United Nations FCCC/ARR/2010/SVK

Framework Convention on Climate Change

Distr.: General
31 March 2011

English only

Report of the individual review of the annual submission of Slovakia submitted in 2010*

* In the symbol for this document, 2010 refers to the year in which the inventory was submitted, and not to the year of publication.

Contents

I. Introduction and summary

A. Overview

1. This report covers the centralized review of the 2010 annual submission of Slovakia, coordinated by the UNFCCC secretariat, in accordance with decision 22/CMP.1. The review took place from 13 to 18 September 2010 in Bonn, Germany, and was conducted by the following team of nominated experts from the UNFCCC roster of experts: generalists – Mr. Domenico Gaudioso (Italy) and Mr. Justin Goodwin (United Kingdom of Great Britain and Northern Ireland); energy – Ms. Kristien Aernouts (Belgium), Mr. Gebru Jember Endalew (Ethiopia), Mr. Fernando Farías (Chile) and Mr. Suthum Patumsawad (Thailand); industrial processes – Ms. Marisol Bacong (Philippines) and Mr. Dusan Vacha (Czech Republic); agriculture – Mr. Sergio Gonzalez (Chile) and Mr. Mahmoud Medany Awad (Egypt); land use, land-use change and forestry (LULUCF) – Ms. Savitri Garivait (Thailand), Ms. Gro Hylen (Norway) and Mr. Harry Vreuls (Netherlands); and waste – Mr. Mark Hunstone (Australia) and Ms. Baasansuren Jamsranjav (Mongolia). Mr. Goodwin and Mr. Gonzalez were the lead reviewers. The review was coordinated by Mr. Sabin Guendehou and Mr. Matthew Dudley (UNFCCC secretariat).

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

B. Emission profiles and trends

3. In 2008, the main greenhouse gas (GHG) in Slovakia was carbon dioxide (CO_2) accounting for 81.3 per cent of total GHG emissions[1] expressed in carbon dioxide equivalent (CO_2 eq), followed by methane (CH_4) (9.7 per cent) and nitrous oxide (N_2O) (8.3 per cent). Hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF_6) collectively accounted for 0.6 per cent of the overall GHG emissions in the country. The energy sector accounted for 65.6 per cent of total GHG emissions, followed by the industrial processes sector (22.8 per cent), the agriculture sector (6.4 per cent), the waste sector (5.0 per cent) and the solvent and other product use sector (0.3 per cent). Total GHG emissions amounted to 48,999.01 Gg CO_2 eq and decreased by 33.7 per cent between the base year[2] and 2008.

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, respectively. In table 1, CO_2, CH_4 and N_2O emissions included in the rows under Annex A sources do not include emissions and removals from the LULUCF sector.

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

[1] In this report, the term "total GHG emissions" refers to the aggregated national GHG emissions expressed in terms of CO_2 eq excluding LULUCF, unless otherwise specified.

[2] "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 2008[a]

			Gg CO_2 eq								*Change*
		Greenhouse gas	*Base year*	*1990*	*1995*	*2000*	*2005*	*2006*	*2007*	*2008*	*Base year–2008 (%)*
Annex A sources		CO_2	62 686.83	62 686.83	44 787.85	41 175.04	41 476.23	40 758.25	38 959.84	39 858.88	–36.4
		CH_4	4 810.88	4 810.88	4 273.96	4 448.89	4 659.51	4 739.58	4 623.25	4 764.13	–1.0
		N_2O	6 162.35	6 162.35	4 164.89	3 537.31	3 829.37	4 197.72	4 029.31	4 058.09	–34.1
		HFCs	NA, NO	NA, NO	22.15	75.59	172.34	198.90	226.99	263.24	NA, NO
		PFCs	271.37	271.37	114.32	11.65	20.25	35.82	24.88	36.16	–86.7
		SF_6	0.03	0.03	9.91	13.25	16.61	17.15	17.44	18.51	60 407.8
KP-LULUCF	Article 3.3[b]	CO_2								1 350.58	
		CH_4								NA	
		N_2O								NA	
	Article 3.4[c]	CO_2	NA							NA	NA
		CH_4	NA							NA	NA
		N_2O	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.

[a] "Base year" for Annex A sources refers to the base year under the Kyoto Protocol, which is 1990 for all gases. The "base year" for activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol is 1990.

[b] 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.

[c] 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 2008

			Gg CO_2 eq							*Change*
		Sector	*Base year*[a]	*1990*	*1995*	*2000*	*2005*	*2006*	*2007*	*2008*	*Base year–2008 (%)*
Annex A		Energy	55 305.31	55 305.31	38 418.87	34 080.60	33 186.83	32 429.54	30 617.49	32 132.51	–41.9
		Industrial processes	10 479.76	10 479.76	9 253.65	9 866.70	11 221.37	11 626.97	11 442.87	11 162.94	6.5
		Solvent and other product use	132.64	132.64	111.74	78.83	159.77	158.29	153.50	153.34	15.6
		Agriculture	6 958.36	6 958.36	4 388.57	3 485.13	3 230.03	3 174.64	3 257.58	3.122.41	–55.1
		Waste	1 055.39	1 055.39	1 200.26	1 750.47	2 376.32	2 557.98	2 410.28	2 427.81	130.0
		Other	NA	NA	NA	NA	NA	NA	NA	NA	NA
		LULUCF	NA	–2 388.50	–2 684.09	–2 386.20	–752.03	–2 931.19	–3 098.91	–2 076.36	NA
		Total (with LULUCF)	**NA**	**71 542.96**	**50 689.00**	**46 875.52**	**49 422.29**	**47 016.23**	**44 782.81**	**46 922.65**	**NA**
		Total (without LULUCF)	**73 931.46**	**73 931.46**	**53 373.09**	**49 261.72**	**50 174.32**	**49 947.42**	**47 881.71**	**48 999.01**	**–33.7**
KP-LULUCF	Article 3.3[b]	Afforestation & reforestation								–1 701.33	
		Deforestation								3 051.91	
		Total (3.3)								**1 350.58**	
	Article 3.4[c]	Forest management								NA	
		Cropland management	NA							NA	NA
		Grazing land management	NA							NA	NA
		Revegetation	NA							NA	NA
		Total (3.4)	**NA**							**NA**	**NA**

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.

[a] "Base year" for Annex A sources refers to the base year under the Kyoto Protocol, which is 1990 for all gases. The "base year" for activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol is 1990.

[b] 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.

[c] 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_2 eq

	As reported	*Adjustment*[a]	*Final*[b]	*Accounting quantity*[c]
Commitment period reserve	244 155 535		244 995 049	
Annex A emissions for current inventory year				
CO_2	39 763 655		39 858 879	
CH_4	4 728 849		4 764 129	
N_2O	4 020 689		4 058 088	
HFCs	263 242		263 242	
PFCs	36 162		36 162	
SF_6	18 511		18 511	
Total Annex A sources	**48 831 107**		**48 999 010**	
Activities under Article 3, paragraph 3, for current inventory year				
3.3 Afforestation and reforestation on non-harvested land for current year of commitment period as reported	–1 701 333		–1 701 333	
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	3 051 913		3 051 913	
Activities under Article 3, paragraph 4, for current inventory year[d]				
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 in base year				

Abbreviation: NA = not applicable.

[a] "Adjustment" is relevant only for Parties for which the ERT has calculated one or more adjustment(s).

[b] "Final" includes revised estimates, if any, and/or adjustments, if any.

[c] "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.

[d] Activities under Article 3, paragraph 4, are relevant only for Parties that elected one or more such activities.

II. Technical assessment of the annual submission

A. Overview

1. Annual submission and other sources of information

6. The 2010 annual inventory submission contains a complete set of common reporting format (CRF) tables for the period 1990–2008 submitted on 14 April 2010 and a national inventory report (NIR) submitted on the 15 April 2010 and resubmitted on 27 August 2010. 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 minimization of adverse impacts under Article 3, paragraph 14, of the Kyoto Protocol. The standard electronic format (SEF) tables were submitted on 14 April 2010. The annual submission was submitted in accordance with decision 15/CMP.1.

7. Slovakia officially submitted revised emission estimates on 16 November 2010 in response to questions raised by the expert review team (ERT) during the course of the centralized review as follows: CO_2, CH_4 and N_2O emissions from domestic navigation (see para. 47); CO_2 emissions from iron and steel production – steel (see para. 56); CO_2 emissions from solvents and other product use (see para. 60); CH_4 emissions from solid waste disposal on land (see para. 106); and N_2O emissions from domestic wastewater handling (see para. 113). Slovakia submitted revised information on 16 November 2010 for KP-LULUCF (see section II.G.1 of this report), in response to questions raised by the ERT during the review. Where necessary, the ERT also used the previous year's submission during the review.

8. 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.[3]

9. During the review, Slovakia provided the ERT with additional information and documents which are not part of the annual submission but are in many cases referenced in the NIR. The full list of information and documents used during the review is provided in annex I to this report.

Completeness of inventory

10. The inventory covers all significant source and sink categories for all years of the time series and is complete in terms of years and geographical coverage. Slovakia has improved the completeness of its inventory by including a number of new estimates in the energy and industrial processes sectors. Following the recommendations from the ERT during the review, Slovakia improved the completeness by providing additional estimates for categories not reported or underestimated (see para. 7 above). However, there are still estimates missing from industrial solid waste disposal sites for the years of the period 1990–1996 and industrial solid waste composting for the period 1990–2001. A number of

[3] 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 (ITL) 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.

carbon pools and categories in LULUCF (see para. 74) and KP-LULUCF (see paras. 124, 130 and 134) are not reported. The ERT recommends that Slovakia report the complete time series for emission estimates and all mandatory categories.

11. In addition, during the review, Slovakia clarified that the notation key not estimated ("NE") was wrongly used for SF_6 emissions from other (consumption of halocarbons and SF_6), which should be reported as not occurring ("NO"). The ERT recommends that Slovakia use the correct notation key in its next annual submission.

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

Overview

12. The ERT concluded that the national system and institutional arrangements continue to perform their required functions.

13. The Party described the changes to the national system since the previous annual submission, including the new cooperation with the National Forest Centre in Zvolen for Kyoto Protocol requirements under LULUCF, a new cooperation with the Transport Research Centre in Brno (the Czech Republic) and the establishment of a Climate and Energy Package (CEP) which includes a committee and action plan for addressing GHG emissions. The ERT noted with appreciation that the stated changes strengthen the national system to support planning, preparation and management of the inventory (see para.143).

Inventory planning

14. The NIR and additional information submitted by the Party during the review describe the national system and institutional arrangements for the preparation of the inventory. The Slovak Hydrometeorological Institute (SHMU) is authorized by the Slovakian Ministry of the Environment to provide environmental services, including annual GHG inventories, and has overall responsibility for the national inventory. The expert group for CEP nominates contact persons for providing the information needed for the GHG inventory preparation. The NIR provides details of the specific responsibilities in the inventory development process, including those related to the choice of methods, data collection (particularly of activity data (AD) and emission factors (EFs)) from statistical services and the processing and archiving of data. Organizations and individuals are listed in table 1.2 of the NIR (including sectoral expertise for each of the sectors (energy, industrial processes, fluorinated gases (F-gases), agriculture, LULUCF and KP-LULUCF, and waste). Experts for uncertainties, transport, energy statistics, projections and the national registry are involved in the preparation of the inventory and have been appointed for five years. Slovakia has elaborated a quality assurance/quality control (QA/QC) plan. However, the presence of a number of errors identified by the ERT during the review, in almost all sectors, has indicated that this plan is still not fully implemented or effective. The ERT strongly recommends that Slovakia strengthen its QA/QC activities to minimize errors in its next annual submission.

