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COMPLIANCE COMMITTEE

CC-2012-1-1/Slovakia/EB  
17 May 2012

## **Report of the individual review of the annual submission of Slovakia submitted in 2011**

### **Note by the secretariat**

The report of the individual review of the annual submission of Slovakia (FCCC/ARR/2011/SVK) submitted in 2011 was published on 8 May 2012. An advance version of the report and Slovakia's written comments on the draft report are contained in the annex to this note. The secretariat would draw your attention, in particular, to paragraphs 6, 8, 12, 20, 48, 57–59, 63, 69–71, 81, 83, 94, 102, 214, 215, 220, 222, 227, 230 and 231, and sections II A 2, II G, IV and V of the report. The secretariat notes that a disagreement over the application of adjustments to inventories under Article 5, paragraph 2, of the Kyoto Protocol has arisen in light of Slovakia's rejection of the adjustments described in section IV of the report.

In accordance with section VII, paragraph 1, of the annex to decision 27/CMP.1 and rule 19, paragraph 1, of the "Rules of procedure of the Compliance Committee of the Kyoto Protocol" (annex to decision 4/CMP.2, as amended by decision 4/CMP.4), the questions of implementation listed in paragraphs 239 and 243 of the report were allocated by the bureau to the enforcement branch.





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Slovakia submitted in 2011\***

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\* In the symbol for this document, 2011 refers to the year in which the inventory was submitted, and not to the year of publication.

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## I. Introduction and summary

1. This report covers the in-country review of the 2011 annual submission of Slovakia, coordinated by the UNFCCC secretariat, in accordance with decision 22/CMP.1. The review took place from 22 to 27 August 2011 in Bratislava, Slovakia, and was conducted by the following team of nominated experts from the UNFCCC roster of experts: generalist – Mr. Tinus Pulles (Netherlands); energy – Ms. Yuriko Hayabuchi (Japan); industrial processes – Ms. Sohyang Lee (Republic of Korea); agriculture – Ms. Junko Akagi (Japan); land use, land-use change and forestry (LULUCF) – Ms. Gro Hølen (Norway); and waste – Mr. Philip Acquah (Ghana). Mr. Acquah and Mr. Pulles were the lead reviewers. The review was coordinated by Mr. Javier Hanna, Ms. Kyoko Miwa and Ms. Xuehong Wang (UNFCCC secretariat).

2. In accordance with the “Guidelines for review under Article 8 of the Kyoto Protocol” (decision 22/CMP.1) (hereinafter referred to as the Article 8 review guidelines), 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.

3. In 2009, the main greenhouse gas (GHG) in Slovakia was carbon dioxide (CO<sub>2</sub>), accounting for 80.8 per cent of total GHG emissions<sup>1</sup> expressed in CO<sub>2</sub> eq, followed by methane (CH<sub>4</sub>) (10.0 per cent) and nitrous oxide (N<sub>2</sub>O) (8.4 per cent). Hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF<sub>6</sub>) collectively accounted for 0.8 per cent of the overall GHG emissions in the country. The energy sector accounted for 66.1 per cent of total GHG emissions, followed by the industrial processes sector (21.6 per cent), the agriculture sector (7.0 per cent), the waste sector (5.0 per cent) and the solvent and other product use sector (0.4 per cent). Total GHG emissions amounted to 43,393.10 Gg CO<sub>2</sub> eq and decreased by 41.5 per cent between the base year<sup>2</sup> and 2009. This decrease is in line with the economic and political transition to a market economy and the changes that occurred in the country in the early 1990s.

4. Tables 1 and 2 show GHG emissions from Annex A sources, emissions and removals from the LULUCF sector under the Convention and emissions and removals from activities under Article 3, paragraph 3, and, if any, Article 3, paragraph 4, of the Kyoto Protocol (KP-LULUCF), by gas and by sector and activity, respectively. In table 1, CO<sub>2</sub>, CH<sub>4</sub> and N<sub>2</sub>O emissions included in the rows under Annex A sources do not include emissions and removals from the LULUCF sector.

5. Tables 3 and 4 provide information on the most important emissions and removals and accounting parameters that will be included in the compilation and accounting database.

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<sup>1</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>2</sup> “Base year” refers to the base year under the Kyoto Protocol, which is 1990 for all gases. The base year emissions include emissions from Annex A sources only.

Table 1  
**Greenhouse gas emissions from Annex A sources and emissions/removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, by gas, base year to 2009<sup>a,b</sup>**

	Greenhouse gas	Base year <sup>a</sup>	Gg CO <sub>2</sub> eq							Change Base year–2009 (%)	
			1990	1995	2000	2005	2007	2008	2009		
Annex A sources	CO <sub>2</sub>	62 767.12	62 767.12	44 831.44	41 210.44	41 496.67	38 966.22	39 092.04	35 049.60	-44.2	
	CH <sub>4</sub>	4 814.37	4 814.37	4 276.20	4 446.03	4 591.69	4 555.63	4 696.14	4 351.35	-9.6	
	N <sub>2</sub> O	6 294.48	6 294.48	4 068.22	3 521.88	3 815.43	4 040.81	4 087.91	3 655.38	-41.9	
	HFCs	NA, NO	NA, NO	22.15	75.60	172.35	227.00	264.44	299.62	NA	
	PFCs	271.37	271.37	114.32	11.65	20.25	24.88	36.16	17.76	-93.5	
	SF <sub>6</sub>	0.03	0.03	9.91	13.25	16.61	17.44	18.51	19.39	63 275.0	
KP-LULUCF	Article 3.3 <sup>c</sup>	CO <sub>2</sub>						-272.29	-189.12		
		CH <sub>4</sub>						NA	NA		
		N <sub>2</sub> O						NA	NA		
	Article 3.4 <sup>d</sup>	CO <sub>2</sub>	NA						NA	NA	NA
		CH <sub>4</sub>	NA						NA	NA	NA
		N <sub>2</sub> O	NA						NA	NA	NA

*Abbreviations:* KP-LULUCF = land use, land-use change and forestry emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, NA = not applicable, NO = not occurring.

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

<sup>b</sup> The table does not reflect the adjusted estimates for a number of categories in the energy and industrial processes sectors (see section II.G below) after adjustment procedures under decision 20/CMP.1 were applied. It reflects the estimates contained in the submission of 12 October 2011 that was subject to these adjustments. The adjustments lead to an increase in total GHG emissions for 2008 of 396.00 Gg CO<sub>2</sub> eq and for 2009 of 349.89 Gg CO<sub>2</sub> eq.

<sup>c</sup> Activities under Article 3, paragraph 3, of the Kyoto Protocol, namely afforestation and reforestation, and deforestation. Only the inventory years of the commitment period must be reported.

<sup>d</sup> Elected activities under Article 3, paragraph 4, of the Kyoto Protocol, including forest management, cropland management, grazing land management and revegetation. For cropland management, grazing land management and revegetation, the base year and the inventory years of the commitment period must be reported.

Table 2

**Greenhouse gas emissions by sector and activity, base year to 2009<sup>a, b, c</sup>**

	Sector	Base year <sup>d</sup>	Gg CO <sub>2</sub> eq							Change Base year–2009 (%)
			1990	1995	2000	2005	2007	2008	2009	
Annex A	Energy	55 313.90	55 313.90	38 392.68	34 097.42	33 157.24	30 570.73	31 327.71	28 661.34	–48.2
	Industrial processes	10 530.85	10 530.85	9 297.37	9 880.01	11 228.70	11 468.91	11 182.73	9 389.33	–10.8
	Solvent and other product use	147.15	147.15	121.53	85.04	171.54	166.25	166.59	164.38	11.7
	Agriculture	7 064.14	7 064.14	4 277.96	3 441.39	3 213.16	3 267.68	3 152.56	3 018.59	–57.3
	Waste	1 091.33	1 091.33	1 232.71	1 774.99	2 342.36	2 358.42	2 365.62	2 159.46	97.9
	LULUCF	NA	–2 954.62	–3 345.72	–3 071.36	–1 429.59	–3 959.40	–3 176.16	–3 449.01	NA
<b>Total (with LULUCF)</b>		<b>NA</b>	<b>71 192.76</b>	<b>49 976.52</b>	<b>46 207.49</b>	<b>48 683.41</b>	<b>43 872.60</b>	<b>45 019.05</b>	<b>39 944.09</b>	<b>NA</b>
<b>Total (without LULUCF)</b>		<b>74 147.38</b>	<b>74 147.38</b>	<b>53 322.24</b>	<b>49 278.85</b>	<b>50 113.00</b>	<b>47 831.99</b>	<b>48 195.21</b>	<b>43 393.10</b>	<b>–41.5</b>
Other <sup>c</sup>		NA	NA	NA	NA	NA	NA	NA	NA	NA
KP-LULUCF	Article 3.3 <sup>d</sup>	Afforestation and reforestation						–453.04	–469.23	
		Deforestation						180.74	280.11	
		<b>Total (3.3)</b>						<b>–272.29</b>	<b>–189.12</b>	
	Article 3.4 <sup>e</sup>	Forest management						NA	NA	
		Cropland management	NA					NA	NA	NA
		Grazing land management	NA					NA	NA	NA
		Revegetation	NA					NA	NA	NA
		<b>Total (3.4)</b>	<b>NA</b>					<b>NA</b>	<b>NA</b>	<b>NA</b>

*Abbreviations:* LULUCF = land use, land-use change and forestry, KP-LULUCF = LULUCF emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, NA = not applicable.

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

<sup>b</sup> The table does not reflect the adjusted estimates for a number of categories in the energy and industrial processes sectors (see section II.G below) after adjustment procedures under decision 20/CMP.1 were applied. It reflects the estimates contained in the submission of 12 October 2011 that was subject to these adjustments. The adjustments lead to an increase in total GHG emissions for 2008 of 396.00 Gg CO<sub>2</sub> eq and for 2009 of 349.89 Gg CO<sub>2</sub> eq.

<sup>c</sup> Emissions/removals reported in the sector other (sector 7) are not included in Annex A of the Kyoto Protocol and are therefore not included in the national totals.

<sup>d</sup> Activities under Article 3, paragraph 3, of the Kyoto Protocol, namely afforestation and reforestation, and deforestation. Only the inventory years of the commitment period must be reported.

<sup>e</sup> Elected activities under Article 3, paragraph 4, of the Kyoto Protocol, including forest management, cropland management, grazing land management and revegetation. For cropland management, grazing land management and revegetation, the base year and the inventory years of the commitment period must be reported.

Table 3  
Information to be included in the compilation and accounting database in t CO<sub>2</sub> eq for 2009

	<i>As reported</i>	<i>Revised estimates</i>	<i>Adjustment<sup>a</sup></i>	<i>Final<sup>b</sup></i>	<i>Accounting quantity<sup>c</sup></i>
<b>Commitment period reserve</b>	217 130 347	216 965 494		218 714 925	
<b>Annex A emissions</b>					
CO <sub>2</sub>	35 086 916	35 049 602	79 399	35 129 001	
CH <sub>4</sub>	4 349 234	4 351 352	1 175	4 352 527	
N <sub>2</sub> O	3 653 164	3 655 376	223 283	3 878 660	
HFCs	299 606	299 619	41 661	341 281	
PFCs	17 761	17 761	3 348	21 109	
SF <sub>6</sub>	19 388	19 388	1 020	20 408	
<b>Total Annex A sources</b>	<b>43 426 069</b>	<b>43 393 099</b>	<b>349 886</b>	<b>43 742 985</b>	
<b>Activities under Article 3, paragraph 3, for current inventory year</b>					
3.3 Afforestation and reforestation on non-harvested land for current year of commitment period as reported	-469 229			-469 229	
3.3 Afforestation and reforestation on harvested land for current year of commitment period as reported	NA			NA	
3.3 Deforestation for current year of commitment period as reported	280 105			280 105	
<b>Activities under Article 3, paragraph 4, for current inventory year<sup>d</sup></b>					
3.4 Forest management for current year of commitment period					
3.4 Cropland management for current year of commitment period					
3.4 Cropland management for base year					
3.4 Grazing land management for current year of commitment period					
3.4 Grazing land management for base year					
3.4 Revegetation for current year of commitment period					
3.4 Revegetation for base year					

*Abbreviation:* NA = not applicable.

<sup>a</sup> "Adjustment" is relevant only for Parties for which the expert review team has calculated one or more adjustment(s).

<sup>b</sup> "Final" includes revised estimates, if any, and/or adjustments, if any.

<sup>c</sup> "Accounting quantity" is included in this table only for Parties that chose annual accounting for activities under Article 3, paragraph 3, and elected activities under Article 3, paragraph 4, if any.

<sup>d</sup> Activities under Article 3, paragraph 4, are relevant only for Parties that elected one of these activities.

Table 4  
**Information to be included in the compilation and accounting database in t CO<sub>2</sub> eq for 2008**

	<i>As reported</i>	<i>Revised estimates</i>	<i>Adjustment<sup>a</sup></i>	<i>Final<sup>b</sup></i>	<i>Accounting quantity<sup>c</sup></i>
<b>Annex A emissions</b>					
CO <sub>2</sub>	39 096 297	39 092 039	109 200	39 201 239	
CH <sub>4</sub>	4 692 928	4 696 143	1 269	4 697 412	
N <sub>2</sub> O	4 079 645	4 087 912	239 553	4 327 465	
HFCs	264 431	264 445	41 614	306 059	
PFCs	36 162	36 162	3 344	39 506	
SF <sub>6</sub>	18 511	18 511	1 019	19 530	
<b>Total Annex A sources</b>	<b>48 187 973</b>	<b>48 195 211</b>	<b>395 999</b>	<b>48 591 210</b>	
<b>Activities under Article 3, paragraph 3, for current inventory year</b>					
3.3 Afforestation and reforestation on non-harvested land for 2008 as reported		-453 035		-453 035	
3.3 Afforestation and reforestation on harvested land for 2008 as reported		NA		NA	
3.3 Deforestation for 2008 as reported		180 745		180 745	
<b>Activities under Article 3, paragraph 4, for current inventory year<sup>d</sup></b>					
3.4 Forest management for 2008					
3.4 Cropland management for 2008					
3.4 Cropland management for base year					
3.4 Grazing land management for 2008					
3.4 Grazing land management for base year					
3.4 Revegetation for 2008					
3.4 Revegetation for base year					

*Abbreviation:* NA = not applicable.

<sup>a</sup> "Adjustment" is relevant only for Parties for which the expert review team has calculated one or more adjustment(s).

<sup>b</sup> "Final" includes revised estimates, if any, and/or adjustments, if any.

<sup>c</sup> "Accounting quantity" is included in this table only for Parties that chose annual accounting for activities under Article 3, paragraph 3, and elected activities under Article 3, paragraph 4, if any.

<sup>d</sup> Activities under Article 3, paragraph 4, are relevant only for Parties that elected one of these activities.

6. The Party's GHG inventory is generally in line with the Intergovernmental Panel on Climate Change (IPCC) *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories* (hereinafter referred to as the Revised 1996 IPCC Guidelines), the 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). However, the expert review team (ERT) noted that Slovakia's reporting of CH<sub>4</sub> and N<sub>2</sub>O emissions from road transportation (all fuels) lacks transparency; in particular, the information provided in the national inventory report (NIR) does not allow the ERT to assess the validity of the decrease in CH<sub>4</sub> and N<sub>2</sub>O emissions resulting from the use of lower emission factors (EFs) as compared with the

previous annual submission. The 2011 inventory submission is complete in terms of sectors, gases, years and geographical coverage and covers most of the categories. However, the ERT noted that the following emissions have been reported as not occurring (“NO”): N<sub>2</sub>O emissions from gaseous fuels used in road transportation; CO<sub>2</sub> emissions from coal mining and handling; and HFC, PFC and SF<sub>6</sub> emissions from foam blowing, fire extinguishers, aerosols/metered dose inhalers and solvents under the category consumption of halocarbons and SF<sub>6</sub>. During the review, the ERT considered that some of these emissions are likely to occur in the country and recommended that Slovakia revise its assumptions and report emissions from these categories or provide substantial explanations for the non-occurrence of these emissions (see para. 20 below). The ERT also noted that, for the key category forest land remaining forest land, the carbon stock changes in the dead organic matter (DOM) and mineral soils pools have been reported as “NO”.

7. In addition, the ERT noted that Slovakia is not ensuring the full harmonization between the activity data (AD) used in the national GHG inventory and the national statistical data, including data sets submitted in accordance with its other international obligations (e.g. reporting to the International Energy Agency (IEA), the statistical office of the European Union (Eurostat), the Food and Agriculture Organization of the United Nations (FAO) and others) (see paras. 21(e), 49, 51 and 222(a) below).

8. Slovakia acknowledged these and other findings at the time of the review, as expressed in a letter from Slovakia’s Minister of the Environment dated 26 October 2011, and informed the ERT about immediate measures to improve the capacity of the Slovak inventory team for the preparation of the 2012 annual submission (e.g. by contracting additional staff). Slovakia also submitted revised emission estimates on 12 October 2011 for some categories in response to the list of potential problems and further questions raised by the ERT during the review (see para. 6 above). In some cases, these revised estimates and provided explanations did not resolve the underestimates identified by the ERT (see paras. 151 and 172 below).

9. Slovakia has submitted supplementary information required under Article 7, paragraph 1, of the Kyoto Protocol in accordance with chapter I of the annex to decision 15/CMP.1.

10. Slovakia has chosen to account for activities under Article 3, paragraph 3, of the Kyoto Protocol at the end of the commitment period. Slovakia has not elected any activities under Article 3, paragraph 4, of the Kyoto Protocol. Slovakia has reported information on activities under Article 3, paragraph 3, of the Kyoto Protocol in accordance with decisions 15/CMP.1 and 6/CMP.3. However, Slovakia still needs to transparently demonstrate and document that the carbon stock changes in the litter carbon pool (reported as included elsewhere (“IE”)) are included in the calculations of the carbon stock changes in mineral soils for afforestation, reforestation, and deforestation (see paras. 199 and 205 below) and that the high carbon stock change factor per area for the net carbon stock changes in soils (2.7 Mg C/ha) for afforestation and reforestation activities is validated and adequately supported with background information (see para. 201 below). In its response to the list of potential problems and further questions raised by the ERT during the review, Slovakia provided adequate additional information supporting the assumptions made and approaches used. The ERT recommends that Slovakia include this information and enhance the transparency of the information related to these issues in the NIR of its next annual submission.

11. Slovakia has reported information on its accounting of Kyoto Protocol units in accordance with chapter I.E of the annex to decision 15/CMP.1, and has used the standard electronic format (SEF) tables as required by decision 14/CMP.1.

12. The national system generally performs its required functions as set out in the annex to decision 19/CMP.1. Although the improvements in the capacity of the national system are significant and reflected in the 2011 annual submission, the ERT noted that Slovakia's inventory system is vulnerable and does not appear to fully exercise the leadership and functions that are required of national systems in order to fully comply with the requirements of the "Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual inventories" (hereinafter referred to as the UNFCCC reporting guidelines). For example, the ERT identified that Slovakia's national system:

(a) Heavily relies on a number of individual contractors (external experts) and their personal networks of contacts for data acquisition for several sectors for the compilation of the inventory;

(b) Has not established clear communication channels with external experts with regard to the principles, purposes and procedures of the UNFCCC reporting guidelines and the review process, and does not ensure that these experts fully understand the formal requirements of these guidelines and the importance of the timely submission of their contributions, including the need to respond to questions and issues identified during the different stages of the review process;

(c) Does not always sufficiently specify the roles of, and cooperation between, government agencies and other entities where formal relationships and/or agreements exist with other institutions, in order to ensure a reliable data flow for the preparation of the inventory and the adequate availability of individual experts within these institutions (see paras. 21 and 40 below);

(d) Has not fully implemented all of the provisions of the Party's quality assurance/quality control (QA/QC plan), resulting in:

(i) A series of inconsistencies between the NIR and the CRF tables and in the textual and numerical content of the Party's responses to the list of potential problems and further questions raised by the ERT during the review;

(ii) A relatively large number of typographical and other mistakes in the NIR;

(iii) An unclear relationship between the AD used for the calculations and those used for the national statistics (e.g. fuel use data).

13. The national registry continues to perform the functions set out in the annex to decision 5/CMP.1 and the annex to decision 13/CMP.1, and continues to adhere to the technical standards for data exchange between registry systems in accordance with relevant decisions of the Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol (CMP).

14. Slovakia has reported information on the minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol, as requested in chapter I.H of the annex to decision 15/CMP.1, in its NIR.

15. In the course of the review, the ERT formulated a number of recommendations relating to the vulnerability of Slovakia's national system, the harmonization of the reporting of data between the inventory and other international reporting obligations, and the implementation of a fully functioning QA/QC system.

## II. Technical assessment of the annual submission

### A. Overview

#### 1. Annual submission and other sources of information

16. The Party's 2011 annual inventory submission was submitted on 15 April 2011; it contains a complete set of common reporting format (CRF) tables for the period 1990–2009 and an NIR. Slovakia resubmitted its NIR on 17 May 2011. Slovakia also submitted information required under Article 7, paragraph 1, of the Kyoto Protocol, including information on: activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, accounting of Kyoto Protocol units, changes in the national system and in the national registry, and the minimization of adverse impacts under Article 3, paragraph 14, of the Kyoto Protocol. The SEF tables were submitted on 15 April 2011. The annual submission was submitted in accordance with decision 15/CMP.1.

17. Slovakia officially submitted revised emission estimates on 12 October 2011 in response to the list of potential problems and further questions raised by the ERT during the review. The values used in this report are based on the values contained in the submission of 12 October 2011.

18. The ERT also used previous years' submissions during the review. In addition, the ERT used the standard independent assessment report (SIAR), parts I and II, to review information on the accounting of Kyoto Protocol units (including the SEF tables and their comparison report) and on the national registry.<sup>3</sup>

19. During the review, Slovakia provided the ERT with additional information. The documents concerned are not part of the annual submission. The full list of materials used during the review is provided in annex I to this report.

#### Completeness of inventory

20. The inventory covers most source and sink categories for the period 1990–2009 and is complete in terms of years, gases, sectors and geographical coverage. During the review, the ERT identified that N<sub>2</sub>O emissions from gaseous fuels used in road transportation, CO<sub>2</sub> emissions from coal mining and handling, and HFC, PFC and SF<sub>6</sub> emissions from foam blowing, fire extinguishers (with the exception of HFCs), aerosols/metered dose inhalers and solvents under the category consumption of halocarbons and SF<sub>6</sub> were reported as "NO", but the ERT considered that some of these categories are likely to occur in Slovakia. In addition, the ERT noted that N<sub>2</sub>O emissions from disturbance associated with land-use conversion to cropland and the carbon stock changes in dead organic matter and mineral soils were reported as "NO", although these emissions probably occur in the country. In response to the list of potential problems and further questions raised by the ERT during the review, Slovakia submitted estimates for N<sub>2</sub>O emissions from gaseous fuels used in road transportation. In addition, Slovakia revised its estimates of CO<sub>2</sub>, CH<sub>4</sub> and N<sub>2</sub>O emissions for all fuels under this category, but the Party did not provide clear justification for these emission estimates or supporting background information (see para. 152 below). Further,

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<sup>3</sup> The SIAR, parts I and II, is prepared by an independent assessor in line with decision 16/CP.10 (paras. 5(a), 6(c) and 6(k)), under the auspices of the international transaction log administrator using procedures agreed in the Registry System Administrators Forum. Part I is a completeness check of the submitted information relating to the accounting of Kyoto Protocol units (including the SEF tables and their comparison report) and to national registries. Part II contains a substantive assessment of the submitted information and identifies any potential problem regarding information on the accounting of Kyoto Protocol units and the national registry.

Slovakia provided estimates of HFC emissions from foam blowing; however, it did not consider all possible uses of closed-cell foams in the country and the corresponding fluorinated gases (F-gas) emissions, including those from decommissioning, thereby leading to a potential underestimation of emissions (see para. 171 below). For the other subcategories under consumption of halocarbons and SF<sub>6</sub>, the F-gas emissions were still reported as “NO”, without the provision of supporting background information or further explanations. Taking this into account and in accordance with the Article 8 review guidelines, the ERT decided to recommend adjustments for these categories (see paras. 170–174 below). With regard to CO<sub>2</sub> emissions from coal mining and handling, Slovakia provided sufficient information in its response to the ERT demonstrating that the volume of CO<sub>2</sub> in fugitive gases from mined coal is below the measurement threshold, thereby justifying the use of the notation key “NO”.

**2. A description of the institutional arrangements for inventory preparation, including the legal and procedural arrangements for inventory planning, preparation and management**

Overview

21. The ERT concluded that the national system did not continue to fully perform its required functions. Although the improvements in the capacity of the national system are significant and reflected in the 2011 annual submission, the ERT noted that Slovakia’s national system is vulnerable and does not appear to fully exercise the leadership and some of the specific functions that are required of national systems in accordance with the annex to decision 19/CMP.1, in order to fully comply with the requirements of the UNFCCC reporting guidelines. The ERT concluded that:

(a) The provisions of Slovakia’s QA/QC plan are not fully implemented or operational in such a way that careful QA/QC procedures, including independent checks of the resulting emission estimates, identify and resolve inconsistencies and errors (e.g. the ERT identified a number of errors during the review in almost all sectors of the inventory, including typographical mistakes and inconsistencies between the CRF tables and the NIR) prior to the submission of the inventory. The official approval of the inventory prior to its submission, as described in the NIR (page 10 and figure 1.3) did not lead to the detection and correction of these and other errors and inconsistencies (see paras. 12(d) above, and 27, 37, 38 and 52 below);

(b) Slovakia has not established, or has established weak, formal relationships and agreements between the institutions involved in the preparation of the inventory that specify the roles of, and cooperation between, government agencies and other entities to ensure a reliable data flow for the preparation of the inventory (see paras. 24 and 38 below);

(c) The inventory planning and preparation process relies heavily on a number of external experts and their personal networks of contacts for data acquisition for several sectors rather than on institutional expertise and cooperation between the institutions managing the national data sources;

(d) The procedures for clear communication channels with external experts with regard to the principles, purposes and procedures of the UNFCCC reporting guidelines and the review process, have not been established in order to ensure that these experts fully understand the formal requirements of these guidelines and the importance of the timely submission of their contributions, as the current expertise within the permanent staff of the national system is insufficient, for example to:

(i) Respond to questions and issues identified during the different stages of the review process;

- (ii) Ensure time-series consistency (both for the AD and for the EFs);
  - (iii) Clearly understand the QA/QC principles and tools, the use of notation keys and the importance of providing comments during previous stages of the inventory review process in time for the review week;
  - (e) The consistency or harmonization of the data used in the inventory calculations with national statistical data and data provided to other international organizations (e.g. Eurostat, FAO and IEA) is not ensured (see paras. 38 and 49 below);
  - (f) The limited resources available for inventory planning, preparation and management are not always directed towards the highest priorities. For example, Slovakia applies a very detailed tier 2 uncertainty analysis for some sectors, including fuel combustion categories, while the more important task of reconciling the national statistical data with the internationally reported data is not ensured (e.g. fuel use data).
22. Slovakia reported that there have been no changes to the national system since its previous annual submission.

#### Inventory planning

23. During the review week, Slovakia explained the national system for the preparation of the inventory. The Slovak Hydrometeorological Institute (SHMU), through its Department of Emissions, is the single national entity designated by the Ministry of the Environment (MoE) to provide environmental services, including the planning, preparation and management of the annual GHG inventory and its submission to the UNFCCC. It has overall responsibility for the national inventory and coordinates the national system. The NIR provides information on the specific responsibilities in the inventory development process, including those related to the choice of methods, data collection (particularly of AD and EFs) from the National Emission Information System (NEIS), statistical services and other sources, and the processing and archiving of data. The organizations and individuals involved in the preparation of the inventory are listed in table 1.2 of the NIR (including the expertise for each of the sectors or particular activities: energy, industrial processes, F-gases, agriculture, LULUCF and KP-LULUCF, and waste). These include Profing SRO, the Statistical Office of the Slovak Republic, the Centre for Transport Research and the National Forest Centre. External experts are also involved in the preparation of the inventory carrying out different tasks, such as the development of the uncertainty analysis, the emission estimates for the transport category, energy statistics, projections and the national registry and, in most cases, have multi-year contracts covering several annual submissions.

24. Although the national system appears to meet the requirements set out in the annex to decision 19/CMP.1 for inventory planning, in practice there appear to be a number of weaknesses and vulnerabilities in this area and in other areas of the national system. For example, Slovakia's national system did not ensure the availability of experts to fully participate and answer, in a timely manner, the questions raised by the ERT during the review week or during previous stages of the inventory review process (e.g. the ERT received the Party's completed comments to the part II of the Synthesis and Assessment report and information on the national system and QA/QC plan no earlier than on the Friday morning of the review week, shortly before the ERT's presentation of its preliminary findings). Some experts were not available during certain periods of the review week and most of the external experts were not present during the ERT's presentation of its review findings on the Friday afternoon at the end of the review week. The Party did not provide any evidence to demonstrate a careful prioritization of some parts of the inventory planning and preparation processes (e.g. the follow-up to the recommendations of previous review reports and the performance and use of a tier 2 uncertainty analysis).

25. During the review, the ERT recommended that Slovakia provide the ERT with evidence of a formal nature and endorsed by the Slovak authorities that its national system will implement the necessary corrective actions to its institutional arrangements, inventory planning and preparation processes and QC procedures as described in its QA/QC plan in accordance with the IPCC good practice guidance and the requirements for national systems set out in the annex to decision 19/CMP.1, which will allow the Party to resolve the issues mentioned in paragraphs 21 and 24 above prior to the 2012 annual submission. This evidence could include a plan of action with measures taken, expected results in relation to the above-mentioned issues and concrete deadlines for the delivery of results. In addition, the ERT considered it appropriate that the Party provide, for each of the measures described in the action plan, a clear statement that the national system will have the necessary resources available for its implementation within the specified deadlines.

26. In its response to the list of potential problems and further questions raised by the ERT during the review, Slovakia provided extensive information on and explanations of the actions taken and to be undertaken in order to address the identified issues, including a proposed plan of activities in tabular format and a letter from the Minister of the Environment indicating that most of the proposed measures will be incorporated in the 2012 Annual Plan of Actions of the Ministry of the Environment and SHMU and the Slovak Environmental Agency, while the remaining measures will be carried out using structural funds from the European Union (EU).

27. The ERT is aware that Slovakia has made efforts to improve the capacity of its national system by increasing the available financial and human resources for the inventory preparation process and it believes that these will indeed improve some aspects of Slovakia's national system (e.g. the involvement of a deputy expert in each sector that will provide the sectoral experts with additional time for the performance of QC activities) and might also facilitate Slovakia's responses at all stages of the inventory review process. However, the ERT has no evidence that Slovakia will be able to enhance its QC activities at the integrated level in time for the 2012 annual submission. For instance, the responses from Slovakia to the list of potential problems and further questions raised by the ERT during the review, including the revised CRF tables for the energy and industrial processes sectors, showed that inconsistencies occurred again (see para. 153 below). Apparently, no responsible expert involved in the compilation of Slovakia's response to the ERT (e.g. energy experts, SHMU and MoE) noticed such inconsistencies or carried out QC checks prior to the official submission.

28. The ERT noted that Slovakia's response to the list of potential problems and further questions was not always adequate. Although the information provided did relate to the identified potential problems, the responses were rather lengthy and neither focused on the problems nor fully answered the questions, for example:

(a) Rather than providing an improvement plan with clear objectives, a time schedule and the necessary resources, as recommended by the ERT, Slovakia explained in detail why some of the observations made by the ERT occurred;

(b) In its response to the ERT's observation of the apparent inconsistency between the data used in the sectoral approach and the energy demand statistics in Slovakia's national energy balance, the Party tried to explain the differences between its sectoral approach and reference approach estimates. The main issue raised by the ERT regarding the lack of agreement between the AD in the inventory and the official national energy statistics was not addressed;

(c) In response to the ERT's request for an explanation as to why the CH<sub>4</sub> and N<sub>2</sub>O EFs used for the emission estimates for road transportation using the COPERT IV

model were updated (with lower values), the Party did not provide an explanation, but revised the emission estimates for all gases in this category (see para. 152 below).

29. The ERT also noted that Slovakia is taking further steps to enhance cooperation between government agencies and other entities involved in the preparation of the inventory, as well as the related institutional arrangements. This is particularly important for the energy sector and for the data flows related to the emission estimates; however, the ERT noted that this information was provided as an additional response following a request by the ERT for additional clarifying information on Slovakia's response to the list of potential problems and further questions. There is no information on when the special inter-ministerial committee for the coordination of climate change policy mentioned in the response will begin its work and if its functions will be in place and working effectively in time for the next annual submission, in particular regarding the data flows for the emission estimates for the energy and industrial processes sectors.

30. The ERT noted that Slovakia plans to obtain an International Organization for Standardization (ISO) 9001 certificate of quality for the national system; however, the ERT did not understand why this measure is necessary since SHMU's quality management system already has an ISO 9001 certificate (annex 7 to the NIR) and a model of QA/QC activities for the inventory preparation process (figure 1.3 of the NIR). Since SHMU, as the coordinator of the national system and the entity responsible for national inventory planning, preparation and management, has an ISO certificate of quality, the ERT considers that the system itself should be robust. If the system functions well, the QC issues should be easily addressed through established procedures. Therefore, Slovakia needs to review and reassess its national system in order to ensure that the system functions appropriately and enhance it with appropriate measures and procedures (e.g. clarifying the role and responsibilities of the quality manager for the national system and preparing and using QC checklists during the inventory preparation process would enhance the QC activities and result in tangible improvements in the quality of the inventory). Therefore, the ERT considers that Slovakia is allocating resources to measures which may not prove to be effective in addressing the related issues.

