.2 of the IPCC good practice guidance for LULUCF.

60. The reported land area AD are inconsistent, as the total area of Slovakia changes along the time series (from 4,898,000 ha in 1990 to 4,903,604 ha in 2006). Furthermore, Slovakia does not report separately carbon stock changes in living biomass due to either deforestation (i.e. conversion from forest land to other land uses) or afforestation/reforestation (i.e. conversion from other land uses to forest land). The ERT noted that no improvements have been introduced into the LULUCF reporting between the 2007 and 2008 submissions. The ERT strongly encourages Slovakia to improve the capability of its national system to fulfil the reporting requirements under Article 3, paragraph 3, of the Kyoto Protocol.

## **B. Key categories**

### **1. Land converted to forest land – CO<sub>2</sub>**

61. The ERT noted that only carbon stock changes in the DOM pool, for just the last three years of the time series (2003–2006), have been reported, while carbon stock changes of living biomass and SOM have been reported as “IE”. The ERT considers that it is not good practice to report carbon stock changes of a land category under a different land category. Therefore, the ERT asks Slovakia to report each carbon stock change occurring in land converted to forest land in the category land converted to forest land and to apply the relevant methodologies provided in the IPCC good practice guidance for LULUCF in order to reconstruct a complete time series of carbon stock changes in the DOM pool.

### **2. Cropland remaining cropland – CO<sub>2</sub>**

62. The Party reported a continuous decrease in DOM in cropland remaining cropland from 1990 to 2003, but no information has been given on this in the NIR for the last three years (2004–2006). The ERT therefore cannot judge whether the applied methodology is consistent with IPCC good practice guidance for LULUCF. The ERT noted that a continuous decrease is unlikely since DOM either contains very small carbon stocks in cropland or is absent. For such a trend to be reported, either the level of DOM in 1990 was extraordinarily high, or the estimation of emissions is affected by some form of bias. The ERT recommends that Slovakia further check DOM estimates and provide explanations for such a trend in its next inventory submission. The ERT also recommends that Slovakia complete the time series of carbon stock changes in the DOM pool by providing estimates for all years. If data are not available, a complete time series should be calculated by an extrapolation in accordance with the IPCC good practice guidance for LULUCF.

### **3. Grassland remaining grassland – CO<sub>2</sub>**

63. The ERT noted that this category changed during the period 1990–2006 from being a net source of emissions to a net sink. Moreover, the ERT noted that only carbon stock changes in the DOM pool have been reported. The ERT cannot judge whether the applied methodology is consistent with IPCC good practice guidance for LULUCF, as there is a lack of information in the NIR. Slovakia is requested to provide further explanation regarding this category in its next annual submissions.

### **C. Non-key categories**

#### **1. Land converted to cropland – CO<sub>2</sub>**

64. The ERT noted that changes in carbon stock from land converted to cropland from other land are reported for only 2004, while for other years this conversion is reported either as “NO” or as “NE”. The ERT recommends that reasons for the conversion from other land be investigated and documented in the next NIR, as it is unusual for other land to be changed to cropland use. Moreover, the ERT recommends that Slovakia complete the time series of carbon stock changes in the DOM pool by providing estimates for all years. If data are not available, a complete time series should be calculated by an extrapolation in accordance with the IPCC good practice guidance for LULUCF.

#### **2. Emissions from agricultural lime application – CO<sub>2</sub>**

65. The ERT noted that the EF applied for dolomite (0.12 Mg CO<sub>2</sub>-C/Mg) is lower than the IPCC default (0.13), and that no explanation is provided in the NIR. The ERT recommends that Slovakia provide an explanation for the selected EF in its next annual submission.

## **VI. Waste**

### **A. Sector overview**

66. In 2006, the waste sector accounted for 2,527.90 Gg CO<sub>2</sub> eq, or 5.2 per cent of total GHG emissions. Emissions from the sector increased by 60.2 per cent between the base year and 2006. Within the sector, 69.7 per cent of the emissions were from solid waste disposal on land, followed by 28.8 per cent from wastewater handling, 1.2 per cent from waste incineration and 0.4 per cent from composting.

67. Slovakia introduced some improvements for AD and EFs in its 2008 submission for solid waste disposal on land and waste incineration in accordance with proposals from the initial review report, and also reported for the first time CH<sub>4</sub> and N<sub>2</sub>O emissions from composting in the category other (6.D). As a result of these changes, the estimate of total emissions from this sector in 2005 is 16.3 per cent higher in the 2008 submission than the estimate given in the 2007 submission. The ERT appreciates these improvements and encourages Slovakia to provide information on all these changes in its next annual submission.