Inventory preparation

Key categories

15. Slovakia used the IPCC tier 1 approach to identify its key categories using the level and trend assessment, which was performed in accordance with the Intergovernmental Panel on Climate Change (IPCC) *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories* (hereinafter referred to as the IPCC good practice

guidance) and the IPCC *Good Practice Guidance for Land Use, Land-Use Change and Forestry* (hereinafter referred to as the IPCC good practice guidance for LULUCF). Slovakia has included the LULUCF sector in its assessment of the key categories. The key category analysis performed by the Party and that performed by the secretariat[4] produced different results owing to a different level of aggregation used by Slovakia. The ERT notes that Slovakia has not included qualitative approaches to identify key categories. 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 include qualitative approaches to identify key categories and include a description of how the key category analysis is used to prioritize improvements to the inventory for future annual submissions.

16. Slovakia has identified afforestation/reforestation – CO_2 and deforestation – CO_2 as key categories in CRF table NIR-3 and indicated in the NIR (page 215) that forest management is a key category, although the Party has elected not to account for activities under Article 3, paragraph 4, of the Kyoto Protocol. The ERT recommends that Slovakia correct this inconsistency and explain, in its next annual submission, how key categories for activities under Article 3, paragraph 3, of the Kyoto Protocol have been identified, following the guidance on establishing the relationship between the activities under the Kyoto Protocol and the associated key categories in the UNFCCC inventory, as provided in chapter 5.4.4 of the IPCC good practice guidance for LULUCF.

Uncertainties

17. Slovakia has compiled a tier 1 uncertainty analysis following the IPCC good practice guidance and included the LULUCF sector. However, the methods and assumptions used for the uncertainty estimates for LULUCF are unclear in the NIR. The ERT commends Slovakia for its detailed uncertainty analysis using a tier 2 Monte Carlo method for emission estimates in energy (fuel combustion), municipal waste disposal sites, industrial processes and solvent use. Figure 1.3 of the NIR illustrates Slovakia's use of the uncertainty analysis to prioritize its efforts to improve the inventory. The ERT notes that Slovakia has reduced uncertainties from 14.0 per cent (for level) and 8.0 per cent (for trend) from the 2009 submission to 10.0 per cent (for level) and 6.0 per cent (for trend) in the 2010 submission. In response to questions from the ERT during the review, Slovakia indicated that these reduced uncertainties are the result of improvements in uncertainty parameters in the energy, industrial processes and solvent and other product use sectors, based on revised tier 2 national approaches. The ERT recommends that Slovakia document clearly the reasons for the changes in uncertainty estimates between submissions and provide more detailed descriptions of the data sources for uncertainties in the LULUCF sector. Slovakia has not provided uncertainty estimates associated with emissions and removals from activities under Article 3, paragraph 3, of the Kyoto Protocol. The ERT recommends that Slovakia include this information in its next annual submission.

Recalculations and time-series consistency

18. Recalculations have been performed and reported in accordance with the IPCC good practice guidance. The ERT noted that recalculations reported by the Party of the time series 1990–2007 have been undertaken to take into account the following:

[4] 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.

(a) In the energy sector – changes and improvements in AD, EFs and parameters for manufacturing industries (1990–2007), including harmonization with the European Union emissions trading scheme (EU ETS) data for all large and medium-sized plants from 2005 onwards for natural gas, coal, coke and coke oven gas; for transport, with the use of the COPERT IV model for 2001–2007; and for 2007 for fugitive emissions from fuels;

(b) In the industrial processes sector – the reallocation of emissions for iron and steel and ferroalloy production from the energy sector to the industrial processes sector;

(c) In the solvent and other product use sector – the provision of emission estimates for the first time;

(d) In the agriculture sector – changes in gross energy intake of dairy and non-dairy cattle based on milk productivity and milk fat;

(e) In the waste sector – revised estimates for CH_4 recovered from landfill and new estimates for industrial solid waste composting.

19. The major changes, and the magnitude of the impact, include: an increase in the estimated total GHG emissions in the base year (0.9 per cent) and an increase in 2007 (2.3 per cent). The rationale for these recalculations is provided in the NIR (table 10.1) and in the sectoral chapters, but is not well explained in the NIR for the waste and LULUCF sectors. No explanations for the recalculations are provided in CRF table 8(b). The ERT recommends that Slovakia fully explain all the recalculations in the NIR and that Slovakia also update CRF table 8(b) with information on the rationale for changes to the inventory estimates.

20. The ERT notes that the use of two different databases including the Emission and Air Pollution Source Inventory (EAPSI) prior to 2000 and the National Emission Information System (NEIS) from 2000 onwards, which are not compatible at the plant level to calculate emissions from stationary fuel combustion, raises questions regarding time-series consistency. In response to the draft review report, Slovakia indicated that time-series consistency between EAPSI and NEIS is ensured for the period 1990–1999 for EAPSI and for the period 2000–2009 for NEIS and at the national level for both databases. The Party indicated that time-series consistency at the plant level cannot be further improved but that time-series consistency at the national level can be further documented. The ERT recommends that Slovakia further document, in its next annual submission, that time-series consistency is ensured for total national emissions data if EAPSI and NEIS are used. Furthermore, since the 2009 submission, emissions reported under the EU ETS are used from 2005 onwards. The ERT reiterates the recommendation from the previous review report that, in the next annual submission, Slovakia ensure time-series consistency of the categories in which EU ETS data are used, by including information confirming that the methods used to derive EU ETS data are in line with the IPCC good practice guidance.

Verification and quality assurance/quality control approaches

21. Slovakia has provided information on QA/QC procedures in line with 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). Slovakia 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, there is not sufficient description of the QA procedures in the industrial processes, agriculture and LULUCF sectors (see the sectoral chapters of this report). The ERT notes that Slovakia has taken significant steps to improve its QC procedures, following recommendations from previous ERTs, and has implemented its QA/QC plan for the first time during this reporting year. However, not all the steps defined in the plan were

performed for the 2010 submission and consistency between the CRF tables and the final NIR was not checked, with the resulting errors being identified by the ERT for the energy, industrial processes, agriculture, LULUCF and waste sectors. The ERT recommends that Slovakia enhance and implement its QA/QC procedures for all sectors to avoid errors and omissions (especially between the CRF tables and the NIR) in its next annual submission.

Transparency

22. Slovakia has improved the transparency of its NIR since the previous inventory submission by providing AD and EFs for several of the industrial processes categories. The ERT welcomes the Party's effort to give, for the first time, an overview of the LULUCF sector, to provide definitions of land-use categories and to improve the description of AD used, especially for forest land. However, the NIR does not provide transparent information on the allocation of fuels and emissions between the energy and the industrial processes sectors, or on the QA procedures for the energy, industrial processes, agriculture, LULUCF and waste sectors. In addition, the Party did not provide transparent information on: the parameters used to estimate emissions/removals from the LULUCF sector (especially for cropland and grassland, land converted to forest land and carbon stock in above- and below-ground living biomass); key model parameters in the waste sector (degradable organic carbon, methane generation rate constant); the rationale for the methane conversion factor (MCF) values; details of the source of biochemical oxygen demand per capita; or a discussion on sludge disposal to landfill. The ERT recommends that Slovakia include, in its next annual submission, transparent information on the allocation of fuels and emissions between the energy and the industrial processes sectors, on the AD, EFs and assumptions used for the LULUCF and waste sectors and for sector-specific QA procedures, as described in the sector-specific sections below.

Inventory management

23. Slovakia has a centralized archiving system at the Department of Emissions within 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. 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, Slovakia indicated that it is planning to develop a special electronic database to record inventory results with limited access. All background data are archived in Excel spreadsheets by the coordination and quality manager.

3. Follow-up to previous reviews

24. The ERT commends Slovakia for implementing a number of improvements in response to recommendations from the previous ERT regarding the energy, industrial processes, agriculture, LULUCF and waste sectors, including the improvement of the estimates using the COPERT IV model and data from the EU ETS, the improvement of the country-specific factors for agriculture and waste, the re-allocation of emissions between the energy and industrial processes sectors, the provision of additional details to improve transparency for some areas (e.g. in the industrial processes and LULUCF sectors) of the NIR and the use of the tier 2 Monte Carlo uncertainty analysis for the energy, industrial processes and waste sectors. Furthermore, the ERT welcomes Slovakia's efforts to give an overview of the LULUCF sector, to provide definitions of land-use categories and to explain the causes of the fluctuations of net CO_2 removals over time, especially for forest land. In addition, in its NIR, Slovakia has identified as "pending" those improvements which were identified in the previous annual review report but which have not been implemented (see para. 25 below).

25. The ERT identified the following improvements which had been identified in previous review reports, but which have not been implemented by Slovakia:

(a) To ensure time-series consistency for the categories in which EU ETS data are used;

(b) To check the consistency of AD and EFs reported in the CRF tables and check the consistency of reporting in the NIR and the CRF tables for the energy, industrial processes and agriculture sectors, as some basic errors were found;

(c) To provide a category-by-category description of AD by source, methodology and EFs used, along with a brief description of background information and references, improvements made since the previous year's submission and the improvements planned for the next year's submission;

(d) To provide additional transparency in the NIR for the general methodology description for industrial processes (providing a description of the emissions split between the energy and the industrial processes sectors, specifically for the subcategories calcium carbide production and iron and steel production) and waste in the description of the trends and QA/QC;

(e) To collect AD from landfill operators and waste collection operators in order to improve the quality of AD and reduce uncertainty and estimates of CH_4 and N_2O emissions from the biological treatment of solid waste and composting for the period 1990–2001 in order to address inconsistency in the time series;

(f) To use a higher-tier method to estimate emissions from industrial solid waste disposal for the entire time series;

(g) To report, separately, the carbon stock changes in living biomass and dead organic matter (DOM) as a result of either deforestation or afforestation and/or reforestation.

4. Areas for further improvement

Identified by the Party

26. Slovakia identified the following areas for improvement, resulting from its own improvement plan or in response to recommendations from previous ERTs:

(a) The implementation of improvements to the consistency between the NIR and CRF tables;

(b) The implementation of a tier 2 methodology to estimate emissions from civil aviation, estimating the amount of fuel sold and the number of flights (domestic and international) in cooperation with the Ministry of Transport and Bratislava airport and the verification of fuel consumption data by the international carriers in order to document emissions from domestic aviation;

(c) The application of the COPERT IV model by including fuel consumption data for heavy-duty vehicles and buses and a comparison study of carbon EFs per fuel (diesel, gasoline) with default EFs in the COPERT IV database;

(d) The implementation of the tier 2 methodology and national nitroge363n (N) excretion values for estimating N_2O emissions from manure management;

(e) The splitting of direct and indirect emissions from agricultural soils and the development of national EFs for direct soil emissions of N_2O and the N_2O emissions from manure management;

(f) The implementation of improvements to estimate changes in carbon stocks and associated emissions using the new national forest inventory (NFI), further research and improvements to the estimation of CO_2 emissions from agricultural lime application;

(g) The implementation of a review of the AD on solid waste and wastewater in 2012 and the implementation of a planned programme to validate the country-specific parameters for first order decay models.