31. The ERT, after carefully assessing the information provided by the Party, concluded that Slovakia did not provide evidence that it will have the required resources to implement all the necessary actions to overcome the vulnerability and weaknesses of the national system identified by the ERT and to resolve all the problems identified in this review report prior to the Party's 2012 annual submission. The ERT also has no evidence that the measures taken by Slovakia after the review will ensure that the Party's national system will be ready to perform all its functions on time and as required by the annex to decision 19/CMP.1 for its next annual submission. Therefore, the ERT concluded that the national system of Slovakia does not fully perform its functions in accordance with paragraph 12 (c–e), paragraph 14(c) and (g) and paragraph 16(b) and (c) of the annex to decision 19/CMP.1.

#### Inventory preparation

##### *Key categories*

32. Slovakia has reported a key category tier 1 analysis, both level and trend assessments, as part of its 2011 annual submission. The key category analysis performed by

Slovakia and that performed by the secretariat<sup>4</sup> produced similar results. Slovakia has included the LULUCF sector in its key category analysis, which was performed in accordance with the IPCC good practice guidance and the IPCC good practice guidance for LULUCF. Slovakia has identified afforestation, reforestation and deforestation as key categories by the level assessment for activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol. The ERT encourages Slovakia to use its uncertainty assessment to perform a tier 2 key category analysis in its next annual submission. Slovakia does not report on how it uses the key category analysis to prioritize the development and improvement of the inventory. The ERT recommends that Slovakia provide a description of how the key category analysis is used to prioritize inventory improvements in future annual submissions.

#### *Uncertainties*

33. Slovakia has reported a tier 1 uncertainty analysis following the IPCC good practice guidance and has included the LULUCF sector in its analysis. The results of this analysis for 2009 show a 13.8 per cent level uncertainty and 8.2 per cent trend uncertainty for the whole inventory. For some categories (e.g. in the energy (fuel combustion), waste (solid waste disposal on land), industrial processes and solvent and other product use sectors) a tier 2 (Monte Carlo) method was used for the uncertainty estimates and the uncertainty parameters were derived from expert judgement and IPCC default values, however it is not completely clear in which cases one was used or another. For other categories, Slovakia used default uncertainty ranges from the IPCC good practice guidance.

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

34. The ERT noted that the recalculations reported by the Slovakia of the time series 1990–2008 have been undertaken to take into account updated or revised methodologies (e.g. use of COPERT IV version 7.1 for road transportation) or updated statistical information (e.g. input data for the industrial processes sector). The recalculations were not always performed for the full time series, leading to possible time-series inconsistencies. The ERT noted that no explanations for the recalculations are provided in CRF table 8(b). The ERT reiterates the recommendation of the previous review report that Slovakia explain all the recalculations in the CRF table 8(b) by including information on the rationale for changes to the inventory estimates.

35. The recalculations for the LULUCF sector were performed for the entire time series (1990–2008). All LULUCF categories were recalculated following the revision of land-use areas and their changes. The application of new biomass conversion and expansion factors allowed the recalculation of estimates for the land-use categories related to the conversion of lands to forest land. Other recalculations were performed following the inclusion of emissions from the dead wood component in the DOM pool and the updating of the AD for the application of agricultural lime. These recalculations affected all of the subcategories related to the conversion of forest land to other land uses, including forest land converted to cropland, grassland, settlements and other land. The recalculations resulted in an increase in net removals of 566.13 Gg CO<sub>2</sub> eq (23.7 per cent) for 1990 and an increase of 1,099.80 Gg CO<sub>2</sub> eq (53.0 per cent) for 2008.

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<sup>4</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 LULUCF. 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 or period. Where the Party performed a key category analysis, the key categories presented in this report follow the Party's analysis. However, they are presented at the level of aggregation corresponding to a tier 1 key category assessment conducted by the secretariat.

36. The recalculations in the 2011 annual submission resulted in a decrease in total GHG emissions (including LULUCF) of 342.81 Gg CO<sub>2</sub> eq (0.5 per cent) and an increase in total GHG emissions (excluding LULUCF) of 223.32 Gg CO<sub>2</sub> eq (0.3 per cent) for 1990 compared with the 2010 submission. For 2008, the recalculations resulted in a decrease in total GHG emissions (including LULUCF) of 1,910.83 Gg CO<sub>2</sub> eq (4.1 per cent) and a decrease in total GHG emissions (excluding LULUCF) of 811.04 Gg CO<sub>2</sub> eq (1.7 per cent) compared to the previous annual submission.

*Verification and quality assurance/quality control approaches*

37. Slovakia has provided information on its QA/QC procedures in line with the UNFCCC reporting guidelines. The Party has an elaborated QA/QC plan in place in accordance with decision 19/CMP.1 and the IPCC good practice guidance. Slovakia's sector-specific QC activities are described in the individual sections of the NIR. However, the ERT noted that not all of the steps and procedures defined in the plan were effectively performed, fully implemented or operational in such a way that careful QA/QC procedures, including independent checks of the resulting emission estimates, were carried out for the 2011 annual submission. For example, the consistency between the CRF tables and the NIR was not checked and many typographical and other errors were detected by the ERT in Slovakia's 2011 annual submission. The ERT reiterates the recommendation from previous review reports that Slovakia enhance and implement its QA/QC procedures for all sectors, including independent checks of the resulting emission estimates, prior to the submission of the inventory, with the objective of avoiding errors, typographical mistakes and omissions in its next annual submission.

38. In Slovakia, there are several data sources available for estimating the emissions for the GHG inventory: NEIS; reports from the European Union emissions trading scheme (EU ETS); data from the Statistical Office of the Slovak Republic; and questionnaires given to industries. The use of data sets from different sources is useful for verification purposes. However, the ERT concluded that these data sets are not used for verification and QA/QC procedures. Moreover, the ERT identified some mistakes and omissions in the CRF tables and emission estimates in the 2011 annual submission which could have been detected either by QC or QA procedures or by comparing different data sets as a verification tool. Therefore, the ERT reiterates the recommendation of previous review reports that Slovakia improve and further develop its QA/QC procedures, including category-specific QC activities and verification procedures (e.g. for the energy and industrial processes sectors) and increase the involvement of experts who are not involved in the preparation of the national GHG inventory.

*Transparency*

39. Slovakia's 2011 annual submission is generally transparent. The NIR provides most of the required information on the national system, key categories, QA/QC procedures, uncertainty assessment, methodologies, AD and EFs for most categories. The ERT noted that the NIR is structured in accordance with the outline of the NIR provided in the UNFCCC reporting guidelines and the suggested annotated NIR. Although the ERT identified a number of issues and problems in Slovakia's 2011 annual submission, these could, in many cases, be relatively easily analysed and assessed due to the transparent reporting and explanations provided in the NIR, however in other cases, the lack of transparency prevented the ERT to make an assessment of such issues. The sectoral chapters below provide examples of such issues (e.g. a comparison of the sectoral approach and the reference approach for fuel combustion, and updated EFs using the COPERT IV model).

### Inventory management

40. Slovakia has a centralized archiving system at the Department of Emissions of SHMU, which includes the archiving of disaggregated EFs and AD, and documentation on how these factors and data have been generated and aggregated for the preparation of the inventory. However, in one case concerning the waste sector (see para. 126 below), the ERT observed that the information used by the external expert was not archived at SHMU. The archived information also includes internal documentation on QA/QC procedures, external and internal reviews and documentation on annual key categories and key category identification and planned inventory improvements. During the review, however, the individual responsible for the archive was not easily available to allow the ERT access to the archives. Further, during the visit to the archive, it was not possible to access the data from the NEIS database, which constitutes one of the most important sources of data for the compilation of the inventory, and some of the information requested by the ERT could not be produced from this database during the review. The ERT recommends that Slovakia ensure that for all functions, including access to the archives, a replacement is ensured when specific individuals within the inventory team are not available and examine the implementation of its archiving system, in order to ensure that all data are correctly archived and accessible to the ERT in accordance with the requirements for national systems set out in the annex to decision 19/CMP.1.

### **3. Follow-up to previous reviews**

41. The ERT commends Slovakia for the considerable improvements in its reporting of the LULUCF sector. All of the recommendations from previous review reports have been implemented and the reporting of this sector is now transparent and fully consistent with the UNFCCC reporting guidelines.

42. The ERT noted that the recommendations from previous review reports regarding all other sectors have, in many cases, not been implemented. Examples of these are provided in the sectoral chapters below, particularly where they reflect the weaknesses of Slovakia's national system (see paras. 24, 38, 39 above and paras. 49, 50, 52, 57, 66, 67, 72, 81, 83, 85, 86, 90, 127 and 131 below).

### **4. Areas for further improvement**

#### Identified by the Party

43. The 2011 NIR identifies areas for improvement in many specific source and sink categories; these are reported in detail in the sectoral chapters of the NIR. The ERT recommends that Slovakia include a summary of these improvements in chapter 10 of the NIR of its next annual submission and a mechanism in the NIR that prioritizes actions among the inventory improvements. Slovakia indicated that it is working to implement the following improvements:

- (a) The reallocation of blast furnace gas and coke oven gas from gaseous fuels to solid fuels;
- (b) The revision of the CH<sub>4</sub> and N<sub>2</sub>O EFs for stationary combustion;
- (c) The implementation of a tier 2 methodology for civil aviation taking into account the fuel sold and number of movements with a differentiation between national and international flights;
- (d) The comparison of the national net calorific values (NCVs) for liquid fuels with the values newly published by Eurostat;

- (e) The provision of detailed information in the CRF tables for the category consumption of halocarbons and SF<sub>6</sub>;
- (f) The recalculation of the emission estimates for sheep for years before 2004 based on existing regional data for recent years;
- (g) The implementation of a tier 2 methodology and national N excretion values for N<sub>2</sub>O emission estimates from manure management;
- (h) The recalculation of direct N<sub>2</sub>O emissions from soils according to new research knowledge in agro-climatic regionalization in Slovakia;
- (i) The derivation of new annual biomass increments for all tree species, the more accurate estimation of the soil carbon stock data for forest soils and the improvement of the estimation of the DOM carbon pools for forest land;
- (j) The implementation of a research project to be carried out by the National Forest Centre (NFC) on the characteristics of dead wood as an important part of forest ecosystems in Slovakia;
- (k) The more accurate estimation of the soil carbon stocks and the improvement of the estimation of the DOM pool for cropland;
- (l) The more accurate estimation of the soil carbon stocks for grassland;
- (m) The re-evaluation of the soil carbon stocks, which are currently overestimated for other land;
- (n) The review of the country-specific degradable organic carbon (DOC) value for municipal solid waste disposal sites and industrial solid waste disposal sites to reflect the decrease in the biogenic fractions of waste;
- (o) The completion of the ongoing development of an integrated database on the AD and EFs used in the inventory for the waste sector;
- (p) The review of the data on the national population for the 2012 annual submission using the results from the publication of the 2011 national population census;
- (q) The review of the AD on solid waste to address outlying data and their replacement through the interpolation/extrapolation of existing data in accordance with observed trends in the European Waste Classification (EWC) since 2002.

Identified by the expert review team

44. During the review, the ERT identified cross-cutting issues for improvement. These are listed in paragraph 230 below.

45. Recommended improvements relating to specific categories are presented in the relevant sector chapters of this report.

## **B. Energy**

### **1. Sector overview**

46. The energy sector is the main sector in the GHG inventory of Slovakia. In 2009, emissions from the energy sector amounted to 28,661.34 Gg CO<sub>2</sub> eq, or 66.1 per cent of total GHG emissions. Since 1990, emissions have decreased by 48.2 per cent. The key drivers for the fall in emissions are the decrease in economic activity and the subsequent decrease in fuel consumption due to the economic and political transition to a market economy that occurred in the country in the early 1990s, and Slovakia's domestic policy

actions to reduce emissions by decreasing the share of solid fuels in the total energy mix in recent years. The share of CO<sub>2</sub> emissions from solid fuels has fallen significantly from 54.7 per cent in 1990 to 27.0 per cent in 2009 with a corresponding increase in the share of CO<sub>2</sub> emissions from gaseous fuels from 24.4 per cent in 1990 to 40.6 per cent in 2009. Within the sector, 34.4 per cent of the emissions were from energy industries, followed by 22.1 per cent from manufacturing industries and construction, 21.5 per cent from transport, 14.5 per cent from other sectors and 3.4 per cent from the category other. The remaining 4.0 per cent were from fugitive emissions from fuels.

47. The CRF tables of the 2011 annual submission include emission estimates for all categories, gases and fuels used in the energy sector, and are complete in terms of years and geographical coverage, as recommended by the Revised 1996 IPCC Guidelines. However, during the review, the ERT noted that Slovakia reported N<sub>2</sub>O emissions from gaseous fuels used in road transportation as “NO”, even though it does report the AD and corresponding CO<sub>2</sub> and CH<sub>4</sub> emissions for this category in the CRF tables. In addition, CO<sub>2</sub> emissions from coal mining and handling were also reported as “NO”. In response to the list of potential problems and further questions raised by the ERT during the review, Slovakia submitted estimates of N<sub>2</sub>O emissions from gaseous fuels used in road transportation covering the years 2000–2009 (see para. 60 below), and provided sufficient information demonstrating that the volume of CO<sub>2</sub> in fugitive gases from mined coal is below the measurement threshold, thereby justifying the use of the notation key “NO” (see para. 61 below). The ERT recommends that Slovakia improve its QC checks and procedures regarding the collection of AD in order to ensure that all non-CO<sub>2</sub> combustion emissions are reported in its next annual submission.

48. The ERT identified some inconsistencies between the information provided in the NIR and in the CRF tables. For example, in the original submission, the NIR indicated that the total GHG emissions from fuel combustion in 2009 amounted to 27,545.65 Gg CO<sub>2</sub> eq, while the CRF tables reported emissions of 27,545.59 Gg CO<sub>2</sub> eq; also, N<sub>2</sub>O emissions from flaring of oil and natural gas were reported in the CRF tables, but not in the NIR. The ERT reiterates the recommendation from the previous review report that Slovakia implement the appropriate QA/QC procedures, particularly the QA procedures involving experts from collaborating institutions involved in the national system to provide a peer review of the inventory data in order to correct these inconsistencies in its next annual submission.

49. Slovakia estimated the GHG emissions from stationary combustion using data collected in the NEIS database. The NIR states that the data on total fuel use from the NEIS database correspond with the national statistics; however, a comparison of the data has not been included in the NIR. In addition, during the review, the ERT noted that the aggregated AD collected in the NEIS database were not compared with the data available in the national energy consumption statistics of the Statistical Office of the Slovak Republic and those reported to international organizations, as recommended by the IPCC good practice guidance (page 2.16). The involvement of energy statisticians from the Statistical Office of the Slovak Republic was not evident during the review, although large and systematic differences between the sectoral and reference approach estimates of the emissions from fuel combustion did occur (see the IPCC good practice guidance, page 2.9). Due to this missing link between the data providers and data sources, Slovakia was not able to show that the fuel use data from the NEIS database cover all fuel uses in the country for all fuels and all subcategories within the fuel combustion categories. The ERT recommends that Slovakia implement clear actions towards the harmonization of official statistical data and other national data sets, in order to ensure that the emissions from the energy sector estimated using the sectoral approach and the fuel use data from the NEIS database are consistent with the emissions estimated from the national energy supply balance and/or data reported to international organizations. In addition, the ERT reiterates the recommendation

from the previous review report that Slovakia include a table presenting a comparison by fuel type of the data on fuel consumption from the NEIS database and from the national statistics in the NIR of its next annual submission. Further, Slovakia has not provided relevant information on or an explanation of the national energy balance in the NIR. The ERT also recommends that Slovakia provide a brief summary of the national energy balance in the NIR, possibly as an annex 4, in accordance with the structure of the NIR outlined in the UNFCCC reporting guidelines, in order to assist future ERTs to understand AD and corresponding emission estimates from primary sources of information. The ERT suggests that Slovakia consider summarizing the energy balance table for publication in the NIR by aggregating some of the energy subcategories according to the classification reported in the CRF tables.

## 2. Reference and sectoral approaches

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

50. Emissions of CO<sub>2</sub> from fuel combustion were calculated using the reference approach and the sectoral approach. For 2009, there is a difference of 19.37 per cent between the CO<sub>2</sub> emission estimates and 12.31 per cent between the total fuel consumption estimates calculated using these two approaches; the higher estimates were calculated using the reference approach. The differences in CO<sub>2</sub> emissions from liquid, solid, gaseous and other fuels are -16.34 per cent, +106.37 per cent, -9.70 per cent and -100.00 per cent, respectively. During the review, host country experts informed the ERT that the difference in 2009 changes to 0.74 per cent for CO<sub>2</sub> emissions if part of the fuel use (coking coal and natural gas) from iron and steel in the energy sector is reallocated to the industrial processes sector. The NIR explains that the differences in fuel consumption between these two approaches could be caused by the fact that a weighted average of NCVs was used in the reference approach and fuel-specific NCVs were used in the sectoral approach. Further, in response to the list of potential problems and further questions raised by the ERT during the review, Slovakia explained that inconsistencies occurring between the reference approach and the sectoral approach reflect the difference in the final methodological approaches used for the sectoral and reference approach estimates and the allocation of fuels between the energy and industrial processes sectors. The ERT recommends that Slovakia work closely with the Statistical Office of the Slovak Republic, examine and reduce these significant discrepancies, possibly implementing clear actions towards the harmonization of data and ensuring that the NEIS data coverage is fully consistent with the national energy statistics, and provide adequate and complete explanations in the NIR of its next annual submission.

51. During the review, the ERT noted that the growth rate for the period 1990–2009 for the total apparent consumption is -37.1 per cent in the CRF tables and -33.2 per cent according to the IEA data. Also, the ERT noted that there is a difference of 1.3 per cent in the total apparent consumption between the CRF tables and the IEA data. However, Slovakia was not able to provide a detailed discussion and analysis of the discrepancies between the figures reported in the CRF tables and the IEA data during the review. In response to the list of potential problems and further questions raised by the ERT during the review, Slovakia provided the results of a direct comparison of the IEA data with the energy balance of the Statistical Office of the Slovak Republic for 2008 and 2009 and the revised CRF tables. The ERT considered the response by the Party and identified, for example, that there is no explanation for the significant difference in coke oven gas in the apparent consumption between the CRF table value (133 kt for 2008), the energy balance value (1,715 kt for 2008) and the IEA data (1,715 kt for 2008). Slovakia stated that there are no differences between the IEA data, the data from the Statistical Office of the Slovak Republic and the reported reference approach for solid fuels in natural units for 2008 and 2009. In addition, Slovakia identified some differences in liquid and gaseous fuels,

provided some explanations for those differences and informed the ERT that, for its next annual submission, a revised estimation of the emissions for 2009 using the sectoral approach is in preparation. The methodology will be revised and the estimates will be based on the same data (fuel consumption, NCVs, oxidation factors and EFs) as those used in the 2011 annual submission, but with a different allocation and by minimizing the risk of double counting. Nevertheless, the ERT noted that Slovakia did not explain how it allocates data from the Statistical Office of the Slovak Republic used for the reference approach in the CRF tables, and how it ensures that the reported reference approach data are fully consistent with the national energy statistics. The ERT recommends that Slovakia examine and minimize any discrepancies regarding the apparent consumption data reported in its inventory to the UNFCCC, the data from the energy balance of the Statistical Office of the Slovak Republic and the data reported to IEA in its next annual submission.

#### *International bunker fuels*

52. Despite recommendations made in the previous review report, Slovakia has not provided in the NIR information on or an explanation of the basis of the expert judgement used for the emission estimates for aviation bunkers. The expert judgement used for the estimation of fuel consumption for 2009 indicates that 95 per cent of the jet kerosene sold at airports is used for international aviation and 10 per cent of the aviation gasoline sold at airports is used for international aviation. The ERT reiterates the recommendation made in the previous review report that Slovakia provide detailed reasoning to support this expert judgement in its next annual submission and correct the inconsistency noted in the NIR regarding jet kerosene, which indicates in the section on civil aviation that 95 per cent of the fuel sold is used in international aviation, while in the section on international bunkers it is stated that this assumption was corrected for 2009 and increased by 5 per cent, thereby stating that 100 per cent of the jet kerosene sold is used in international aviation. A similar inconsistency is noted for aviation gasoline in the section on international bunkers, which indicates that 5 per cent of the aviation gasoline sold at airports is used for international aviation, while in the same paragraph it is stated that 10 per cent of the aviation gasoline is used for international flights and that this assumption has not been changed for 2009.

53. Further, the ERT noted that Slovakia estimates the emissions from international aviation based on expert judgement and on information on landing and take-off (LTO) cycles and fuel consumption. The NIR states that the number of realized LTO cycles, the types of aircraft and the carrying capacity of the airports are basic input information used for the estimation of emissions from civil aviation, but an explanation of the method used to determine how the LTO cycles (33,078 cycles in 2009) are used in the input data (the EFs and total consumption of jet kerosene and aviation gasoline) and how the LTOs are divided into national and international LTOs, has not been included in the NIR. The ERT also recommended that Slovakia include, in its next annual submission, transparent information on the method used for the allocation of the LTO cycles and input data between domestic aviation and international aviation to enable the ERT to understand the method used to determine how the LTO cycles are used as basic input information in the estimation of emissions from this category.

54. For marine bunkers, Slovakia explained that two relevant ports in the country, Bratislava and Komarno on the Danube River, were taken into consideration for the estimation of emissions from Slovak inland international transport. The ERT noted that for shipping transport, a significant drop (92.0 per cent) in emissions occurred between 2004 and 2005, followed by an increase of 4,371.5 per cent in 2006. The ERT noted that Slovakia explained that the emissions depend on the amount of diesel oil purchased by navigation companies and the oil prices, which may vary significantly from year to year. The ERT recommends that Slovakia further enhance the transparency of the NIR by

including this information and other relevant information on the trends in the NIR of its next annual submission.

*Feedstocks and non-energy use of fuels*

55. The ERT noted that the fuel quantity of natural gas used as feedstock is reported as “NO” in CRF table 1.A(d) for the period 2002–2004; however, the ERT notes that there was ammonia production based on natural gas (according to emissions reported under the industrial processes sector) in the country during the same period. During the review, Slovakia explained that the official data for these years are not available from the Statistical Office of the Slovak Republic. However, the ERT considers that it is possible to estimate the AD for the entire time series by interpolating the data and/or by using the data on the real natural gas quantities used in ammonia production. The ERT recommends that Slovakia include the missing data for the complete time series in its next annual submission.

### 3. Key categories

Stationary combustion: liquid, solid and gaseous fuels – CO<sub>2</sub>

56. The ERT noted several fluctuations in the trends of the annual implied emission factors (IEFs) for the period 1990–2009 which are not sufficiently explained or justified with supporting information in the NIR or in the CRF tables. For example, for manufacture of solid fuels and other energy industries, the CO<sub>2</sub> IEFs for gaseous fuels (ranging from 177.32 t/TJ to 217.11 t/TJ) are the highest among the reporting Parties and higher than the IPCC default value (56.1 t/TJ). This could be a result of the misallocation of some solid fuels classified incorrectly as gaseous. Conversely, the CO<sub>2</sub> IEFs for liquid fuels from food processing, beverages and tobacco decreased from 76.02 t/TJ in 1990 to 63.80 t/TJ in 2009; the 2009 value is 16.1 per cent lower than the 1990 value. The ERT recommends that Slovakia include further explanations for any large inter-annual variations in the IEFs and, if necessary, revise the allocation of fuels in accordance with the Revised 1996 IPCC Guidelines, in its next annual submission.

### 4. Non-key categories

Road transportation: liquid, gaseous and biomass fuels – CH<sub>4</sub> and N<sub>2</sub>O

57. The ERT noted that Slovakia has estimated CH<sub>4</sub> and N<sub>2</sub>O emissions (and also CO<sub>2</sub> emissions) from road transportation using the COPERT IV model (version 7.1), as recommended by the previous review report, but only for the years from 2000 onwards. The previous years of the time series were estimated using the COPERT III model. The ERT also noted that the Party did not provide sufficient information in the NIR to justify the use of the lower CH<sub>4</sub> and N<sub>2</sub>O EFs from the COPERT IV model, when compared with those from previous COPERT model versions. The ERT identified that the CH<sub>4</sub> and N<sub>2</sub>O EFs for gasoline and diesel oil for 2008 in the original 2011 annual submission (e.g. IEFs for gasoline: CH<sub>4</sub> – 15.40 kg/TJ and N<sub>2</sub>O – 3.76 kg/TJ) were lower than those reported in the 2010 annual submission for 2008 (e.g. IEFs for gasoline: CH<sub>4</sub> – 18.73 kg/TJ and N<sub>2</sub>O – 4.73 kg/TJ). These values show a reduction of 17.8 per cent and 20.5 per cent in the CH<sub>4</sub> and N<sub>2</sub>O IEFs for gasoline, respectively, and similar reductions in the CH<sub>4</sub> and N<sub>2</sub>O IEFs for diesel oil. Slovakia was unable to provide a satisfactory explanation for this change during the review week. The ERT recommended that Slovakia provide supporting background information on the CH<sub>4</sub> and N<sub>2</sub>O EFs used to estimate the emissions for this category and clearly justify that the emissions are not underestimated.

58. In response to the list of potential problems and further questions raised by the ERT during the review, Slovakia submitted revised estimates of CH<sub>4</sub> and N<sub>2</sub>O emissions for all fuels used in road transportation using the COPERT IV model (version 8.1) for the years 1990–2009. In addition, Slovakia revised AD for all fuels in this category, resulting also in revised estimates of CO<sub>2</sub> emissions. These revised estimates resulted in an overall reduction of 32.98 Gg CO<sub>2</sub> eq, or 0.5 per cent of the total GHG emissions from this category, or 0.1 per cent of the total sectoral GHG emissions for 2009. Slovakia also provided an explanation as to why it believes that the new EFs used in the COPERT IV model are more applicable to Slovakia's conditions and national circumstances. However, Slovakia did not document this statement and did not provide clear explanations of the different parameters used for setting and calculating the EFs in the COPERT IV model (e.g. the number of sample cars, type of vehicle, model year, engine displacement, weight of vehicle, type of mode (conditions of testing method for mileage), average speed, mileage and actual measurements of CH<sub>4</sub>, carbon monoxide (CO), CO<sub>2</sub>, hydrocarbons (HCs), N<sub>2</sub>O, nitrogen oxide (NO<sub>x</sub>) and particulate matter (PM)), as well as consistent reasons to explain why the AD have been changed. The ERT considered Slovakia's response and concluded that the Party did not provide satisfactory background data and/or sufficiently transparent information to enable the ERT to assess these EFs and the revised estimates and/or information justifying that the revised CH<sub>4</sub> and N<sub>2</sub>O emissions from road transportation are not underestimated and explaining how they were calculated, or to allow the ERT to assess the revised estimates of CO<sub>2</sub> emissions from this category. The ERT recognizes that, while the IPCC good practice guidance encourages the use of country-specific EFs and higher-tier methods, these EFs and methods must be supported by sufficient and appropriate evidence so that their completeness, comparability, consistency, transparency and accuracy can be assessed.

59. Therefore, in accordance with the Article 8 review guidelines, the ERT decided to calculate and recommend an adjustment for this category (see paras. 149–166 below). With regard to the next annual submission, the ERT recommends that Slovakia report transparent, detailed and complete information on the EFs used for its estimates of CH<sub>4</sub> and N<sub>2</sub>O emissions using the COPERT model and ensure that the total fuel consumption used in the model is fully consistent with the fuel use data from the national energy statistics as required by the IPCC good practice guidance, which is a very important factor if the Party continues to use this model for its CO<sub>2</sub> emission estimates. However, it is also important to remember that it is good practice to calculate CO<sub>2</sub> emissions on the basis of fuel consumption statistics using the tier 1 approach, because this method provides an important quality check.

60. In addition, the ERT noted that Slovakia reported N<sub>2</sub>O emissions from gaseous fuels in road transportation as "NO", even though the Party did report the AD and corresponding CO<sub>2</sub> and CH<sub>4</sub> emissions in the CRF tables for this category. Slovakia was unable to provide a satisfactory explanation for this during the review week. The ERT recommended that Slovakia estimate N<sub>2</sub>O emissions from gaseous fuels used in road transportation using the AD reported in the CRF tables and the default N<sub>2</sub>O EF for natural gas provided in the Revised 1996 IPCC Guidelines. In response to the list of potential problems and further questions raised by the ERT during the review, Slovakia submitted estimates for these emissions covering the period 2000–2009 following the recommendations of the ERT, and informed the ERT that, prior to the year 2000, consumption of natural gas in road transportation did not occur in the country and that, currently, it is limited to bus transportation. These estimates amounted to 0.007 Gg CO<sub>2</sub> eq, or 0.0001 per cent of the total GHG emissions from the category for 2009. The ERT agreed with these estimates; however, it noted that Slovakia slightly modified the AD originally reported in the CRF tables for the period 2000–2009, resulting in an N<sub>2</sub>O IEF that is slightly higher than the IPCC default EF (0.10 kg/TJ) for 2009, while for other years this IEF was either slightly

lower or higher than the IPCC default value. This could be the result of a mistake in the reported AD for this category; however, the reasons for revising these AD are unclear to the ERT, as Slovakia did not provide any explanation for this change. The ERT recommends that Slovakia implement category-specific QC measures in order to prevent these types of errors, report on these measures and ensure the consistency of the AD used with the data from the national energy statistics in its next annual submission.

#### Coal mining and handling: solid fuels – CO<sub>2</sub>

61. The ERT noted that Slovakia has reported CO<sub>2</sub> emissions from coal mining and handling as “NO”, even though the Party has reported the AD for this category in the CRF tables, from which the corresponding CH<sub>4</sub> emissions have been estimated for all years of the time series. During the review week, Slovakia informed the ERT that the release of CO<sub>2</sub> into the atmosphere may occur during mining activity in the country. In response to the list of potential problems and further questions raised by the ERT during the review, Slovakia stated that the volume of CO<sub>2</sub> in fugitive gases is below the measurement threshold and close to zero, due to the very limited period of time from handling to combustion, as the mines are located only a few kilometres away from the power plants, making coal deposits not necessary and creating conditions that are not appropriate for the oxidation and generation of CO<sub>2</sub>. The ERT agreed with this explanation and recommends that Slovakia include this detailed information in the NIR of its next annual submission.

### **5. Areas for further improvement**

#### Identified by the Party

62. Slovakia identified the following issues for improvement:

- (a) A more accurate disaggregation and allocation of emissions for the category other (manufacturing industries and construction) according to detailed industry characteristics;
- (b) A comparison of the NCVs for liquid fuels between the inventory data and the newly published Eurostat data in order to further improve the accuracy of the emission estimates.

#### Identified by the expert review team

63. The ERT identified the following issues for improvement:

- (a) The implementation of clear actions towards the minimization of discrepancies and the harmonization of official statistical data and other national data sets in order to ensure that emissions from the energy sector estimated using the fuel use data from the NEIS database are consistent with the emissions estimated using data from the national energy balance and/or data reported to international organizations, and ensure that the NEIS data coverage is fully consistent with the national energy statistics;
- (b) Ensuring that the NIR contains sufficient relevant information on the national energy balance, as recommended in the outline of the NIR provided in the UNFCCC reporting guidelines;
- (c) The provision of detailed reasoning to support the expert judgement used for the estimates of aviation bunkers and the correction of the inconsistencies noted in the NIR regarding fuel use in international aviation;
- (d) The enhancement of the transparency of the NIR by including relevant information on the fuel consumption and emission trends for the sector, as well as on any identified large inter-annual variations in the IEFs and, if necessary, the revision of the

allocation of fuels classified as solid fuels in accordance with the Revised 1996 IPCC Guidelines;

(e) Ensuring the consistency and completeness of the information on feedstocks and non-energy use of fuels, including any missing data for the complete time series;

(f) The provision of complete and transparent background information on the CH<sub>4</sub> and N<sub>2</sub>O EFs used to estimate emissions from road transportation, ensuring that the EFs, methods and resulting emissions for the relevant gases are supported by sufficient and appropriate evidence regarding their completeness, comparability, consistency, transparency and accuracy, and that the total fuel consumption used for the estimates is fully consistent with the fuel use data from the national energy statistics;

(g) The correct estimation of N<sub>2</sub>O emissions from gaseous fuels used in road transportation, ensuring the consistency of the AD used with the data from the national energy statistics;

(h) The provision of a detailed explanation for the non-occurrence of CO<sub>2</sub> emissions from coal mining and handling.

## **C. Industrial processes and solvent and other product use**

### **1. Sector overview**

64. In 2009, emissions from the industrial processes sector amounted to 9,389.33 Gg CO<sub>2</sub> eq, or 21.6 per cent of total GHG emissions, and emissions from the solvent and other product use sector amounted to 164.38 Gg CO<sub>2</sub> eq, or 0.4 per cent of total GHG emissions. Since 1990, emissions have decreased by 10.8 per cent in the industrial processes sector, and increased by 11.7 per cent in the solvent and other product use sector. The key driver for the fall in emissions in the industrial processes sector is the decrease in the demand for industrial commodities and the subsequent decrease in production due to the economic and political transition to a market economy which occurred in the country in the early 1990s. The ERT noted a decrease in the gross domestic product (GDP) in Slovakia by 4.8 per cent in 2009 compared to 2008, which resulted in a decrease in total GHG emissions from the industrial processes sector by 16.0 per cent compared to 2008. Within the industrial processes sector, 50.6 per cent of the emissions were from metal production, followed by 24.3 per cent from mineral products, 21.6 per cent from chemical industry and 3.4 per cent from consumption of halocarbons and SF<sub>6</sub>.