### **B. Key categories**

#### **1. Solid waste disposal on land – CH<sub>4</sub>**

68. Between the base year and 2006, the emissions of CH<sub>4</sub> from solid waste disposal on land increased by 274.8 per cent, from 22.37 Gg CH<sub>4</sub> in the base year to 83.85 Gg CH<sub>4</sub> in 2006, as a result of a gradual increase in landfilled municipal solid waste and a rapid increase in industrial solid waste. The CH<sub>4</sub> emissions from landfilled industrial solid waste were recalculated and consequently emission estimates for 2005 increased by 181.2 per cent between the 2007 and 2008 submissions. However, there are no concrete explanations for changes in AD. The ERT recommends that Slovakia provide explanations for any recalculations in its future submissions.

69. Slovakia estimates CH<sub>4</sub> emissions from landfilled municipal solid waste with the IPCC tier 2 first order decay (FOD) model and default parameters that reflect the waste management practices in Slovakia. However, CH<sub>4</sub> emissions from industrial solid waste are estimated following the IPCC tier 1 method because the consistent time series for AD needed for the FOD method is unavailable. Because this is a key category, and bearing in mind the IPCC good practice guidance, the ERT encourages Slovakia to prepare a consistent time series of AD for landfilled industrial solid waste and to estimate CH<sub>4</sub> emissions using the FOD method.

70. In the 2008 submission, Slovakia has for the first time reported the amount of CH<sub>4</sub> recovered. However, this improvement is not correctly reflected in the CRF tables. The ERT notes that CH<sub>4</sub> emissions in CRF table 6.A should be actual CH<sub>4</sub> emissions after subtraction of the amount of CH<sub>4</sub> recovery from gross CH<sub>4</sub> generation and recommends that Slovakia report the actual emissions in future submissions.

## 2. Wastewater handling – CH<sub>4</sub>

71. The actual parameter values that were used for the estimation of CH<sub>4</sub> emissions from domestic and industrial wastewater handling (i.e. WS<sub>ix</sub>, SS<sub>jy</sub>, MCF<sub>x</sub>, MCF<sub>y</sub> and MR in tables 8.16 and 8.17), and the AD for the same categories, are not presented in the NIR. The ERT recommends that Slovakia provide all background parametric data and AD for the whole time series in the NIR of its next annual submission.

### C. Non-key categories

## 1. Wastewater handling – N<sub>2</sub>O

72. No description of the methodology used to estimate N<sub>2</sub>O emissions from wastewater handling is provided in the NIR (i.e. ISI-method referenced in the NIR, chapter 8.4) even though Slovakia had been recommended to do this in the initial review report. The ERT reiterates this recommendation.

## 2. Waste incineration – CO<sub>2</sub>

73. The ERT noted that in the 2008 submission Slovakia allocated CO<sub>2</sub> emissions from waste incineration between the energy sector and the waste sector, according to whether there is energy recovery. In line with IPCC good practice guidance, CO<sub>2</sub> emissions from waste incineration without energy recovery are reported under the waste sector while emissions from incineration with energy recovery are reported under the energy sector.

74. Slovakia does not estimate CO<sub>2</sub> emissions from biogenic waste incineration, instead using (incorrectly) the notation key “NO”. Although CO<sub>2</sub> emissions from the incineration of biogenic waste should not be included in the national totals, the emissions estimates from this waste should be provided as memo items in the CRF tables in accordance with the UNFCCC reporting guidelines.

## 3. Other – CH<sub>4</sub> and N<sub>2</sub>O

75. Slovakia reported CH<sub>4</sub> and N<sub>2</sub>O emissions from composting for the first time in the 2008 submission. Methodology, EFs and time-series AD are documented in the NIR following the recognized international scientific literature. CH<sub>4</sub> and N<sub>2</sub>O emissions are calculated for both composted municipal solid waste and industrial solid waste; however, emissions from composted industrial solid waste are not included in the CRF tables or in total national emissions. The reason for this is that emissions from composted industrial solid waste are based on preliminary results and time is needed to discuss them with experts. The ERT encourages Slovakia to investigate further improvements in the reliability of AD and to include CH<sub>4</sub> and N<sub>2</sub>O emissions from composting of industrial solid waste in the next annual NIR and the CRF tables.

## VII. Other issues

### 1. Changes to the national system

76. Slovakia did not provide information on specific changes to the national system in either the 2007 or the 2008 submission. However, the NIR and the QA/QC information provided during the review state that structural changes to the national system are ongoing (transposition effects of European Union legislation) and that a new high-level coordination body, established in June 2008, will be involved in the

final approval of the inventory and will identify necessary improvements. Slovakia is recommended to document relevant changes in the national system in its next submission. The ERT also recommends that Slovakia report on the development and implementation of its QA/QC plan.