Identified by the expert review team

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

(a) Improve the completeness of the inventory for the early years in the time series for waste (1990–2001), and report non-reported categories in LULUCF and non-estimated pools for mandatory activities under Article 3, paragraph 3, of the Kyoto Protocol;

(b) Include more transparent information in the specific-sector chapters of the NIR, including information on the comparison of the reference and sectoral approaches, the allocation of fuels and emissions between the energy and the industrial processes sectors, the AD, EFs and assumptions used for the LULUCF and waste sectors, and for sector-specific QA;

(c) Explain how the key categories for activities under Article 3, paragraph 3, of the Kyoto Protocol have been identified and provide information on uncertainty estimates associated with emissions and removals from activities under Article 3, paragraph 3, of the Kyoto Protocol;

(d) Provide the information required for the reporting and accounting of carbon pools for activities under Article 3, paragraph 3, of the Kyoto Protocol during the commitment period, given that the second cycle of the new NFI, which is expected to provide data and information, is planned to take place in 2015–2016, which is beyond the end of the commitment period;

(e) Ensure that all recalculations are fully explained in the NIR and update CRF table 8(b) with information on the rationale for changes in the inventory estimates;

(f) Implement the recommendations identified in the NIR and those outstanding improvements from previous review reports;

(g) Enhance the availability of public information referred to in paragraphs 46 and 47 of the annex to decision 13/CMP.1 and report on any changes to that public information available on the public user interface of the national registry;

(h) Explore further steps in implementing Article 3, paragraph 14, of the Kyoto Protocol and report information on how Slovakia is striving to implement its commitments under Article 3, paragraph 14.

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

B. Energy

1. Sector overview

29. The energy sector is the main sector in the GHG inventory of Slovakia. In 2008, emissions from the energy sector amounted to 32,132.51 Gg CO_2 eq, or 65.6 per cent of total GHG emissions. Since 1990, emissions have decreased by 41.9 per cent. The key driver for the fall in emissions is the decrease in economic activity and the restructuring of

the economy through the implementation of new and more effective technologies, which has reduced the proportion of energy-intensive industries and increased the proportion of the services sector, in terms of gross domestic product. Within the sector, 33.7 per cent of the emissions were from energy industries, followed by 24.5 per cent from manufacturing industries and construction, 20.9 per cent from transport, 13.5 per cent from other sectors and 4.1 per cent from other. Fugitive emissions account for 3.3 per cent.

30. The CRF tables include emission estimates for all categories, gases and fuels used in the energy sector, as recommended by the *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories* (hereinafter referred to as the Revised 1996 IPCC Guidelines). Emissions from the energy sector have been reported for all years. Slovakia has improved the completeness of its inventory by including N_2O emissions from venting and flaring from natural gas production and processing and from oil production for the entire time series, as recommended by the previous review report. CO_2, N_2O and CH_4 emissions from domestic navigation were not reported due to a lack of AD; however, during the review, Slovakia provided estimates of these emissions following the recommendations from the ERT (see para. 47 below).

31. The NIR does not provide transparent information on the allocation of fuels and emissions between the energy and the industrial processes sectors. For example, the description in the NIR on the reallocation of part of the emissions from the energy sector to iron and steel production in the industrial processes sector is not clear. Slovakia did not provide the clarification requested by the ERT during the review week on this allocation. The ERT recommends that Slovakia include, in its next annual submission, transparent information on the allocation of fuels and emissions between the energy and the industrial processes sectors.

32. The ERT has identified some inconsistencies between the NIR and the CRF tables, for example: the NIR indicated that the total emissions in 2008 were 32,121 Gg CO_2 eq, while the CRF tables reported 32,132.46 Gg CO_2 eq; N_2O emissions from fugitive emissions are reported only in the CRF tables; and the contribution of transport is reported as 13.8 per cent of total CO_2 eq in energy whereas it should be 20.9 per cent. The ERT recommends that Slovakia implement the appropriate QA/QC procedures in order to correct these inconsistencies in its next annual submission.

33. Slovakia reported a recalculation due to the correction of natural gas consumption in public electricity and heat production for 2007, based on updated information from the Slovak Gas Industry. In road transportation, Slovakia used the COPERT IV software to perform a recalculation of the emissions from the year 2000 onwards, but the years before 2000 were not recalculated and emissions were still estimated using the COPERT III software. The ERT identified that time-series consistency is not guaranteed. The ERT recommends that Slovakia use the COPERT IV methodology for the whole time series in its next annual submission. The recalculations reported result in a decrease in emissions in the energy sector by 13.8 per cent in 2008.

34. The use of two different databases to calculate emissions from stationary fuel combustion (EAPSI prior to 2000 and NEIS from 2000 onwards), which are not compatible at the plant level, raises questions regarding time-series consistency. In the NIR, Slovakia states that the databases are comparable only at the national level. In response to questions raised by the ERT during the review, Slovakia explained that the categorization of fuels has completely changed in the NEIS database and that fuel consumption data before 2000 were manually disaggregated according to the appropriate categories. The fact that many producers changed their names and production activity, ceased production, renamed or opened new plants may complicate the Party's efforts to establish a consistent time series according to categories when using the sectoral approach. However, in the NIR, Slovakia states that the total fuel consumption is consistent. The ERT recommends that Slovakia

include, in the NIR of its next annual submission, a table with total fuel consumption for all years from both databases, aggregated into the main groups of fuel types as used in the national energy statistics, and compare these data with national energy balances. The ERT also recommends that Slovakia implement the QA/QC checks described in the NIR and report in its next annual submission all relevant information on this QA/QC, which will demonstrate that the time-series consistency is ensured.

35. Since the 2009 submission, EFs for CO_2 emissions for energy industries and manufacturing industries and construction have been harmonized with EU ETS data for all large and medium-sized plants from 2005 onwards for natural gas, coal, coke and coke oven gas. The ERT reiterates the recommendation from the previous review report that Slovakia ensure the time-series consistency of the categories in which EU ETS data are used. The ERT recommends that Slovakia include, in its next annual submission, information confirming that the methods used to derive EU ETS data are in line with the IPCC good practice guidance.

36. A detailed uncertainty analysis has been carried out using a tier 2 Monte Carlo method for each of the fuel combustion categories reported in the energy sector. The ERT acknowledges the detailed information which the Party has now provided, as recommended by the previous review report.

37. In the NIR, Slovakia gives a comparison between CO_2 emissions from the top 30 emitters from the EU ETS and the database NEIS, for the years of the period 2005–2008. Slovakia identified that emissions under the EU ETS are higher than those in the NEIS database. In the NIR, Slovakia explains that this anomaly is caused by the non-compatibility of category allocation and the different definitions of industrial processes and energy emissions. The ERT found that, in the EU ETS, sometimes only part of the plant, rather than the whole plant, is included in the scheme, and emissions can therefore be expected to be lower than for emissions in the NEIS database, which cover the whole plant. The ERT acknowledges the efforts of Slovakia to compare emissions using two data sources; however, further work needs to be done to check why the EU ETS emissions are higher, and to continue the comparison of emission estimates using two databases and improve the consistency between the two data sets.

2. Reference and sectoral approaches

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

38. Emissions of CO_2 from fuel combustion were calculated using the reference approach and the sectoral approach. For 2008, there is a difference of 18.0 per cent between the CO_2 emission estimates and 13.0 per cent between the total fuel consumption estimates calculated using the two approaches. As a result of the reallocation of part of the fuel use (cooking coal and natural gas) from manufacturing industries and construction in the energy sector to the industrial processes sector, the difference becomes higher than in the previous submission.

39. In table 3.44 of the NIR, where the sectoral emissions together with the emissions reallocated to industrial processes are compared with emissions according to the reference approach, the explanation provided is not correct. The ERT recommends that Slovakia check the correctness of the data presented in this table, because these data are not consistent with the emissions reported under the industrial processes sector. Taking into account the correction submitted by Slovakia during the review, the difference in 2008 is 1.9 per cent. However, the difference between both approaches in the early years before 1996 remains high (e.g. 13.5 per cent in 1992). During the review, Slovakia explained that it is difficult to address this issue because plant-specific information prior to 1996 cannot be easily obtained. The ERT encourages Slovakia to use the relevant information and data

obtained during the QA/QC process of comparing total national energy data with the energy data from the databases to help understand and explain the differences in its next annual submission.

International bunker fuels

40. No official statistical data that distinguish between domestic and international aviation are available in the country and there are no international sources for this information. Following expert judgement, a fuel consumption ratio of 90:10 (where 90 per cent represents jet kerosene and 10 per cent represents aviation gasoline) was used. Aviation fuel was considered to be domestic, jet kerosene to be international. The ERT reiterates the recommendation made in the previous review report that, in its next annual submission, Slovakia provide detailed reasoning to support this expert judgement.

Feedstocks and non-energy use of fuels

41. Slovakia estimated the quantity of residual carbon from combustion stored in products (845.17 Gg C in 2008). This estimate is based on plant-specific information and expert judgement. The ERT recommends that Slovakia ensure that the results from the CRF tables 1.A(b) and 1.A(d) are consistent. The ERT identified that there is double counting of the amount of carbon stored from gas and diesel oil in CRF table 1.A(b) compared with table 1.A(d). For the years of the period 2002–2004, the fuel quantity of natural gas is stated to be not occurring ("NO") in the NIR (table 3.47) and in table 1.A(d). However, there is ammonia production based on natural gas (according to reported emissions in the industrial processes sector) in the same period. In response to a question raised by the ERT during the review, Slovakia presented an estimate for the missing years. The ERT recommends that Slovakia report estimated data for the entire time series in the next annual submission.

3. Key categories

Stationary combustion: all fuels – CO_2

42. Slovakia estimated GHG emissions from stationary combustion using data collected in NEIS, in accordance with national legislation. The NIR states that the data for total fuel use in NEIS correspond with the statistics on national fuel use, but a comparison has not been included in the NIR. The ERT reiterates the recommendation from the previous review report that Slovakia include, in the NIR of its next annual submission, a table presenting this comparison by fuel type (e.g. for solid, liquid, gaseous, biomass and other).

43. The ERT noted several fluctuations in the annual implied emission factor (IEF), which are not sufficiently explained in the CRF tables or in the NIR. For example, for manufacture of solid fuels and other energy industries, the IEF for CO_2 of gaseous fuels is constant between 1990 and 2000 (199.68 t/TJ), increases between 2000 and 2001 (217.11 t/TJ) and shows an unstable trend thereafter. For iron and steel, the IEF for CO_2 from gaseous fuels is constant between 1990 and 1999 (53.58 t/TJ), increases between 1999 and 2006 (78.93 t/TJ) and decreases thereafter. In response to questions about these fluctuations raised by the ERT during the review, Slovakia responded that, with regard to the inconsistencies in the IEFs in the categories of the energy sector, the Party has already explained several times and included in the NIR explanations which confirm that the IEFs are not comparable at the category level. Furthermore, the Party also explained that the fuels are aggregated into liquid, solid, gaseous and biomass categories and that the IEFs are only interim calculations for the CRF tables; with the EFs for the fuels provided in the NIR. The ERT acknowledges that there is information on the EFs used for individual fuels in the NIR. However, if there is a change in the mix of the fuels in one category, the IEF changes.