65. In the 2011 annual submission, the ERT noted that Slovakia has improved its GHG inventory for the industrial processes sector by including emissions from electric arc furnaces in iron and steel production and by using a tier 3 method with plant-specific EFs for estimating emissions from ferroalloys production (2002–2009) in response to the recommendations of the previous review report. In addition, Slovakia has used an online database of importers and uses of F-gases to collect the necessary AD in order to estimate F-gas emissions, enabling the Party to calculate actual emissions and split the emissions between individual subcategories.

66. However, the ERT noted that the CO<sub>2</sub> emission estimates for desulphurization and ceramics production under the category limestone and dolomite use were not revised as recommended in the previous review report to improve the completeness and accuracy of the estimates for the earlier years of the time series. Therefore, the ERT mentioned these unaddressed recommendations during its preliminary questions to the Party, to which Slovakia replied that it was not possible to obtain data within the available time frame so as to include them in its estimates for the 2011 annual submission. Also, during the review, the Slovak sectoral expert clarified that data have been obtained and presented in the

preliminary emission estimates provided to the ERT, which will be included in the Party's next annual submission. The ERT recommends that Slovakia include the emission estimates for limestone and dolomite use in its next annual submission following the recommendation of the previous review report and as showed to the ERT during the review.

67. The ERT noted that only two external experts are involved in the preparation of the GHG emission estimates for the industrial processes sector, one of whom is exclusively involved in the estimation of F-gas emissions. The limited number of staff also makes it more difficult to prepare the inventory, where professional knowledge/experience in various industry activities is highly recommended. Therefore, the ERT recommends that Slovakia ensure that sufficient institutional support is provided to the industrial processes experts in future annual submissions.

68. The ERT also noted that the trends in AD and EFs for some of the categories fluctuate abruptly after being constant or stable for many years. For example, there was a 77.0 per cent increase in the AD for ferroalloys production for 2002 compared to 2001 because Slovakia used EU ETS data from 2002 onwards for this category. The inter-annual changes in the reported perfluoromethane (CF<sub>4</sub>) IEFs for aluminium production for the period 2007–2009 were 43.1 per cent and –46.5 per cent, since Slovakia improved the operational characteristics. Slovakia reported similar trends in AD and EFs for other categories (e.g. cement production). Slovakia explained that the trends in the above-mentioned categories fluctuate during those years, because production of industrial commodities vary every year. However, the ERT noted that the emission levels of most categories probably do not abruptly change from year to year after being constant for many years and significant changes in emissions from previous years may indicate possible input or calculation errors. Moreover, the changes in production data cannot result in abrupt changes in the EFs. Therefore, the ERT recommends that Slovakia carefully check the annual increases or decreases in the emissions of relevant categories through the application of enhanced QA/QC procedures and explain any identified abrupt changes of AD and EFs by the unique characteristics, if any, of the specific categories in the NIR of its next annual submission.

69. The ERT noted that Slovakia has reported HFC, PFC and SF<sub>6</sub> emissions from foam blowing, fire extinguishers (with the exception of HFCs), aerosols/metered dose inhalers and solvents under the category consumption of halocarbons and SF<sub>6</sub> as “NO”. However, some of these subcategories (e.g. foam blowing) have a high possibility of being sources of F-gas emissions in Slovakia because related relevant activities are common in most developed countries and have also been identified in neighbouring countries which have similar economic and industrial structures. During the review, the ERT asked the Slovak experts to confirm whether there are such activities under these subcategories resulting in emissions in the country. However, a clear answer was not provided to the ERT. Therefore, the ERT raised this issue in its list of potential problems and further questions during the review and recommended that Slovakia check whether these activities occur in the country for all subcategories and relevant gases under the category consumption of halocarbons and SF<sub>6</sub>. If these activities are not occurring, Slovakia should continue to use the notation key “NO” and provide all relevant supporting information, otherwise the Party should collect AD and EFs with the assistance of major distributors and end-users of F-gases and estimate the emissions using the methods described in chapter 3.7 of the IPCC good practice guidance.

70. In response to the list of potential problems and further questions raised by the ERT during the review, Slovakia provided information and estimates of HFC emissions from foam blowing (0.01 Gg CO<sub>2</sub> eq). With regard to these estimates, the ERT noted that Slovakia did not consider all possible uses of closed-cell foams and the use of some types of foam products containing HFCs which had previously been imported into the country

and might have produced emissions from stocks and from decommissioning, and that emissions from the use of these products were not fully estimated, thereby leading to an underestimation of emissions. The ERT found that Slovakia did not transparently explain these specific issues and did not provide supporting information in its response. In addition, Slovakia included in its estimates a gas (HFC-365mfc) with a global warming potential (GWP) value that has not yet been agreed upon by the Conference of the Parties (COP) and which should not be included in the national totals but only reported in CRF table 9(b) for information purposes, and another gas (HFC-245ca) using an incorrect GWP value of 640, instead of the correct value of 560.

71. For the other subcategories under consumption of halocarbons and SF<sub>6</sub> (i.e. fire extinguishers (with the exception of reported HFCs), aerosols/metered dose inhalers and solvents), the F-gas emissions were still reported as “NO” and the Party did not provide supporting information or further explanations for doing so. Taking this into account and in accordance with the Article 8 review guidelines, the ERT decided to recommend adjustments for the subcategories foam blowing, fire extinguishers, aerosols/metered dose inhalers and solvents (see paras. 167–192 below).

## 2. Key categories

### Carbide production – CO<sub>2</sub>

72. The approach used by the Party for splitting CO<sub>2</sub> emissions from calcium carbide production into the categories limestone and dolomite use and carbide production is not in line with the Revised 1996 IPCC Guidelines, as already identified in the previous review report. The ERT reiterates the recommendation that Slovakia use the methodology and recommendations provided in the Revised 1996 IPCC Guidelines (chapter 2.11.2, page 2.22) for estimating and reporting CO<sub>2</sub> emissions from this category in its next annual submission.

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

73. Slovakia reported emissions from iron and steel production under the industrial processes sector, except those from coke production and sinter production which are still included under the energy sector under manufacturing industries and construction. Reporting emissions from one source of emissions under two sectors (energy and industrial processes) requires thorough QC procedures which can be performed by using a carbon mass balance for all relevant activities; however, this was not performed by Slovakia in its 2011 annual submission. In response to a request made by the ERT during the review, Slovakia provided the ERT with a preliminary carbon balance that showed problems of transparency in the reporting of emissions for this category under the industrial processes sector, but also in the energy sector (see paras. 50, 51 and 56 above). Therefore, the ERT recommends that Slovakia’s energy and industrial processes experts consult each other to revise, consolidate and ensure the accuracy of the carbon mass balance so that the data and resulting emissions are consistent and all carbon flows are accurately taken into account and adequately reported under the energy and industrial processes sectors, prior to the preparation of the GHG inventory for Slovakia’s next annual submission. The ERT also recommends that Slovakia include the carbon mass balance in the NIR of its next annual submission.

74. The ERT welcomes the fact that, in response to a recommendation in the previous review report, Slovakia has reported emissions from electric arc furnaces using surveys from relevant plants and the EU ETS reports in its 2011 annual submission.

### 3. Non-key categories

#### Ferroalloys production – CO<sub>2</sub>

75. The ERT noted that Slovakia used two different data sets and methodologies for the estimation of CO<sub>2</sub> emissions from this category (a tier 2 approach was used for the period 1990–2001, and a tier 3 approach was used for the period 2002–2009 with more detailed information about ferroalloys production for the estimates for 2002 onwards). The ERT noted varying trends and high fluctuations since 2002. The AD for 2002 increased by 77.0 per cent compared to 2001. Also, there was a drop in the value of the AD by 56.3 per cent in 2009 compared to 2008 that was explained by Slovakia during the review. The ERT noted that the emission levels of most categories probably do not abruptly change from year to year, and significant changes in emissions from previous years may indicate possible input or calculation errors. Therefore, the ERT recommends that Slovakia check the annual increases or decreases in the emissions of ferroalloys production through the application of enhanced QA/QC procedures and explain any identified significant changes by the unique characteristics, if any, of this category in the NIR of its next annual submission.

### 4. Areas for further improvement

#### Identified by the Party

76. Slovakia identified the following issues for improvement:

(a) The inclusion of CO<sub>2</sub> emission estimates for desulphurization and ceramics production for the earlier years of the time series under the category limestone and dolomite use in the next annual submission;

(b) The provision of detailed information in CRF tables for the category consumption of halocarbons and SF<sub>6</sub>.

#### Identified by the expert review team

77. The ERT identified the following issues for improvement:

(a) Ensure sufficient institutional support for the two Slovak industrial processes experts since the industrial processes sector includes various industry activities;

(b) Thoroughly check the annual increases or decreases in emission levels, AD and EFs for all categories through the application of enhanced QA/QC procedures and explain any abrupt inter-annual changes;

(c) Ensure the completeness, transparency, comparability and consistency of the F-gas emission estimates, including the accuracy of the estimation methodologies used for the entire time series;

(d) Ensure the accuracy and provision of the carbon mass balance for iron and steel production so that the data and resulting emissions are consistent and all carbon flows are accurately taken into account and adequately reported under the energy and industrial processes sectors;

(e) Ensure that the correct methodology is used for the estimation of CO<sub>2</sub> emissions from carbide production.

## D. Agriculture

### 1. Sector overview

78. In 2009, emissions from the agriculture sector amounted to 3,018.59 Gg CO<sub>2</sub> eq, or 7.0 per cent of total GHG emissions. Since 1990, emissions have decreased by 57.3 per cent. The key driver for the fall in emissions is the reduction in livestock population and the decrease in the consumption of mineral fertilizers due to the economic and political transition to a market economy which occurred in the country in the early 1990s. Within the sector, 54.7 per cent of the emissions were from agricultural soils, followed by 28.7 per cent from enteric fermentation and 16.6 per cent from manure management. Rice cultivation, prescribed burning of savannas and field burning of agricultural residues do not occur in Slovakia. However, the ERT noted that for some subcategories under rice cultivation and field burning of agricultural residues, Slovakia incorrectly used the notation key not applicable (“NA”). The ERT recommends that Slovakia revise its use of the notation keys for these subcategories in its next annual submission.

79. Emissions from the agriculture sector have been reported for all gases, categories and years of the inventory time series and are complete in terms of geographical coverage.

80. The ERT noticed that Slovakia has addressed two recommendations from the previous review report by conducting the key category analysis at a more disaggregated level and by providing data on the recalculations performed in CRF table 8(a). However, some of the recommendations, including the correction of simple editorial mistakes, have not been taken into account in the 2011 annual submission. The ERT recommends that Slovakia take into account and implement all recommendations from previous review reports and the 2011 review report for the further improvement of the inventory in its next annual submission.

81. Slovakia has one outsourced expert working on the compilation of the inventory for the agriculture sector. Emission estimates are calculated by the expert and the compilation of the inventory, including the writing of the NIR and the inputting of data into the CRF tables, is carried out by SHMU. During the review week, comments on the Synthesis and Assessment Report, part II for the agriculture sector were provided by the expert and by SHMU independently; both sets of comments were different and at one point contradictory. The ERT considers that this implies a lack of coordination between the different actors within Slovakia’s national system. The ERT recommends that Slovakia enhance the coordination of the inventory team for its next annual submission and ensure the timely response to previous stages of the review process.

82. The ERT found that the NIR is not sufficiently transparent to present how the estimates were calculated. Further, the sector-specific QA/QC activities were essentially not documented, and reasons for the recalculations (e.g. emissions from nitrogen-fixing (N-fixing) crops and crop residue) were not provided in the NIR. The recalculations were performed for the categories manure management and agricultural soils for the years 1990–2008. The impact of the recalculations on total GHG emissions excluding LULUCF was an increase of 0.14 per cent and 0.06 per cent for 1990 and 2008, respectively. The ERT recommends that Slovakia increase the transparency of its reporting by providing more detailed information on the data used for the emission estimates, for example by indicating the source for the parameters and AD used, describing the QA/QC activities conducted and providing reasons for the recalculations in the NIR of its next annual submission.

83. As also observed in the previous review report, the ERT noted that many editorial mistakes are still present in the NIR of the 2011 annual submission (e.g. typographical errors, incorrect units, wrong citation of tables) and that there are inconsistencies between the NIR and the CRF tables (e.g. the fraction of livestock N excreted and deposited onto

soil during grazing ( $\text{Frac}_{\text{GRAZ}}$ ) in the NIR was reported as 0.057, while in the CRF it was reported as 0.15). During the review, the ERT also found an inconsistency in the value of the fraction of N excretion that volatilizes as ammonia ( $\text{NH}_3$ ) and  $\text{NO}_x$  ( $\text{Frac}_{\text{GASM}}$ ). The value used for the estimates was 0.20 according to the agriculture expert, while the value reported in the CRF tables was 0.24 for 2009. The ERT reiterates the recommendation from the previous review report that Slovakia implement tier 1 QC activities prior its next annual submission in order to ensure the accuracy and consistency of its reporting.

## 2. Key categories

### Enteric fermentation – $\text{CH}_4$

84. The methodologies used for the calculation of emission estimates for this category are in line with the IPCC good practice guidance. A tier 2 approach was applied to those animal categories with significant emissions (i.e. dairy cattle, non-dairy cattle and sheep) and a tier 1 approach was applied to the other categories. Slovakia has eight regions and the tier 2 estimates were calculated according to the age of the animals at a regional level; the sum of the emissions for each animal species was reported in CRF table 4.A. According to the agriculture expert, the main data source for the estimations was the annual census of domestic livestock in the Slovak Republic.

85. The ERT noted that a tier 2 approach was applied to the AD for dairy cattle and non-dairy cattle across the whole time series, but it was only applied to the AD for sheep from 2004 onwards. Even though in the previous review report it was recommended that Slovakia ensure time-series consistency by applying a tier 2 approach for the period 1990–2003, this issue has not been addressed in the 2011 annual submission. The ERT reiterates this recommendation to be implemented in Slovakia's next annual submission. During the review, the agriculture expert informed the ERT that time-series consistency would be ensured in the next annual submission, as relevant AD are now available.

86. The EFs for dairy cattle, non-dairy cattle and sheep were estimated on the basis of country-specific data on milk production and average gross energy intake. However, the NIR is not sufficiently transparent to present how these emissions were calculated. The ERT recommends that Slovakia enhance the documentation on the EFs by including the following information in the NIR of its next annual submission: detailed livestock population data by animal type and region, and the data sources for the parameters and AD used.

87. During the review, the agriculture expert informed the ERT about the sector-specific QC procedures implemented for this category (e.g. the comparison of IPCC default EFs for eastern and western Europe with the EFs calculated from the national data). The ERT recommends that Slovakia include this information in the “category-specific QA/QC and verification” section in the NIR of its next annual submission.

### Agricultural soils – $\text{N}_2\text{O}$

88. The estimation methodologies used for this category are in line with the IPCC good practice guidance. Slovakia applied a country-specific approach to estimate emissions from some subcategories (e.g. N-fixing crops and crop residue), and the rationale for the application of a country-specific approach was documented in the NIR. Country-specific data were obtained from literature on research activities conducted in Slovakia and used for the calculation of the emission estimates. The references used are specified in the NIR; however, the ERT considers that the inclusion of a description as to why those data have been chosen would enhance the transparency of the NIR of Slovakia's next annual submission.

89. The fraction of total above-ground crop biomass that is removed from the field as a crop product ( $Frac_R$ ) and the fraction of total above-ground biomass of N-fixing crops that is N ( $Frac_{NCRBF}$ ) were reported in the CRF tables as not estimated (“NE”) and as 0.0705, respectively. However, Slovakia stated that these parameters were not taken into account in the calculation of the emissions, since the Party applied a country-specific approach to the estimation of emissions from the subcategories N-fixing crops and crop residue. In this case, the ERT recommends that Slovakia use the notation key “NA” and include the reasons for doing so in the documentation box of CRF table 4.D in its next annual submission.

90. In the previous review report, it was recommended that Slovakia report disaggregated values of  $Frac_{GRAZ}$ ; however, this recommendation was not addressed in the 2011 annual submission. The ERT reiterates the previous recommendation that Slovakia report disaggregated values of  $Frac_{GRAZ}$  according to animal types in its next annual submission.

91. The ERT noted that the reasons for reporting cultivation of histosols as “NO” were not clearly provided in the NIR. In accordance with the previous review report, Slovakia explained that the area of histosols was negligible and protected by law; therefore, no agricultural activities are present on this area. The ERT recommends that Slovakia include this information in the NIR of its next annual submission.

### 3. Non-key categories

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

92. Since manure management is a non-key category, a tier 1 approach was used for the calculation of the emission estimates. Nevertheless, Slovakia plans to improve the estimates by applying a tier 2 approach and national N excretion values in future annual submissions. During the review, Slovakia mentioned that the scientific results for the use of a tier 2 method were available; however, those results were yet to be used in the inventory due to the limitation of resources, and several QC procedures were yet to be conducted for the estimates. Slovakia informed the ERT that these data would be used in its next annual submission. The ERT commends Slovakia for the progress made and encourages the Party to implement this improvement in its next annual submission.

### 4. Areas for further improvement

#### Identified by the Party

93. Slovakia identified the following issues for improvement:

- (a) The recalculation of the time series prior to 2004 for CH<sub>4</sub> emissions from sheep under enteric fermentation based on existing regional data for recent years;
- (b) The use of a tier 2 methodology and national N excretion values for N<sub>2</sub>O emissions from manure management;
- (c) The update of the share of animal waste management systems according to animal categories for N<sub>2</sub>O emissions from manure management and from synthetic fertilizers using information from regional statistics;
- (d) The recalculation of direct N<sub>2</sub>O emissions from soils according to new research data in correspondence with the agro-climatic regionalization of the country.

#### Identified by the expert review team

94. The ERT identified the following issues for improvement:

- (a) The review of the use of notation keys for rice cultivation, agricultural soils ( $Frac_R$  and  $Frac_{NCRBF}$ ), prescribed burning of savannas and field burning of agricultural residues;
- (b) Increasing the transparency of the inventory by providing more detailed information on the data used for the emission estimates, describing the QA/QC activities conducted, providing reasons for the recalculations and taking the recommendations of the ERT into account;
- (c) The implementation of tier 1 QC procedures prior to the submission of the inventory in order to avoid editorial mistakes and inconsistencies between the NIR and the CRF tables;
- (d) Enhancing the coordination of the inventory team and ensuring a timely response at all stages of the review process;
- (e) The application of a tier 2 approach for the estimation of  $CH_4$  emissions from sheep from 1990 to 2003 in order to ensure time-series consistency;
- (f) The disaggregation of the  $Frac_{GRAZ}$  values according to animal type;
- (g) The provision of a clear rationale for reporting cultivation of histosols as “NO”.

## **E. Land use, land-use change and forestry**

### **1. Sector overview**

95. In 2009, net removals from the LULUCF sector amounted to 3,449.01 Gg  $CO_2$  eq. Since 1990, net removals have increased by 16.7 per cent. The LULUCF sector shows net removals with high inter-annual variability for the entire time series. Salvation harvest following natural disturbances are a key driver for the inter-annual variability in removals. Within the sector, net removals of 2,806.35 Gg  $CO_2$  eq were from forest land, followed by net removals of 695.61 Gg  $CO_2$  eq from cropland and 425.52 Gg  $CO_2$  eq from grassland. Settlements (216.66 Gg  $CO_2$  eq) and other land (261.80 Gg  $CO_2$  eq) were reported as net sources.

96. The ERT commends Slovakia for improving the GHG inventory for the LULUCF sector in its 2011 annual submission, in accordance with the recommendations from the previous review report. Slovakia has improved the completeness and transparency of its reporting on the LULUCF sector by providing estimates or notation keys for all gases and categories in all cells in the CRF tables.

97. Removals and emissions from the LULUCF sector were reported for all years of the time series for the full geographical area. The reporting on the LULUCF sector is generally complete in terms of gases, except for  $N_2O$  emissions from disturbances associated with conversions to cropland, which are reported as “NO”. Lands converted to cropland in mineral soils are reported in CRF table 5.B, hence the ERT considers that emissions of  $N_2O$  occur in Slovakia. The ERT recommends that Slovakia provide estimates for these categories in its next annual submission, in order to improve completeness, or provide substantial explanations for the non-occurrence of these emissions in the country.

98. Slovakia has a total land area of 4,903.68 kha. For a consistent representation of land, the annually updated areas from the Geodesy, Cartography and Cadastre Authority (GCCA) of Slovakia were used, linking the land-use definitions to the IPCC land-use categories. In 2009, 41.0 per cent of the country’s total area was classified as forest land, followed by 31.4 per cent as cropland and 17.9 per cent as grassland. The remaining 4.7 per cent, 3.1 per cent and 1.9 per cent were classified as settlements, other land and wetlands,

respectively. The ERT commends Slovakia for providing for the first time in the NIR the definition of the six land-use classes and for providing a land-use matrix for each year of the time series (1990–2009). To ensure that all land in the country is included in the inventory, the ERT recommends that Slovakia correct the small inconsistencies identified by the ERT in the total land area reported for the different years of the time series in the land-use matrices in NIR table 7.4.

99. The methodologies used by Slovakia to estimate the changes in carbon stocks and emissions of non-CO<sub>2</sub> gases for the LULUCF sector are consistent with the IPCC good practice guidance for LULUCF. For the changes in carbon stocks in living biomass on forest land remaining forest land, Slovakia used the IPCC default method based on estimates of gains and losses, which are based on country-specific biomass conversion and expansion factors. The amount of annual harvest was taken from the official statistics published in the Green Reports of the Ministry of Agriculture. For the DOM and mineral soils pools for forest land remaining forest land, a tier 1 method was applied following the assumption that there had been no carbon stock changes in these pools, hence the use of the notation key “NO”. Given the slight increase in the area of forest land over time and the forest activities (management, harvesting, storm felling and the outbreak of bark beetle attacks) occurring in the forests of Slovakia, the ERT considers that it is highly likely that changes would occur in the carbon stocks of both the DOM and the mineral soils pools. In addition, forest land remaining forest land is a key category. Therefore, the ERT recommends that Slovakia use a higher-tier method to estimate the carbon stock changes for the DOM and mineral soils pools in its next annual submission.

100. The recalculations for the LULUCF sector were performed for the entire time series. Almost all LULUCF categories were recalculated following the revision of land areas and their changes. New biomass conversion and expansion factors were applied to land conversions to forest land. Also, recalculations were performed following the inclusion of emissions from the dead wood component in the DOM pool for forest land converted to other land uses. This recalculation was applied to all subcategories related to the conversion of forest land to other land uses, including forest land converted to cropland, grassland, settlements and other land. The impact of recalculations on the LULUCF sector is a decrease in removals of 23.7 per cent for 1990 and a decrease in removals of 53.0 per cent for 2008. The ERT commends Slovakia for its efforts to improve the accuracy and completeness of the inventory in accordance with the recommendations from previous review reports.

101. The results of the uncertainty analysis of the LULUCF sector were included in annex 6 to the NIR. The uncertainty used for the AD and the EFs is fixed at 100 per cent for all land-use categories according to table A6.1 in annex 6 to the NIR. The uncertainty reported under the different land-use categories varies between 20 per cent and 100 per cent. The ERT recommends that Slovakia explain the discrepancy between the values reported for the different land-use categories and those used in the uncertainty analysis. Further, it is not clear if the reported uncertainties for each land-use category are based on expert judgement or estimates since both are mentioned as the basis for the analysis (e.g. section 7.5.4 and table 7.11 of the NIR). To increase the transparency and accuracy of the inventory, the ERT recommends that Slovakia provide further documentation on the derivation of the uncertainty values and use consistent wording in accordance with the methods actually used by the Party in the NIR of its next annual submission.

102. There is no information on the QA/QC procedures conducted for the statistics from official data sources that are used in the calculation of the emission estimates. The ERT recommends that Slovakia include, in its next annual submission, a description of how the QA/QC procedures are carried out. Slovakia stated in the NIR that an external expert at SHMU prepares the inventory for the LULUCF sector. During the review, Slovakia

informed the ERT that this expert also carries out the QA/QC procedures for the estimates for the LULUCF sector. These arrangements do not appear to be robust and indicate vulnerabilities in the national system. Therefore, the ERT recommends that Slovakia, in addition to QC procedures, implement QA activities performed by experts not involved in the preparation of the inventory in its next annual submission, with the objective of ensuring that the GHG inventory for the LULUCF sector is compiled in accordance with the IPCC good practice guidance for LULUCF.

103. Slovakia has reported a tier 1 key category analysis based on the emissions and removals at the land-use category level and not at the land-use subcategory level as suggested by the IPCC good practice guidance for LULUCF (table 5.4.1). The ERT encourages Slovakia to perform the key category analysis in accordance with the IPCC good practice guidance for LULUCF with the aim of further evaluating the significance of the subcategories in order to select appropriate methods and prioritize resources, and to report the results in its next annual submission.

## 2. Key categories

### Forest land remaining forest land – CO<sub>2</sub>

104. Forest land remaining forest land is a key category by level and trend assessments. The area of this land-use category constituted 40.3 per cent of the total land area of Slovakia in 2009. Forest land remaining forest land represented a net sink of 2,516.26 Gg CO<sub>2</sub>, offsetting 5.8 per cent of the total GHG emissions for 2009. Large inter-annual changes in the net removals of CO<sub>2</sub> from living biomass have been identified for the whole time series; there was an increase in removals of 279.2 per cent from 2000 to 2001, a decrease in removals of 94.9 per cent between 2004 and 2005 and an increase in removals of 1,472.1 per cent between 2005 and 2006. The changes are mainly caused by the annual variation in the amount of harvest. In response to a question raised by the ERT during the review, Slovakia informed the ERT that the large fall in net carbon stocks in 2005 was caused by a large outtake of timber due to a hurricane in the Tatra Mountains. Further, the shift in the trends between 2000 and 2001 are mainly explained by a change in the factor for annual wood increment used in the calculations. The rationale for this shift was that Slovakia compiled new tables on the growth rate for each tree species in the country. The new estimates of the annual increment reflect the increase in the forest growth rate observed in the country. The large increase in removals is caused by the combination of an increased annual increment and a harvest rate that is at the same level as in 2000. The ERT welcomes these clarifications and encourages Slovakia to include these explanations in the NIR of its next annual submission. To further increase the transparency of the inventory, the ERT encourages Slovakia to include in the NIR the statistics on the forest harvest for the time period from 1990 to the current year of reporting. Further, the ERT strongly recommends that Slovakia ensure time-series consistency by recalculating the whole time series using the same models and parameters in its next annual submission.

105. Slovakia has reported in the NIR that the carbon stocks in the DOM pool are assumed to be in a steady state or that no changes have occurred (in accordance with the tier 1 method), as no significant changes have occurred to the forest types, disturbances or management regimes within the reporting period. Given the forest activities (management, harvesting, storm felling and outbreak of bark beetle attacks) occurring in the forests of Slovakia, the ERT considers that it is highly likely that changes occur in the carbon stocks of dead wood. Therefore, the ERT recommends that Slovakia estimate the changes in the carbon stocks for the DOM pool in its next annual submission. In response to a question raised by the ERT during the review, Slovakia informed the ERT that there is a proposal to conduct a research project with the aim of obtaining more accurate data on dead wood in forest land. According to the response provided by the Party, the research project could

improve the quality and accuracy of the calculations of GHG emissions for the DOM pool. The ERT encourages Slovakia to implement the results from the project and report any changes in the carbon stocks in the DOM pool for forest land remaining forest land using a higher-tier method in its future annual submissions.

106. Slovakia has reported in the NIR that the carbon stocks in mineral soils are assumed to be in a steady state in accordance with the tier 1 approach. As reported in the NIR, and in response to a question raised by the ERT during the review, Slovakia informed the ERT that there are national soil databases available for use in the compilation of the inventory. However, the evaluation, as well as the validation, of the data and results has not been finalized. The ERT encourages Slovakia to use these national data sets and estimate the carbon stock changes in mineral soils using a higher-tier method in its next annual submission.

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

107. Land converted to forest land resulted in net removals of 317.89 Gg CO<sub>2</sub> for 2009 and 1,950.11 Gg CO<sub>2</sub> for 1990. Slovakia has provided estimates based on the carbon stock changes in living biomass and mineral soils. The annual increment used for the estimation of the carbon stock changes in living biomass is taken from an experimental database of the NFC and the implied carbon stock change factor for mineral soils is estimated using a tier 2 method based on national data sets from soil inventories. Land converted to forest land was identified as a key category by level and trend assessments.

108. The area of forest land has increased by 8.6 and 1.0 per cent since 1970 and 1990, respectively. Slovakia reported the area of land converted to forest land as 33.35 kha for 2009 and 183.53 kha for 1990, using the IPCC default 20-year transition period beginning in 1970. The area of land in transition from grassland to forest land accounted for 52.7 per cent of land converted to forest land for 2009, while cropland converted to forest land accounted for 69.6 per cent of this area for 1990. During the period 1990–2009 there was some conversion of other land to forest land. From the information provided in the NIR, it is not clear to the ERT what subgroups of other land (e.g. bare soil, rock or unmanaged land) have been converted to forest land. Therefore, the ERT recommends that Slovakia provide clear information on the types of other land that have been converted to forest land and provide evidence that the implied carbon stock change factor for mineral soils (3.44 Mg C/ha) used by the Party is appropriate for land-use changes of other land to forest land in its next annual submission (see also para. 201 below).

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

109. Cropland remaining cropland was identified as a key category by level and trend assessments. The area of this land-use category constituted 30.8 per cent of the total land area of Slovakia in 2009. Cropland remaining cropland is a dominant land-use category, but its area has constantly decreased since the 1970s. In the NIR, Slovakia has reported that this trend has been particularly strong since 1990. This land-use category was a net sink of 859.32 Gg CO<sub>2</sub> in 2009. The inventory includes only the net carbon stock changes in living biomass for perennial woody crops including vineyards and CO<sub>2</sub> emissions resulting from the application of agricultural lime. All other carbon pools are reported as “NO”. In the NIR, Slovakia has provided an explanation as to why the carbon stock changes in the DOM pool have not been reported, but there is no information on the management practices or estimates of the carbon stock changes in the mineral soils pool (according to the NIR, there is no organic soil in Slovakia). The ERT recommends that Slovakia provide a detailed explanation of the non-occurrence of carbon stock changes in mineral soils or provide estimates in accordance with a tier 2 or tier 3 method, including transparent information on the AD and methods used in its next annual submission.

110. Slovakia states in the NIR that there is a plan to “estimate more accurate soil carbon stock data for agricultural soils” for its next annual submission. It is not clear to the ERT what this plan contains and what effect it will have on the improvement of the inventory. The ERT recommends that Slovakia include, in its next NIR, information on the planned improvements, when the improvements will be implemented and what the outcome of the improvements will be, and report on the results of the improvements implemented in future annual submissions.

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

111. Land converted to cropland was identified as a key category by trend assessment. The area of land converted to cropland was reported to be 26.96 kha for 2009 and 153.15 kha for 1990. The total area of cropland has decreased by 6.4 per cent since 1990. The area of grassland converted to cropland accounts for 96.0 per cent of the total area of land converted to cropland in 2009.

112. Land converted to cropland resulted in net emissions of 163.71 Gg CO<sub>2</sub> for 2009 and 788.84 Gg CO<sub>2</sub> for 1990. Slovakia used the tier 1 method and the IPCC default 20-year transition period for land in transition between two land-use categories to estimate the carbon stock changes in living biomass for forest land and grassland converted to cropland. It is assumed that all living biomass and dead forest wood is cleared at the time of land-use conversion, resulting in net emissions. The net carbon stock changes in mineral soils were estimated using a country-specific tier 2 method. The entire time series (1990–2008) was recalculated due to the availability of new data and the updating of AD. The ERT commends Slovakia for its efforts to improve the accuracy of the inventory.

#### Land converted to grassland – CO<sub>2</sub>

113. Land converted to grassland was identified as a key category by level and trend assessments. Slovakia reported a land area of 117.43 kha for 2009 and 128.12 kha for 1990 for this category. The transition from cropland to grassland accounts for more than 90 per cent of land-use change for both years. The area of grassland has increased by 8.7 per cent since 1990. The same trend has been observed in neighbouring countries.

114. Land converted to grassland resulted in net removals of 452.52 Gg CO<sub>2</sub> for 2009 and 346.84 Gg CO<sub>2</sub> for 1990. Slovakia has provided estimates based on the carbon stock changes in mineral soils for land-use changes from forest land, cropland and other land. The carbon stock changes in living biomass were reported for the conversions of forest land and cropland to grassland. Further, emissions from the DOM pool were reported at the time of conversion from forest land. The entire time series (1990–2008) has been recalculated due to the availability of new data and the updating of AD. The ERT commends Slovakia for its efforts to improve the accuracy and completeness of the inventory.

#### Settlements – CO<sub>2</sub>

115. Settlements was identified as a key category by trend assessment. The area of settlements has increased by 82.4 per cent since 1990. According to the NIR, this is due to the development of the transport infrastructure, industrial areas and municipalities. The main types of land converted were cropland and other land. There is an abrupt increase of 52.1 per cent in the area of settlements between 1995 and 1996, 84.5 per cent of which is from the category other land. The ERT notes that there is no explanation in the NIR for the cause of this abrupt increase in the land area of settlements. The ERT recommends that Slovakia provide an explanation for the cause of this abrupt increase in the land area in the NIR of its next annual submission. Further, the ERT recommends that Slovakia ensure that the time series of the estimates for this category are consistent throughout the whole period.