## 2. Changes to the national registry

77. The Party 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.

## 3. Commitment period reserve

78. Slovakia has not reported the calculation of its commitment period reserve in the 2008 submission. In response to questions raised by the ERT during the review, Slovakia indicated that it had reported its commitment period reserve in its cover letter to the 2008 submission to be 244,512,104 t CO<sub>2</sub> eq, based on the total emissions in its most recently reviewed inventory (48,902.42 Gg CO<sub>2</sub> eq). The ERT agrees with this value. The ERT recommends that Slovakia report the calculation of its commitment period reserve in its next annual submission.

# VIII. Conclusions and recommendations

79. Slovakia has submitted its inventory, comprising an NIR and CRF tables, in accordance with the deadlines established by the UNFCCC reporting guidelines. It is complete in terms of geographical coverage and covers all gases, years and categories, except for a number of minor categories in the LULUCF sector. The 2008 inventory submission includes all the required elements and shows improvement from previous submissions in areas such as recalculations, completeness and time-series consistency.

80. The inventory is generally in line with the 1996 IPCC Revised Guidelines, the IPCC good practice guidance and the IPCC good practice guidance for LULUCF. The majority of the methodological issues identified in this review relate to relatively minor matters concerning a lack of detail needed by the ERT to fully understand and review the reported estimates. This could be easily addressed by providing better descriptions in the NIR and by including the key AD and corresponding EFs in appropriate tabular format to underpin the aggregated information in the CRF tables. Detailed background data should be provided to support all country-specific and tier 2 methodologies. The quality of the inventory submission could be enhanced considerably by addressing the various deficiencies identified in the review processes in a systematic and progressive way in future reporting cycles.

81. The key recommendation of this report is for Slovakia to develop its QA/QC plan as a stand-alone description of the QA/QC responsibilities, tasks and procedures across the many institutions, consultants and individuals involved in the Slovak national system. Slovakia should make every effort to address the concerns of the ERT on this issue and comply with the recommendations on QA/QC contained in this report. The NIR does not indicate what formal arrangements and agreements have been established to secure data acquisition and delivery of the estimates for specific sectors or individual components of the inventory. Changes to the national system should be reported in annual submissions, and it should be made clear that the system has the capacity to generate and report GHG emissions estimates that are in line with the IPCC good practice guidance and subject to appropriate levels of QA/QC.

82. Other recommendations for further improvements are to:

- (a) Improve transparency in the NIR by providing more detailed descriptions of the methodologies and of the energy balance and its relationship with the NEIS database;

- (b) Develop procedures to use EU ETS data;
- (c) Make sure that all fuel use is accounted for in the GHG inventory and describe the input of NEIS and EU ETS to the energy balance;
- (d) Update uncertainty analyses;
- (e) Provide explanations for all recalculations and link these to previous reviews;
- (f) Enhance the completeness of the inventory and avoid potential underestimation of emissions.

### **IX. Questions of implementation**

83. 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/gplulucf/gplulucf.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 Slovakia 2007. FCCC/ASR/2007/SVK. Available at <<http://unfccc.int/resource/docs/2007/asr/svk.pdf>>.

Status report for Slovakia 2008. FCCC/ASR/2007/SVK. Available at <<http://unfccc.int/resource/docs/2008/asr/svk.pdf>>.

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

Synthesis and assessment report on the greenhouse gas inventories submitted in 2008. Available at <<http://unfccc.int/resource/webdocs/sai/2008.pdf>>.

FCCC/ARR/2006/SVK. Report of the individual review of the greenhouse gas inventory of Slovakia submitted in 2006. Available at <<http://unfccc.int/resource/docs/2008/arr/svk.pdf>>.

FCCC/IRR/2007/SVK. Report of the review of the initial report of Slovakia. Available at <<http://unfccc.int/resource/docs/2007/irr/svk.pdf>>.

### **B. Additional information provided by the Party**

Responses to questions during the review were received from Ms. Janka Szemesova (Slovak Hydrometeorological Institute, Bratislava), including additional material on the methodology and assumptions used. The following documents were also provided by Slovakia:

Ministry of the Environment of the Slovak Republic. 2007. *National Inventory System of the Slovak Republic to monitor emissions of greenhouse gases and their sinks in accordance with Article 5, paragraph 1 of the Kyoto Protocol*. Bratislava.

Mind'áš J. 2007. *Project NSISP. Methodology of the Greenhouse gas emission inventory in the IPCC sector "3" "Agriculture, Forest and Land Use" (AFOLU)*. SPIRIT a.s. Bratislava.

Ministry of the Environment of the Slovak Republic. 2008. *Quality Assurance/Quality Control Plan for the Greenhouse Gas Inventory in the Slovak Republic*. Slovak Hydrometeorological Institute. Ministry of Environment of the Slovak Republic. Bratislava.

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