The ERT recommends that Slovakia add further explanations on large inter-annual variations in the IEFs in the next annual submission.

Road transportation: liquid fuels and biofuels – CO_2 and N_2O

44. As recommended by the previous review report, Slovakia applies the COPERT IV model to estimate GHG emissions from road transportation, but only for the years from 2000 onwards. The previous years are still estimated using COPERT III. In its NIR, Slovakia states that time-series consistency is ensured by the fact that before 2000 the use of European emissions standards level V and IV engines was not relevant in the Slovak Republic. However, the ERT identified, for example, that the IEF for N_2O shows a large inter-annual variation in the time series before and after 2000. In response to questions raised during the review on the subject of estimating the whole time series using COPERT IV, Slovakia responded that a recalculation back to the base year is not possible due to the lack of disaggregated data on the vehicle fleet. The ERT recommends that Slovakia make efforts to complete the whole time series using the COPERT IV methodology.

45. As this is a key category, the previous review report had recommended that Slovakia develop and use country-specific EFs. In response to this recommendation, Slovakia noted that the EU member States are planning to harmonize the N_2O EFs for diesel oil and gasoline based on updated values from the COPERT IV model, in accordance with the recommendation of working group I under the Climate Change Committee of the European Commission and that it intends to use the updated EFs in its next annual submission. Slovakia also noted that it intends to cooperate with the Slovnaft company (refinery and major fuel distributor in Slovakia), with a view to developing country-specific EFs. The ERT reiterates the recommendation made by the previous review report that Slovakia develop country-specific EFs.

46. Biofuel blending in gasoline and diesel oil has been required by law in Slovakia since 2006. In accordance with the law, up to 2009, 2.0 per cent of biofuel had to be blended into the fuel used and, from 2010, 5.75 per cent will have to be blended. In response to the request made by the previous review report, Slovakia noted that the actual biofuel content is monitored and reported in the annual reports required under the European directive on the promotion of the use of biofuels or other renewable fuels for transport (directive 2003/30/EC). Following the recommendations from the previous review report, the Party has confirmed that it considered the blending of biomass in liquid fuels and recalculated the emissions data. However, the ERT identified that the share of biofuel used is the same for both gasoline and diesel oil. During the review week, the ERT asked Slovakia whether separate percentages for biofuel blending are available for diesel and gasoline, and the Party provided data for 2007 and 2008. The ERT recommends that Slovakia use separate percentages for diesel and gasoline in the calculations for its next annual submission.

4. Non-key categories

Domestic navigation: liquid fuels – CO_2, CH_4 and N_2O

47. The previous ERT recommended that the Party report the estimation of emissions from domestic navigation (Danube River). In its NIR, Slovakia states that other inland shipping is negligible and only for tourist purposes. In response to questions raised by the ERT during the review, Slovakia responded that AD are not available. The ERT recommended during the review that Slovakia collect AD and report emissions from domestic navigation. Following this recommendation, Slovakia provided estimates of CO_2, CH_4 and N_2O emissions for 2008. The estimates result in 0.05 Gg CO_2 eq emissions of all

gases together in 2008. Slovakia indicated that the whole time series will be recalculated and reported in the next annual submission. The ERT commends Slovakia's intentions.

C. Industrial processes and solvent and other product use

1. Sector overview

48. In 2008, emissions from the industrial processes sector amounted to 11,162.94 Gg CO_2 eq, or 22.8 per cent of total GHG emissions, and emissions from the solvent and other product use sector amounted to 153.34 Gg CO_2 eq, or 0.3 per cent of total GHG emissions. Since the base year, emissions have increased by 6.5 per cent in the industrial processes sector, and increased by 15.6 per cent in the solvent and other product use sector. The key driver for the rise in emissions in the industrial processes sector was the increase in emissions of N_2O from nitric acid production, HFCs and SF_6 from consumption of halocarbons and SF_6 and CO_2 from mineral products. The increase was partially offset by the reduction in CO_2 emissions from iron and steel production and PFCs from aluminium production. Within the industrial processes sector, 50.4 per cent of the emissions were from metal production, followed by 26.8 per cent from mineral products, 20.3 per cent from chemical industry and 2.5 per cent from consumption of halocarbons and SF_6.

49. Slovakia has improved the transparency of its NIR since the previous annual submission by providing AD and EFs for several industrial processes categories. However, the ERT noted that the transparency could be further improved by providing a general methodology description instead of general referencing of the IPCC guidelines (with an ambiguous statement if the Revised 1996 IPCC Guidelines, the IPCC good practice guidance, the *2006 IPCC Guidelines for National Greenhouse Gas Inventories* (hereinafter referred to as the 2006 IPCC Guidelines) were used) and by providing a description of the emissions split between the energy and the industrial processes sectors, specifically for the subcategories calcium carbide production and iron and steel production.

50. Slovakia has also improved consistency and comparability: by reallocating the process-related emissions from glass production from limestone and dolomite use to the individual subcategory glass production; by reallocating process-related CO_2 emissions from the energy sector to the industrial processes sector for iron and steel production and carbide production; and by recalculating CO_2, CH_4 and N_2O emissions from ammonia production, N_2O emissions from nitric acid production and CO_2 emissions from ferroalloys production. In the 2010 submission, Slovakia reported for the first time CO_2 emissions from solvent and other product use. The recalculations, reallocations, and new estimates were reported by Slovakia in response to the recommendations from previous review reports. The effect of the recalculations on the base year and 2007 (as reported in the CRF tables) was an increase in emission estimates of 101.6 per cent and 96.1 per cent, respectively. The largest increases were observed for CO_2 emissions, due to the reallocation of process-related emissions from the energy sector to the industrial processes sector for iron and steel production. During the review, Slovakia provided revised estimates in response to potential underestimates identified by the ERT (see paras. 56 and 60 below). These revised estimates result in an increase in emissions in the industrial processes sector by 0.2 per cent and in the solvent and other product use sector by 94.1 per cent for the year 2008.

51. In its 2010 submission, Slovakia reported that it used for the first time a tier 2 Monte Carlo method for the uncertainty analysis for all subcategories under the industrial processes sector except for consumption of halocarbons and SF_6. The NIR indicated that the tier 2 uncertainty analysis for the industrial processes sector, including the solvent and other product use sector, was estimated in the range of confidence interval +/–2.8 per cent. The uncertainty level of +/–2.8 per cent is low compared with other Parties, mainly because of the lower uncertainty estimates reported for N_2O emissions from nitric acid production.

The ERT encourages Slovakia to provide more information about the uncertainty assessment and recommends that the Party use default uncertainty values for plant-specific EFs which are derived from measured data if the uncertainty associated with the plant-specific EFs is not available.

52. The 2010 NIR provides basic category-specific information about the QC procedures implemented by the Party, but in general all paragraphs include a description of similar or the same procedures. The ERT considers that this approach is not fully transparent. The ERT identified some errors and omissions in the CRF tables and emission estimates, which could have been detected either by the QC or the QA procedures, as described in paragraphs 56, 58 and 60. The ERT recommends that Slovakia enhance the QA/QC procedures for the industrial processes sector to avoid errors and omissions in its next annual submission.

2. Key categories

Limestone and dolomite use – CO_2

53. Slovakia reported, under the category limestone and dolomite use, CO_2 emissions from calcium carbide production, desulphurization and ceramics production. Emissions from ceramics production are reported only for the years 2004–2008. The ERT recommends that Slovakia collect AD and provide CO_2 emission estimates for the whole time series in its next annual submission. Slovakia reported CO_2 emissions from desulphurization using a constant value (40.9 kt from calcium carbonate ($CaCO_3$) and 0.9 kt from magnesium carbonate ($MgCO_3$)) for the period 1990–2003 based on expert judgement and the NIR does not provide any additional information. The ERT identified that in neighbouring countries to Slovakia, desulphurization units were built between 1995 and 2005, and concluded that it is very unlikely that the amount of limestone used for desulphurization in the period 1990–2003 was stable and that Slovakia probably overestimates CO_2 emissions, especially for the period 1990–2003. The ERT recommends that Slovakia revise its expert judgement and provide more reliable data about limestone and dolomite use for desulphurization in its next annual submission.

Iron and steel production – CO_2

54. Slovakia reallocated CO_2 emissions from pig iron production from the energy sector to the industrial processes sector in response to the recommendations of the previous review report. The ERT noted that this approach is in line with the IPCC good practice guidance. In its NIR and during the review, Slovakia provided explanations and comments on the methodology and AD used. However, the ERT identified that the information provided is not in a single section but split between several sections in the energy and industrial processes sectors of the NIR. The ERT recommends that, in its next annual submission, Slovakia provide a clear description of the methodology and AD used for emission estimates and the emissions split between the energy and industrial processes sectors in a single subchapter and provide links to appropriate sections where additional information is presented in order to improve the transparency of the NIR.

55. Slovakia reallocated a proportion of CO_2 emissions from limestone and dolomite use in the iron and steel category from mineral products to iron and steel production under metal production. The reallocation was made following the recommendations from the previous review report. The ERT commends Slovakia for this improvement.

56. The ERT identified that CO_2 emissions from consumed electrodes for steel production in electric arc furnaces are not estimated or reported in the inventory even though a default EF exists in the IPCC good practice guidance to estimate these emissions. In response to a question raised by the ERT during the review, Slovakia indicated that

electric arc furnace technology is in operation in three plants where graphite anodes are used. During the review, the ERT recommended that Slovakia estimate these emissions. Following the recommendations from the ERT, Slovakia provided CO_2 emission estimates from consumed electrodes under the iron and steel category for the years of the period 2000–2008. The revised estimates for 2008 were 20.84 Gg CO_2 eq. Slovakia also explained that, for other years, data are not available and that CO_2 emission estimates for the period 1990–1999 will be included in its next annual submission. The ERT welcomes Slovakia's plan to provide emission estimates for the whole time series and recommends that Slovakia provide the methodology, AD, description and information about time-series consistency in the NIR of its next annual submission.

Consumption of halocarbons and SF_6 – SF_6

57. During the review, the ERT identified that Slovakia reported potential SF_6 emissions from the category other (consumption of halocarbons and SF_6) and that actual emissions are reported as "NO". The ERT also identified that Slovakia reported actual SF_6 emissions from electrical equipment and that potential emissions are reported as "NO". During the review, Slovakia explained that these values were incorrectly allocated into the different subcategories in the CRF Reporter software and, therefore, the Party revised the CRF tables, where actual and potential emissions were allocated under the category electrical equipment and notation keys were used correctly in the category other.

58. During the review, Slovakia provided a detailed description of an online database of importers and users of F-gases. The ERT welcomes Slovakia's activity on AD collection for F-gas emission estimates and noted that this database could be used for actual emission estimates, as well as for the emissions split between individual subcategories, for example for SF_6 emissions currently reported under other.