116. Total emissions from settlements are estimated to be 216.66 Gg CO<sub>2</sub> for 2009. The emissions result from the conversion of forest land, cropland and grassland to settlements. Slovakia has used a tier 1 method to estimate the carbon stock changes in living biomass for forest land converted to settlements. It is assumed that all living biomass and dead wood is cleared at the time of the land-use conversion, resulting in net emissions. However, it is unclear to the ERT how the emissions from mineral soils are calculated (e.g. whether all carbon is lost in the same year in which the conversion takes place). The ERT recommends that Slovakia provide such information in the NIR of its next annual submission, in order to increase the transparency of the inventory.

### 3. Non-key categories

#### Other land – CO<sub>2</sub>

117. There is an abrupt decrease of 27.6 per cent in the area of other land between 1995 and 1996 which coincides with the increase in the area of settlements (see para. 115 above). The ERT notes that there is no explanation in the NIR for the cause of this abrupt decrease in the land area. The ERT recommends that Slovakia provide an explanation for the cause of this abrupt decrease in the land area in the NIR of its next annual submission. Further, the ERT recommends that the Party ensure that the time series of the estimates for this category are consistent throughout the whole time period.

#### CO<sub>2</sub> emission from agricultural lime application – CO<sub>2</sub>

118. CO<sub>2</sub> emissions resulting from the application of agricultural lime have been recalculated for the whole time series due to the updating of the AD. Data on the amount of lime used were obtained from the Central Controlling and Testing Institute in Agriculture. The calculation was carried out using a tier 1 method in accordance with the IPCC good practice guidance for LULUCF. The ERT commends Slovakia for its efforts to update the emission estimates for lime application, since the previous estimates were based on expert judgement and were underestimated.

#### Biomass burning – CH<sub>4</sub> and N<sub>2</sub>O

119. In CRF table 5(V), Slovakia has reported emissions of CH<sub>4</sub>, N<sub>2</sub>O, NO<sub>x</sub> and CO for forest land remaining forest land and has used the notation key “NA” for non-methane volatile organic compounds (NMVOCs), all of which result from controlled burning of biomass and wildfires. The ERT commends Slovakia for its efforts to improve the completeness of the inventory. Further, the ERT noted that there is sparse explanation of how the emissions have been estimated and why NMVOCs have not been estimated. The ERT recommends that Slovakia increase the transparency of the calculations and provide, in the NIR of its next annual submission, a description of how the emissions were estimated.

120. In CRF table 5(V), Slovakia has used the notation key “NO” to report emissions of CH<sub>4</sub> and N<sub>2</sub>O from biomass burning for land converted to forest land. The ERT noted that the reasons for reporting biomass burning on land converted to forest land as “NO” were not clearly provided in the NIR. The ERT recommends that Slovakia include this information in the NIR of its next annual submission.

121. Non-CO<sub>2</sub> emissions from biomass burning from cropland remaining cropland were reported as “NO”, as this practice does not occur in the country.

#### 4. Areas for further improvement

##### Identified by the Party

122. Slovakia identified the following issues for improvement:

- (a) The derivation of new annual biomass increments for all tree species, the more accurate estimation of the soil carbon stocks data for forest soils and the improvement of the estimation of the DOM carbon pools for forest land;
- (b) The implementation of a research project to be carried out by the National Forest Centre (NFC) on the characteristics of dead wood as an important part of forest ecosystems in Slovakia;
- (c) The more accurate estimation of the soil carbon stocks and the improvement of the estimation of the DOM pool for cropland;
- (d) The more accurate estimation of the soil carbon stocks for grassland;
- (e) The re-evaluation of the soil carbon stocks, which are currently overestimated for other land.

##### Identified by the expert review team

123. The ERT identified the following issues for improvement:

- (a) The provision of additional information on the databases used for the estimates for the whole LULUCF sector, in order to increase the transparency of the inventory;
- (b) The provision of estimates for N<sub>2</sub>O emissions from disturbance associated with land-use conversion to cropland or the provision of detailed explanations for the non-occurrence of these emissions in the country, in order to improve the completeness of the inventory;
- (c) The use of a tier 2 or tier 3 method to estimate the changes in carbon stocks in the DOM and mineral soils pools for forest land remaining forest land, in order to improve the completeness of the inventory;
- (d) Ensuring the time-series consistency of the removals of CO<sub>2</sub> for forest land remaining forest land;
- (e) Increasing the transparency of the inventory by including in the NIR information on the reasons for using the notation key “NO” to report biomass burning on land converted to forest land;
- (f) Ensuring time-series consistency, especially for the area of settlements and other land, and ensuring transparency by including an explanation for the abrupt changes in the land area for both categories between 1995 and 1996;
- (g) Increasing the transparency of the uncertainty analysis by providing documentation on the derivation of the uncertainty values and using consistent wording in accordance with the methods used by the Party;
- (h) The performance of a key category analysis at the land-use subcategory level, as suggested by the IPCC good practice guidance for LULUCF (table 5.4.1), with the aim of further evaluating the significance of the subcategories in order to select appropriate methods and prioritize resources.

## F. Waste

### 1. Sector overview

124. In 2009, emissions from the waste sector amounted to 2,159.46 Gg CO<sub>2</sub> eq, representing 5.0 per cent of total GHG emissions. Since 1990, emissions have increased by 97.9 per cent. The key drivers for the rise in emissions are: the increase in the population by 2.3 per cent; the increase in the per capita waste generation since 1990 by 18.3 per cent; the increase in the proportion of municipal solid waste disposed in managed solid waste disposal sites since 2001 by 46.1 per cent; and the increase in energy utilization in waste incineration plants. In addition, various economic incentives have contributed to the shift in solid waste disposal practices towards an increasing use of managed disposal sites. Within the sector, 73.4 per cent of the emissions were from solid waste disposal on land (47.5 per cent from managed waste disposal on land and 25.8 per cent from industrial and agricultural solid waste disposal on land), followed by 20.7 per cent from wastewater handling, 5.6 per cent from composting and 0.4 per cent from waste incineration.

125. In the NIR, Slovakia has continued to report a lack of AD for CH<sub>4</sub> recovery from sludge stabilization and some solid waste disposal sites (SWDS) due to the non-existence of mandatory requirements for the data collection and reporting of data on the biogas and CH<sub>4</sub> fractions from such activities. However, additional information provided by the Party during the review indicated that Slovakia is in the process of developing national legislation on the recovery and accounting of CH<sub>4</sub> recovery from biogas generation related activities. This legislation will, among other things, seek to establish the mandatory reporting of biogas and CH<sub>4</sub> recovery data from various activities in order to drive an increase in renewable energy (biogas) utilization. The ERT encourages Slovakia to ensure the development of the institutional arrangements under the emerging legislation on biogas and landfill gas recovery, in order to improve the disaggregation of data, the accuracy and transparency of the measurements used and the reporting of CH<sub>4</sub> and biogas recovery for relevant categories in the inventory.

126. The ERT noted the efforts of the sectoral external expert to consolidate and refine the ongoing development of the AD and EF database for the waste sector, in order to ensure continuity of the institutional memory, but also with the objective of transmitting all this information to the centralized archive at SHMU and facilitating the preparation of the waste sector inventory by other experts to be involved in this task in the future. The ERT recommends that Slovakia complete this project in order to further improve the transparency of the emission estimates and facilitate QC procedures of the waste sector inventory.

127. Slovakia has improved the implementation of category-specific QA/QC procedures, particularly the verification of plant-specific AD for CH<sub>4</sub> recovery and use, in order to reduce the uncertainty of the estimates of landfill gas recovery for energy use and/or flaring, as well as the verification of the biogenic and non-biogenic fractions with the operators of incineration plants in response to the recommendations of the previous review report. However, the ERT reiterates the recommendation of the previous review report that the Party further strengthen its QA/QC procedures through the involvement of relevant institutions and other experts in the peer review of the estimates, ensure that any missing AD for any inventory period are provided or estimated through a correct proximate analysis, thereby ensuring time-series consistency, and provide an adequate explanation of any unusual trends and the key drivers as a result of various domestic actions that influence waste disposal practices (i.e. legislation, regulations, directives, economic incentives, changes in solid waste and wastewater treatment technologies) in the NIR of the next annual submission.

128. Slovakia has performed recalculations in response to the recommendations in the previous review report. These recalculations include: the updated reporting of CH<sub>4</sub> recovered from SWDS; the inclusion and refinement of wastewater discharge pathways for the estimation of CH<sub>4</sub> and N<sub>2</sub>O emissions from the discharge of domestic and commercial, and industrial wastewater; and inclusion of N<sub>2</sub>O and CO<sub>2</sub> emissions from waste incineration for the period 1990–2008. The net effect of these recalculations is a decrease in emissions of 62.19 Gg CO<sub>2</sub> eq, representing a 2.7 per cent decrease in sectoral emissions and a 0.1 per cent decrease in total GHG emissions for 2008 and an increase in emissions of 35.94 Gg CO<sub>2</sub> eq, representing a 3.4 per cent increase in sectoral emissions and a 0.05 per cent increase in total GHG emissions for 1990. The recalculations are also the result of the application of a more appropriate DOC value of 0.065 instead of 0.068. The change was based on the average rainfall/precipitation of 500 mm in Slovakia and resulted in a significant decrease in waste disposal at industrial waste disposal sites by 16.8 per cent in the 2011 annual submission compared to the previous annual submission. The ERT found that the recalculations have been clearly explained in the NIR, but not in the CRF tables. The ERT recommends that Slovakia fully explain all recalculations in the NIR and in CRF table 8(b) in its next and future annual submissions.

## 2. Key categories

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

129. Slovakia has used the first order decay (FOD) model to estimate CH<sub>4</sub> emissions from municipal solid waste disposal on land in accordance with the IPCC good practice guidance. Slovakia has included in the NIR the justification for the choice of a country-specific CH<sub>4</sub> generation rate constant (k) of 0.065 in response to the recommendations in the previous review report.

130. In its 2011 annual submission, Slovakia has estimated and reported emissions from industrial and agricultural solid waste disposal sites for the period 2000–2009 under the category other using the mass balance approach from the Revised 1996 IPCC Guidelines and default values for parameters such as the DOC value and the fraction of DOC dissimilated (DOC<sub>f</sub>) from the *2006 IPCC Guidelines for National Greenhouse Gas Inventories* (hereinafter referred to as the 2006 IPCC Guidelines) due to a lack of historical AD required for the application of the FOD model. The missing estimates for the period 1990–1999 represent a time-series consistency issue.

131. The ERT noted that in the previous review report it was recommended that Slovakia disaggregate municipal solid waste from industrial and agricultural solid waste and apply the FOD model to estimate emissions from industrial and agricultural solid waste disposal sites in view of the significant contribution of these activities and the possibility that they may become a key category. The ERT also noted that, for example, in 2009, CH<sub>4</sub> emissions from solid waste disposal on land contributed 3.7 per cent of total national GHG emissions, whereas managed waste disposal on land contributed 2.4 per cent of total national GHG emissions and other (agricultural and industrial waste) contributed 1.3 per cent of total national GHG emissions. Based on the national circumstances and the difficulty in obtaining AD for the years 1990–1999, the ERT reiterates the recommendation of the previous review report that Slovakia disaggregate municipal solid waste disposal from industrial and agricultural solid waste, and apply the splicing techniques provided in the IPCC good practice guidance to obtain the missing AD. For example, the use of the correlation between the industry contribution to GDP and industrial waste disposal per GDP, and the per capita waste generation could be used to obtain the waste generation AD. In addition, the ERT recommends that Slovakia use appropriate IPCC default EFs for the corresponding waste management practices to estimate the emissions for the period 1990–

1999, in order to address the identified time-series inconsistency issue in its next annual submission.

132. The ERT noted that Slovakia has accounted for CH<sub>4</sub> recovery from solid waste disposal sites in accordance with the IPCC good practice guidance in its 2011 annual submission in response to the recommendations of the previous review report, and has documented this revision in the NIR. However, Slovakia has not documented in the NIR the technical procedures and the performed measurements of landfill gas recovered. The accounting method used can lead to a potential underestimation of recovery because, for example, the actual fraction of CH<sub>4</sub> in biogas emissions can potentially exceed the 50 per cent share assumed in the IPCC default method. The ERT recommends that Slovakia implement measures to ensure that the reporting of CH<sub>4</sub> recovery based on the metering of all landfill gas recovered for energy utilization and flaring is consistent with the IPCC good practice guidance.

133. The ERT commends Slovakia for the very detailed tier 2 uncertainty assessment undertaken for solid waste disposal on land. The ERT noted that the uncertainty estimates range from -76.54 per cent to +78.24 per cent for 2009, which is very high compared to the 50 per cent IPCC default percentage, thereby indicating the need to strengthen the selection of parameters and QA procedures in order to reduce the uncertainty in the input variables for the FOD model, particularly the waste composition and waste fractions for the computation of the DOC values. The ERT encourages Slovakia to complete its tier 2 uncertainty assessment covering all categories of the waste sector in its next annual submission.

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

134. Slovakia has used the method recommended in the 2006 IPCC Guidelines to estimate emissions from wastewater handling. Emission estimates have been reported in the 2011 annual submission for all relevant wastewater treatment pathways, including treated and untreated domestic and commercial and industrial wastewater, septic tanks and dry toilets. In response to the recommendations of the previous review report, Slovakia has provided a clear rationale for the choice of methods and EFs used for each wastewater handling pathway in the NIR.

135. Slovakia has also provided in the NIR an elaborate discussion of the anaerobic and aerobic stabilization of sludge generated in wastewater treatment plants. The outcome of a recent study on 80 per cent of wastewater treatment plants has also been provided in the NIR, which indicates that sludge stabilization for energy recovery is growing in the country, with about 18 cogeneration units producing 12.7 GWh of electricity in 2007. The ERT noted that Slovakia has recognized the growing significance of CH<sub>4</sub> generation in the waste sector and its recovery for energy use, which has a high emission reduction potential, and recommends that Slovakia take advantage of the current bill in parliament to develop a more comprehensive approach towards the collection of AD for biogas and CH<sub>4</sub> recovery for energy utilization and/or flaring, in order to report emissions from flaring in the waste sector and emissions from energy use in the energy sector with improved accuracy and transparency in its next annual submission.

136. In response to the recommendations of the previous review report, Slovakia has documented the recalculations for wastewater handling as a result of the shift to the use of the method recommended in the 2006 IPCC Guidelines, and has reported these changes in the CRF tables for the period 1990–2008.

### 3. Non-key categories

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

137. The ERT noted that Slovakia has improved the coverage and transparency of the estimation of N<sub>2</sub>O emissions from wastewater handling by using a method from the Fraunhofer Institute for Systems and Innovation Research ISI for advanced centralized wastewater treatment plants with nitrification/denitrification stage processes. The recalculation led to an increase in N<sub>2</sub>O emissions from wastewater handling of 43.17 Gg CO<sub>2</sub> eq (or by 45.2 per cent) for 1990 and 10.61 Gg CO<sub>2</sub> eq (or by 14.6 per cent) for 2008. The impact on total GHG emissions is an increase of 0.1 per cent for 1990 and 0.02 per cent for 2008. The recalculations are clearly documented in the NIR and consistently reported in the CRF tables.

138. The ERT noted that the Statistical Office of the Slovak Republic published its biannual AD for protein consumption for 2009, which included data for 2007 and 2008 and enabled Slovakia to correct the per capita protein consumption for the emission estimates for 2007 and 2008 in response to the recommendations of the previous review report. The improved collaboration of the external expert for the waste sector and the Statistical Office of the Slovak Republic underpins the need to formalize the roles and responsibilities of all relevant institutions, in order to ensure the effective planning and preparation of the inventory and the effective implementation of QA/QC procedures for the waste sector.

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

139. The ERT noted that, in response to the recommendations of previous review reports, Slovakia has made use of the European Waste Classification (EWC) reporting to obtain the AD for the biogenic waste streams for the years 1990–1997 and to estimate CO<sub>2</sub> emissions from biogenic waste incineration. The Party has reported these emissions under the memo items and has used the appropriate notation key “IE” in CRF table 6.C. Further, Slovakia has documented the incineration of municipal and industrial solid waste with energy recovery for 2008 and 2009, and has reported the QA/QC activities undertaken, particularly the involvement of the waste incinerator operators to obtain plant-specific AD on the biogenic fractions of waste and the waste composition in order to reduce the uncertainty of the biogenic and non-biogenic CO<sub>2</sub> emissions for the 2011 annual submission in the absence of a centralized system for the collection of AD for this category.

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

140. Slovakia has continued to report CH<sub>4</sub> and N<sub>2</sub>O emissions from industrial solid waste composting as “NO” for the years 1990–2001, notwithstanding the fact that the Party confirmed that the appropriate notation key for these years should be “NE”, as reflected in the previous review report. The ERT noted that the Statistical Office of the Slovak Republic has only reported consistent AD from 2002 onwards, and that there are no centrally collected data on anaerobic treatment and on the composting of industrial solid waste compared to the composting of municipal solid waste. The ERT recommends that Slovakia take advantage of the emerging legislation on CH<sub>4</sub> recovery for energy utilization to obtain data that will be suitable for the preparation of the inventory and report on this improvement in the NIR of its next annual submission. Further, the ERT recommends that Slovakia develop emission estimates for the years 1990–2001 in its next annual submission.

#### 4. Areas for further improvement

##### Identified by the Party

141. Slovakia identified the following areas for further improvement as part of its improvement plan:

- (a) The review of the country-specific DOC value for municipal solid waste disposal sites and industrial solid waste disposal sites to reflect the decrease in the biogenic fractions of waste;
- (b) The completion of the ongoing development of an integrated database on the AD and EFs used in the inventory for the waste sector;
- (c) The review of the data on the national population for the 2012 submission using the results from the publication of the 2011 national population census;
- (d) The review of the AD on solid waste to address outlying data and their replacement through the interpolation/extrapolation of existing data in accordance with observed trends in EWC since 2002.

##### Identified by the expert review team

142. The ERT identified the following issues for improvement:

- (a) The use of the notation key “IE” instead of “NO” in the NIR and in the CRF tables for CH<sub>4</sub> emissions from uncategorized sites since the FOD method accounts for such emissions using appropriate methane conversion factors estimated for the various years of the time series;
- (b) The disaggregation of industrial solid waste disposal from municipal solid waste disposal for the period 1990–1996 by applying the splicing techniques provided in the IPCC good practice guidance, in order to obtain the missing AD;
- (c) The development of institutional arrangements under the emerging legislation on biogas and landfill gas recovery and the integration of metering into the reporting of CH<sub>4</sub> and biogas recovery in the relevant categories.

#### G. Adjustments

143. The ERT identified underestimations in the emission estimates and recommended nine adjustments in the energy sector and five adjustments in the industrial processes sector for 2008 and 2009 of the 2011 annual submission of Slovakia. The ERT calculated these adjustments in accordance with the “Technical guidance on methodologies for adjustments under Article 5, paragraph 2, of the Kyoto Protocol” (hereinafter referred to as the guidance for adjustments under Article 5, paragraph 2, of the Kyoto Protocol) (annex to decision 20/CMP.1). In addition, in accordance with the Article 8 review guidelines (annex to decision 22/CMP.1), the ERT prepared the adjustments in consultation with Slovakia and officially notified the Party of the calculated adjustments.

144. The underestimations leading to adjustments in the energy sector for 2008 and 2009 include emissions from road transportation (1.A.3.b) for gasoline (CO<sub>2</sub> and N<sub>2</sub>O), diesel oil (CO<sub>2</sub> and N<sub>2</sub>O), liquefied petroleum gas (LPG) (CH<sub>4</sub> and N<sub>2</sub>O), gaseous fuels (CH<sub>4</sub>) and biomass (CH<sub>4</sub> and N<sub>2</sub>O). The underestimations leading to adjustments in the industrial processes sector for 2008 and 2009 include HFC emissions from foam blowing (2.F.2), PFC and SF<sub>6</sub> emissions from fire extinguishers (2.F.3), HFC emissions from aerosols/metered dose inhalers (2.F.4) and HFC emissions from solvents (2.F.5).

145. The adjusted estimate for GHG emissions from the energy sector for 2008 amounts to 31,677.73 Gg CO<sub>2</sub> eq, compared with 31,327.71 Gg CO<sub>2</sub> eq as reported by Slovakia in its revised 2011 annual submission (an increase of 350.02 Gg CO<sub>2</sub> eq or 1.1 per cent) and the adjusted estimate for 2009 amounts to 28,965.19 Gg CO<sub>2</sub> eq, compared with 28,661.34 Gg CO<sub>2</sub> eq as reported by Slovakia in its revised 2011 annual submission (an increase of 303.86 Gg CO<sub>2</sub> eq or 1.1 per cent). The adjusted estimate for GHG emissions from the industrial processes sector for 2008 amounts to 11,228.70 Gg CO<sub>2</sub> eq, compared with 11,182.73 Gg CO<sub>2</sub> eq as reported by Slovakia in its revised 2011 annual submission (an increase of 45.98 Gg CO<sub>2</sub> eq or 0.4 per cent) and the adjusted estimate for 2009 amounts to 9,435.36 Gg CO<sub>2</sub> eq, compared with 9,389.33 Gg CO<sub>2</sub> eq as reported by Slovakia in its revised 2011 annual submission (an increase of 46.03 Gg CO<sub>2</sub> eq or 0.5 per cent).

146. The calculation of the adjustments leads to an increase in estimated total GHG emissions from Annex A sources of 0.8 per cent (396.00 Gg CO<sub>2</sub> eq) for 2008, from 48,195.21 Gg CO<sub>2</sub> eq as reported by Slovakia to 48,591.21 Gg CO<sub>2</sub> eq as calculated by the ERT. The calculation of the adjustments leads to an increase in estimated total GHG emissions from Annex A sources of 0.8 per cent (349.89 Gg CO<sub>2</sub> eq) for 2009, from 43,393.10 Gg CO<sub>2</sub> eq as reported by Slovakia to 43,742.98 Gg CO<sub>2</sub> eq as calculated by the ERT.

147. In its response to the draft annual review report, Slovakia notified the secretariat of its intention to reject the calculated adjustments and sent a notification to the ERT with its rationale for not accepting the adjustments.

148. The ERT notes that Slovakia may submit revised estimates for the parts of its inventory to which adjustments were applied, in conjunction with its next inventory, or at the latest with the inventory for the year 2012. The revised estimates will be part of the review under Article 8 of the Kyoto Protocol and if accepted by the ERT the revised estimates will replace the adjustments.

## 1. CO<sub>2</sub>, CH<sub>4</sub> and N<sub>2</sub>O emissions from road transportation

### The original estimate

149. In its 2011 annual submission, Slovakia reported an emission estimate of 6,576.57 Gg CO<sub>2</sub> eq for 2008 and 6,101.51 Gg CO<sub>2</sub> eq for 2009 for the road transportation category. For 2008, emissions of 2,075.31 Gg CO<sub>2</sub> eq correspond to gasoline, followed by 4,394.41 Gg CO<sub>2</sub> eq for diesel oil, 87.32 Gg CO<sub>2</sub> eq for LPG, 17.71 Gg CO<sub>2</sub> eq for gaseous fuels and 1.83 Gg CO<sub>2</sub> eq for biomass. For 2009, emissions of 2,000.74 Gg CO<sub>2</sub> eq correspond to gasoline, followed by 4,003.80 Gg CO<sub>2</sub> eq for diesel oil, 74.46 Gg CO<sub>2</sub> eq for LPG, 20.11 Gg CO<sub>2</sub> eq for gaseous fuels and 2.41 Gg CO<sub>2</sub> eq for biomass.

### The underlying problem

150. In its 2011 annual submission, Slovakia estimated CH<sub>4</sub> and N<sub>2</sub>O emissions (and also CO<sub>2</sub> emissions) from road transportation using the COPERT IV model (version 7.1) for the years from 2000 onwards. However, the Party did not provide a sufficient explanation in the NIR to justify the use of the lower CH<sub>4</sub> and N<sub>2</sub>O EFs from the COPERT IV model, when compared with those from previous COPERT model versions. The ERT identified that the CH<sub>4</sub> and N<sub>2</sub>O EFs used for the emission estimates for gasoline and diesel oil for 2008 in the original 2011 annual submission were lower (e.g. the value of the IEFs for gasoline were: CH<sub>4</sub> – 15.40 kg/TJ and N<sub>2</sub>O – 3.76 kg/TJ) than those used in the previous inventory submission for 2008 (e.g. the IEFs for gasoline were: CH<sub>4</sub> – 18.73 kg/TJ and N<sub>2</sub>O – 4.73 kg/TJ). These values showed a reduction in the CH<sub>4</sub> and N<sub>2</sub>O IEFs for gasoline of 17.8 per cent and 20.5 per cent, respectively. CH<sub>4</sub> and N<sub>2</sub>O EFs with similarly low values were reported for 2009. During the review, the ERT requested that Slovakia provide the

rationale and background information for the use of these EFs in the 2011 annual submission. However, Slovakia was not able to provide such information or a satisfactory explanation, because the estimation of such factors is performed by the COPERT IV model. Due to the lack of transparency of the information provided, the ERT could not assess the validity and accuracy of these lower CH<sub>4</sub> and N<sub>2</sub>O EFs and the corresponding emission estimates for the road transportation category.

#### The recommendation to the Party

151. In the list of potential problems and further questions raised during the review, the ERT recommended that Slovakia provide supporting background information on the CH<sub>4</sub> and N<sub>2</sub>O EFs used to estimate emissions from this category and clearly justify that the emissions are not underestimated.

152. In its response to the list of potential problems and further questions raised by the ERT, Slovakia submitted revised estimates of CH<sub>4</sub> and N<sub>2</sub>O emissions and included also revised estimates of CO<sub>2</sub> emissions for all fuels from road transportation using the COPERT IV model (version 8.1) for the years 1990–2009, and in addition, the Party revised the AD for all fuels in this category. These estimates showed an overall reduction of 32.98 Gg CO<sub>2</sub> eq or 0.5 per cent of total GHG emissions for the category, or 0.1 per cent of total GHG emissions for the energy sector for 2009. Slovakia also provided an explanation as to why it believes that the new CH<sub>4</sub> and N<sub>2</sub>O EFs as used in the COPERT IV model are more applicable to Slovakia's conditions and national circumstances. However, Slovakia did not provide clear explanations of the different parameters used for setting and calculating the EFs in the COPERT IV model (e.g. the number of sample cars, type of vehicle, model year, engine displacement, weight of vehicle, type of mode (conditions of testing method for mileage), average speed, mileage and actual measurements of CH<sub>4</sub>, CO, CO<sub>2</sub>, HC, N<sub>2</sub>O, NO<sub>x</sub> and PM), as well as consistent reasons as to why the AD were changed between the original and the revised 2011 annual submissions.

#### The rationale for adjustment

153. The ERT assessed the information provided by Slovakia in its response to the identified potential problem and concluded that the information provided does not adequately resolve the problem because it does not provide an explanation of the values used for setting and calculating the CH<sub>4</sub> and N<sub>2</sub>O EFs and the corresponding emissions in the COPERT IV model. The ERT considered the response provided by Slovakia and concluded that the Party did not provide satisfactory background data and/or sufficiently transparent information for the ERT to assess these EFs and the revised estimates and/or justifying that the revised CH<sub>4</sub> and N<sub>2</sub>O emissions from road transportation are not underestimated and how they were calculated, as well as to assess the revised estimates of CO<sub>2</sub> emissions from this category. Moreover, the ERT found differences and inconsistencies between the AD provided in the CRF tables and in the NIR of the original 2011 annual submission, the revised AD reported by Slovakia, the background information provided by Slovakia (e.g. for biomass consumption) and the available information published by the Statistical Office of the Slovak Republic (2009).<sup>5</sup> Further, the ERT was not able to confirm whether the total fuel consumption used in the COPERT model is consistent with the total fuel used in the country for road transportation.

154. The ERT noted that, in accordance with paragraph 19 of the annex to decision 20/CMP.1, an adjustment procedure should be initiated if the information provided by the Party is not sufficiently transparent; therefore, the ERT considered this as the rationale for

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<sup>5</sup> Available at  
<[http://portal.statistics.sk/files/Sekcie/sek\\_500/energetika/archiv2010\\_pdf/puben09\\_web\\_def.pdf](http://portal.statistics.sk/files/Sekcie/sek_500/energetika/archiv2010_pdf/puben09_web_def.pdf)>.

the calculation of adjustments of the CO<sub>2</sub>, CH<sub>4</sub> and N<sub>2</sub>O emission estimates for road transportation and decided to recommend adjustments for this category with potential problems.

The assumptions, data and methodology used to calculate the adjustment

155. In accordance with table 1 of the guidance for adjustments under Article 5, paragraph 2, of the Kyoto Protocol (annex to decision 20/CMP.1), the ERT decided to use the adjustment method 1: default IPCC tier 1, to calculate the CO<sub>2</sub>, CH<sub>4</sub> and N<sub>2</sub>O emission estimates using available IPCC default values for the CO<sub>2</sub>, CH<sub>4</sub> and N<sub>2</sub>O EFs for all considered fuels. In addition, in accordance with paragraph 34(c) of the guidance for adjustments under Article 5, paragraph 2, of the Kyoto Protocol (annex to decision 20/CMP.1), the ERT decided to use averages of the IEF values from a cluster of countries to calculate the N<sub>2</sub>O emission estimates for LPG and the CH<sub>4</sub> and N<sub>2</sub>O emission estimates for biomass, as the corresponding IPCC default values are not available.

156. In accordance with the guidance for adjustments under Article 5, paragraph 2, of the Kyoto Protocol, the cluster of countries should cover a minimum number of countries and, to the extent possible, take into account similar national circumstances. Therefore, the ERT considered data on the N<sub>2</sub>O IEFs for LPG and the CH<sub>4</sub> and N<sub>2</sub>O IEFs for biomass used in road transportation available for the latest year (2008) of the reviewed 2010 annual submissions of European Annex I Parties, namely: Belarus, Belgium, Bulgaria, Croatia, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Liechtenstein, Lithuania, Luxembourg, Monaco, Netherlands, Norway, Poland, Portugal, Russian Federation, Slovenia, Spain, Sweden, Switzerland and Ukraine, and excluded the Parties that reported these IEFs using notation keys for the purposes of obtaining an average calculation.

157. Table 5 presents the background data used for the calculation of the average N<sub>2</sub>O IEFs for LPG and the average CH<sub>4</sub> and N<sub>2</sub>O IEFs for biomass.

Table 5

**Background data used for the calculation of adjustments for the N<sub>2</sub>O EFs for LPG and the CH<sub>4</sub> and N<sub>2</sub>O EFs for biomass used in road transportation**

<i>Party</i>	<i>LPG N<sub>2</sub>O IEF, kg/TJ</i>	<i>Biomass CH<sub>4</sub> IEF, kg/TJ</i>	<i>Biomass N<sub>2</sub>O IEF, kg/TJ</i>
Belarus	0.10	NO	NO
Belgium	2.12	NE	NE
Bulgaria	0.20	153.73	25.52
Croatia	3.62	3.00	0.60
Czech Republic	NE	1.40	NE
Denmark	NA, NO	8.70	1.76
Estonia	0.10	NO	NA
Finland	NO	13.52	2.82
France	1.04	3.20	1.41
Germany	1.70	1.46	1.45
Greece	7.03	5.71	1.77
Hungary	3.00	IE	IE

<i>Party</i>	<i>LPG N<sub>2</sub>O IEF, kg/TJ</i>	<i>Biomass CH<sub>4</sub> IEF, kg/TJ</i>	<i>Biomass N<sub>2</sub>O IEF, kg/TJ</i>
Ireland	3.35	5.21	2.42
Italy	2.31	IE	IE
Latvia	4.51	1.10	1.40
Liechtenstein	NO	0.07	1.46
Lithuania	0.20	10.00	0.60
Luxembourg	3.06	0.94	2.36
Monaco	NO	19.40	11.93
Netherlands	3.93	4.38	2.81
Norway	4.62	NO	NO
Poland	0.20	3.00	0.60
Portugal	6.52	3.38	2.48
Russian Federation	0.10	NO	NO
Slovenia	NO	1.10	1.40
Spain	3.49	NA	NA
Sweden	NO	IE, NO, NE	0.19
Switzerland	NO	2.15	1.81
Ukraine	0.10	NO	NO
<b>Average</b>	<b>2.44</b>	<b>12.71</b>	<b>3.41</b>

*Abbreviations:* IE= included elsewhere, IEF = implied emission factor, LPG = liquefied petroleum gas, NA = not applicable, NE = not estimated, NO = not occurring.

158. The calculation of the emissions for the adjustments was performed using IPCC default EFs from the Revised 1996 IPCC Guidelines for CO<sub>2</sub> and N<sub>2</sub>O emissions from gasoline and diesel oil, and CH<sub>4</sub> emissions from LPG and gaseous fuels, and the calculated average IEFs were used for N<sub>2</sub>O emissions from LPG, and CH<sub>4</sub> and N<sub>2</sub>O emissions from biomass. When the ERT assessed the revised AD reported by Slovakia in response to the list of potential problems and further questions raised by the ERT during the review, it noted differences and inconsistencies in these data compared with the AD provided in the CRF tables and the NIR in the original 2011 annual submission and in the available information published by the Statistical Office of the Slovak Republic and the background information provided by Slovakia (e.g. for biomass consumption), and the ERT was not able to confirm whether the total fuel consumption used in the revised estimates is consistent with the total fuel used in the country for road transportation (overall, the revised AD for this category increased by 0.04 per cent for 2008 and decreased by 0.09 per cent for 2009 compared with the AD in the original 2011 annual submission). Therefore, the AD used for the calculations of adjustments were taken from CRF table 1.A(a) of the original 2011 annual submission, which are, in principle, consistent with the information in the NIR.

159. The ERT performed calculations of adjustments for CO<sub>2</sub>, CH<sub>4</sub> and N<sub>2</sub>O emissions from road transportation for all fuels reported in the 2011 annual submission. However, the ERT found that the resulting adjusted estimates for CH<sub>4</sub> emissions from gasoline and diesel oil and CO<sub>2</sub> emissions from LPG and gaseous fuels were lower than the original estimates subject to adjustments; therefore, in accordance with paragraph 17 of the guidance for

adjustments under Article 5, paragraph 2, of the Kyoto Protocol (annex to decision 20/CMP.1), the ERT decided not to include adjustments for the above-mentioned gases and fuels in this report. The ERT notes that CO<sub>2</sub> emissions from biomass is not an Annex A source and is therefore not subject to adjustments, and that the revised estimates of N<sub>2</sub>O emissions from gaseous fuels were accepted by the ERT and, therefore, are also not subject to adjustments (see para. 60 above).

#### The adjusted estimate

160. Tables 6, 7, 8, 9 and 10 show the steps for the calculation of adjustments for the category road transportation for 2008 and 2009, in line with paragraph 7 of decision 20/CMP.1. These tables present the results of the ERT's calculation, including the estimates for CO<sub>2</sub> and N<sub>2</sub>O emissions from gasoline, CO<sub>2</sub> and N<sub>2</sub>O emissions from diesel oil, CH<sub>4</sub> and N<sub>2</sub>O emissions from LPG, CH<sub>4</sub> emissions from gaseous fuels and CH<sub>4</sub> and N<sub>2</sub>O emissions from biomass as reported by Slovakia, the adjusted estimates as calculated by the ERT, and the impact of the adjustments on total estimated GHG emissions for 2008 and 2009.

161. As table 6 shows, the adjusted estimate for the subcategory gasoline (CO<sub>2</sub> and N<sub>2</sub>O emissions) for 2008 amounts to 2,327.730 Gg CO<sub>2</sub> eq compared with 2,120.873 Gg CO<sub>2</sub> eq as reported by Slovakia, and for 2009 the adjusted estimate amounts to 2,207.650 Gg CO<sub>2</sub> eq compared with 2,010.001 Gg CO<sub>2</sub> eq as reported by Slovakia. The application of the adjustments leads to an increase in total estimated GHG emissions of 206.857 Gg CO<sub>2</sub> eq, or 0.43 per cent for 2008 and of 197.649 Gg CO<sub>2</sub> eq, or 0.46 per cent for 2009.

162. As table 7 shows, the adjusted estimate for the subcategory diesel oil (CO<sub>2</sub> and N<sub>2</sub>O emissions) for 2008 amounts to 4,496.240 Gg CO<sub>2</sub> eq compared with 4,356.066 Gg CO<sub>2</sub> eq as reported by Slovakia, and for 2009 the adjusted estimate amounts to 4,064.352 Gg CO<sub>2</sub> eq compared with 3,961.419 Gg CO<sub>2</sub> eq as reported by Slovakia. The application of the adjustments leads to an increase in total estimated GHG emissions of 140.173 Gg CO<sub>2</sub> eq, or 0.29 per cent for 2008, and of 102.933 Gg CO<sub>2</sub> eq, or 0.24 per cent for 2009.

163. As table 8 shows, the adjusted estimate for the subcategory LPG (CH<sub>4</sub> and N<sub>2</sub>O emissions) for 2008 amounts to 87.477 Gg CO<sub>2</sub> eq compared with 87.250 Gg CO<sub>2</sub> eq as reported by Slovakia, and for 2009 the adjusted estimate amounts to 75.077 Gg CO<sub>2</sub> eq compared with 74.805 Gg CO<sub>2</sub> eq as reported by Slovakia. The application of the adjustments leads to an increase in total estimated GHG emissions of 0.227 Gg CO<sub>2</sub> eq, or 0.0005 per cent for 2008, and of 0.272 Gg CO<sub>2</sub> eq, or 0.001 per cent for 2009.

164. As table 9 shows, the adjusted estimate for the subcategory gaseous fuels (CH<sub>4</sub> emissions) for 2008 amounts to 18.631 Gg CO<sub>2</sub> eq compared with 17.926 Gg CO<sub>2</sub> eq as reported by Slovakia, and for 2009 the adjusted estimate amounts to 20.778 Gg CO<sub>2</sub> eq compared with 20.306 Gg CO<sub>2</sub> eq as reported by Slovakia. The application of the adjustments leads to an increase in total estimated GHG emissions of 0.704 Gg CO<sub>2</sub> eq, or 0.001 per cent for 2008, and of 0.472 Gg CO<sub>2</sub> eq, or 0.001 per cent for 2009.

165. As table 10 shows, the adjusted estimate for the subcategory biomass (CH<sub>4</sub> and N<sub>2</sub>O emissions) for 2008 amounts to 3.740 Gg CO<sub>2</sub> eq compared with 1.679 Gg CO<sub>2</sub> eq as reported by Slovakia, and for 2009 the adjusted estimate amounts to 4.529 Gg CO<sub>2</sub> eq compared with 1.999 Gg CO<sub>2</sub> eq as reported by Slovakia. The application of the adjustments leads to an increase in total estimated GHG emissions of 2.060 Gg CO<sub>2</sub> eq, or 0.004 per cent for 2008, and of 2.531 Gg CO<sub>2</sub> eq, or 0.01 per cent for 2009.

Table 6  
**Description of the adjustments calculation for CO<sub>2</sub> and N<sub>2</sub>O emissions from gasoline under road transportation for 2008 and 2009**

<i>Parameter/Estimate</i>	<i>Value</i>	<i>Unit</i>	<i>Source</i>
Category: road transportation: liquid fuels – gasoline – CO <sub>2</sub> and N <sub>2</sub> O			
Slovakia's reported CO <sub>2</sub> emissions from gasoline for 2008	2 074.794	Gg	2011 submission of Slovakia v2.1, CRF table 1.A(a)
Slovakia's reported N <sub>2</sub> O emissions from gasoline for 2008	0.117	Gg	2011 submission of Slovakia v2.1, CRF table 1.A(a)
Slovakia's reported CO <sub>2</sub> emissions from gasoline for 2009	1 965.834	Gg	2011 submission of Slovakia v2.1, CRF table 1.A(a)
Slovakia's reported N <sub>2</sub> O emissions from gasoline for 2009	0.115	Gg	2011 submission of Slovakia v2.1, CRF table 1.A(a)
Slovakia's reported CO <sub>2</sub> IEF from gasoline for 2008	71.35	t/TJ	2011 submission of Slovakia v2.1, CRF table 1.A(a)
Slovakia's reported N <sub>2</sub> O IEF from gasoline for 2008	4.03	kg/TJ	2011 submission of Slovakia v2.1, CRF table 1.A(a)
Slovakia's reported CO <sub>2</sub> IEF from gasoline for 2009	71.56	t/TJ	2011 submission of Slovakia v2.1, CRF table 1.A(a)
Slovakia's reported N <sub>2</sub> O IEF from gasoline for 2009	4.17	kg/TJ	2011 submission of Slovakia v2.1, CRF table 1.A(a)
CO <sub>2</sub> EF for gasoline	73.00	t/TJ	Revised 1996 IPCC Guidelines, volume 3, table 1–36
N <sub>2</sub> O EF for gasoline	20.00	kg/TJ	Revised 1996 IPCC Guidelines, volume 3, table 1–36
Slovakia's reported gasoline consumption for 2008	28 539.95	TJ	2011 submission of Slovakia v1.3, CRF table 1.A(a)
Slovakia's reported gasoline consumption for 2009	27 075.85	TJ	2011 submission of Slovakia v1.3, CRF table 1.A(a)
CF (for the EF): CO <sub>2</sub>	1.02	—	Table 2 of appendix III to the guidance for adjustments under Article 5, paragraph 2, of the Kyoto Protocol
CF (for the EF): N <sub>2</sub> O	1.21	—	Table 2 of appendix III to the guidance for adjustments under Article 5, paragraph 2, of the Kyoto Protocol
Adjusted CO <sub>2</sub> EF after application of the CF for gasoline	74.46	t/TJ	ERT's calculation
Adjusted N <sub>2</sub> O EF after application of the CF for gasoline	24.20	kg/TJ	ERT's calculation
Adjusted conservative estimate of CO <sub>2</sub> emissions from gasoline for 2008	2 103.834	Gg	ERT's calculation
Adjusted conservative estimate of N <sub>2</sub> O emissions from gasoline for 2008	0.691	Gg	ERT's calculation

<i>Parameter/Estimate</i>	<i>Value</i>	<i>Unit</i>	<i>Source</i>
Adjusted conservative estimate of CO <sub>2</sub> emissions from gasoline for 2009	1 995.907	Gg	ERT's calculation
Adjusted conservative estimate of N <sub>2</sub> O emissions from gasoline for 2009	0.655	Gg	ERT's calculation
Original estimate reported by Slovakia – CO <sub>2</sub> , CH <sub>4</sub> and N <sub>2</sub> O emissions from gasoline for 2008	2 120.873	Gg CO <sub>2</sub> eq	2011 submission of Slovakia v2.1, CRF table 1.A(a)
Adjusted conservative estimate – CO <sub>2</sub> , CH <sub>4</sub> and N <sub>2</sub> O emissions from gasoline for 2008	2 327.730	Gg CO <sub>2</sub> eq	ERT's calculation
Original estimate reported by Slovakia – CO <sub>2</sub> , CH <sub>4</sub> and N <sub>2</sub> O emissions from gasoline for 2009	2 010.001	Gg CO <sub>2</sub> eq	2011 submission of Slovakia v2.1, CRF table 1.A(a)
Adjusted conservative estimate – CO <sub>2</sub> , CH <sub>4</sub> and N <sub>2</sub> O emissions from gasoline for 2009	2 207.650	Gg CO <sub>2</sub> eq	ERT's calculation
Total aggregated GHG emissions (excluding LULUCF) as reported by Slovakia for 2008	48 195.21	Gg CO <sub>2</sub> eq	2011 submission of Slovakia v2.1, CRF table summary 2
Total aggregated GHG emissions (excluding LULUCF) as reported by Slovakia for 2009	43 393.10	Gg CO <sub>2</sub> eq	2011 submission of Slovakia v2.1, CRF table summary 2
Total aggregated GHG emissions (excluding LULUCF) after application of the adjustment: CO <sub>2</sub> emissions from gasoline for 2008	48 224.25	Gg CO <sub>2</sub> eq	ERT's calculation
Total aggregated GHG emissions (excluding LULUCF) after application of the adjustment: N <sub>2</sub> O emissions from gasoline for 2008	48 373.03	Gg CO <sub>2</sub> eq	ERT's calculation
Total aggregated GHG emissions (excluding LULUCF) after application of the adjustment: CO <sub>2</sub> emissions from gasoline for 2009	43 423.17	Gg CO <sub>2</sub> eq	ERT's calculation
Total aggregated GHG emissions (excluding LULUCF) after application of the adjustment: N <sub>2</sub> O emissions from gasoline for 2009	43 560.68	Gg CO <sub>2</sub> eq	ERT's calculation
Difference between the original and adjusted total aggregated GHG emissions: CO <sub>2</sub> emissions from gasoline for 2008	29.039	Gg CO <sub>2</sub> eq	ERT's calculation
	0.06	%	ERT's calculation
Difference between the original and adjusted total aggregated GHG emissions: N <sub>2</sub> O emissions from gasoline for 2008	177.817	Gg CO <sub>2</sub> eq	ERT's calculation
	0.37	%	ERT's calculation
Difference between the original and adjusted total aggregated GHG emissions: CO <sub>2</sub> emissions from gasoline for 2009	30.072	Gg CO <sub>2</sub> eq	ERT's calculation
	0.07	%	ERT's calculation
Difference between the original and adjusted total aggregated GHG emissions: N <sub>2</sub> O emissions from gasoline for 2009	167.577	Gg CO <sub>2</sub> eq	ERT's calculation
	0.39	%	ERT's calculation

*Abbreviations:* CF = conservativeness factor, CRF = common reporting format, EF = emission factor, ERT = expert review team, GHG = greenhouse gas, IEF = implied emission factor, LULUCF = land use, land-use change and forestry.

**Table 7**  
**Description of the adjustments calculation for CO<sub>2</sub> and N<sub>2</sub>O emissions from diesel oil under road transportation for 2008 and 2009**

<i>Parameter/Estimate</i>	<i>Value</i>	<i>Unit</i>	<i>Source</i>
Category: road transportation: liquid fuels – diesel oil – CO <sub>2</sub> and N <sub>2</sub> O			
Slovakia's reported CO <sub>2</sub> emissions from diesel oil for 2008	4 321.725	Gg	2011 submission of Slovakia v2.1, CRF table 1.A(a)
Slovakia's reported N <sub>2</sub> O emissions from diesel oil for 2008	0.092	Gg	2011 submission of Slovakia v2.1, CRF table 1.A(a)
Slovakia's reported CO <sub>2</sub> emissions from diesel oil for 2009	3 930.274	Gg	2011 submission of Slovakia v2.1, CRF table 1.A(a)
Slovakia's reported N <sub>2</sub> O emissions from diesel oil for 2009	0.085	Gg	2011 submission of Slovakia v2.1, CRF table 1.A(a)
Slovakia's reported CO <sub>2</sub> IEF from diesel oil for 2008	74.15	t/TJ	2011 submission of Slovakia v2.1, CRF table 1.A(a)
Slovakia's reported N <sub>2</sub> O IEF from diesel oil for 2008	1.57	kg/TJ	2011 submission of Slovakia v2.1, CRF table 1.A(a)
Slovakia's reported CO <sub>2</sub> IEF from diesel oil for 2009	74.17	t/TJ	2011 submission of Slovakia v2.1, CRF table 1.A(a)
Slovakia's reported N <sub>2</sub> O IEF from diesel oil for 2009	1.60	kg/TJ	2011 submission of Slovakia v2.1, CRF table 1.A(a)
CO <sub>2</sub> EF for diesel oil	74.00	t/TJ	Revised 1996 IPCC Guidelines, volume 3, table 1–37
N <sub>2</sub> O EF for diesel oil	4.00	kg/TJ	Revised 1996 IPCC Guidelines, volume 3, table 1–37
Slovakia's reported diesel oil consumption for 2008	58 907.65	TJ	2011 submission of Slovakia v1.3, CRF table 1.A(a)
Slovakia's reported diesel oil consumption for 2009	53 256.46	TJ	2011 submission of Slovakia v1.3, CRF table 1.A(a)
CF (for the EF): CO <sub>2</sub>	1.02	—	Table 2 of appendix III to the guidance for adjustments under Article 5, paragraph 2, of the Kyoto Protocol
CF (for the EF): N <sub>2</sub> O	1.21	—	Table 2 of appendix III to the guidance for adjustments under Article 5, paragraph 2, of the Kyoto Protocol
Adjusted CO <sub>2</sub> EF after application of the CF for diesel oil	75.48	t/TJ	ERT's calculation
Adjusted N <sub>2</sub> O EF after application of the CF for diesel oil	4.84	kg/TJ	ERT's calculation
Adjusted conservative estimate of CO <sub>2</sub> emissions from diesel oil for 2008	4 401.886	Gg	ERT's calculation
Adjusted conservative estimate of N <sub>2</sub> O emissions from diesel oil for 2008	0.285	Gg	ERT's calculation

<i>Parameter/Estimate</i>	<i>Value</i>	<i>Unit</i>	<i>Source</i>
Adjusted conservative estimate of CO <sub>2</sub> emissions from diesel oil for 2009	3 979.600	Gg	ERT's calculation
Adjusted conservative estimate of N <sub>2</sub> O emissions from diesel oil for 2009	0.258	Gg	ERT's calculation
Original estimate reported by Slovakia – CO <sub>2</sub> , CH <sub>4</sub> and N <sub>2</sub> O emissions from diesel oil for 2008	4 356.066	Gg CO <sub>2</sub> eq	2011 submission of Slovakia v2.1, CRF table 1.A(a)
Adjusted conservative estimate – CO <sub>2</sub> , CH <sub>4</sub> and N <sub>2</sub> O emissions from diesel oil for 2008	4 496.240	Gg CO <sub>2</sub> eq	ERT's calculation
Original estimate reported by Slovakia – CO <sub>2</sub> , CH <sub>4</sub> and N <sub>2</sub> O emissions from diesel oil for 2009	3 961.419	Gg CO <sub>2</sub> eq	2011 submission of Slovakia v2.1, CRF table 1.A(a)
Adjusted conservative estimate – CO <sub>2</sub> , CH <sub>4</sub> and N <sub>2</sub> O emissions from diesel oil for 2009	4 064.352	Gg CO <sub>2</sub> eq	ERT's calculation
Total aggregated GHG emissions (excluding LULUCF) as reported by Slovakia for 2008	48 195.21	Gg CO <sub>2</sub> eq	2011 submission of Slovakia v2.1, CRF table summary 2
Total aggregated GHG emissions (excluding LULUCF) as reported by Slovakia for 2009	43 393.10	Gg CO <sub>2</sub> eq	2011 submission of Slovakia v2.1, CRF table summary 2
Total aggregated GHG emissions (excluding LULUCF) after application of the adjustment: CO <sub>2</sub> emissions from diesel oil for 2008	48 275.37	Gg CO <sub>2</sub> eq	ERT's calculation
Total aggregated GHG emissions (excluding LULUCF) after application of the adjustment: N <sub>2</sub> O emissions from diesel oil for 2008	48 255.22	Gg CO <sub>2</sub> eq	ERT's calculation
Total aggregated GHG emissions (excluding LULUCF) after application of the adjustment: CO <sub>2</sub> emissions from diesel oil for 2009	43 442.43	Gg CO <sub>2</sub> eq	ERT's calculation
Total aggregated GHG emissions (excluding LULUCF) after application of the adjustment: N <sub>2</sub> O emissions from diesel oil for 2009	43 446.71	Gg CO <sub>2</sub> eq	ERT's calculation
Difference between the original and adjusted total aggregated GHG emissions: CO <sub>2</sub> emissions from diesel oil for 2008	80.160	Gg CO <sub>2</sub> eq	ERT's calculation
	0.17	%	ERT's calculation
Difference between the original and adjusted total aggregated GHG emissions: N <sub>2</sub> O emissions from diesel oil for 2008	60.013	Gg CO <sub>2</sub> eq	ERT's calculation
	0.12	%	ERT's calculation
Difference between the original and adjusted total aggregated GHG emissions: CO <sub>2</sub> emissions from diesel oil for 2009	49.326	Gg CO <sub>2</sub> eq	ERT's calculation
	0.11	%	ERT's calculation
Difference between the original and adjusted total aggregated GHG emissions: N <sub>2</sub> O emissions from diesel oil for 2009	53.606	Gg CO <sub>2</sub> eq	ERT's calculation
	0.12	%	ERT's calculation

*Abbreviations:* CF = conservativeness factor, CRF = common reporting format, EF = emission factor, ERT = expert review team, GHG = greenhouse gas, IEF = implied emission factor, LULUCF = land use, land-use change and forestry.

Table 8  
**Description of the adjustments calculation for CH<sub>4</sub> and N<sub>2</sub>O emissions from LPG under road transportation for 2008 and 2009**

<i>Parameter/Estimate</i>	<i>Value</i>	<i>Unit</i>	<i>Source</i>
Category: road transportation: liquid fuels – LPG – CH <sub>4</sub> and N <sub>2</sub> O			
Slovakia's reported CH <sub>4</sub> emissions from LPG for 2008	0.023	Gg	2011 submission of Slovakia v2.1, CRF table 1.A(a)
Slovakia's reported N <sub>2</sub> O emissions from LPG for 2008	0.003	Gg	2011 submission of Slovakia v2.1, CRF table 1.A(a)
Slovakia's reported CH <sub>4</sub> emissions from LPG for 2009	0.018	Gg	2011 submission of Slovakia v2.1, CRF table 1.A(a)
Slovakia's reported N <sub>2</sub> O emissions from LPG for 2009	0.003	Gg	2011 submission of Slovakia v2.1, CRF table 1.A(a)
Slovakia's reported CH <sub>4</sub> IEF from LPG for 2008	17.77	kg/TJ	2011 submission of Slovakia v2.1, CRF table 1.A(a)
Slovakia's reported N <sub>2</sub> O IEF from LPG for 2008	2.64	kg/TJ	2011 submission of Slovakia v2.1, CRF table 1.A(a)
Slovakia's reported CH <sub>4</sub> IEF from LPG for 2009	16.01	kg/TJ	2011 submission of Slovakia v2.1, CRF table 1.A(a)
Slovakia's reported N <sub>2</sub> O IEF from LPG for 2009	2.44	kg/TJ	2011 submission of Slovakia v2.1, CRF table 1.A(a)
CH <sub>4</sub> EF for LPG	20.00	kg/TJ	Revised 1996 IPCC Guidelines, volume 3, table 1–5
N <sub>2</sub> O EF for LPG	2.44	kg/TJ	ERT's calculation (see table 5 above)
Slovakia's reported LPG consumption for 2008	1 297.26	TJ	2011 submission of Slovakia v1.3, CRF table 1.A(a)
Slovakia's reported LPG consumption for 2009	1 088.21	TJ	2011 submission of Slovakia v1.3, CRF table 1.A(a)
CF (for the EF): CH <sub>4</sub>	1.12	—	Table 2 of appendix III to the guidance for adjustments under Article 5, paragraph 2, of the Kyoto Protocol
CF (for the EF): N <sub>2</sub> O	1.21	—	Table 2 of appendix III to the guidance for adjustments under Article 5, paragraph 2, of the Kyoto Protocol
Adjusted CH <sub>4</sub> EF after application of the CF for LPG	22.40	kg/TJ	ERT's calculation
Adjusted N <sub>2</sub> O EF after application of the CF for LPG	2.96	kg/TJ	ERT's calculation
Adjusted conservative estimate of CH <sub>4</sub> emissions from LPG for 2008	0.029	Gg	ERT's calculation

<i>Parameter/Estimate</i>	<i>Value</i>	<i>Unit</i>	<i>Source</i>
Adjusted conservative estimate of N <sub>2</sub> O emissions from LPG for 2008	0.004	Gg	ERT's calculation
Adjusted conservative estimate of CH <sub>4</sub> emissions from LPG for 2009	0.024	Gg	ERT's calculation
Adjusted conservative estimate of N <sub>2</sub> O emissions from LPG for 2009	0.003	Gg	ERT's calculation
Original estimate reported by Slovakia – CO <sub>2</sub> , CH <sub>4</sub> and N <sub>2</sub> O emissions from LPG for 2008	87.250	Gg CO <sub>2</sub> eq	2011 submission of Slovakia v2.1, CRF table 1.A(a)
Adjusted conservative estimate – CO <sub>2</sub> , CH <sub>4</sub> and N <sub>2</sub> O emissions from LPG for 2008	87.477	Gg CO <sub>2</sub> eq	ERT's calculation
Original estimate reported by Slovakia – CO <sub>2</sub> , CH <sub>4</sub> and N <sub>2</sub> O emissions from LPG for 2009	74.805	Gg CO <sub>2</sub> eq	2011 submission of Slovakia v2.1, CRF table 1.A(a)
Adjusted conservative estimate – CO <sub>2</sub> , CH <sub>4</sub> and N <sub>2</sub> O emissions from LPG for 2009	75.077	Gg CO <sub>2</sub> eq	ERT's calculation
Total aggregated GHG emissions (excluding LULUCF) as reported by Slovakia for 2008	48 195.21	Gg CO <sub>2</sub> eq	2011 submission of Slovakia v2.1, CRF table summary 2
Total aggregated GHG emissions (excluding LULUCF) as reported by Slovakia for 2009	43 393.10	Gg CO <sub>2</sub> eq	2011 submission of Slovakia v2.1, CRF table summary 2
Total aggregated GHG emissions (excluding LULUCF) after application of the adjustment: CH <sub>4</sub> emissions from LPG for 2008	48 195.33	Gg CO <sub>2</sub> eq	ERT's calculation
Total aggregated GHG emissions (excluding LULUCF) after application of the adjustment: N <sub>2</sub> O emissions from LPG for 2008	48 195.32	Gg CO <sub>2</sub> eq	ERT's calculation
Total aggregated GHG emissions (excluding LULUCF) after application of the adjustment: CH <sub>4</sub> emissions from LPG for 2009	43 393.23	Gg CO <sub>2</sub> eq	ERT's calculation
Total aggregated GHG emissions (excluding LULUCF) after application of the adjustment: N <sub>2</sub> O emissions from LPG for 2009	43 393.24	Gg CO <sub>2</sub> eq	ERT's calculation
Difference between the original and adjusted total aggregated GHG emissions: CH <sub>4</sub> emissions from LPG for 2008	0.118 0.0002	Gg CO <sub>2</sub> eq %	ERT's calculation ERT's calculation
Difference between the original and adjusted total aggregated GHG emissions: N <sub>2</sub> O emissions from LPG for 2008	0.110 0.0002	Gg CO <sub>2</sub> eq %	ERT's calculation ERT's calculation
Difference between the original and adjusted total aggregated GHG emissions: CH <sub>4</sub> emissions from LPG for 2009	0.131 0.0003	Gg CO <sub>2</sub> eq %	ERT's calculation ERT's calculation

<i>Parameter/Estimate</i>	<i>Value</i>	<i>Unit</i>	<i>Source</i>
Difference between the original and adjusted total aggregated GHG emissions: N <sub>2</sub> O emissions from LPG for 2009	0.141	Gg CO <sub>2</sub> eq	ERT's calculation
	0.0003	%	ERT's calculation

*Abbreviations:* CF = conservativeness factor, CRF = common reporting format, EF = emission factor, ERT = expert review team, GHG = greenhouse gas, IEF = implied emission factor, LPG = liquefied petroleum gas, LULUCF = land use, land-use change and forestry.

**Table 9**  
**Description of the adjustments calculation for CH<sub>4</sub> emissions from gaseous fuels under road transportation for 2008 and 2009**

<i>Parameter/Estimate</i>	<i>Value</i>	<i>Unit</i>	<i>Source</i>
Category: road transportation: gaseous fuels – CH <sub>4</sub>			
Slovakia's reported CH <sub>4</sub> emissions from gaseous fuels for 2008	0.038	Gg	2011 submission of Slovakia v2.1, CRF table 1.A(a)
Slovakia's reported CH <sub>4</sub> emissions from gaseous fuels for 2009	0.057	Gg	2011 submission of Slovakia v2.1, CRF table 1.A(a)
Slovakia's reported CH <sub>4</sub> IEF from gaseous fuels for 2008	177.86	kg/TJ	2011 submission of Slovakia v2.1, CRF table 1.A(a)
Slovakia's reported CH <sub>4</sub> IEF from gaseous fuels for 2009	240.98	kg/TJ	2011 submission of Slovakia v2.1, CRF table 1.A(a)
CH <sub>4</sub> EF for gaseous fuels	300.00	kg/TJ	Revised 1996 IPCC Guidelines, volume 3, table 1–3
Slovakia's reported gaseous fuels consumption for 2008	212.01	TJ	2011 submission of Slovakia v1.3, CRF table 1.A(a)
Slovakia's reported gaseous fuels consumption for 2009	236.46	TJ	2011 submission of Slovakia v1.3, CRF table 1.A(a)
CF (for the EF): CH <sub>4</sub>	1.12	—	Table 2 of appendix III to the guidance for adjustments under Article 5, paragraph 2, of the Kyoto Protocol
Adjusted CH <sub>4</sub> EF after application of the CF for gaseous fuels	336.00	kg/TJ	ERT's calculation
Adjusted conservative estimate of CH <sub>4</sub> emissions from gaseous fuels for 2008	0.071	Gg	ERT's calculation
Adjusted conservative estimate of CH <sub>4</sub> emissions from gaseous fuels for 2009	0.079	Gg	ERT's calculation
Original estimate reported by Slovakia – CO <sub>2</sub> , CH <sub>4</sub> and N <sub>2</sub> O emissions from gaseous fuels for 2008	17.926	Gg CO <sub>2</sub> eq	2011 submission of Slovakia v2.1, CRF table 1.A(a)
Adjusted conservative estimate – CO <sub>2</sub> , CH <sub>4</sub> and N <sub>2</sub> O emissions from gaseous fuels for 2008	18.631	Gg CO <sub>2</sub> eq	ERT's calculation

<i>Parameter/Estimate</i>	<i>Value</i>	<i>Unit</i>	<i>Source</i>
Original estimate reported by Slovakia – CO <sub>2</sub> , CH <sub>4</sub> and N <sub>2</sub> O emissions from gaseous fuels for 2009	20.306	Gg CO <sub>2</sub> eq	2011 submission of Slovakia v2.1, CRF table 1.A(a)
Adjusted conservative estimate – CO <sub>2</sub> , CH <sub>4</sub> and N <sub>2</sub> O emissions from gaseous fuels for 2009	20.778	Gg CO <sub>2</sub> eq	ERT's calculation
Total aggregated GHG emissions (excluding LULUCF) as reported by Slovakia for 2008	48 195.21	Gg CO <sub>2</sub> eq	2011 submission of Slovakia v2.1, CRF table summary 2
Total aggregated GHG emissions (excluding LULUCF) as reported by Slovakia for 2009	43 393.10	Gg CO <sub>2</sub> eq	2011 submission of Slovakia v2.1, CRF table summary 2
Total aggregated GHG emissions (excluding LULUCF) after application of the adjustment: CH <sub>4</sub> emissions from gaseous fuels for 2008	48 195.92	Gg CO <sub>2</sub> eq	ERT's calculation
Total aggregated GHG emissions (excluding LULUCF) after application of the adjustment: CH <sub>4</sub> emissions from gaseous fuels for 2009	43 393.57	Gg CO <sub>2</sub> eq	ERT's calculation
Difference between the original and adjusted total aggregated GHG emissions: CH <sub>4</sub> emissions from gaseous fuels for 2008	0.704	Gg CO <sub>2</sub> eq	ERT's calculation
	0.001	%	ERT's calculation
Difference between the original and adjusted total aggregated GHG emissions: CH <sub>4</sub> emissions from gaseous fuels for 2009	0.472	Gg CO <sub>2</sub> eq	ERT's calculation
	0.001	%	ERT's calculation

*Abbreviations:* CF = conservativeness factor, CRF = common reporting format, EF = emission factor, ERT = expert review team, GHG = greenhouse gas, IEF = implied emission factor, LULUCF = land use, land-use change and forestry.

**Table 10**  
**Description of the adjustments calculation for CH<sub>4</sub> and N<sub>2</sub>O emissions from biomass under road transportation for 2008 and 2009**

<i>Parameter/Estimate</i>	<i>Value</i>	<i>Unit</i>	<i>Source</i>
Category: road transportation: biomass fuels – CH <sub>4</sub> and N <sub>2</sub> O			
Slovakia's reported CH <sub>4</sub> emissions from biomass for 2008	0.015	Gg	2011 submission of Slovakia v2.1, CRF table 1.A(a)
Slovakia's reported N <sub>2</sub> O emissions from biomass for 2008	0.004	Gg	2011 submission of Slovakia v2.1, CRF table 1.A(a)
Slovakia's reported CH <sub>4</sub> emissions from biomass for 2009	0.016	Gg	2011 submission of Slovakia v2.1, CRF table 1.A(a)
Slovakia's reported N <sub>2</sub> O emissions from biomass for 2009	0.005	Gg	2011 submission of Slovakia v2.1, CRF table 1.A(a)
Slovakia's reported CH <sub>4</sub> IEF from biomass for 2008	5.99	kg/TJ	2011 submission of Slovakia v2.1, CRF table 1.A(a)

<i>Parameter/Estimate</i>	<i>Value</i>	<i>Unit</i>	<i>Source</i>
Slovakia's reported N <sub>2</sub> O IEF from biomass for 2008	1.82	kg/TJ	2011 submission of Slovakia v2.1, CRF table 1.A(a)
Slovakia's reported CH <sub>4</sub> IEF from biomass for 2009	6.32	kg/TJ	2011 submission of Slovakia v2.1, CRF table 1.A(a)
Slovakia's reported N <sub>2</sub> O IEF from biomass for 2009	2.08	kg/TJ	2011 submission of Slovakia v2.1, CRF table 1.A(a)
CH <sub>4</sub> EF for biomass	12.71	kg/TJ	ERT's calculation (see table 5 above)
N <sub>2</sub> O EF for biomass	3.41	kg/TJ	ERT's calculation (see table 5 above)
Slovakia's reported biomass consumption for 2008	2 334.33	TJ	2011 submission of Slovakia v1.3, CRF table 1.A(a)
Slovakia's reported biomass consumption for 2009	2 827.43	TJ	2011 submission of Slovakia v1.3, CRF table 1.A(a)
CF (for the EF): CH <sub>4</sub>	1.12	—	Table 2 of appendix III to the guidance for adjustments under Article 5, paragraph 2, of the Kyoto Protocol
CF (for the EF): N <sub>2</sub> O	1.21	—	Table 2 of appendix III to the guidance for adjustments under Article 5, paragraph 2, of the Kyoto Protocol
Adjusted CH <sub>4</sub> EF after application of the CF for biomass	15.38	kg/TJ	ERT's calculation
Adjusted N <sub>2</sub> O EF after application of the CF for biomass	4.13	kg/TJ	ERT's calculation
Adjusted conservative estimate of CH <sub>4</sub> emissions from biomass for 2008	0.036	Gg	ERT's calculation
Adjusted conservative estimate of N <sub>2</sub> O emissions from biomass for 2008	0.010	Gg	ERT's calculation
Adjusted conservative estimate of CH <sub>4</sub> emissions from biomass for 2009	0.043	Gg	ERT's calculation
Adjusted conservative estimate of N <sub>2</sub> O emissions from biomass for 2009	0.012	Gg	ERT's calculation
Original estimate reported by Slovakia – CH <sub>4</sub> and N <sub>2</sub> O emissions from biomass for 2008	1.679	Gg CO <sub>2</sub> eq	2011 submission of Slovakia v2.1, CRF table 1.A(a)
Adjusted conservative estimate – CH <sub>4</sub> and N <sub>2</sub> O emissions from biomass for 2008	3.740	Gg CO <sub>2</sub> eq	ERT's calculation
Original estimate reported by Slovakia – CH <sub>4</sub> and N <sub>2</sub> O emissions from biomass for 2009	1.999	Gg CO <sub>2</sub> eq	2011 submission of Slovakia v2.1, CRF table 1.A(a)
Adjusted conservative estimate – CH <sub>4</sub> and N <sub>2</sub> O emissions from biomass for 2009	4.529	Gg CO <sub>2</sub> eq	ERT's calculation
Total aggregated GHG emissions (excluding LULUCF) as reported by Slovakia for 2008	48 195.21	Gg CO <sub>2</sub> eq	2011 submission of Slovakia v2.1, CRF table summary 2

<i>Parameter/Estimate</i>	<i>Value</i>	<i>Unit</i>	<i>Source</i>
Total aggregated GHG emissions (excluding LULUCF) as reported by Slovakia for 2009	43 393.10	Gg CO <sub>2</sub> eq	2011 submission of Slovakia v2.1, CRF table summary 2
Total aggregated GHG emissions (excluding LULUCF) after application of the adjustment: CH <sub>4</sub> emissions from biomass for 2008	48 195.66	Gg CO <sub>2</sub> eq	ERT's calculation
Total aggregated GHG emissions (excluding LULUCF) after application of the adjustment: N <sub>2</sub> O emissions from biomass for 2008	48 196.82	Gg CO <sub>2</sub> eq	ERT's calculation
Total aggregated GHG emissions (excluding LULUCF) after application of the adjustment: CH <sub>4</sub> emissions from biomass for 2009	43 393.67	Gg CO <sub>2</sub> eq	ERT's calculation
Total aggregated GHG emissions (excluding LULUCF) after application of the adjustment: N <sub>2</sub> O emissions from biomass for 2009	43 395.06	Gg CO <sub>2</sub> eq	ERT's calculation
Difference between the original and adjusted total aggregated GHG emissions: CH <sub>4</sub> emissions from biomass for 2008	0.447	Gg CO <sub>2</sub> eq	ERT's calculation
	0.001	%	ERT's calculation
Difference between the original and adjusted total aggregated GHG emissions: N <sub>2</sub> O emissions from biomass for 2008	1.613	Gg CO <sub>2</sub> eq	ERT's calculation
	0.003	%	ERT's calculation
Difference between the original and adjusted total aggregated GHG emissions: CH <sub>4</sub> emissions from biomass for 2009	0.572	Gg CO <sub>2</sub> eq	ERT's calculation
	0.001	%	ERT's calculation
Difference between the original and adjusted total aggregated GHG emissions: N <sub>2</sub> O emissions from biomass for 2009	1.959	Gg CO <sub>2</sub> eq	ERT's calculation
	0.005	%	ERT's calculation

*Abbreviations:* CF = conservativeness factor, CRF = common reporting format, EF = emission factor, ERT = expert review team, GHG = greenhouse gas, IEF = implied emission factor, LULUCF = land use, land-use change and forestry.