3. Non-key categories

Carbide production – CO_2

59. Slovakia splits CO_2 emissions from calcium carbide production into the category limestone and dolomite use, which includes CO_2 emissions from limestone and dolomite decomposition during carbide production, and the category carbide production, which includes CO_2 emissions from coke use for carbide production and CO_2 emissions from carbide use for acetylene production and use. The ERT noted that this splitting of emissions across categories is not in line with the Revised 1996 IPCC Guidelines and the IPCC good practice guidance. The ERT reiterates the recommendation of the previous ERT that Slovakia revise its approach and report all CO_2 emissions from carbide production and use under the category carbide production.

Solvent and other product use – CO_2

60. The NIR provides a description of CO_2 emission estimates for paint application, degreasing and dry cleaning, chemical products, manufacture and processing. It also provides an explanation that CO_2 emission estimates are based on the emissions of non-methane volatile organic compounds (NMVOC) and the approximation that NMVOC contain 60.0 per cent of carbon. The ERT noted that the reported CO_2 emission estimates do not follow the methodology described and are probably underestimated. During the review, Slovakia provided revised estimates of CO_2 emissions from paint application, degreasing and dry cleaning, chemical products, manufacture and processing, including CRF tables, following the recommendations from the ERT. The revised estimates are 18.46 Gg CO_2 eq and are in line with the methodology described in the NIR and based on best

available data. The ERT recommends that Slovakia enhance and provide more information about QA/QC procedures for this sector in its next annual submission.

D. Agriculture

1. Sector overview

61. In 2008, emissions from the agriculture sector amounted to 3,122.41 Gg CO_2 eq, or 6.4 per cent of total GHG emissions. Since the base year, emissions have decreased by 55.1 per cent. The key driver for the fall in emissions is the reduction in livestock numbers and a decrease in the consumption of mineral fertilizers. Within the sector, 54.5 per cent of the emissions were from agricultural soils, followed by 29.0 per cent from enteric fermentation and 16.5 per cent from manure management.

62. The ERT noticed clear improvements in the 2010 submission in comparison with the previous year's submission, as Slovakia has implemented most of the previous review report recommendations. Emissions from the agriculture sector have been reported for all categories and all years of the inventory time series and are complete in terms of geographical coverage as well. The ERT commends Slovakia for this achievement.

63. The ERT noted a number of inconsistencies between data in the NIR and the CRF tables. For example, in table 6.22 of the NIR, the figure for the indirect emissions from atmospheric deposition is 0.34 Gg in 2008, while in the original submission in CRF table 4.D the figure was 0.31 Gg, although this was corrected in a later submission after the review week. All data in tables 6.22 and 6.23 in the NIR were inconsistent with the data in CRF table 4.D for the entire time series. Similarly, N leaching and run-off reported in tables 6.24 and 6.25 of the NIR as 0.837 Gg in 2008 was inconsistent with the figures reported in the CRF tables. During the review, Slovakia provided revised CRF tables which improve the consistency between the NIR and the CRF tables. The ERT appreciates this improvement and recommends that Slovakia enhance both QA and QC procedures in order to avoid such inconsistencies in its next annual submission.

64. There were a number of instances of incorrect units in the NIR, for example: on page 141, the unit for average gross energy intake is given as kg/head/day instead of MJ/head/day; and on page 146, the unit for EF in table 6.9 is given in Gg instead of kg/head/year. Editorial mistakes were also noted by the ERT, such as twice repeating tables 6.4 and 6.5. The ERT recommends that Slovakia improve the consistency in the NIR in its next annual submission.

65. No recalculations have been reported in the CRF tables, although the NIR shows that recalculations were carried out across the time series for indirect N_2O emissions from atmospheric deposition and N leaching and run-off. The NIR explains that the rationale for these recalculations is the improvement of consistency in calculations. For the category of agricultural soils, revised estimates were provided in the CRF tables submitted during the review due to the harmonization of figures between the NIR and the CRF tables. The ERT recommends that Slovakia report recalculations in CRF table 8(a) and improve consistency between the NIR and the CRF tables in its next annual submission.

66. The ERT noted that there is not a sufficient description of both QA and QC procedures in the agriculture sector in the NIR and recommends that Slovakia ensure that it implements an adequate system for the verification of AD and background information and QA/QC.

2. Key categories

Enteric fermentation – CH_4

67. The ERT noted that the trend in CH_4 IEFs for non-dairy cattle is in general increasing across the period 1990–2008. Large inter-annual changes in CH_4 IEFs over the period 1990–2008, except for 2005–2006 and 2006–2007, have been identified and range between –6.9 per cent and 11.5 per cent. Slovakia did not respond to this during the review. The ERT recommends that Slovakia provide an explanation of the trend in CH_4 IEFs in its next annual submission. For CH_4 emissions from enteric fermentation, the tier 2 approach was applied to data for dairy cattle and non-dairy cattle across the whole time series, but only applied to data for sheep from 2004 onwards. The ERT recommends that Slovakia apply the tier 2 approach for the entire time series for sheep in order to improve the time-series consistency in the next annual submission. The tier 1 methodology is used for goats, horses and swine because these categories are not key categories. This is in line with the IPCC good practice guidance. 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. The ERT commends Slovakia for this improvement.

Direct soil emissions – N_2O

68. In the key category analysis, the Party considered N_2O emissions from agricultural soils as one category although according to the IPCC good practice guidance the emissions from agricultural soils should be addressed under the categories: direct N_2O emissions from agricultural soils and indirect emissions. In response to a question raised by the ERT during the review, Slovakia indicated that it lacks sufficient information on AD, EFs and uncertainties to report indirect emissions. As already planned by the Party, the ERT recommends that Slovakia identify both direct and indirect N_2O emissions from N used in agriculture in its next annual submission.

69. The ERT noted that the $Frac_{GRAZ}$ value reported in the NIR (page 153) is 0.057, which is different from the value used in CRF table 4.D (0.01). In addition, disaggregated values of $Frac_{GRAZ}$ should be reported for each animal type, as indicated in the documentation box of CRF table 4.D. The ERT recommends that Slovakia improve the consistency and transparency of $Frac_{GRAZ}$ values in its next annual submission.

70. The ERT noted from the NIR that Slovakia recalculated indirect N_2O emissions from both atmospheric deposition and N leaching and run-off with some detailed data in the NIR, but this was not reflected in CRF table 8(a). The ERT recommends that Slovakia improve the consistency between the NIR and the CRF tables.

E. Land use, land-use change and forestry

1. Sector overview

71. In 2008, net removals from the LULUCF sector amounted to 2,076.36 Gg CO_2 eq, which offset 4.3 per cent of the total GHG emissions in Slovakia. Since the base year, net removals have decreased by 13.1 per cent. The key driver for the fall in removals is the decrease in removals from forest land remaining forest land by 66.7 per cent. Within the sector, forest land remaining forest land contributed to a net removal of 1,482.14 Gg CO_2, land converted to forest land, 535.70 Gg CO_2, and land converted to grassland, 359.99 Gg CO_2.

72. The ERT commends the progress Slovakia has made by describing in the NIR the land-use definitions as recommended in the previous review report, but the ERT identified that the land-use definitions are provided only for forest land, cropland, grassland and other

land. Furthermore, the ERT noted that, although Slovakia indicated in the NIR that wetlands do not occur in the country, it has reported them as included elsewhere ("IE") in CRF table 5.D. The ERT recommends that Slovakia correct the use of the notation keys in the next annual submission. The Party also reported in the NIR that settlements are included in other land. The ERT reiterates the recommendation from the previous review report that Slovakia distinguish wetlands and settlements from the category other in its next annual submission.

73. The Party explains in the NIR that it uses several sources to estimate the land area for land-use classes. In table 7.4 of the NIR, the ERT found that the total area reported for the period 1990–2003 is 38 kha lower than the total area reported for 2004–2008 (which is in accordance with the official total area of the country). This raises some doubt about the consistency of data on land area from the different sources and suggests that some land areas are over- or underestimated. The ERT recommends that the Party provide information about the sampling routines of the sources and demonstrate in the next annual submission that information from different databases is consistent.

74. The inventory in the LULUCF sector includes emissions and removals for most categories and gases. However, the changes in carbon stock in the following pools are not reported: DOM soils in forest land remaining forest land; DOM in grassland converted to forest land; living biomass and soils in cropland remaining cropland; living biomass and soils in grassland remaining grassland; living biomass and DOM in land converted to grassland; living biomass in land converted to other land (except for forest land converted to other land reported as "IE"); and DOM in land converted to other land. Also, N_2O emissions from disturbance associated with land-use conversion to cropland are reported as "NE". The ERT identifies that the reporting of these pools and categories are mandatory and reiterates the recommendation formulated in the previous review report that Slovakia provide estimates for these pools and categories currently reported as "NE" in its next annual submission. The ERT noted that Slovakia reported direct N_2O emissions from N-fertilization of forest land and other, non-CO_2 emissions from drainage of soils and wetlands, and CO_2 emissions from agricultural lime application as not occurring in the CRF tables.

75. The ERT welcomes Slovakia's effort to give, for the first time in the NIR, a section on an overview of the LULUCF sector, to provide definitions of land-use categories and to improve the description of AD used, especially for forest land. The ERT noted that the NIR still does not provide transparent information on the AD and methodology used to estimate emissions and removals, especially for cropland and grassland. The ERT recommends that the Party improve the transparency for these categories.

76. No recalculations have been reported by Slovakia. It is not clear how the figure 20.0 per cent reported as uncertainty for forest land and the figure 50.0 per cent for all other land-use categories have been derived using expert estimation. The ERT recommends that Slovakia improve the transparency of uncertainty estimates in its next annual submission.

77. The NIR does not provide a description of the QA/QC procedures for the LULUCF sector. The ERT recommends that the Party provide such a description in its next annual submission. The ERT identified a number of inconsistencies and errors that could have been identified by the QA/QC procedures. For example, in the NIR, page 174, it is stated that wetlands do not occur, while on page 166 in the description of other land, the Party indicated that wetlands are included in other land. According to table 7.4 in the NIR, there is no land converted to cropland (except for the year 2004) and the notation key "NO" should have been used instead of "NE" for carbon stock changes in mineral soil and for N_2O emissions from disturbance associated with land-use conversion to cropland. The ERT recommends that Slovakia correct these inconsistencies and strengthen the QA/QC procedures in the LULUCF sector for its next annual submission.

78. Slovakia indicated in the NIR that several improvements are planned for the next annual submission regarding forest land, cropland and grassland due to the availability of information from the new NFI. Although the nature of the planned improvements is not clearly described, the ERT recommends that Slovakia continue with this effort and give a description of the new NFI and when the changes will take place, report the information provided by this new NFI in its next annual submission and explain how this information improves emission and removal estimates for different pools and land-use categories in the LULUCF sector. The ERT also recommends that Slovakia report appropriate recalculations when the new information is used and ensure time-series consistency in the next annual submission.