#### Conservativeness of the expert review team's calculation of the adjustment

166. In line with paragraph 5 of decision 20/CMP.1, conservativeness was ensured by applying conservativeness factors of 1.02 (for the CO<sub>2</sub> EF for road transportation), 1.12 (for the CH<sub>4</sub> EF for road transportation) and 1.21 (for the N<sub>2</sub>O EF for road transportation) from table 2 of appendix III to the guidance for adjustments under Article 5, paragraph 2, of the Kyoto Protocol (annex to decision 20/CMP.1). The ERT therefore considers that the resulting adjusted values are conservative.

## **2. HFCs, PFCs and SF<sub>6</sub> emissions from consumption of halocarbons and SF<sub>6</sub>**

### The original estimate

167. In its 2011 annual submission, Slovakia reported emissions of 282.94 Gg CO<sub>2</sub> eq for consumption of halocarbons and SF<sub>6</sub> for 2008 (see CRF table summary 2), of which 257.78 Gg CO<sub>2</sub> eq corresponds to HFC emissions from refrigeration and air-conditioning equipment, followed by HFCs emissions of 6.65 Gg CO<sub>2</sub> eq from fire extinguishers and SF<sub>6</sub>

emissions of 18.51 Gg CO<sub>2</sub> eq from electrical equipment. For 2009, Slovakia reported emissions of 318.99 Gg CO<sub>2</sub> eq for consumption of halocarbons and SF<sub>6</sub> (see CRF table summary 2), of which 294.27 Gg CO<sub>2</sub> eq corresponds to HFC emissions from refrigeration and air-conditioning equipment, followed by HFC emissions of 5.33 Gg CO<sub>2</sub> eq from fire extinguishers and SF<sub>6</sub> emissions of 19.39 Gg CO<sub>2</sub> eq from electrical equipment.

#### The underlying problem

168. In its 2011 annual submission, Slovakia reported actual and potential HFC emissions from foam blowing, aerosols/metered dose inhalers and solvents, and PFC and SF<sub>6</sub> emissions from fire extinguishers under consumption of halocarbons and SF<sub>6</sub> as “NO” for 2008 and 2009. However, it is highly possible that some of these subcategories (such as foam blowing) are sources of F-gas emissions in Slovakia, because related relevant activities are common in most developed countries, and were also identified in neighbouring countries with similar economic, social and industrial structures. It is unlikely that these subcategories are key categories, although emissions of F-gases have been increasing rapidly in many countries in recent years.

#### The recommendation to the Party

169. During the review, the ERT asked the Slovak experts to confirm whether there are such activities under these subcategories resulting in emissions in the country. However, a clear answer was not provided to the ERT. Therefore, in its list of potential problems and further questions, the ERT recommended that Slovakia check whether these activities do occur in the country for all subcategories and relevant gases under the category consumption of halocarbons and SF<sub>6</sub>. In the cases where such activities and gases do not occur, the ERT recommended that the Party continue to use the notation key “NO” and to provide all relevant supporting information. For the other activities and gases that do occur in Slovakia, the ERT recommended that Slovakia collect relevant AD and EFs, and estimate the HFC, PFC and SF<sub>6</sub> emissions using the approaches recommended in chapter 3.7 of the IPCC good practice guidance.

#### The rationale for adjustment

170. After the review, in its response to the list of potential problems and further questions raised by the ERT, Slovakia provided estimates of HFC emissions from foam blowing (0.01 Gg CO<sub>2</sub> eq) and informed the ERT that “Only small amounts of gases L113 and S316 in approximately amount 250 kg/year is used in laboratories for water evaluation, which are recycled. As is evident, these gases do not belong among the required F-gases under the Convention and the Kyoto Protocol. Foam blowing agents are imported into Slovakia through small companies in building industry mainly for flat roofs and cold stores. Consumption of PUR (polyurethane) foams is estimated based on expert judgement up to 100 t/year and is decreasing because of quality and price problems of such flat roofs. This consumption can lead to 0.008 Gg CO<sub>2</sub> eq referring only to the year 2009 and the blowing agent mixture of HFC 245fa/365mfc (1:1) with the GWP = 750. Potential emissions can be estimated as 8 per cent from 50 t of polyols = 4 t (2 t HFC-245fa and 2 t HFC-365fa) with the 0.5 per cent of losses per year = 0.01 t HFC-245fa and 0.01 t HFC-365fa. The emissions are summarized in the table.”

171. With regard to these estimates, the ERT noted that Slovakia did not consider all possible uses of closed-cell foams and the use of some types of foam products containing HFCs which had previously been imported into the country that might have produced emissions from stocks and from decommissioning, and that emissions from the use of these products were not fully estimated, thereby leading to an underestimation of emissions. The ERT found that Slovakia did not transparently explain these specific issues and did not

provide supporting information in its response. In addition, Slovakia included in its estimates a gas (HFC-365mfc) with a GWP value that has not yet been agreed upon by the COP and which should not be included in the national totals, but only reported in CRF table 9(b) for information purposes, and another gas (HFC-245ca) using an incorrect GWP value of 640, instead of the correct value of 560. In addition, the ERT noted that for the other subcategories under consumption of halocarbons and SF<sub>6</sub> (i.e. fire extinguishers (with the exception of reported HFCs), aerosols/metered dose inhalers and solvents), the F-gas emissions were still reported as “NO” and the Party did not provide supporting information or further explanations for doing so.

172. The ERT assessed the information provided by Slovakia and concluded that the information and estimates provided by the Party do not adequately resolve the problems identified by the ERT. Since Slovakia had, in 2008 and 2009, one of the highest GDP/capita among Parties included in Annex I to the Convention with economies in transition (EIT Annex I Parties), which in most cases reported these emissions, the ERT considered that Slovakia had underestimated F-gas emissions from the category consumption of halocarbons and SF<sub>6</sub> and decided to recommend adjustments for the identified subcategories with potential problems.

173. The ERT noted the methodological guidance from the IPCC good practice guidance (page 3.79) indicates that: “Good practice is to use the tier 2 actual method for all sub-source categories within this source category...If an inventory agency is unable to implement actual methods for all sub-source categories, it is good practice to calculate and report potential estimates for all sub-source categories...”

174. The rationale for the adjustment is that the inventory data submitted by Slovakia are incomplete due to missing and incomplete estimates of emissions for the years 2008 and 2009 for the identified subcategories.

#### The assumptions, data and methodology used to calculate the adjustment

175. In accordance with paragraph 80(c) of the annex to decision 22/CMP.1, the ERT requested that Slovakia provide information on the F-gases used in Slovakia, and data on production, exports and imports of equipment or goods containing HFCs, PFCs and SF<sub>6</sub>. Slovakia was not able to provide sufficient, clear and consistent information on the use of these gases in the country for 2008 and 2009.

176. In accordance with table 1 of the guidance for adjustments under Article 5, paragraph 2, of the Kyoto Protocol (annex to decision 20/CMP.1), the ERT decided to use the adjustment method 5: average emission rate from a cluster of countries based on a driver to calculate the missing emission estimates for the identified subcategories.

177. In accordance with the above-mentioned guidance, the cluster of countries should cover a minimum number of countries and, to the extent possible, take into account similar national circumstances. In order to choose the cluster of countries, the ERT considered the information provided by Slovakia as well as the geographical conditions, population, economic indicators (GDP/capita) estimated by the World Bank<sup>6</sup> and the availability of emission estimates for each country of the cluster.

178. The ERT considered data on emissions of HFCs, PFCs, SF<sub>6</sub> from the relevant subcategories available for the latest year (2008) of the reviewed 2010 annual submissions of the EIT Annex I Parties, namely Belarus, Bulgaria, Croatia, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Russian Federation, Slovenia and Ukraine.

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<sup>6</sup> Available at <<http://data.worldbank.org/indicator/NY.GDP.PCAP.CD>>.

179. The ERT concluded that Bulgaria, Czech Republic, Estonia, Hungary, Latvia, Poland, Romania, Russian Federation and Slovenia are the countries to be included in the cluster for the calculations in line with paragraphs 35–40 of the technical guidance on methodologies for adjustments under Article 5, paragraph 2, of the Kyoto Protocol, which provides guidance on the choice of drivers and clusters. Belarus and Croatia did not report emissions for the considered subcategories in their 2010 submissions and were therefore not taken into account in the cluster. For Lithuania and Ukraine, the 2010 submission estimates were subject to adjustments and therefore were not taken into account in the cluster.

180. For the subcategory foam blowing, Slovakia indicated that foams are not produced in the country; however, the Party indicated that it imported foam blowing agents, but did not indicate precisely which species of HFCs or PFCs were imported and if these gases were used for manufacturing foams (open-cell or closed-cell foams) or for consumption in final products. Therefore, the ERT calculated adjustments for emissions from foam blowing as a whole at the subcategory level based on the available data on HFC emissions from foam blowing in the cluster of countries. Romania reported HFC emissions from foam blowing as “NO” in its 2010 submission, while PFCs and SF<sub>6</sub> emissions were reported as “NO” or “NE” by all countries in the cluster; therefore, these gases were not taken into account for the calculation of the adjustment for the foam blowing subcategory.

181. For the subcategory fire extinguishers, Slovakia reported HFC emissions (6.65 Gg CO<sub>2</sub> eq for 2008 and 5.33 Gg CO<sub>2</sub> eq for 2009) and reported PFC and SF<sub>6</sub> emissions as “NO”. The ERT concluded that the estimates should cover all the gases in this subcategory since Slovakia has a very high GDP/capita among EIT Annex I Parties (see table 8 below), with a more diversified economy than most of these Parties, and because at least one Party reported such emissions. Among these Parties, Poland and Russian Federation reported PFCs emissions, and Romania reported SF<sub>6</sub> emissions from fire extinguishers. Therefore, the ERT calculated adjustments for emissions from fire extinguishers based on the data on PFC and SF<sub>6</sub> emissions from fire extinguishers for these countries. In addition, the ERT found that the resulting adjusted estimates for HFC emissions from this subcategory were lower than the original estimates; therefore, in accordance with paragraph 17 of the guidance for adjustments under Article 5, paragraph 2, of the Kyoto Protocol (annex to decision 20/CMP.1), the ERT decided not to include adjustments for HFC emissions from fire extinguishers in this report.

182. For the subcategory aerosols/metered dose inhalers, Slovakia stated that it imported F-gases as propellants in medicines in 2010 in the amount of 3.17 t. However, no information was provided for 2008 and 2009 and Slovakia did not specifically provide any other relevant information on this subcategory. Therefore, the ERT calculated adjustments for emissions from aerosols/metered dose inhalers based on the available data on HFC emissions from aerosols/metered dose inhalers in the cluster of countries. Slovenia and Romania reported these emissions as “NO” in their 2010 submissions, while PFCs and SF<sub>6</sub> emissions were reported as “NO”, “NA” or “NE” by all other countries in the cluster. Therefore, these gases were not taken into account in the calculation of the adjustment for the subcategory aerosols/metered dose inhalers.

183. For the subcategory solvents, Slovakia stated that solvents are not produced in Slovakia and that there is no import or export of F-gases for this use. However, Slovakia did not specifically provide any other relevant information on this subcategory. The ERT found that the Czech Republic, a Party with similar national circumstances and patterns of consumption of F-gases, reported HFCs emissions from solvents. Therefore, the ERT calculated adjustments for HFCs emissions from solvents based on the data on HFC emissions from solvents for the Czech Republic. PFCs and SF<sub>6</sub> emissions were reported as

“NO” or “NE” by all countries in the cluster; therefore, these gases were not taken into account in the calculation of the adjustment for the subcategory solvents.

184. Calculations of adjustments were applied separately to the HFC, PFC and SF<sub>6</sub> emissions from each considered subcategory. The ERT decided to use emissions per capita as a driver for all identified subcategories. The following data were collected for Slovakia and the cluster of countries: (a) actual F-gas emissions for 2008 from the relevant subcategories, expressed in Gg CO<sub>2</sub> eq from the 2010 annual submissions of each Party;<sup>7</sup> (b) the total population in 2008 and 2009 from the 2011 annual submission of each Party; and (c) the GDP for each Party from the World Bank.<sup>8</sup>

185. The ERT calculated the available HFCs, PFCs, and SF<sub>6</sub> emissions per capita for all countries in the cluster. The resulting average per capita HFC, PFC and SF<sub>6</sub> emissions were then applied to Slovakia’s total population in 2008 to estimate the total HFCs emissions in 2008 from foam blowing, aerosols/metered dosed inhalers and solvents, and the total PFCs and SF<sub>6</sub> emissions from fire extinguishers. The ERT then used the growth rate of the total population of Slovakia between 2008 and 2009 (0.11 per cent) to estimate the relevant total HFCs, PFCs and SF<sub>6</sub> emissions in each subcategory indicated above for Slovakia for 2009.

186. Table 11 below presents the background data and assumptions used for the calculation of the adjustments for foam blowing, fire extinguishers, aerosols/metered dose inhalers and solvents.

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<sup>7</sup> Available at <[http://unfccc.int/national\\_reports/annex\\_i\\_ghg\\_inventories/national\\_inventories\\_submissions/items/5270.php](http://unfccc.int/national_reports/annex_i_ghg_inventories/national_inventories_submissions/items/5270.php)>.

<sup>8</sup> Available at <<http://data.worldbank.org/indicator/NY.GDP.PCAP.CD>>.

Table 11

**Background data for the calculation of adjustments**

Party	Total population (2008), inhabitants	GDP per capita (2008), USD	Total emissions (2008), Gg CO <sub>2</sub> eq									
			Foam blowing		Fire extinguishers			Aerosols/metered dose inhalers		Solvents		
			HFCs	Emissions/capita x 10 <sup>-6</sup>	PFCs	Emissions/capita x 10 <sup>-6</sup>	SF <sub>6</sub>	Emissions/capita x 10 <sup>-6</sup>	HFCs	Emissions/capita x 10 <sup>-6</sup>	HFCs	Emissions/capita x 10 <sup>-6</sup>
Slovenia	2 032 362	27 015	0.50	0.25	NO	–	NO	–	NO	–	NO	–
Czech Republic	10 467 542	20 729	3.22	0.31	IE, NO	–	NO	–	65.20	6.23	3.56	0.34
Estonia	1 340 940	17 578	5.30	3.96	NO	–	NO	–	2.64	1.97	NO	–
Hungary	10 045 401	15 365	5.62	0.56	NO	–	NO	–	10.20	1.01	NO	–
Latvia	2 270 894	14 858	2.38	1.05	NO	–	NO	–	2.73	1.20	NO	–
Poland	38 136 000	13 886	317.00	8.31	14.94	0.39	NA	–	178.23	4.67	NO	–
Russian Federation	142 008 800	11 700	119.12	0.84	89.37	0.63	NO	–	182.77	1.29	NO	–
Romania	21 504 442	9 300	NO	–	NO	–	0.14	0.16	NO	–	NO	–
Bulgaria	8 427 418	6 798	116.87	13.87	NO	–	NO	–	2.08	0.25	NO	–
<b>Average</b>	–	–	–	<b>3.64</b>	–	<b>0.51</b>	–	<b>0.16</b>	–	<b>2.37</b>	–	<b>0.34</b>
Slovakia (2008)	5 412 254	18 133	–	–	–	–	–	–	–	–	–	–
Slovakia (2009)	5 418 374	16 126	–	–	–	–	–	–	–	–	–	–

Abbreviations: IE = included elsewhere, NA = not applicable, NE = not estimated, NO = not occurring.

The adjusted estimate

187. Tables 12, 13, 14 and 15 below show the steps for the calculation of the adjustments, in line with paragraph 7 of decision 20/CMP.1. These tables present the results of the ERT’s calculation, including the original estimate or the notation keys used for HFC emissions from foam blowing, aerosols/metered dose inhalers and solvents, and PFC and SF<sub>6</sub> emissions from fire extinguishers as reported by Slovakia, the adjusted estimate as calculated by the ERT, and the impact of the adjustment on total estimated GHG emissions for 2008 and 2009.

188. As table 12 shows, the adjusted estimate for HFCs emissions from foam blowing for 2008 amounts to 23.854 Gg CO<sub>2</sub> eq compared with 0.01 Gg CO<sub>2</sub> eq as reported by Slovakia, and the adjusted estimate for 2009 amounts to 23.881 Gg CO<sub>2</sub> eq compared with 0.01 Gg CO<sub>2</sub> eq as reported by Slovakia. The application of the adjustments leads to an increase in total estimated GHG emissions of 23.840 Gg CO<sub>2</sub> eq, or 0.05 per cent for 2008, and of 23.867 Gg CO<sub>2</sub> eq, or 0.06 per cent for 2009.

189. As table 13 shows, the adjusted estimate for PFCs and SF<sub>6</sub> emissions from fire extinguishers for 2008 amounts to 3.344 Gg CO<sub>2</sub> eq and 1.019 Gg CO<sub>2</sub> eq, respectively, and the adjusted estimate for 2009 amounts to 3.348 Gg CO<sub>2</sub> eq and 1.020 Gg CO<sub>2</sub> eq, respectively, compared with “NO” as reported by Slovakia for both years. The application of the adjustments leads to an increase in total estimated GHG emissions for 2008 of 0.01 per cent and 0.002 per cent, for PFC and SF<sub>6</sub> emissions, respectively, and of 0.01 per cent and 0.002 per cent, for PFC and SF<sub>6</sub> emissions, respectively for 2009.

190. As table 14 shows, the adjusted estimate for HFCs emissions from aerosols/metered dose inhalers amounts to 15.546 Gg CO<sub>2</sub> eq for 2008 and 15.563 Gg CO<sub>2</sub> eq for 2009, compared with “NO” as reported by Slovakia for both years. The application of the adjustments leads to an increase in total estimated GHG emissions of 0.03 per cent for 2008 and of 0.04 per cent for 2009.

191. As table 15 shows, the adjusted estimate for HFCs emissions from solvents amounts to 2.229 Gg CO<sub>2</sub> eq for 2008 and 2.231 Gg CO<sub>2</sub> eq for 2009, compared with “NO” as reported by Slovakia for both years. The application of the adjustments leads to an increase in total estimated GHG emissions of 0.005 per cent for 2008 and of 0.005 per cent for 2009.

Table 12  
**Description of the adjustments calculation for HFCs emissions from foam blowing for 2008 and 2009**

<i>Parameter/Estimate</i>	<i>Value</i>	<i>Unit</i>	<i>Source</i>
Category: consumption of halocarbons and SF <sub>6</sub> : foam blowing – HFCs			
Slovakia’s HFCs emissions estimate for 2008	0.014	Gg CO <sub>2</sub> eq	2011 submission of Slovakia v1.3, CRF table 2(I)
Slovakia’s HFCs emissions estimate for 2009	0.014	Gg CO <sub>2</sub> eq	2011 submission of Slovakia v1.3, CRF table 2(I)
Average HFCs emissions per capita for 2008	0.00000364	Gg CO <sub>2</sub> eq/capita	ERT’s calculation (see table 11 above)
Population of Slovakia in 2008	5 412 254	Inhabitants	2011 submission of Slovakia, additional information box of CRF table 6.A
Population of Slovakia in 2009	5 418 374	Inhabitants	2011 submission of Slovakia, additional information box of CRF table 6.A

<i>Parameter/Estimate</i>	<i>Value</i>	<i>Unit</i>	<i>Source</i>
Calculated HFCs emissions in Slovakia for 2008	19.714	Gg CO <sub>2</sub> eq	ERT's calculation
Increase in population in Slovakia between 2008 and 2009	0.11	%	ERT's calculation
Calculated HFCs emissions in Slovakia for 2009	19.736	Gg CO <sub>2</sub> eq	ERT's calculation
Conservativeness factor	1.21		Table 2 of appendix III to the guidance for adjustments under Article 5, paragraph 2, of the Kyoto Protocol
Adjusted conservative estimate of HFCs emissions in Slovakia for 2008	23.854	Gg CO <sub>2</sub> eq	ERT's calculation
Adjusted conservative estimate of HFCs emissions in Slovakia for 2009	23.881	Gg CO <sub>2</sub> eq	ERT's calculation
Total aggregated GHG emissions (excluding LULUCF) as reported by Slovakia for 2008	48 195.21	Gg CO <sub>2</sub> eq	2011 submission of Slovakia v2.1, CRF table summary 2
Total aggregated GHG emissions (excluding LULUCF) as reported by Slovakia for 2009	43 393.10	Gg CO <sub>2</sub> eq	2011 submission of Slovakia v2.1, CRF table summary 2
Total aggregated GHG emissions (excluding LULUCF) after application of the adjustment for 2008	48 219.05	Gg CO <sub>2</sub> eq	ERT's calculation
Total aggregated GHG emissions (excluding LULUCF) after application of the adjustment for 2009	43 416.97	Gg CO <sub>2</sub> eq	ERT's calculation
Difference between the original and adjusted total aggregated GHG emissions for 2008	23.840	Gg CO <sub>2</sub> eq	ERT's calculation
	0.05	%	ERT's calculation
Difference between the original and adjusted total aggregated GHG emissions for 2009	23.867	Gg CO <sub>2</sub> eq	ERT's calculation
	0.06	%	ERT's calculation

*Abbreviations:* CRF = common reporting format, ERT = expert review team, GHG = greenhouse gas, LULUCF = land use, land-use change and forestry.

Table 13  
**Description of the adjustments calculation for PFCs and SF<sub>6</sub> emissions from fire extinguishers for 2008 and 2009**

<i>Parameter/Estimate</i>	<i>Value</i>	<i>Unit</i>	<i>Source</i>
Category: consumption of halocarbons and SF <sub>6</sub> : fire extinguishers – PFCs and SF <sub>6</sub>			
Slovakia's PFCs emissions estimate for 2008 and 2009	NO		2011 submission of Slovakia v1.3, CRF table 2(I)

<i>Parameter/Estimate</i>	<i>Value</i>	<i>Unit</i>	<i>Source</i>
Slovakia's SF <sub>6</sub> emissions estimate for 2008 and 2009	NO		2011 submission of Slovakia v1.3, CRF table 2(I)
Average PFCs emissions per capita for 2008	0.00000051	Gg CO <sub>2</sub> eq/capita	ERT's calculation (see table 11 above)
Average SF <sub>6</sub> emissions per capita for 2008	0.00000016	Gg CO <sub>2</sub> eq/capita	ERT's calculation (see table 11 above)
Population of Slovakia in 2008	5 412 254	Inhabitants	2011 submission of Slovakia, additional information box of CRF table 6.A
Population of Slovakia in 2009	5 418 374	Inhabitants	2011 submission of Slovakia, additional information box of CRF table 6.A
Calculated PFCs emissions in Slovakia for 2008	2.763	Gg CO <sub>2</sub> eq	ERT's calculation
Calculated SF <sub>6</sub> emissions in Slovakia for 2008	0.842	Gg CO <sub>2</sub> eq	ERT's calculation
Increase in population in Slovakia between 2008 and 2009	0.11	%	ERT's calculation
Calculated PFCs emissions in Slovakia for 2009	2.767	Gg CO <sub>2</sub> eq	ERT's calculation
Calculated SF <sub>6</sub> emissions in Slovakia for 2009	0.843	Gg CO <sub>2</sub> eq	ERT's calculation
Conservativeness factor	1.21		Table 2 of appendix III to the guidance for adjustments under Article 5, paragraph 2, of the Kyoto Protocol
Adjusted conservative estimate of PFCs emissions in Slovakia for 2008	3.344	Gg CO <sub>2</sub> eq	ERT's calculation
Adjusted conservative estimate of PFCs emissions in Slovakia for 2009	3.348	Gg CO <sub>2</sub> eq	ERT's calculation
Adjusted conservative estimate of SF <sub>6</sub> emissions in Slovakia for 2008	1.019	Gg CO <sub>2</sub> eq	ERT's calculation
Adjusted conservative estimate of SF <sub>6</sub> emissions in Slovakia for 2009	1.020	Gg CO <sub>2</sub> eq	ERT's calculation
Total aggregated GHG emissions (excluding LULUCF) as reported by Slovakia for 2008	48 195.21	Gg CO <sub>2</sub> eq	2011 submission of Slovakia v2.1, CRF table summary 2
Total aggregated GHG emissions (excluding LULUCF) as reported by Slovakia for 2009	43 393.10	Gg CO <sub>2</sub> eq	2011 submission of Slovakia v2.1, CRF table summary 2
Total aggregated GHG emissions (excluding LULUCF) after application of the adjustment for 2008: PFCs	48 198.55	Gg CO <sub>2</sub> eq	ERT's calculation
Total aggregated GHG emissions (excluding LULUCF) after application of the adjustment for 2009: PFCs	43 396.45	Gg CO <sub>2</sub> eq	ERT's calculation

<i>Parameter/Estimate</i>	<i>Value</i>	<i>Unit</i>	<i>Source</i>
Difference between the original and adjusted total aggregated GHG emissions for 2008: PFCs	3.344	Gg CO <sub>2</sub> eq	ERT's calculation
	0.01	%	ERT's calculation
Difference between the original and adjusted total aggregated GHG emissions for 2009: PFCs	3.348	Gg CO <sub>2</sub> eq	ERT's calculation
	0.01	%	ERT's calculation
Total aggregated GHG emissions (excluding LULUCF) after application of the adjustment for 2008: SF <sub>6</sub>	48 196.23	Gg CO <sub>2</sub> eq	ERT's calculation
Total aggregated GHG emissions (excluding LULUCF) after application of the adjustment for 2009: SF <sub>6</sub>	43 394.12	Gg CO <sub>2</sub> eq	ERT's calculation
Difference between the original and adjusted total aggregated GHG emissions for 2008: SF <sub>6</sub>	1.019	Gg CO <sub>2</sub> eq	ERT's calculation
	0.002	%	ERT's calculation
Difference between the original and adjusted total aggregated GHG emissions for 2009: SF <sub>6</sub>	1.020	Gg CO <sub>2</sub> eq	ERT's calculation
	0.002	%	ERT's calculation

*Abbreviations:* CRF = common reporting format, ERT = expert review team, GHG = greenhouse gas, LULUCF = land use, land-use change and forestry, NO = not occurring.

Table 14  
**Description of the adjustments calculation for HFCs emissions from aerosols/metered dose inhalers for 2008 and 2009**

<i>Parameter/Estimate</i>	<i>Value</i>	<i>Unit</i>	<i>Source</i>
Category: consumption of halocarbons and SF <sub>6</sub> : aerosols/metered dose inhalers – HFCs			
Slovakia's HFCs emissions estimate for 2008 and 2009	NO		2011 submission of Slovakia v1.3, CRF table 2(I)
Average HFCs emissions per capita for 2008	0.00000237	Gg CO <sub>2</sub> eq/capita	ERT's calculation (see table 11 above)
Population of Slovakia in 2008	5 412 254	Inhabitants	2011 submission of Slovakia, additional information box of CRF table 6.A
Population of Slovakia in 2009	5 418 374	Inhabitants	2011 submission of Slovakia, additional information box of CRF table 6.A
Calculated HFCs emissions in Slovakia for 2008	12.848	Gg CO <sub>2</sub> eq	ERT's calculation
Increase in population in Slovakia between 2008 and 2009	0.11	%	ERT's calculation
Calculated HFCs emissions in Slovakia for 2009	12.862	Gg CO <sub>2</sub> eq	ERT's calculation

<i>Parameter/Estimate</i>	<i>Value</i>	<i>Unit</i>	<i>Source</i>
Conservativeness factor	1.21		Table 2 of appendix III to the guidance for adjustments under Article 5, paragraph 2, of the Kyoto Protocol
Adjusted conservative estimate of HFCs emissions in Slovakia for 2008	15.546	Gg CO <sub>2</sub> eq	ERT's calculation
Adjusted conservative estimate of HFCs emissions in Slovakia for 2009	15.563	Gg CO <sub>2</sub> eq	ERT's calculation
Total aggregated GHG emissions (excluding LULUCF) as reported by Slovakia for 2008	48 195.21	Gg CO <sub>2</sub> eq	2011 submission of Slovakia v2.1, CRF table summary 2
Total aggregated GHG emissions (excluding LULUCF) as reported by Slovakia for 2009	43 393.10	Gg CO <sub>2</sub> eq	2011 submission of Slovakia v2.1, CRF table summary 2
Total aggregated GHG emissions (excluding LULUCF) after application of the adjustment for 2008	48 210.76	Gg CO <sub>2</sub> eq	ERT's calculation
Total aggregated GHG emissions (excluding LULUCF) after application of the adjustment for 2009	43 408.66	Gg CO <sub>2</sub> eq	ERT's calculation
Difference between the original and adjusted total aggregated GHG emissions for 2008	15.546	Gg CO <sub>2</sub> eq	ERT's calculation
	0.03	%	ERT's calculation
Difference between the original and adjusted total aggregated GHG emissions for 2009	15.563	Gg CO <sub>2</sub> eq	ERT's calculation
	0.04	%	ERT's calculation

*Abbreviations:* CRF = common reporting format, ERT = expert review team, GHG = greenhouse gas, LULUCF = land use, land-use change and forestry, NO = not occurring.

Table 15  
**Description of the adjustments calculation for HFC emissions from solvents for 2008 and 2009**

<i>Parameter/Estimate</i>	<i>Value</i>	<i>Unit</i>	<i>Source</i>
Category: consumption of halocarbons and SF <sub>6</sub> : solvents – HFCs			
Slovakia's HFCs emissions estimate for 2008 and 2009	NO		2011 submission of Slovakia v1.3, CRF table 2(I)
Average HFCs emissions per capita for 2008	0.00000034	Gg CO <sub>2</sub> eq/capita	ERT's calculation (see table 8 above)
Population of Slovakia in 2008	5 412 254	Inhabitants	2011 submission of Slovakia, additional information box of CRF table 6.A
Population of Slovakia in 2009	5 418 374	Inhabitants	2011 submission of Slovakia, additional information box of CRF table 6.A

<i>Parameter/Estimate</i>	<i>Value</i>	<i>Unit</i>	<i>Source</i>
Calculated HFCs emissions in Slovakia for 2008	1.842	Gg CO <sub>2</sub> eq	ERT's calculation
Increase in population in Slovakia between 2008 and 2009	0.11	%	ERT's calculation
Calculated HFCs emissions in Slovakia for 2009	1.844	Gg CO <sub>2</sub> eq	ERT's calculation
Conservativeness factor	1.21		Table 2 of appendix III to the guidance for adjustments under Article 5, paragraph 2, of the Kyoto Protocol
Adjusted conservative estimate of HFCs emissions in Slovakia for 2008	2.229	Gg CO <sub>2</sub> eq	ERT's calculation
Adjusted conservative estimate of HFCs emissions in Slovakia for 2009	2.231	Gg CO <sub>2</sub> eq	ERT's calculation
Total aggregated GHG emissions (excluding LULUCF) as reported by Slovakia for 2008	48 195.21	Gg CO <sub>2</sub> eq	2011 submission of Slovakia v2.1, CRF table summary 2
Total aggregated GHG emissions (excluding LULUCF) as reported by Slovakia for 2009	43 393.10	Gg CO <sub>2</sub> eq	2011 submission of Slovakia v2.1, CRF table summary 2
Total aggregated GHG emissions (excluding LULUCF) after application of the adjustment for 2008	48 197.44	Gg CO <sub>2</sub> eq	ERT's calculation
Total aggregated GHG emissions (excluding LULUCF) after application of the adjustment for 2009	43 395.33	Gg CO <sub>2</sub> eq	ERT's calculation
Difference between the original and adjusted total aggregated GHG emissions for 2008	2.229	Gg CO <sub>2</sub> eq	ERT's calculation
	0.005	%	ERT's calculation
Difference between the original and adjusted total aggregated GHG emissions for 2009	2.231	Gg CO <sub>2</sub> eq	ERT's calculation
	0.005	%	ERT's calculation

*Abbreviations:* CRF = common reporting format, ERT = expert review team, GHG = greenhouse gas, LULUCF = land use, land-use change and forestry, NO = not occurring.

#### Conservativeness of the expert review team's calculation of the adjustment

192. In line with paragraph 5 of decision 20/CMP.1, conservativeness was ensured by applying a conservativeness factor of 1.21 (for the estimates of HFCs, PFCs and SF<sub>6</sub> emissions under consumption of halocarbons and SF<sub>6</sub>) from table 2 of appendix III to the guidance for adjustments under Article 5, paragraph 2, of the Kyoto Protocol (annex to (decision 20/CMP.1)). The ERT therefore considers that the resulting adjusted values are conservative.

## **H. Supplementary information required under Article 7, paragraph 1, of the Kyoto Protocol**

### **1. Information on activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol**

#### Overview

193. Slovakia has submitted information on activities under Article 3, paragraph 3, of the Kyoto Protocol, following the requirements outlined in paragraphs 5–9 of the annex to decision 15/CMP.1. The information was reported in part 2 of the NIR and in the corresponding CRF tables. Slovakia has not elected any activities under Article 3, paragraph 4, of the Kyoto Protocol. Slovakia chose commitment period accounting for all activities under Article 3, paragraph 3, of the Kyoto Protocol. Slovakia has reported activities under Article 3, paragraph 3, for 2008 and 2009. The geographical location of the boundary areas that encompass the units of land subject to afforestation and reforestation, and deforestation activities is specified as the boundary of Slovak regional districts in accordance with the GCCA database. These areas are identified using reporting method 1 from the IPCC good practice guidance for LULUCF. The definition of forest and the land-identification system used to determine the area subject to activities under Article 3, paragraph 3, of the Kyoto Protocol are in accordance with the IPCC good practice guidance for LULUCF.

194. The ERT noted inconsistencies in the use of the notation keys between table NIR-1 and the corresponding KP-LULUCF CRF tables with supplementary background data for LULUCF activities under the Kyoto Protocol. The ERT recommends that Slovakia correct these inconsistencies in the next annual submission.

195. Slovakia has used the notation key “NO” to report GHG emissions from wildfires on afforestation and reforestation, and deforestation areas, N<sub>2</sub>O emissions caused by disturbance associated with land-use conversion of forest land to cropland and CO<sub>2</sub> emissions from liming for areas subject to deforestation. Based on the information provided in the NIR and the reported values under the Convention reporting (LULUCF), the ERT considers that these emissions probably occur for afforestation and reforestation, and deforestation activities. Therefore, the ERT recommends that Slovakia provide estimates for these emissions in its next annual submission or provide explanations for the non-occurrence of these emissions on areas subject to afforestation and reforestation, and deforestation (see paras. 200 and 207–209 below).

196. Slovakia has reported recalculations for the carbon stock changes for afforestation and reforestation, and deforestation activities due to the updating of land areas and the separation of above-ground and below-ground biomass. In addition, Slovakia has reported the carbon stock changes for dead wood for deforestation areas. Compared with the estimates submitted in 2010, these recalculations have resulted in a reduction in net removals from afforestation and reforestation and a decrease in net emissions from deforestation by 73.4 per cent and 94.1 per cent, respectively, for 2008. The ERT commends Slovakia for these improvements which have been achieved through the implementation of the recommendations from previous review reports.

197. In its 2011 annual submission, Slovakia reported that the carbon stock changes in litter for 2008 and 2009 are included in the estimate for mineral soils and used the notation key “IE” for afforestation and reforestation in CRF table 5(KP-I)A.1.1 and deforestation in CRF table 5(KP-I)A.2. During the review, the ERT noted that Slovakia did not provide clear documentation in the NIR demonstrating that litter is included in the calculations of the carbon stock changes in mineral soils. Therefore, the ERT recommended that Slovakia provide clear documentation to prove that this carbon pool is included in the estimates of the carbon stock changes under mineral soils and a clear definition of the litter and dead

wood pools (reported as “NO”) (e.g. the diameter of DOM) to ensure that the same definitions are used consistently throughout the time series, and to demonstrate that the pools are neither omitted nor double counted. After the review, in its response to the list of potential problems and further questions raised by the ERT, Slovakia provided its definition of the litter and dead wood pools. Further, the Party provided documentation (in Slovak) stating that its national data sources for the carbon stock changes in the forest soils organic layer include litter and are obtained by sound scientific sampling procedures. Hence, the litter pool is reported under mineral soils. The ERT considered the additional information provided by the Party and concluded that Slovakia has justified that the carbon stock changes in the litter pool were reported together with the carbon stock changes for mineral soils. To enhance the transparency of its reporting of KP-LULUCF activities, the ERT recommends that Slovakia provide, in its next annual submission, the additional information provided to the ERT after the review, including the description of carbon pools, taking into consideration the description of carbon pools provided in table 3.1.2 (page 3.15) of the IPCC good practice guidance for LULUCF.

#### Activities under Article 3, paragraph 3, of the Kyoto Protocol

##### *Afforestation and reforestation – CO<sub>2</sub>*

198. In Slovakia, afforestation and reforestation are carried out in accordance with a mandatory plan drawn up by the forest owners and approved by the authorities.

199. In its 2011 annual submission, Slovakia provided estimates for the carbon stock changes in above-ground biomass, below-ground biomass and mineral soils for afforestation and reforestation activities. The carbon stock changes in litter have been reported together with the carbon stock changes in the mineral soils organic carbon pool and have been reported as “IE” in the CRF tables. The carbon stock changes in dead wood and organic soils have been reported as “NO”, since it is assumed that dead wood does not exist in afforestation and reforestation areas and there are no organic soils in the country according to the NIR. The EFs and parameters used are country-specific and based on research projects. There is no practice of applying fertilizer and liming in afforestation and reforestation areas in Slovakia, hence the notation key “NO” is used in table NIR-1. The ERT noted that there is an inconsistency between the notation keys used in table NIR-1 and the corresponding CRF tables with supplementary background data for KP-LULUCF activities. The ERT recommends that Slovakia correct this inconsistency in the next annual submission.

200. In table NIR-1, Slovakia has used the notation key “NO” to report biomass burning on afforestation and reforestation areas because there is no practice of biomass burning on afforestation and reforestation areas. In CRF table 5(V), Slovakia has reported emissions caused by wildfires. From the information provided in the NIR, it is not clear to the ERT why Slovakia has not reported emissions from wildfires on afforestation and reforestation areas. The ERT recommends that Slovakia provide estimates for emissions from wildfires in its next annual submission or provide explanations for the non-occurrence of these emissions on afforestation and reforestation areas.

201. Slovakia has reported the carbon stock changes in mineral soils for afforestation and reforestation activities and has provided the ERT with additional information about the AD and the calculation method used. However, the implied carbon stock change factor for the net carbon stock changes in soils per area is the highest of all reporting Parties (2.7 Mg C/ha), and especially high when compared to the value that the Czech Republic reported in its 2011 inventory submission (0.16 Mg C/ha). The ERT noted that using such a high factor can lead to an overestimation of removals for afforestation and reforestation activities. In accordance with paragraphs 13(b) and 17 of the annex to decision 20/CMP.1, the ERT

recommended during the review that Slovakia review this implied carbon stock change factor to ensure that the value of the removals will not be overestimated at the end of the commitment period reporting. In its response to the list of potential problems and further questions raised by the ERT, Slovakia acknowledged that the factor used is high compared to the one used by the Czech Republic; however, Slovakia noted that it is more reasonable to compare its value with the values of other countries in the Alpine biogeographical region (e.g. Austria). According to the “Review of existing information on the interrelations between soil and climate change” (Schils et al., 2008, page 105, table 10), the ERT noted that Austria, and to some extent Poland, has reported factors in the same range, although Slovakia is in the upper range. Further, Slovakia informed the ERT that it will continue to use this carbon stock change factor per unit area in future reporting. The ERT concluded that the approach is acceptable, but encourages Slovakia to validate this carbon stock change factor per area and include this information in its next annual submission. According to the Party’s plan for further improvements provided in its response to the list of potential problems and further questions raised by the ERT, Slovakia is planning to more accurately estimate the carbon stock changes in cropland and grassland soils. These improvements will be incorporated in the calculation of the implied carbon stock change factors for land conversion to forest land. The ERT recommends that Slovakia implement these improvements and report on the progress made in its next annual submission.

202. The ERT noted a discrepancy between the areas reported for land converted to forest land under the Convention (33.35 kha in CRF table 5.A for 2009) and the area reported for afforestation and reforestation activities for KP-LULULCF (30.26 kha in table NIR-2 for 2009). During the review, Slovakia informed the ERT that this was due to calculation errors. The ERT recommends that Slovakia improve its QC procedures and ensure that the reported values are correct in its next annual submission.

203. In CRF table 5(KP-I)A.1.2. “Units of land harvested since the beginning of the commitment period”, the notation key “NA” has been used to report all carbon pools. During the review, Slovakia informed the ERT that there are no forest management practices to harvest young forests less than 25 years old, hence the activity does not occur on areas that are subject to afforestation and reforestation. The ERT noted that the notation key “NA” is inappropriate and recommends that Slovakia use the notation key “NO” in this table in its next annual submission.

#### *Deforestation – CO<sub>2</sub>*

204. Slovakia has provided information in the NIR explaining that harvesting or forest disturbances that are followed by the re-establishment of forest are distinguished from deforestation. Deforestation is regulated by official legislation.

205. Slovakia has reported estimates for the carbon stock changes in above-ground biomass, below-ground biomass, dead wood and mineral soils for deforestation. The change in the carbon stock in litter was estimated together with mineral soils and has been reported as “IE” in the CRF tables. The carbon stock changes in organic soils are reported as “NO”, as there are no organic soils in the country according to statements in the NIR. Most of the EFs and parameters used are country-specific.

206. The ERT noted that there are inconsistencies between the notation keys used in table NIR-1 for deforestation and the corresponding CRF tables with supplementary background data for KP-LULUCF activities. The ERT recommends that Slovakia correct these inconsistencies in the next annual submission.

207. In CRF table 5.B, Slovakia has reported the net carbon stock changes in mineral soils when forest land is converted to cropland, hence the ERT considers that N<sub>2</sub>O emissions occur in Slovakia under deforestation activities. The ERT recommends that

Slovakia provide estimates for the N<sub>2</sub>O emissions from disturbance associated with land-use conversion to cropland in CRF table 5(KP-II)3 in its next annual submission or provide substantial explanations for the non-occurrence of these emissions in the country in the next annual submission.

208. Slovakia has reported emissions from agricultural lime application in CRF table 5(IV). In the NIR, Slovakia stated that there is no practice of applying lime to deforested areas, hence the use of the notation key “NO” in table NIR-1. Based on the information on liming reported in the NIR and in the CRF tables for the Convention reporting, it is not clear to the ERT why Slovakia does not report emissions from lime application for areas where forest land is converted to cropland. The ERT recommends that Slovakia provide estimates of emissions from liming in its next annual submission or provide explanations for the non-occurrence of these emissions on areas subject to deforestation in its next annual submission.

209. Slovakia has used the notation key “NA” to report GHG emissions from wildfires on areas subject to deforestation. Based on the information in the NIR and the reported values for wildfires under the Convention reporting, the ERT considers that this activity may occur in areas subject to deforestation. Therefore, the ERT recommends that Slovakia provide estimates for these emissions in its next annual submission or provide explanations for the non-occurrence of these emissions on deforestation areas in the next annual submission.

210. The ERT noted a discrepancy between the areas reported for forest land converted to other land-use categories reported under the Convention (10.53 kha for 2009) and the area reported for deforestation activities for KP-LULUCF (7.44 kha for 2009). The ERT recommends that Slovakia improve its QC procedures and ensure that the reported values are correct and consistent in its next annual submission.

## **2. Information on Kyoto Protocol units**

### Standard electronic format and reports from the national registry

211. Slovakia has reported information on its accounting of Kyoto Protocol units in the required SEF tables, as required by decisions 15/CMP.1 and 14/CMP.1. The ERT took note of the findings included in the SIAR on the SEF tables and the SEF comparison report.<sup>9</sup> The SIAR was forwarded to the ERT prior to the review, pursuant to decision 16/CP.10. The ERT reiterated the main findings contained in the SIAR.

212. Information on the accounting of Kyoto Protocol units has been prepared and reported in accordance with chapter I.E of the annex to decision 15/CMP.1, and reported in accordance with decision 14/CMP.1 using the SEF tables. This information is consistent with that contained in the national registry and with the records of the international transaction log (ITL) and the clean development mechanism registry and meets the requirements set out in paragraph 88 (a–j) of the annex to decision 22/CMP.1. The Party provided access to information from its national registry that substantiated or clarified the information reported in its annual submission. The transactions of Kyoto Protocol units initiated by the national registry are in accordance with the requirements of the annex to decision 5/CMP.1 and the annex to decision 13/CMP.1. No discrepancy has been identified by the ITL and no non-replacement has occurred. The national registry has adequate procedures in place to minimize discrepancies.

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<sup>9</sup> The SEF comparison report is prepared by the ITL administrator and provides information on the outcome of the comparison of data contained in Slovakia’s SEF tables with corresponding records contained in the ITL.

### National registry

213. The ERT took note of the SIAR and its finding that the reported information on the national registry is complete and has been submitted in accordance with the annex to decision 15/CMP.1. The ERT further noted from the SIAR and its finding that the national registry continues to perform the functions set out in the annex to decision 13/CMP.1 and the annex to decision 5/CMP.1, and continues to adhere to the technical standards for data exchange between registry systems in accordance with decisions 16/CP.10 and 12/CMP.1. The national registry also has adequate security, data safeguard and disaster recovery measures in place and its operational performance is adequate.

### Calculation of the commitment period reserve

214. Slovakia has reported its commitment period reserve in its 2011 annual submission. Slovakia reported its commitment period reserve to be 217,130,347 t CO<sub>2</sub> eq based on the national emissions in its most recently reviewed inventory (43,426.07 Gg CO<sub>2</sub> eq). The ERT disagrees with this figure. In its response to the list of potential problems and further questions raised by the ERT, Slovakia reported its revised commitment period reserve to be 216,965,494 t CO<sub>2</sub> eq based on the national emissions in its revised 2009 inventory (43,393.10 Gg CO<sub>2</sub> eq). The ERT noted that, although this value is correctly calculated, it disagrees with this figure; its calculation of the commitment period reserve is 218,714,925 t CO<sub>2</sub> eq based on the Slovak national emissions for the 2009 inventory taking into account the recommended adjustments (43,742.98 Gg CO<sub>2</sub> eq) (see para. 146 above).

## **3. Changes to the national system**

215. Slovakia reported that there have been no changes to its national system since the previous annual submission. However, the ERT noted that, although the improvements in the capacity of the national system are relevant and have been reflected in the 2011 annual submission, Slovakia's inventory system is vulnerable and does not appear to fully exercise the leadership and functions that are required of national systems in order to fully comply with the requirements of the UNFCCC reporting guidelines. The ERT concluded that Slovakia's national system is not in accordance with the requirements of national systems set out in decision 19/CMP.1, and a question of implementation regarding the national system is listed in chapter V below. The ERT recommends that Slovakia, in its next annual submission, report any changes to its national system in accordance with chapter I.F of the annex to decision 15/CMP.1.

## **4. Changes to the national registry**

216. Slovakia reported that there have been minor changes to its national registry since the previous annual submission. During the reported period, there have been three updates of the SERINGAS software used by the registry, the New Message Flow has been deployed to the production environment, and new releases which deal with corrections of minor bugs and new functionalities under the EU ETS have been implemented. The ERT concluded that, taking into account the confirmed changes to the national registry, Slovakia's national registry continues to perform the functions set out in the annex to decision 13/CMP.1 and the annex to decision 5/CMP.1, and continues to adhere to the technical standards for data exchange between registry systems in accordance with relevant CMP decisions.

## **5. Minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol**

217. Slovakia reported that there have been no changes in its reporting of the minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto

Protocol since the previous annual submission. The ERT concluded that the information provided continues to be complete and transparent.

218. Slovakia explained in the NIR that its policy with regard to the minimization of adverse impacts is greatly influenced by its membership of the EU. Slovakia has fully privatized the former state-owned mines and continues to grant the coal industry investment aid, but, at the same time, it does not export its coal to other countries. Therefore, the Slovak economy has a minimal impact on the existing structure of international trade in terms of coal and pricing. More than 21 per cent of bilateral and specific projects related to the foreign development policy of Slovakia during the period 2004–2008 were focused on supporting the utilization of renewable energy resources and energy efficiency, and on adaptation measures, including the construction of early warning systems, adjustments and efficiency improvements of water management, as well as capacity-building and the improvement of infrastructure for compliance with the Convention and the Kyoto Protocol (e.g. in Serbia and Kazakhstan). In addition to the development aid delivered by the Party, Slovakia has expanded the provisions of preferential market access for developing and least developed countries.

### III. Conclusions and recommendations

219. Slovakia made its annual submission on 15 April 2011. The annual submission contains the GHG inventory (comprising CRF tables and an NIR) and supplementary information required under Article 7, paragraph 1, of the Kyoto Protocol (information on: activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, Kyoto Protocol units and changes to the national system and the national registry and the minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol). This is in line with decision 15/CMP.1. Slovakia resubmitted its NIR on 17 May 2011.

220. The ERT concludes that the inventory submission of Slovakia has been prepared and reported generally in accordance with the UNFCCC reporting guidelines. The inventory submission is complete and Slovakia has submitted a complete set of CRF tables for the years 1990–2009 and an NIR; these are complete in terms of geographical coverage, years, gases and sectors, but only generally complete in terms of categories. Some of the categories, particularly in the energy sector (e.g. N<sub>2</sub>O emissions from gaseous fuels in road transportation and CO<sub>2</sub> emissions from coal mining and handling), and the industrial processes sector (e.g. HFC, PFC and SF<sub>6</sub> emissions from foam blowing, fire extinguishers (with the exception of HFCs), aerosols/metered dose inhalers and solvents under the category consumption of halocarbons and SF<sub>6</sub>) were reported as “NO”, whereas the ERT considers that these activities do occur in Slovakia. In addition, the ERT noted that N<sub>2</sub>O emissions from disturbance associated with land-use conversion to cropland and the carbon stock changes in the dead organic matter and mineral soils pools were also reported as “NO”, although these emissions probably occur in Slovakia. In response to the list of potential problems and further questions raised by the ERT during the review, Slovakia submitted estimates for N<sub>2</sub>O emissions from gaseous fuels in road transportation and provided sufficient information demonstrating that the volume of CO<sub>2</sub> in fugitive gases from mined coal is below the measurement threshold, thereby justifying the use of the notation key “NO” for the subcategory CO<sub>2</sub> emissions from coal mining and handling. Further, Slovakia provided estimates of HFC emissions from foam blowing; however, it did not consider all possible uses of closed-cell foams in the country, including decommissioning.

221. The submission of information required under Article 7, paragraph 1, of the Kyoto Protocol has been prepared and reported in accordance with decision 15/CMP.1.

222. Slovakia's inventory is generally in line with the Revised 1996 IPCC Guidelines, the IPCC good practice guidance and the IPCC good practice guidance for LULUCF. The ERT identified the following main issues with regard to the Party's reporting:

(a) The reconciliation and full harmonization between AD used in the national GHG inventory and the national statistical data, including data sets officially reported under other international obligations, is not ensured, in particular for the energy sector;

(b) The reporting of CH<sub>4</sub> and N<sub>2</sub>O emissions from road transportation (all fuels) lacks transparency and the information provided in the NIR does not allow the ERT to assess the validity of the use of lower EFs compared with those used in the previous submission;

(c) The accuracy of the emission estimates for road transportation and consumption of halocarbons and SF<sub>6</sub> are not fully ensured, leading to the potential underestimation of emissions;

(d) For forest land remaining forest land, the carbon stock changes in the DOM and mineral soils pools are reported as "NO", although these changes probably occur;

(e) A fully operational QA/QC system, including the implementation of all provisions of the QA/QC plan and independent checks of the resulting emission estimates has not been implemented, resulting in inconsistencies between the NIR and the CRF tables and between the textual and numerical content of the responses to the list of potential problems and further questions raised by the ERT, typographical errors and mistakes in the NIR and the CRF tables, and the incorrect use of notation keys.

223. Slovakia has made recalculations for the inventory between the 2010 and 2011 submissions due to changes in AD and EFs and in order to rectify identified errors in many categories in almost all sectors. The impact of these recalculations on total GHG emissions is a decrease in emissions of 0.5 per cent (including LULUCF) and an increase of 0.3 per cent (excluding LULUCF) for 1990, and a decrease in emissions of 4.1 per cent (including LULUCF) and a decrease of 1.7 per cent (excluding LULUCF) for 2008. The main recalculations took place in the LULUCF sector, but also for road transportation in the energy sector, and in the industrial processes sector.

224. Slovakia provided supplementary information on activities under Article 3, paragraph 3, of the Kyoto Protocol, following the requirements outlined in paragraphs 5–9 of the annex to decision 15/CMP.1. Slovakia has not elected any activities under Article 3, paragraph 4, of the Kyoto Protocol and chose commitment period accounting for the activities under Article 3, paragraph 3, of the Kyoto Protocol. The definition of forest and the land-identification system used to determine the area subject to activities under Article 3, paragraph 3, of the Kyoto Protocol are in accordance with the IPCC good practice guidance for LULUCF.

225. Slovakia has made recalculations for the KP-LULUCF activities between the 2010 and 2011 submissions due to the updating of land areas, the separation of above-ground and below-ground biomass and the inclusion of carbon stock changes for dead wood for areas subject to deforestation. The impact of these recalculations on each KP-LULUCF activity for 2008 is as follows:

(a) A reduction in net removals from afforestation and reforestation activities by 73.4 per cent;

(b) A reduction in net emissions from deforestation activity by 94.1 per cent.

226. Slovakia has reported information on its accounting of Kyoto Protocol units in accordance with chapter I.E of the annex to decision 15/CMP.1, and used the required reporting format tables as required by decision 14/CMP.1.

227. The national system does not fully perform all of its required functions as set out in the annex to decision 19/CMP.1, and a question of implementation regarding the national system is listed in chapter V below. The ERT noted that the national system is not exercising sufficient leadership in order to meet all of the requirements of the UNFCCC reporting guidelines and in order to set and prioritize inventory improvements to distribute resources and tasks within the inventory team. The ERT identified the following functions that are not being fully performed by the national system as required by the guidelines for national systems under Article 5, paragraph 1, of the Kyoto Protocol (annex to decision 19/CMP.1):

(a) Specific responsibilities in the inventory development process, including those relating to the choice of methods, data collection, particularly AD and EFs from national statistical services and other entities, and QA/QC procedures have not been clearly defined and allocated (paragraph 12(c));

(b) An inventory QA/QC plan has been elaborated describing the specific QC procedures to be implemented and facilitating the QA procedures to be conducted; however, the provisions of this plan have not been fully implemented (paragraph 12(d)), in particular the general inventory QC procedures (tier 1) in accordance with the IPCC good practice guidance (paragraph 14(g));

(c) A process to respond to any issues raised by the inventory review process under Article 8 has not been properly established and implemented (paragraph 12(e));

(d) Sufficient AD, process information and EFs necessary to support the methods selected for the estimation of GHG emissions have not been fully collected (paragraph 14(c));

(e) Access by the ERT to the archived material used for the inventory preparation process was not always possible and was hampered by the unavailability of specific individuals within the inventory team (paragraph 16(b));

(f) The unavailability of specific experts within the Slovak inventory team hampered Slovakia's response to the ERT's requests for clarifications of the inventory information, in particular on F-gases (paragraph 16(c));

(g) The ERT received the complete comments to the Synthesis and Assessment report, part II and information on the national system and the QA/QC plan on the Friday morning of the review week, shortly before the ERT's presentations of its preliminary findings, placing the ERT in the difficult position of assessing and including this response in its summary presentations (paragraph 16(c)).

228. The national registry continues to perform the functions set out in the annex to decision 13/CMP.1 and the annex to decision 5/CMP.1, and continues to adhere to the technical standards for data exchange between registry systems in accordance with relevant CMP decisions.

229. Slovakia has reported information under chapter I.H of the annex to decision 15/CMP.1, "Minimization of adverse impacts in accordance with Article 3, paragraph 14" as part of its 2011 annual submission. Slovakia explained in the NIR that its policy regarding the minimization of adverse impacts is greatly influenced by its membership of the EU and that its economy has a minimal impact on the existing structure of international trade in terms of coal and pricing. Part of the foreign development policy of Slovakia is focused on supporting the utilization of renewable energy resources and energy efficiency, and on adaptation measures, capacity-building and the improvement of infrastructure for compliance with the Convention and the Kyoto Protocol. In addition, Slovakia has expanded the provisions of preferential market access for developing and least developed

countries. The ERT concluded that the information provided continues to be complete and transparent.

230. The ERT identifies the following cross-cutting issues for improvement:

(a) The development of procedures and institutional arrangements in order to ensure the consistency of and harmonization between the AD used in the inventory, national statistical data and data reported under other international obligations and a reliable data flow for the preparation of the inventory (see paras. 21(b) and (e) above);

(b) The establishment of clear communication channels with regard to the principles, purposes and procedures of the UNFCCC reporting guidelines and the review processes with external experts, ensuring that these experts fully understand the formal requirements of these guidelines and the importance of the timely submission of their contributions (see para. 21(d) above);

(c) The implementation of a fully operational QA/QC system, including all the provisions of the QA/QC plan, and independent checks of the resulting emission estimates involving experts from collaborating institutions, particularly data providers and different data sources (e.g. EU ETS, NEIS, statistical data), prior to the submission of the inventory (see para. 21(a) and 38 above);

(d) The improvement of the transparency of the emission estimates in the energy sector, in particular the information on the parameters and assumptions of the COPERT IV model methodology and the information on AD (e.g. by providing an energy balance in the NIR), and in the industrial processes sector, in particular with regard to the provision of a carbon mass balance covering activities related to the iron and steel category and clear information on the use of F-gases under the category consumption of halocarbons and SF<sub>6</sub> (see paras. 49, 57, 69 and 73 above).

231. In the course of the review, the ERT formulated a number of recommendations relating to the completeness, transparency and accuracy of Slovakia's annual submission with regard to the energy, industrial processes, agriculture, LULUCF and waste sectors. These recommendations are in many cases reiterations of the recommendations of previous review reports. The key recommendations are that Slovakia:

(a) Provide estimates for N<sub>2</sub>O emissions from disturbance associated with land-use conversion to cropland and carbon stock changes in the dead organic matter and mineral soils pools, or provide substantial explanations for the non-occurrence of these emissions/removals in the country;

(b) Check the annual increase or decrease in emission and removal levels and the changes in AD and EFs and provide adequate explanations of the trends in all relevant categories;

(c) Work in close collaboration with the Statistical Office of the Slovak Republic to examine and resolve discrepancies in the apparent consumption reported in the inventory, the national energy balance and the information reported to IEA, and include a table presenting this comparison by fuel type;

(d) Provide detailed reasoning to support the assumptions and background information based on expert judgement in the NIR (e.g. by providing the explanation that CO<sub>2</sub> emissions from coal mining and handling do not occur in the country);

(e) Improve the collaboration and enhance the consultation between the national experts for the energy and industrial processes sectors, in order to consolidate a carbon mass balance and use it in the preparation of the national GHG inventory, as well as the coordination among agriculture experts and SHMU so as to avoid inconsistencies and contradictions in the information provided to the ERT;

(f) Provide more detailed information in the NIR on the data used, indicate the source of each parameter and AD used, describe the QA/QC activities performed and provide reasons for the recalculations and document these in CRF table 8(b), in particular for the agriculture and waste sectors;

(g) Ensure that all land areas and land uses in the country are included in the inventory and correct small inconsistencies in total land areas in the land-use matrices;

(h) Provide further documentation on the uncertainty values derived by expert judgement and use consistent terminologies, in particular for the LULUCF sector;

(i) Disaggregate industrial solid waste from municipal solid waste using appropriate methods for the estimation of the AD and EFs for the period 1990–1999, in order to address the identified time-series inconsistency;

(j) Implement measures to ensure a more comprehensive collection of AD (biogas) and the accurate reporting of CH<sub>4</sub> recovery based on the metering of all gas recovered for energy utilization and the fraction of biogas flared on-site, in order to report accurately emissions from CH<sub>4</sub> flaring under the waste sector and CH<sub>4</sub> for energy use under the energy sector.

#### IV. Adjustments

232. The ERT concludes, based on the review of the 2008 and 2009 inventories, that for the following categories: CO<sub>2</sub> and N<sub>2</sub>O emissions from gasoline and diesel oil, CH<sub>4</sub> emissions from LPG and gaseous fuels, N<sub>2</sub>O emissions from LPG and CH<sub>4</sub> and N<sub>2</sub>O emissions from biomass under road transportation; and HFCs emissions from foam blowing, aerosols/metered dose inhalers and solvents, and PFCs and SF<sub>6</sub> emissions from fire extinguishers under consumption of halocarbons and SF<sub>6</sub>, the AD and/or EFs used are not fully in line with the Revised 1996 IPCC Guidelines and the IPCC good practice guidance as required by Article 5, paragraph 2, of the Kyoto Protocol. The ERT recommended that Slovakia submit revised estimates or provide further justifications for its calculations for the identified categories as a way of resolving the identified potential problems. The ERT, following the review of the additional information provided by Slovakia during and after the review week, concluded that it did not satisfactorily correct the problem through the submission of acceptable revised estimates and decided to calculate and recommend 14 adjustments in accordance with the guidance for adjustments under Article 5, paragraph 2, of the Kyoto Protocol (decision 20/CMP.1).

233. Slovakia, in its communication of 17 April 2012, rejected the calculated adjustments. In accordance with the Article 8 review guidelines, the ERT sent its final report and the notification by Slovakia to the Compliance Committee and the CMP because the ERT considers that the identified potential problems are still unresolved and listed them as questions of implementation (see para. 243 below).

234. The application of adjustments by the ERT would result in a change in the estimates of the 2008 emissions for:

(a) CO<sub>2</sub> emissions from gasoline in road transportation – from 2,074.794 Gg, as reported by Slovakia, to 2,103.834 Gg, or 0.06 per cent of total GHG emissions;

(b) N<sub>2</sub>O emissions from gasoline in road transportation – from 36.289 Gg CO<sub>2</sub> eq, as reported by Slovakia, to 214.107 Gg CO<sub>2</sub> eq, or 0.37 per cent of total GHG emissions;

(c) CO<sub>2</sub> emissions from diesel oil in road transportation – from 4,321.725 Gg, as reported by Slovakia, to 4,401.886 Gg, or 0.17 per cent of total GHG emissions;

(d) N<sub>2</sub>O emissions from diesel oil in road transportation – from 28.372 Gg CO<sub>2</sub> eq, as reported by Slovakia, to 88.385 Gg CO<sub>2</sub> eq, or 0.12 per cent of total GHG emissions;

(e) CH<sub>4</sub> emissions from LPG in road transportation – from 0.492 Gg CO<sub>2</sub> eq, as reported by Slovakia, to 0.610 Gg CO<sub>2</sub> eq, or 0.0002 per cent of total GHG emissions;

(f) N<sub>2</sub>O emissions from LPG in road transportation – from 1.079 Gg CO<sub>2</sub> eq, as reported by Slovakia, to 1.189 Gg CO<sub>2</sub> eq, or 0.0002 per cent of total GHG emissions;

(g) CH<sub>4</sub> emissions from gaseous fuels in road transportation – from 0.792 Gg CO<sub>2</sub> eq, as reported by Slovakia, to 1.496 Gg CO<sub>2</sub> eq, or 0.001 per cent of total GHG emissions;

(h) CH<sub>4</sub> emissions from biomass in road transportation – from 0.307 Gg CO<sub>2</sub> eq, as reported by Slovakia, to 0.754 Gg CO<sub>2</sub> eq, or 0.001 per cent of total GHG emissions;

(i) N<sub>2</sub>O emissions from biomass in road transportation – from 1.372 Gg CO<sub>2</sub> eq, as reported by Slovakia, to 2.986 Gg CO<sub>2</sub> eq, or 0.003 per cent of total GHG emissions;

(j) HFCs emissions from foam blowing – from 0.014 Gg CO<sub>2</sub> eq, as reported by Slovakia, to 23.854 Gg CO<sub>2</sub> eq, or 0.05 per cent of total GHG emissions;

(k) PFCs emissions from fire extinguishers – from “NO”, as reported by Slovakia, to 3.344 Gg CO<sub>2</sub> eq, or 0.01 per cent of total GHG emissions;

(l) SF<sub>6</sub> emissions from fire extinguishers – from “NO”, as reported by Slovakia, to 1.019 Gg CO<sub>2</sub> eq, or 0.002 per cent of total GHG emissions;

(m) HFCs emissions from aerosols/metered dose inhalers – from “NO”, as reported by Slovakia, to 15.546 Gg CO<sub>2</sub> eq, or 0.03 per cent of total GHG emissions;

(n) HFCs emissions from solvents – from “NO”, as reported by Slovakia, to 2.229 Gg CO<sub>2</sub> eq, or 0.005 per cent of total GHG emissions.