2. Key categories

Forest land remaining forest land – CO_2

79. Slovakia calculated the carbon stock changes in living biomass using the default method of the IPCC good practice guidance for LULUCF and country-specific parameters (such as annual growth rate, biomass expansion factor for different tree species), which were derived from several sources including forest management plans, the permanent forest inventory and experimental data. The trend in net CO_2 removals fluctuates over the period 1990–2008. The fluctuation is mainly due to variations in harvesting and natural disturbances such as hurricanes. The ERT appreciates Slovakia's effort to explain, in the NIR, the cause of the fluctuation in net CO_2 removals over time.

80. The information provided in the NIR is not clear to the ERT and meant that the ERT was unable, without clarification provided by Slovakia during the review, to understand whether the carbon stock calculated includes above- and below-ground living biomass. The ERT recommends that Slovakia provide more information on biomass calculations in its next annual submission.

81. Slovakia did not report carbon stock changes in DOM and states in the NIR that, due to a lack of AD, this pool is reported as "NE". During the review, the Party informed the ERT that it is planning to collect data during the next NFI. The ERT reiterates the recommendation from the previous review report that Slovakia include carbon stock changes in DOM in its next annual submission.

82. In addition, carbon stock changes in forest soil are not reported due to a lack of data. The Party explained in the NIR that there is a database based on a large-scale soil survey from permanent plots. The ERT recommends that Slovakia use the information in this database to estimate and report carbon stock changes in soil in its next annual submission.

83. The ERT noted that there is a small area (4.89 kha) of organic soil in Slovakia which is reported under forest land remaining forest land in the CRF tables. During the previous review, the Party had explained that this area falls under the area of national parks and thus is not cultivated. The ERT recommends that Slovakia provide this information in the NIR, and ensure that the area is included in the forest area to ensure the transparency and consistency of the land area data.

84. Slovakia stated in the NIR that almost all forest area of the Slovak Republic is managed. The ERT encourages the Party to include, in NIR of its next annual submission, the information on how managed and unmanaged forests are distinguished.

Land converted to forest land – CO_2

85. The Party reports carbon stock changes in mineral soils from grassland and other land (other land reported by the Party includes wetlands, settlements, and other land according to the classification used by Slovakia (see para. 89) converted to forest land for

the years 2004–2008. Country-specific data derived from the national soil inventory are used. The ERT recommends that Slovakia provide further documentation on the database used and how the values were derived and provide consistent time-series data going back to 1990. Due to a lack of data, Slovakia does not report changes in carbon stock for living biomass and DOM for land converted to forest land. The ERT reiterates the recommendation from the previous review report that Slovakia include these estimates in its next annual submission.

Land converted to grassland – CO_2

86. Only carbon stock changes for mineral soils are reported for land converted to grassland for the years 2004–2008, using country-specific data derived from the national soil inventory. The ERT reiterates the recommendation from the previous review report that Slovakia provide sufficient and transparent information on soil carbon, an explanation of the national circumstances of Slovakia and information on how the average carbon stocks are derived from the national soil inventory, and provide consistent time-series data going back to 1990. Due to a lack of data, Slovakia does not report changes in carbon stock in living biomass and DOM for land converted to grassland. The ERT reiterates the recommendation from the previous review report that Slovakia include these estimates in its next annual submission.

3. Non-key categories

Cropland remaining cropland – CO_2

87. According to the NIR, carbon stock changes in cropland remaining cropland are not included in the inventory. However, carbon stock changes in DOM are estimated and reported in the CRF tables for the years 1990–2003. During the review week, Slovakia clarified that these estimates represent the carbon stock changes in mineral soils and not in DOM. The ERT recommends that Slovakia correct this inconsistency and include estimates of carbon stock changes in living biomass, DOM and soils for the entire time series in its next annual submission.

Grassland remaining grassland – CO_2

88. According to the NIR, the carbon stock changes in grassland remaining grassland are not included in the inventory. However, carbon stock changes in DOM are estimated and reported in the CRF tables for the years 1990–2003, except for 1993. During the review, the Party informed the ERT that, due to a lack of AD, only carbon stock changes in mineral soils are calculated and hence the data in the CRF tables represent the carbon stock changes in mineral soils and not in DOM. The ERT recommends that the Party correct the inconsistency and provide estimates for carbon stock changes in living biomass, DOM and soils for the entire time series in its next annual submission.

Other land – CO_2

89. The land-use definition used for other land by Slovakia is not in accordance with the IPCC good practice guidance for LULUCF. Other land should include bare soil, rock, ice and all other unmanaged land, but Slovakia includes settlements and wetlands in other land. When land-use change occurs, for example between forest land and settlements, emissions and removals need to be reported transparently. The ERT recommends that the Party use the IPCC good practice guidance for LULUCF definition of other land in its next annual submission.

90. Slovakia reports other land to be a sink from 1990 to 2000, and a source from 2001 to 2008. The ERT recommends that the Party check the methods used for the calculations,

and that data are entered correctly in the CRF tables. Furthermore, the ERT recommends that Slovakia provide, in its next annual submission, an explanation of why this category fluctuates between a sink and source.

Emissions from agricultural lime application – CO_2

91. The trend in CO_2 emissions from agricultural lime application changes (increases) between 1999 and 2000 and (decreases) between 2006 and 2007 and remains constant thereafter. This reflects the changes in the amount of limestone and dolomite applied to cropland. During the review week, Slovakia explained that, due to lack of data, expert judgement is used. The Party has already acknowledged, in the previous review report, that further research into this issue is needed. The ERT encourages Slovakia to improve the estimation of CO_2 emissions from agricultural lime application and to give the reasons behind the changes in the amount of agricultural lime in its next annual submission.

F. Waste

1. Sector overview

92. In 2008, emissions from the waste sector amounted to 2,427.81 Gg CO_2 eq, or 5.0 per cent of total GHG emissions. Since the base year, emissions have increased by 130.0 per cent. The key driver for the rise in emissions is an increase in emissions from solid waste disposal on land arising from a combination of the transition to well-managed waste disposal and the inclusion of emissions from agricultural and industrial solid waste disposal from 1997 onwards. Within the sector, 76.1 per cent of the emissions were from solid waste disposal on land, followed by 18.4 per cent from wastewater handling, 4.8 per cent from composting and 0.7 per cent from incineration.

93. The ERT found that the trend in emissions from waste in Slovakia is difficult to fully assess due to the missing emission estimates from industrial solid waste disposal sites for the period 1990–1996 and industrial solid waste composting for the period 1990–2001. The level of increase in emissions from the waste sector since 1990 is likely to be lower than reported.

94. The ERT recognizes the Party's difficulties in estimating emissions from industrial waste treatment activities during the period of economic transition faced by Slovakia in the early 1990s. However, the missing estimates in the earlier years of the time series represent a time-series consistency issue and the ERT encourages Slovakia to devote some resources to compiling emission estimates for the period 1990–1996.

95. Changes to the solid waste classification system from the year 2002 have resulted in some potential issues with the time-series consistency of AD (e.g. industrial solid waste categories paper/textiles and wood/straw are now aggregated). The ERT recommends that Slovakia review the effects that the changes to solid waste classifications may have on the time-series consistency of AD and provide more information on how time-series consistency has been ensured in its next annual submission.

96. Slovakia implements sector-specific QA/QC procedures and documents these in the NIR. However, these QA/QC procedures could be strengthened to ensure that AD in particular have been assessed and that any unusual trends are fully explained and corrected, as appropriate.

97. The ERT identified that, in order to estimate CH_4 emissions from solid waste disposal sites, Slovakia deducted the CH_4 recovered from the emissions generated twice (see para. 106) and that N_2O emissions from domestic wastewater handling reported were lower than those in the underlying calculation sheets provided during the review (see para.

113). These examples of underestimations could have been identified by the QA/QC procedures. The ERT recommends that Slovakia strengthen its QA/QC procedures and report thereon in its next annual submission.

98. Slovakia has performed recalculations in the waste sector as a result of revisions to the CH_4 recovery data in solid waste disposal on land and the inclusion, for the first time, of emissions from composting of industrial solid waste. The net effect of these recalculations is an increase of 120.5 Gg CO_2 eq (5.0 per cent) in 2007. No changes are observed in the base year. The ERT found that the recalculations are not well explained in the NIR and the CRF tables. The ERT recommends that the Party fully explain all recalculations in the NIR and CRF table 8(b) in its next and future annual submissions.

99. During the review, in response to the issues of potential underestimations raised by the ERT (see paras. 106 and 113 below) and following the ERT's recommendations, Slovakia provided revised estimates of CH_4 emissions from solid waste disposal on land and N_2O emissions from wastewater handling. The revised estimates increase emissions in the waste sector by 2.0 per cent in 2008 compared with the original submission. Slovakia also provided a clarification of the methods used to estimate emissions of N_2O from wastewater handling.

2. Key categories

Solid waste disposal on land – CH_4

100. Slovakia uses the first order decay model from the IPCC good practice guidance to estimate CH_4 emissions from municipal solid waste disposal on land. AD covering the period 1960–2008 have been used as the basis for the emission estimates. Slovakia reports emissions from managed waste disposal on land in CRF table 6.A from 2001 to 2008, with a corresponding MCF of 1. For the years between 1990 and 2000, CH_4 emissions from municipal waste are reported in CRF table 6.A as "uncategorized" with MCFs changing linearly from 0.6 for the period 1990–1993 to 0.95 in 2000, to reflect a transition from uncategorized to well-managed waste disposal practices. Slovakia also estimates and reports emissions from industrial and agricultural solid waste disposal sites under other using the mass balance approach from the Revised 1996 IPCC Guidelines and default parameters such as degradable organic carbon (DOC) and fraction of DOC dissimilated (DOC_f) from the 2006 IPCC Guidelines. As CH_4 emissions from industrial and agricultural solid waste disposal sites are a significant subcategory, the ERT recommends that Slovakia apply the first order decay model of the IPCC good practice guidance to industrial and agricultural solid waste disposal sites.

101. The methods and AD are generally well described in the NIR. However, there are some areas where improvements can be made to enhance the transparency, such as describing the basis for key model parameters (DOC and the methane generation rate constant (k)) and the inclusion of a discussion on sludge disposal to landfill.

102. DOC values for municipal solid waste are based on a consideration of waste composition in households with central and solid fuel heating. Household heating system data are used to modify the DOC value from 1960 to present. These data are considered a good proxy for waste composition, as households with solid fuel heating tend to burn much of their waste rather than sending it to landfill. The derivation of the DOC values is not well documented in the NIR. During the review, Slovakia provided the ERT with further explanation of how the DOC values were derived for the period 1960–2008. The ERT noted that the previous NIR had a more detailed description of the process of deriving the DOC values. The ERT recommends that Slovakia include this description, which it had provided during the review, in its next and future annual submissions.

103. Slovakia uses a country-specific *k* value of 0.065. During the review, Slovakia confirmed that this value is based on United States Environmental Protection Agency data for Mexico. The choice of this factor was made on the basis of similar annual rainfall levels. An analysis of Slovakian waste composition data provided during the review has confirmed that this data value is appropriate. However, the basis for this value is not well documented in the NIR. The ERT recommends that the Party include the source of this value and a justification for its use in its next and future annual submissions.