235. This in turn resulted in a change in the estimated total GHG emissions of Slovakia for 2008 – from 48,195.211 Gg CO<sub>2</sub> eq, as reported by Slovakia, to 48,591.210 Gg CO<sub>2</sub> eq, or an increase of 0.82 per cent.

236. The application of adjustments by the ERT would result in a change in the estimates of the 2009 emissions for:

(a) CO<sub>2</sub> emissions from gasoline in road transportation – from 1,965.834 Gg, as reported by Slovakia, to 1,995.907 Gg, or 0.07 per cent of total GHG emissions;

(b) N<sub>2</sub>O emissions from gasoline in road transportation – from 35.546 Gg CO<sub>2</sub> eq, as reported by Slovakia, to 203.123 Gg CO<sub>2</sub> eq, or 0.39 per cent of total GHG emissions;

(c) CO<sub>2</sub> emissions from diesel oil in road transportation – from 3,930.274 Gg, as reported by Slovakia, to 3,979.600 Gg, or 0.11 per cent of total GHG emissions;

(d) N<sub>2</sub>O emissions from diesel oil in road transportation – from 26.300 Gg CO<sub>2</sub> eq, as reported by Slovakia, to 79.906 Gg CO<sub>2</sub> eq, or 0.12 per cent of total GHG emissions;

(e) CH<sub>4</sub> emissions from LPG in road transportation – from 0.381 Gg CO<sub>2</sub> eq, as reported by Slovakia, to 0.512 Gg CO<sub>2</sub> eq, or 0.0003 per cent of total GHG emissions;

(f) N<sub>2</sub>O emissions from LPG in road transportation – from 0.856 Gg CO<sub>2</sub> eq, as reported by Slovakia, to 0.997 Gg CO<sub>2</sub> eq, or 0.0003 per cent of total GHG emissions;

(g) CH<sub>4</sub> emissions from gaseous fuels in road transportation – from 1.197 Gg CO<sub>2</sub> eq, as reported by Slovakia, to 1.668 Gg CO<sub>2</sub> eq, or 0.001 per cent of total GHG emissions;

- (h) CH<sub>4</sub> emissions from biomass in road transportation – from 0.341 Gg CO<sub>2</sub> eq, as reported by Slovakia, to 0.913 Gg CO<sub>2</sub> eq, or 0.001 per cent of total GHG emissions;
- (i) N<sub>2</sub>O emissions from biomass in road transportation – from 1.657 Gg CO<sub>2</sub> eq, as reported by Slovakia, to 3.616 Gg CO<sub>2</sub> eq, or 0.005 per cent of total GHG emissions;
- (j) HFCs emissions from foam blowing – from 0.014 Gg CO<sub>2</sub> eq, as reported by Slovakia, to 23.881 Gg CO<sub>2</sub> eq, or 0.06 per cent of total GHG emissions;
- (k) PFCs emissions from fire extinguishers – from “NO”, as reported by Slovakia, to 3.348 Gg CO<sub>2</sub> eq, or 0.01 per cent of total GHG emissions;
- (l) SF<sub>6</sub> emissions from fire extinguishers – from “NO”, as reported by Slovakia, to 1.020 Gg CO<sub>2</sub> eq, or 0.002 per cent of total GHG emissions;
- (m) HFCs emissions from aerosols/metered dose inhalers – from “NO”, as reported by Slovakia, to 15.563 Gg CO<sub>2</sub> eq, or 0.04 per cent of total GHG emissions;
- (n) HFCs emissions from solvents – from “NO”, as reported by Slovakia, to 2.231 Gg CO<sub>2</sub> eq, or 0.005 per cent of total GHG emissions.

237. This in turn resulted in a change in the estimated total GHG emissions of Slovakia for 2009 – from 43,393.099 Gg CO<sub>2</sub> eq, as reported by Slovakia, to 43,742.985 Gg CO<sub>2</sub> eq, or an increase of 0.81 per cent.

## V. Questions of implementation

238. The ERT concludes from the information contained in the 2011 annual submission and the additional information received during and after the review week that the national system of Slovakia does not fully comply with the guidelines for national systems under Article 5, paragraph 1, of the Kyoto Protocol (annex to decision 19/CMP.1).

239. In particular, the ERT concludes that the national system of Slovakia does not fully perform the following specific functions required for national systems, as set out in the annex to decision 19/CMP.1, and the ERT considers that they are unresolved problems, and, therefore, lists them as questions of implementation:

- (a) Define and allocate specific responsibilities in the inventory development process, including those relating to choice of methods, data collection, particularly AD and EFs from statistical services and other entities, processing and archiving, and QC and QA. This definition shall specify the roles of, and cooperation between, government agencies and other entities involved in the preparation of the inventory, as well as the institutional, legal and procedural arrangements made to prepare the inventory (para. 12(c));
- (b) Elaborate an inventory QA/QC plan which describes specific QC procedures to be implemented during the inventory development process, facilitate the overall QA procedures to be conducted, to the extent possible, on the entire inventory and establish quality objectives (para. 12(d));
- (c) Establish processes for the official consideration and approval of the inventory, including any recalculations, prior to its submission and to respond to any issues raised by the inventory review process under Article 8. (para. 12(e));
- (d) Collect sufficient AD, process information and EFs as are necessary to support the methods selected for estimating GHG emissions by sources and removals by sinks (paragraph 14(c));
- (e) Implement general inventory QC procedures (tier 1) in accordance with its QA/QC plan following the IPCC good practice guidance (para. 14(g));

(f) Provide review teams under Article 8 with access to all archived information used by the Party to prepare the inventory, in accordance with relevant decisions of the COP and/or CMP (para. 16(b)); and

(g) Respond to requests for clarifying inventory information resulting from the different stages of the review process of the inventory information, and information on the national system, in a timely manner in accordance with Article 8 (para. 16(c)).

240. In this respect, the ERT notes that the national system of Slovakia does not seem to fully exercise the leadership that is required of national systems in order to meet all of the above-mentioned requirements. In particular the ERT notes that the national system does not fully ensure:

(a) Strong formal relations and agreements between institutions, with a clear specification of the roles of, and cooperation between, government agencies and other entities in order to ensure a reliable data flow for the preparation of the inventory, which, currently, relies heavily on a number of external experts and their personal networks of contacts for data acquisition for several sectors;

(b) Clear communication channels with regard to the principles, purposes and procedures of the UNFCCC reporting guidelines and the review processes with external experts, ensuring that these experts fully understand the formal requirements of these guidelines, including reporting and review requirements, and the need to ensure their availability during (or during a major part of) the review week, and that their contributions are delivered on time, as the current expertise within the permanent staff of the national system is insufficient to compensate for this and, for example, to:

(i) Respond to questions and issues identified during the review process;

(ii) Ensure time-series consistency (of the AD and EFs);

(iii) Clearly understand the QA/QC principles and tools, the use of notation keys and the importance of providing comments to previous stages of the review process in time for the review week;

(c) That the limited resources available for inventory planning, preparation and management are directed towards the highest priorities, such as the reconciliation of data used in the inventory with national statistical and internationally reported AD (e.g. fuel use), and not towards other activities, such as the detailed tier 2 uncertainty analysis for some sectors and categories of the inventory.

241. Therefore, in the opinion of the ERT, the national system is vulnerable, both because of insufficient leadership and because of its reliance on individual external expertise, rather than on institutional expertise and cooperation between national institutions, including those managing the data sources.

242. The ERT also notes that Slovakia, in its response to the list of potential problems and further questions raised by the ERT, provided extensive information and explanations on the actions taken and to be undertaken to address the identified issues, including a proposed plan of activities and a letter from the Minister of the Environment indicating that most of the proposed measures will be incorporated in the 2012 Annual Plan of Actions of the Ministry of the Environment, while the remaining measures will be carried out using structural funds from the EU. However, this information was not always adequate and focused on the problems; for example, the inventory improvement plan did not contain clear objectives, a time schedule for the implementation of the improvements and the allocation of necessary resources, and no information was provided on when the special inter-ministerial committee for the coordination of climate change policy mentioned in the Party's response will begin its work and if its functions will be in place and working

effectively in time for the next annual submission. Also, Slovakia is allocating resources to measures which may not prove to be effective in addressing the related QA/QC issues, such as obtaining an ISO 9001 certificate of quality for the national system, while SHMU's quality management system already has an ISO 9001 certificate. Therefore, the ERT concludes that Slovakia did not provide evidence that it will implement all necessary actions to overcome the vulnerability and weaknesses of the national system identified by the ERT before the next annual submission.

243. The ERT concludes that Slovakia's estimates of CO<sub>2</sub>, CH<sub>4</sub> and N<sub>2</sub>O emissions from road transportation, and HFC, PFC and SF<sub>6</sub> emissions from consumption of halocarbons and SF<sub>6</sub> are incomplete and/or have been prepared in a way that is not consistent with the methodological and reporting requirements of the Revised 1996 IPCC Guidelines and the IPCC good practice guidance. Slovakia did not satisfactorily resolve the identified potential problems during the review, including through the submission of revised estimates, and did not agree with the adjustments calculated by the ERT, as indicated in its communication of 17 April 2012. Therefore, the ERT lists a question of implementation regarding the calculation of the estimates of CO<sub>2</sub>, CH<sub>4</sub> and N<sub>2</sub>O emissions from road transportation, and HFC, PFC and SF<sub>6</sub> emissions from consumption of halocarbons and SF<sub>6</sub> that were not prepared in accordance with the methodological and reporting requirements.

## Annex I

### Documents and information used during the review

#### A. Reference documents

Intergovernmental Panel on Climate Change. *2006 IPCC Guidelines for National Greenhouse Gas Inventories*. Available at <<http://www.ipcc-nggip.iges.or.jp/public/2006gl/index.html>>.

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\\_lulucf/gp\\_lulucf.htm](http://www.ipcc-nggip.iges.or.jp/public/gp_lulucf/gp_lulucf.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 2011. Available at <<http://unfccc.int/resource/docs/2011/asr/svk.pdf>>.

Synthesis and assessment report on the greenhouse gas inventories submitted in 2011. Available at <<http://unfccc.int/resource/webdocs/sai/2011.pdf>>.

FCCC/ARR/2010/SVK. Report of the individual review of the annual submission of Slovakia submitted in 2010. Available at <<http://unfccc.int/resource/docs/2011/arr/svk.pdf>>.

UNFCCC. *Standard Independent Assessment Report*, Parts I and II. Available at <[http://unfccc.int/kyoto\\_protocol/registry\\_systems/independent\\_assessment\\_reports/items/4061.php](http://unfccc.int/kyoto_protocol/registry_systems/independent_assessment_reports/items/4061.php)>.

## B. Additional information provided by the Slovakia

Responses to questions during the review were received from Ms. Helena Princová (Climate Change Policy Department of the Ministry of the Environment), Ms. Janka Szemesova (Department of Emissions and Air Quality Monitoring of the Slovak Hydrometeorological Institute), Ms. Miroslava Bujnakova (Climate Change Policy Department of the Ministry of the Environment) and Mr. Peter Tomlein (Industrial processes external expert), including additional material on the methodologies and assumptions used. The following documents<sup>1</sup> were also provided by Slovakia:

Anon. 2010. *Green Report 2009. Forests in Slovakia*. Ministry of Agriculture and Rural Development of the Slovak Republic. Available at <<http://www.mpsr.sk/en/index.php?navID=17&id=26>>.

Dimitrios Gkatzoflias and Leon Ntziachristos. 2011. *COPERT 4 v8.1*. Thessaloniki: Laboratory of Applied Thermodynamics (LAT). Greece. Available at <[http://www.emisia.com/download\\_file.html?file=COPERT4\\_v8\\_1.pdf](http://www.emisia.com/download_file.html?file=COPERT4_v8_1.pdf)>.

Pavlenda, P. 2008. *Quantification of carbon stocks in forest soils*. In: Kobza, J. (Ed.): *Piate pôdoznalecké dni. Pôda - národné bohatstvo. Zborník z medzinárodnej konferencie*, Bratislava: VÚPOP, 2008, s. 243-250 (in Slovak). An English summary is available at <<http://agris.fao.org/agris-search/search/display.do?f=2009%2FSK%2FSK0901.xml%3BSK2009000121>>.

Schils, R., Kuikman, P., Liski, J., van Oijen, M., Smith, P., Webb, J., Alm, J., Somogyi, Z., van den Akker, J., Billett, M., Emmett, B., Evans, C., Lindner, M., Palosuo, T., Bellamy, P., Jandl, R., Hiederer, R. 2008. *Review of existing information on the interrelation between soil and climate change*. CLIMSOIL Final Report. Technical report - 2008 – 048, EC, 208 pp. Available at <[http://ec.europa.eu/environment/soil/pdf/climsoil\\_report\\_dec\\_2008.pdf](http://ec.europa.eu/environment/soil/pdf/climsoil_report_dec_2008.pdf)>.

Tomlein, P., Michal and Tomlein, M. 2010. *Refrigerants logging and reporting*. Stockholm: IIR Conference on sustainable refrigeration and heat pump technology.

Tomlein, P. 2010. *Inventory of HFCs, PFCs a SF<sub>6</sub> sources and emissions in the year 2009*. Bratislava: Slovak Hydrometeorological Institute.

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<sup>1</sup> Reproduced as received from the Party.

## Annex II

### Acronyms and abbreviations

AD	activity data
CF	conservativeness factor
CF <sub>4</sub>	perfluoromethane
CH <sub>4</sub>	methane
CMP	Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol
CO	carbon monoxide
CO <sub>2</sub>	carbon dioxide
CO <sub>2</sub> eq	carbon dioxide equivalent
COP	Conference of the Parties
CRF	common reporting format
DOC	degradable organic carbon
DOC <sub>f</sub>	degradable organic carbon fraction
DOM	dead organic matter
EIT	economy in transition
EF	emission factor
ERT	expert review team
EU	European Union
EU ETS	European Union emissions trading scheme
Eurostat	statistical office of the European Union
EWC	European Waste Classification
FAO	Food and Agriculture Organization of the United Nations
F-gas	fluorinated gas
FOD	first order decay
Frac <sub>GASM</sub>	fraction of livestock N excretion that volatilizes as NH <sub>3</sub> and NO <sub>x</sub>
Frac <sub>GRAZ</sub>	fraction of livestock N excreted and deposited onto soil during grazing
Frac <sub>N<sub>2</sub>CBRF</sub>	fraction of total above-ground crop biomass of N-fixing crop that is N
Frac <sub>R</sub>	fraction of total above-ground crop biomass that is removed from the field as a crop product
GCCA	Geodesy, Cartography and Cadastre Authority
GDP	gross domestic product
GHG	greenhouse gas; unless indicated otherwise, GHG emissions are the sum of CO <sub>2</sub> , CH <sub>4</sub> , N <sub>2</sub> O, HFCs, PFCs and SF <sub>6</sub> without GHG emissions and removals from LULUCF
GWP	global warming potential
HC	hydrocarbons
HFCs	hydrofluorocarbons
IE	included elsewhere
IEA	International Energy Agency
IEF	implied emission factor
ITL	international transaction log
IPCC	Intergovernmental Panel on Climate Change
kg	kilogram (1 kg = 1,000 grams)
KP-LULUCF	land use, land-use change and forestry emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol
LPG	liquefied petroleum gas
LTO	landing and take-off
LULUCF	land use, land-use change and forestry
MoE	Ministry of the Environment
NA	not applicable

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NCV	net calorific value
N <sub>2</sub> O	nitrous oxide
NIR	national inventory report
NE	not estimated
NEIS	National Emission Information System
NFC	National Forest Centre
NH <sub>3</sub>	ammonia
NMVOCs	non-methane volatile organic compounds
NO	not occurring
NO <sub>x</sub>	nitrogen oxide
PFCs	perfluorocarbons
PM	particulate matter
QA/QC	quality assurance/quality control
SEF	standard electronic format
SF <sub>6</sub>	sulphur hexafluoride
SHMU	Slovak Hydrometeorological Institute
SIAR	standard independent assessment report
SWDS	solid waste disposal sites
TJ	terajoule (1 TJ = 10 <sup>12</sup> joule)
UNFCCC	United Nations Framework Convention on Climate Change

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## **Comments of Slovakia to the draft *Report of the individual review of the annual submission of Slovakia submitted in 2011***

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Dear Ms. Astrid Olsson,

First of all, we would like to thank to the UNFCCC secretariat and your expert review team (ERT) for particular attention and great effort they put into comprehensive analyses of our annual inventory submission 2011 as well as to the review of National Inventory System of Slovakia (NIS SR) and its functioning. Draft ARR report received for our comments on March 20, 2012 fully reflects ambition of the ERT to identify all possible areas for improvements.

We perceive a revision process and a review report as an independent way of assessment with the main objective to improve regularly the quality of national GHG emissions` inventory and national conditions for its preparation. In this context we would like to state our slight disappointment with the fact, that we received the draft of ARR 2011 more than 3 months later as was originally planned in the timetable presented at the beginning of the in-country review 2011 (20 March 2012 instead of 5 December 2011) and also announced by the Lead reviewer upon our request in January (by mid of February 2011). Even though during period after in-country review 2011 we were working seriously on further improvements based on findings of the ERT published in the Saturday Paper<sup>1</sup>, due to delay in delivering of the draft ARR we did not have sufficient time to consider and reflect all the relevant recommendations of the ERT in the NIR SVK 2012.

Based on our further work and analyses carried out after the in-country review 2011 and analyses of conclusions presented in the draft of ARR 2011 we are sending you our comments and some objections, particularly in the following areas:

- CO<sub>2</sub>, CH<sub>4</sub> and N<sub>2</sub>O emissions from road transportation (CRF 1A3b) – ANNEX I contains more detailed reasoning for proposed revision of your adjustment proposals.
- HFCs, PFCs and SF<sub>6</sub> emissions from consumptions of halocarbons and SF<sub>6</sub> (CRF 2.F) – ANNEX II contains more detailed reasoning for proposed revision of your adjustment proposals.

We suppose you will consider our comments and corrections in Annexes and, if appropriate, reflect them in the relevant chapters of the draft ARR 2011.

Finally, we would like to express our deep dissatisfaction with decision of the ERT to qualify all our proposals for actions to improve functioning of the NIS SR announced in the First response to the Saturday Paper from 10 October 2011 and the Second response to Saturday Paper from 19 October 2011 as inadequate. We recognize objectives and specific functions which NIS should fulfil according to the Article 5, paragraph 1 of the Kyoto Protocol and decision 19/CMP.1. Due to the fact that the NIS SR is operating in national circumstances and managed by official procedures adopted within the Ministry of the Environment, proposed measures in the Plan of Action submitted in our two responses in October were selected carefully to represent realistic steps on the way of further improvement, not just empty promises that could not be fulfilled.

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<sup>1</sup> *Potential Problems and Further Questions from ERT formulated in the course of the 2011 review of the greenhouse gas inventories of Party submitted in 2011, 27 August 2011*

## ANNEX I

### **Comments to the assessment and proposed adjustments related to CO<sub>2</sub>, CH<sub>4</sub> and N<sub>2</sub>O emissions from road transportation (CRF 1A3b) as contained in document FCCC/ARR/2011/SVK: Draft Report of the individual review of the annual submission of Slovakia submitted in 2011**

#### **Part II. Chapter B. Energy, part 4. Non-key categories, para 57-60; Chapter G. Adjustment, part 1. CO<sub>2</sub>, CH<sub>4</sub> and N<sub>2</sub>O emissions from road transportation, para 149-166**

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After thorough examination of assessment and proposed adjustments in the draft ARR 2011 relating to the CO<sub>2</sub>, CH<sub>4</sub> and N<sub>2</sub>O emissions from road transportation we understand that ERT has identified potential problems in two main areas:

1. Transparency of NIR SVK 2011 in the reporting of CH<sub>4</sub> and N<sub>2</sub>O EFs from 1A3b for all fuels, particularly in justifying the decrease in EFs compared to the 2010 submission.
2. Underestimation of EFs of CO<sub>2</sub>, CH<sub>4</sub> and N<sub>2</sub>O from gasoline, diesel oil, LPG, gaseous fuels and biomass.

Transparency:

We admit some weaknesses in the transparency of the NIR SVK 2011, therefore we respect your arguments, that in our Response to the Saturday Paper<sup>2</sup> we concentrated more on recalculations and comparison of EFs instead of on a comprehensive explanation of our methodology and emission factors used.

The main reason behind was that by submitting new emission estimates for CO<sub>2</sub>, CH<sub>4</sub> and N<sub>2</sub>O for all fuels (in order to secure a consistency we changed COPERT IV version 7.0 to COPERT IV version 8.1) we tried to solve the request for ensuring time series consistency since 1990 identified by the previous ERT in the ARR/2010/SVK and also addressed in paragraph 34 of current draft of ARR 2011. Background information on our approach were included in our Response to the Saturday Paper<sup>1</sup>.

Underestimation of emissions:

We do not fully share your views on some issues and reasoning for proposed adjustments related to emissions from road transportation, and particularly some of the links made to potential underestimations. The main question to decide is not whether our N<sub>2</sub>O and CH<sub>4</sub> EFs are correct, but whether the ERT can generally conclude underestimation of emissions due to the change to new COPERT versions. As we can read from paragraph 159, the ERT does not apply adjustments to CH<sub>4</sub> emissions from gasoline and diesel oil and to CO<sub>2</sub> emissions from LPG and gaseous fuels because the adjusted estimates for 2008 and 2009 are lower than the original estimates we submitted (as referred to in paragraph 17 of the Good Practice Guidance for Adjustments (20/CMP.1)). In our view this is a clear indication that we are not underestimating emissions for these emission sources.

The adjustments you propose in these non-key categories are initiated because of alleged lack of transparency. In fact our EFs are not very different from many other Annex I Parties (as we presented in the response to the Saturday Paper<sup>1</sup>) and in some cases, like CO<sub>2</sub> from diesel oil, our EF is even higher than the IPCC default. So, we do not fully agree with you that we have underestimated

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<sup>2</sup> *The Responses to the Potential Problems and Further Questions from the ERT formulated in the course of the 2011 review of the greenhouse gas inventories of Party submitted in 2011, October 10, 2011*

emissions. The problem of Slovakia should be qualified as the lack of transparency without explicit link to underestimations - at least for some gases/fuels. Perhaps the NIR SVK 2011 is not as transparent as it should be but we cannot understand your rationale for arguing that you cannot assess whether our EFs are underestimated when e.g. our EF for CO<sub>2</sub> from diesel is already higher than the IPCC default. Lack of transparency can indeed trigger adjustments but we would expect more robust reasoning to argue potential underestimation of our emissions in CRF 1A3b.

In addition, the ERT is proposing adjustments based on IPCC tier 1 method while we estimate emissions using tier 3 method, which is more accurate.

We have also reservations regarding the method used by the ERT to estimate N<sub>2</sub>O and CH<sub>4</sub> biomass emissions, and N<sub>2</sub>O LPG emissions (where there are no EFs in the 1996 IPCC Guidelines). The Good Practice Guidance for Adjustments (20/CMP.1) requires that the ERT demonstrates the appropriateness of the cluster (paragraph 37). The ERT should also assign the Party to the cluster of countries to which it would most likely belong according to its national circumstances. We are therefore asking the ERT for a reason to use the Table 5 in the draft ARR. Just removing BG (extreme values, not similar national circumstances) from this table would reduce the EFs from 2.4, 12.7 and 3.4 for LPG N<sub>2</sub>O, biomass CH<sub>4</sub> and biomass N<sub>2</sub>O, respectively, to 2.6, 4.9 and 2.2. The later EFs are quite similar to the ones we submitted.

Reference to relevant N<sub>2</sub>O changes in the COPERT 4 methodology version 8.1:

METHODOLOGY: N<sub>2</sub>O hot and cold emission factors parameters for Euro 5 and Euro 6 LPG passenger cars are set equal to Euro 5 and Euro 6 gasoline ones. This is estimated to slightly increase N<sub>2</sub>O in some EU's member states where LPG vehicles are widespread.

Reference: [http://www.emisia.com/download\\_file.html?file=COPERT4\\_v8\\_1.pdf](http://www.emisia.com/download_file.html?file=COPERT4_v8_1.pdf)

## ANNEX II

### Comments to the assessment and proposed adjustments related to HFCs, PFCs and SF<sub>6</sub> emissions from consumptions of halocarbons and SF<sub>6</sub> (CRF 2.F) as contained in document FCCC/ARR/2011/SVK: Draft Report of the individual review of the annual submission of Slovakia submitted in 2011

**Part II. Chapter C. Industrial processes and solvent and other product use, part 2. HFCs, PFCs and SF<sub>6</sub> emissions from consumptions of halocarbons and SF<sub>6</sub>, para 69-70**  
**Chapter G. Adjustments, part 2. HFCs, PFCs and SF<sub>6</sub> emissions from consumptions of halocarbons and SF<sub>6</sub>, para 167- 192;**

After another round of reviewing and subsequent confirmation of input data for these categories by our experts as well as a thorough review of proposed adjustments in the draft ARR 2011 related to HFCs, PFCs and SF<sub>6</sub> emissions from consumptions of halocarbons and SF<sub>6</sub> (CRF 2.F) we still would like to submit for your consideration following corrections of values presented in Table 11 (page 63, draft ARR 2011). Details and reasoning for proposed corrections are given in table below.

*Table A: Comments to the Table 11, page 63 from the Draft 2011 ARR*

Category	Average value from Table 11 of Draft 2011 ARR in GgCO <sub>2</sub> per capita *10 <sup>-6</sup>	Reported value in the NIR SVK 2011	New SVK proposal	Comments
<b>Solvents</b>	0,34 emissions per capita based on CZ inventory	"NO"	"NO"	Suggested value derived from CZ is not relevant to SVK. There is no import of F-Solvents to SVK. SVK uses solvents L113, S316 which are not obliged to be included in the inventory.
<b>Aerosols</b>	2,37	0,654	1,36	Number of containers is correct and was verified again via report of ŠÚKL <sup>1</sup> . Original charge of container was set on the base of expert estimation. After recalculation of basic charge we suggest to accept average value = 1,36 obtained after excluding extreme values from CZ and PL
<b>PFC extinguishing media</b>	0,51	"NO"	"NO"	We suggest to keep status NO. Import of PFC extinguishing media is not reported in SVK.
<b>SF<sub>6</sub> extinguishing media</b>	0,16	"NO"	"NO"	We suggest to keep status NO. SVK reports SF <sub>6</sub> as insulation gas. In Table 11 only RO reports SF <sub>6</sub> as extinguishing media and this should not be the base for representative cluster of countries.
<b>Blowing agents</b>	3,64	0,049	0,44	Suggested average value in Table 11 is not relevant for SVK. After review of national circumstances we suggest to use average from values reported by CZ and HU = 0,44. Extreme values from PL and EE should be taken out from average. In SVK production of foams changed from blowing agent R141b directly to cyclopentan and in 2002 to HFC 245fa and HFC365mfc. Import to building industry was based on values of big importers (BASF) and estimation of part imported by small companies. We suppose that consumption in SVK was the lowest, comparably to value from CZ.

<sup>1</sup> ŠÚKL – State Institute for Drug Control (štátny ústav kontroly liečiv)

In the light of updated information on sources and values of EF, we propose to correct your adjustments on pages 79-80 of the draft ARR 2011, paragraph 234,( j) – (n) for year 2008 and paragraph 236, (j)-(n), for year 2009 using new values from Table B.

Table B: Comparison of recalculations for 2008 and 2009

	2008 ERT GgCO <sub>2</sub> /year	2008 SVK suggest GgCO <sub>2</sub> /year	2009 ERT GgCO <sub>2</sub> /year	2009 SVK suggest GgCO <sub>2</sub> /year
2.F.5 Solvents	2,229	NO	2,231	NO
2.F.4 Aerosols	15,546	6,591	15,563	7,072
2.F.3 PFC Extinguishing Media	3,344	NO	3,348	NO
2.F.3 SF <sub>6</sub> Extinguishing Media	1,019	NO	1,020	NO
2.F.2 Foam Blowing	23,854	2,019	23,881	2,039

Further explanations of applied methodology and results of recalculations and implications on national GHG emission inventory for given CRF categories are described below.

### Source category description – Foam Blowing (CRF 2.F.2)

Emissions for this category were estimated based on the latest available data and information and are reported for the first time in the NIR SVK 2012 submission. Emissions are released from hard (CRF 2.F.2.1) and soft foams (2.F.2.2) categories. The following gases have occurred since 1999: HFC134a, HFC245fa for hard foam and HFC365mfc for soft foam (Tables C and D). The product life factor is 0.5% for all gases in this category.

Based on the recommendations of the ERT during the in-country review 2011, additional review of national circumstances was performed. Average value 0.435 Gg of CO<sub>2</sub> per capita x 10<sup>-6</sup> was used based on average values from neighbouring countries. After verifying data in our country, it is supposed that consumption in Slovakia is very low and production of foams has changed from blowing agent R141b directly to cyclopentane and in 2002 to HFC245fa and HFC365mfc. Import on behalf of construction industry was quantified from values of big importers (BASF, etc.) and estimation of remaining parts was based on imports of small companies.

Table C. Overview of HFCs emissions in category 2.F.2 Foam Blowing according to gases

Year	2.F.2.1 Hard Foam			2.F.2.2 Soft Foam	
	HFC134a		Actual emissions from stock [t]	HFC245fa	HFC365mfc
	new products [t]	in operation [t]			
1999	41,200	41,200	0,206	NO	NO
2000	41,200	82,400	0,412	NO	NO
2001	37,500	119,900	0,600	NO	NO
2002	37,500	157,400	0,787	0,034	0,026
2003	31,200	188,600	0,943	0,068	0,052
2004	24,900	213,500	1,068	0,099	0,076
2005	18,700	232,200	1,161	0,130	0,100
2006	13,700	245,900	1,230	0,156	0,120
2007	12,500	258,400	1,292	0,176	0,136
2008	NO	258,400	1,292	0,192	0,148
2009	NO	258,400	1,292	0,203	0,156
2010	NO	258,400	1,292	0,213	0,164

Table D: Time series of total HFCs emissions in category 2.F.2 Foam Blowing

Year	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
HFCs (Gg CO <sub>2</sub> eq.)	0,268	0,536	0,779	1,083	1,346	1,563	1,739	1,874	1,992	2,019	2,039	2,057

#### **Source category description – Aerosols/Metered Dose Inhalers (CRF 2.F.4)**

Emissions for this category were estimated based on the latest available data and information and are reported for the first time in the NIR SVK 2012 submission. Emissions are produced in the category 2.F.4.1 – Metered Dose Inhalers. Since 2000 the following gases have occurred: HFC134a (since 2000) and HFC227ea (in 2010) (Tables E and F). The product life factor is 100% for all gases in this category. Estimation of emissions for this category was based on the recommendation of the ERT during the in-country review 2011. Number of containers was taken directly from the report of the ŠÚKL institute<sup>3</sup>. Original charge of a container was set on the base of expert estimation with the average value of 1.36 Gg CO<sub>2</sub> per capita x 10<sup>-6</sup>.

Table E: Overview of HFCs emissions in category 2.F.4.1 Metered Dose Inhalers according to gases

Year	2.F.4.1 Metered Dose Inhalers		
	HFC134a		HFC227ea
	in operation [t]	Actual emissions from stock [t]	Actual emissions from stock [t]
2000	3,730	3,730	NO
2001	4,100	4,100	NO
2002	4,290	4,290	NO
2003	4,470	4,470	NO
2004	4,660	4,660	NO
2005	4,850	4,850	NO
2006	5,030	5,030	NO
2007	5,030	5,030	NO
2008	5,070	5,070	NO
2009	5,440	5,440	NO
2010	4,838	4,838	0,274

Table F: Overview of total HFCs emissions in category 2.F.4 Aerosols/Metered Dose Inhalers

Year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
HFCs (Gg CO <sub>2</sub> eq.)	4,849	5,330	5,577	5,811	6,058	6,305	6,539	6,539	6,591	7,072	7,084

#### **Source category description – Solvents (CRF 2.F.5)**

No emissions of F gases were included in this category. There is no import of F-solvents to the Slovak Republic. According to the information from industry, solvents L113, S316 are used, but these are not included in the IPCC GPG 2000.

#### **Source category description – Other applications using ODS substitutes (CRF 2.F.6)**

No emissions of F gases were included in this category.

#### **Source category description – Semiconductor manufacture (CRF 2.F.7)**

No emissions of F gases were included in this category.

#### **Source category description – Electrical equipment (CRF 2.F.8)**

Emissions originated from electrical equipment represent less than 10% of SF<sub>6</sub> emissions from 2.F category. Total actual emissions of SF<sub>6</sub> were 0.77 Gg of CO<sub>2</sub> equivalents in 2008 and total actual emissions of SF<sub>6</sub> were 0.81 Gg of CO<sub>2</sub> equivalents in 2009. The potential emissions of SF<sub>6</sub> were 0.005 Gg of CO<sub>2</sub> equivalents in 2008 and 0.004 Gg of CO<sub>2</sub> equivalents in 2009. Emissions of HFCs and PFCs are not occurring in this category.

<sup>3</sup> ŠÚKL – State Institute for Drug Control