104. Slovakia uses the mass balance approach from the Revised 1996 IPCC Guidelines to estimate emissions from industrial solid waste disposal sites for the years of the period 1997–2008. The Party indicated that the industrial waste was not estimated before 1997 due to a lack of AD about waste streams. Previous review reports have recommended that Slovakia use a higher-tier method to estimate emissions from industrial solid waste disposal for the entire time series. The ERT reiterates this recommendation. The ERT also notes that table 8.9 in the NIR lists incorrect values for DOC_f (3.0 per cent) and recommends that Slovakia correct this value in its next and future annual submissions.

105. The previous review report recommended that Slovakia disaggregate municipal solid waste from industrial solid waste in the key category analysis and use this analysis to inform improvements in the inventory of the waste sector. This recommendation was made because when disaggregated, both of these solid waste subcategories may be key categories individually. The ERT therefore reiterates the recommendation from the previous review report that Slovakia disaggregate municipal solid waste from industrial solid waste in the key category analysis.

106. The ERT identified that, in order to estimate CH_4 emissions from solid waste disposal sites, Slovakia deducted the CH_4 recovered from the emissions generated twice. In response to a question raised by the ERT during the review, it was confirmed that CH_4 recovery was deducted from 'net' emissions prior to reporting in the CRF table. The ERT concluded that CH_4 emissions are therefore underestimated for all years of the period 2003–2008 where CH_4 recovery takes place. During the review, following the recommendations from the ERT, Slovakia provided revised estimates of CH_4 emissions from solid waste disposal on land. The revised estimates result in an increase of 1.9 per cent in emissions from solid waste disposal on land in 2008 compared with that in the original submission. The ERT concludes that these revised estimates are in line with its recommendations and recommends that Slovakia include these emissions in its next and future annual submissions.

Wastewater handling – CH_4

107. Slovakia uses the tier 1 method provided in the 2006 IPCC Guidelines to estimate emissions from wastewater handling. Emission estimates are reported for all relevant wastewater treatment pathways, including treated and untreated domestic and commercial and industrial wastewater, septic tanks and dry toilets. Census data provides the basis for the proportions of the population connected to each wastewater treatment system.

108. Wastewater handling methods and AD are generally transparently documented in the NIR. However, the ERT finds that Slovakia has not provided a clear rationale for the MCF values used in the calculation. The ERT therefore recommends that Slovakia improve the explanation of the rationale for MCF values used for each wastewater treatment pathway in its next annual submission.

109. Slovakia uses a country-specific value for biochemical oxygen demand per person of 60g/person/day but the source of this factor is not provided in the NIR. The ERT recommends that the Party fully document the source for this value in its next annual submission.

110. Emissions from sludge treatment are reported as "IE" (included under solid waste disposal on land). A general discussion on sludge treatment is provided in the NIR. Some in-situ anaerobic stabilization occurs at the wastewater treatment plants; however, CH_4 recovery for heat is undertaken in all cases where this occurs. The ERT recommends that Slovakia expand on the discussion of sludge given in the NIR, including the provision of AD and more comprehensive documentation of sludge emissions in CRF table 9(a). The ERT also recommends that Slovakia clearly outline that sludge biogas consumed for energy purposes is reported in the energy sector.

111. In response to a question raised by the ERT during the review, Slovakia indicated that the data for untreated industrial wastewater (chemical oxygen demand) for the years of the period 2005–2008, as presented in table 8.10 of the NIR, are incorrect. The ERT recommends that Slovakia correct these data in its next NIR submission. In addition, there are two tables numbered 8.10 in the NIR. The ERT recommends that Slovakia rectify this discrepancy in its next annual submission.

112. The NIR states that there has been a recalculation in wastewater handling as a result of a shift to the use of the tier 1 method from the 2006 IPCC Guidelines, but no changes are reported in the CRF tables as the wastewater estimates for the period 1990–2007 were not updated in the CRF tables. The ERT strongly recommends that Slovakia investigate this discrepancy and update the emission estimates from wastewater handling in the CRF tables, as appropriate, in its next annual submission.

3. Non-key categories

Wastewater handling – N_2O

113. During the review week, an examination of the underlying calculation sheets provided to the ERT showed that N_2O emission estimates reported in the CRF tables for all years did not correspond to those contained in the calculation sheets. The underlying sheets outlined the approach taken for domestic and commercial wastewater treatment and discharge of N_2O, including emissions from discharge of treated wastewater, other discharges and direct emissions from wastewater treatment plants. The N_2O emissions estimate for 2008 in the calculation sheet is 0.19 Gg N_2O and the corresponding value in the CRF table is 0.15 Gg N_2O. In response to the issue of a potential underestimation raised by the ERT, Slovakia provided a revised estimate of N_2O emissions corresponding to the calculation sheet. This revised estimate results in an increase in N_2O emissions of 26.7 per cent in 2008 when compared with the original submission. The ERT concludes that the revised estimates are in line with its recommendations and recommends that Slovakia correct the reported values for the whole time series and fully document the recalculations in both the NIR and the CRF tables in its next and future annual submissions.

114. Slovakia has also reported incorrect per capita protein values in CRF table 6.B. The ERT recommends that Slovakia include the correct parameters in the CRF table and the NIR in the next annual submission.

Waste incineration – CO_2

115. Previous review reports have recommended that Slovakia make use of available biogenic waste stream data to estimate emissions of CO_2 from biogenic waste incineration and report them under memo items with the appropriate "IE" in CRF table 6.C. The ERT reiterates this recommendation for the estimation of CO_2 emissions from the incineration of biogenic waste.

Composting – CH_4 and N_2O

116. Slovakia reports emissions from industrial solid waste composting as "NO" for the period 1990–2001. During the review, the Party confirmed that this notation key is incorrect and emissions for the years of the period 1990–2001 should be reported as "NE". The ERT recommends that Slovakia correct this discrepancy in the CRF table 6 and the NIR of its next annual submission. Furthermore, the ERT encourages Slovakia to develop emission estimates for the years of the period 1990–2001.

G. 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

117. Slovakia used the annotated NIR outline and provided, in its NIR Part II, the information required as outlined in paragraphs 6–9 of the annex to decision 15/CMP.1. The Party has elected no activity under Article 3, paragraph 4, of the Kyoto Protocol and has chosen commitment period accounting for activities under Article 3, paragraph 3, of the Kyoto Protocol.

118. During the review, the Party was not able to respond on time to some important questions raised by the ERT in relation to its reporting of KP-LULUCF as, during the centralized review, the ERT was informed by the Party that there were no LULUCF experts available to answer the remaining and further questions. The ERT concluded that Slovakia has not fully met the requirement set out in paragraph 16(c) of the annex to decision 19/CMP.1 and regarded this situation as an indicator that Slovakia was not well prepared to respond to questions from the ERT during the review. The ERT strongly recommends that Slovakia avoid a similar situation during future reviews.

119. In response to a question raised by the ERT during the review, regarding the fact that Slovakia did not report in the NIR information required by paragraph 5 of the annex to decision 15/CMP.1, the Party indicated that estimates of GHG emissions and removals both with and without LULUCF are provided in table ES.1 and in table 2.1 in the NIR. To increase transparency, the ERT recommends that the Party clearly state in the NIR that estimates for activities under Article 3, paragraph 3, of the Kyoto Protocol are clearly distinguished from anthropogenic GHG emissions from the sources listed in Annex A to the Kyoto Protocol and hence are in accordance with paragraph 5 of the annex to decision 15/CMP.1.

120. To increase the transparency and completeness of the reported information, the ERT recommends that the Party clearly state that Slovakia recognizes the principles laid out in decision 16/CMP.1 and that methodologies have been applied, taking into account the IPCC good practice guidance for LULUCF agreed by the Conference of the Parties, in order to be in accordance with paragraph 6(a) of the annex to decision 15/CMP.1. Such elaboration could, for example, be included in section 11.1 of the NIR.

121. Slovakia states in its NIR that there is no fertilizer application on areas of afforestation and reforestation and that it uses the notation key "NR" ("not reported") in CRF table NIR-1. Also, the Party indicates that there is no liming and biomass burning on land areas subject to afforestation, reforestation and deforestation activities and uses "NR" in CRF table NIR-1. The ERT recommends that Slovakia change the notation key "NR" to "NO" if the activity does not occur.

122. Slovakia uses the notation key "NO" for other in CRF table NIR-2; and the total area (19.74 kha) reported in CRF table NIR-2 is 99.6 per cent lower than the area reported for LULUCF under the Convention, meaning that the area reported in CRF table NIR-2 does not cover the whole area of Slovakia. The validity of the data reported in CRF table NIR-2 is also questionable because the ERT identified that the total area for different categories is missing or appears to be grossly under-reported. The ERT strongly recommends that the Party complete CRF table NIR-2 with the land area covering the whole country, following the guidance given underneath the table and update the other CRF tables for the KP-LULUCF sector in the next annual submission to improve completeness and accuracy.

123. The ERT is concerned about Slovakia's ability to obtain accurate and consistent results for the activities under Article 3, paragraph 3, of the Kyoto Protocol for the commitment period. At the request of the ERT during the review, Slovakia provided additional information about project plans and framework contracts between SHMU and the LULUCF sector expert, which give a guarantee for the allocation of resources for the work in the years 2010–2014. Nevertheless, to increase confidence in the improvement of future reporting, the ERT recommends that the Party provide, in its next annual submission, detailed information on: existing project(s)/plan(s); the time planning of projects, with a clear relationship between the expected results in the plan and the improved reporting on carbon stock changes in the five pools (above-ground biomass, below-ground biomass, litter, dead wood and soil organic carbon), as required under the annual submission of information under Article 3, paragraph 3, of the Kyoto Protocol; and the allocation of resources for the work in the years 2010–2014.

124. Furthermore, the ERT recommends that the Party implement the plans for providing information for dead wood and report, in its next annual submission, on the progress of its work and indicate when the Party will provide estimates for changes in carbon stock in litter and in dead wood. The reporting of information on emissions and removals from activities under Article 3, paragraph 3, of the Kyoto Protocol is mandatory (para. 5 of the annex to decision 15/CMP.1) and the ERT recommends that Slovakia clarify whether it accounts for the pools and, if so, demonstrate that the Party is able to report the pools for the commitment period. If Slovakia does not account for the pools, the ERT recommends that the Party provide verifiable information which demonstrates that the pool is not a net source of anthropogenic GHG emissions (para. 6(e) of the annex to decision 15/CMP.1). The ERT points out that the second cycle of the NFI is planned to take place in 2015–2016 which is beyond the end of the commitment period and too late to be of any relevance for the provision of information required on the reporting and accounting of carbon pools for activities under Article 3, paragraph 3, of the Kyoto Protocol during the first commitment period. The ERT strongly recommends that Slovakia reconsider the schedule for the implementation of its plans and report thereon in its next annual submission.

125. The documentation on data used for the estimation of land areas for afforestation, reforestation and deforestation is not transparent. In response to a question raised by the ERT, the Party explained that there were typing errors in the tables (table 11.3, page 211). The ERT recommends that Slovakia report, in the NIR of its next annual submission, the correct values in tables (table 11.3, page 211) with improved headings (tables 11.2, 11.3 and 11.4), and improve its QA and QC procedures for KP-LULUCF reporting.

126. Slovakia reports under the Convention, land-use changes from forest land to other land as well as from grassland and other land to forest land since 1990. For land uses other than forest land, the ERT identified that the source of information seems to be the same as the source used by Slovakia to report on areas of afforestation/reforestation and deforestation. With respect to afforestation, reforestation and deforestation, in CRF table NIR-2, the discrepancy between the numbers reported for forest land converted to other land and other land converted to forest land under the Convention appears to be very large.

In reporting under the Convention, forest land converted to other land (or other land converted to forest land) will remain in that category for 20 years (the default period according to the IPCC good practice guidance for LULUCF) before being classified as other land (or forest land). For reporting under the Kyoto Protocol, all land conversions subject to afforestation/reforestation or deforestation occurring in 1990 and later will generally remain in that category throughout the commitment period. Thus, land areas reported under the Convention and the Kyoto Protocol are not directly comparable.

127. Even taking into account this and the fact that the Party has used the 20-year approach for the time period 1988–2008, the difference between the data reported under the Convention (forest land converted to other land (19.34 kha) and other land converted to forest land (53.60 kha)) and under the Kyoto Protocol (deforestation (6.03 kha) and afforestation/reforestation (13.71 kha)) appear too large, and no acceptable explanation is given either in the NIR or in the response to further questions during the review. The ERT recommends that Slovakia provide evidence of any substantial discrepancies in land areas between the reporting under the Convention and the reporting under the Kyoto Protocol in the next annual submission. Furthermore, the ERT recommends that the Party include, in the NIR, an improved description of the AD used for the 20-year approach under the Convention and of the data used for the Kyoto Protocol reporting, in order to increase transparency. The ERT recommends that Slovakia provide evidence that the area reported as the area of afforestation/reforestation is not overestimated and that of deforestation is not underestimated. The ERT recommends that Slovakia undertake the announced inventory improvements and QC of data sets, as well as the recalculation of emissions and removals under both the Convention and the Kyoto Protocol and report on the progress of this work in its next annual submission.

128. The ERT identified that Slovakia has not provided information about uncertainty estimates associated with emissions and removals from afforestation, reforestation and deforestation. The ERT recommends that the Party include this information in the next annual submission.

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

Afforestation and reforestation – CO_2

129. The tier 1 method from the IPCC good practice guidance for LULUCF was used to estimate carbon stock changes in above-ground biomass and mineral soils and associated CO_2 emissions/removals from afforestation and reforestation, which is identified by the Party as a key category in CRF table NIR-3. In response to a question raised by the ERT during the review, Slovakia stated that it does not have sufficient data for a higher-tier method.

130. Slovakia reported only changes in carbon stock in above-ground biomass and mineral soils for afforestation and reforestation. Slovakia did not provide sufficient explanation in the NIR for the use of the notation key "NO" for the carbon stock change for afforestation and reforestation in the following pools: dead wood and litter for "Units of land not harvested since the beginning of the commitment period". In its response, Slovakia informed the ERT that the Party will use the notation key "NE" for dead wood and litter for land subject to afforestation/reforestation. The ERT recommends that Slovakia provide estimates of carbon stock changes in these two pools, or provide verifiable information which demonstrates that these pools are not net sources of anthropogenic GHG emissions (para. 6(e) of the annex to decision 15/CMP.1).

131. Slovakia did not provide clear documentation in the NIR on the use of "IE" for gains in carbon stock changes for afforestation and reforestation of below-ground biomass in CRF table 5KP-I(A.1.1) to prove that this carbon pool is included in the calculations of the

change in carbon stock. During the review, the Party informed the ERT that the below-ground biomass is included in above-ground biomass as part of the whole tree biomass. The ERT acknowledges the clarification about the below-ground biomass and recommends that, in the next and future annual submissions, Slovakia report separate estimates for above- and below-ground biomass and improve the description in the NIR which explains how this has been done (AD, equations and other factors used) and which parts of the trees are included in the two carbon pools, in order to improve the transparency.

132. The ERT noted that the Party stated in the NIR, and repeated in its responses to questions raised by the ERT during the review, that the activities afforestation and reforestation take place mainly on land that has been either cropland or grassland. This contradicts the information provided for the reporting under the Convention. Paragraph 7.4.2.1 (page 168) of the NIR states that changes to forest land are due to the conversion of grassland (23.6 kha) and other land (30.0 kha). The ERT recommends that Slovakia clarify this in its next annual submission. Furthermore, the ERT reiterates the recommendation formulated in paragraph 89 above that Slovakia use the definition of other land in line with the IPCC good practice guidance for LULUCF.

Deforestation – CO_2

133. The tier 1 method from the IPCC good practice guidance for LULUCF was used to estimate carbon stock changes in above-ground biomass and mineral soils and associated CO_2 emissions in deforestation, which is identified by the Party as a key category in CRF table NIR-3. In response to a question raised by the ERT during the review, Slovakia stated that it does not have sufficient data for a higher-tier method.

134. Slovakia did not provide sufficient explanation for the use of the notation key "NO" for the carbon stock change for deforestation in the following pools: DOM and litter. In its response to a question raised by the ERT, Slovakia stated that the Party will change "NO" to the notation key "NE" for dead wood and litter for land subject to deforestation in its next annual submission. The ERT recommends that Slovakia provide estimates of carbon stock changes in the required carbon pools dead wood and litter, or provide verifiable information which demonstrates that these pools are not net sources of anthropogenic GHG emissions (para. 6(e) of the annex to decision 15/CMP.1).

135. During the review, the Party informed the ERT that most of the deforestation results in settlements. In respect to this, the ERT strongly recommends that the Party separate wetlands and settlements from the land-use category other land in order to be in line with the IPCC good practice guidance for LULUCF and to increase transparency.

136. Furthermore, the ERT recommends that the Party implement the plans for providing information on dead wood and report on the progress of its work in the next annual submission and indicate when it will provide estimates for changes in carbon stock in litter and in dead wood. The ERT points out that, when the Party has the information on the amount of dead wood on forest land before conversion to settlements, the Party will be able to provide estimates of emissions from dead wood. If other land-use conversions from forest land take place, the ERT recommends that the Party report also on this land conversion.

137. Slovakia did not provide clear documentation in the NIR on the use of "IE" for gains in carbon stock changes for deforestation and reforestation of below-ground biomass in table 5KP-I (A.2), to prove that this carbon pool is included in the calculations of the change in carbon stock. During the review, the Party informed the ERT that the below-ground biomass is included in above-ground biomass as part of the whole tree biomass. The ERT acknowledges the clarification about the below-ground biomass and recommends that Slovakia report in the next and future annual submissions separate estimates for above- and

below-ground biomass and improve the description in the NIR of how this has been done (AD, equations and other factors used) and which parts of the tree are included in the two carbon pools, in order to improve transparency.

2. Information on Kyoto Protocol units

Standard electronic format and reports from the national registry

138. 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 and recommendations included in the SIAR on the SEF tables and the SEF comparison report.[5] The SIAR was forwarded to the ERT prior to the review, pursuant to decision 16/CP.10. The ERT reiterated the main findings and recommendations contained in the SIAR.

139. Information on the accounting of Kyoto 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. 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.

National registry

140. 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.

141. However, the national registry has not fulfilled the requirements regarding the public availability of information in accordance with section II.E of the annex to decision 13/CMP.1. Slovakia does not currently provide Article 6 project information on the public user interface of its national registry. In response to a question raised by the ERT, Slovakia indicated that the fulfilling of this task has been considered and is still postponed due to the ongoing process of restructuring the ministries. Slovakia has made an agreement with the registry that, in this transitional period, the Party will add this information to its web page within one or two months (from October 2010). The ERT reiterates the recommendation of the SIAR and of the previous review report that Slovakia enhance the availability of public information referred to in paragraphs 46 and 47 of the annex to decision 13/CMP.1, and report, in its next annual submission, on any changes to that public information available on the public user interface of the national registry.

Calculation of the commitment period reserve

142. Slovakia has reported its commitment period reserve (CPR) in its 2010 annual submission to be 244,099,958 t CO_2 eq. The ERT disagreed with this figure. In response to questions raised by the ERT during the review, Slovakia revised the estimates in its most recently reviewed inventory (2008) to be 48,999.01 Gg CO_2 eq and reported its calculation

[5] The SEF comparison report is prepared by the ITL administrator and provides information on the outcome of the comparison of data contained in the Party's SEF tables with corresponding records contained in the ITL.

of the CPR to be 244,995,049 t CO_2 eq, based on the national emissions in its most recently reviewed inventory (48,999.01 Gg CO_2 eq).

3. Changes to the national system

143. The Party described in its NIR and in its responses to questions by the ERT during the review the changes to its national system since the previous annual submission and these changes include: the rearrangement of the National Focal Point to the UNFCCC and the Kyoto Protocol at the Ministry of the Environment; a new cooperation with the National Forest Centre in Zvolen for reporting KP-LULUCF; a new cooperation with the Transport Research Centre in Brno (the Czech Republic); and the establishment of a Committee on Climate and Energy Package (CEP). The Committee serves mainly as a coordinating body at a higher political level for all climate and energy tasks and was established according to the Resolution of the Slovak Republic Government no. 416/2008 of 18 June 2009. The Committee regularly presents to the Slovak Government updates of the information on its activities. The ERT considers that the stated changes strengthen the national system to support the planning, preparation and management of the inventory and are suitably documented in the NIR. The ERT concluded that, taking into account the confirmed changes in the national system, Slovakia's national system continues to be in accordance with the requirements of national systems set out in decision 19/CMP.1.

4. Changes to the national registry

144. Slovakia reported that there have been no changes to its national registry since the previous annual submission. The ERT concluded that the Party'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 decisions of the Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol (CMP).

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

145. 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 2010 annual submission. The Party submitted this information on 15 April 2010. The reported information is considered to be complete and mostly transparent.

146. The information provided makes reference to paragraph 24 (a–f) of the annex to decision 15/CMP.1. The ERT commends Slovakia for this achievement, taking into account that Slovakia is not an Annex II Party and, therefore, is only required to provide information according to paragraph 23 of the annex to decision 15/CMP.1. However, the ERT found that the information provided is not adequate to allow it to understand how Slovakia is striving to implement its commitments. The ERT recommends, therefore, that Slovakia explore further steps in implementing Article 3, paragraph 14, of the Kyoto Protocol, and report in the NIR of its next annual submission information on how the Party is striving to implement these commitments, in particular by cooperating with developing country Parties in the technological development of non-energy uses of fossil fuels, and assisting developing country Parties which are highly dependent on the export and consumption of fossil fuels in diversifying their economies.

III. Conclusions and recommendations

147. Slovakia made its annual submission on 14 April 2010 and submitted an NIR on 15 April 2010 and resubmitted the NIR on 27 August 2010. The annual submission contains the GHG inventory (comprising CRF tables and an NIR) and supplementary information under Article 7, paragraph 1, of the Kyoto Protocol (information on: activities under Article 3, paragraph 3, of the Kyoto Protocol, Kyoto Protocol units, 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.

148. The ERT concludes that the inventory submission of Slovakia has been prepared and reported in accordance with the UNFCCC reporting guidelines. The inventory submission is complete and the Party has submitted a complete set of CRF tables for the years 1990–2008 and an NIR; these are complete in terms of geographical coverage, years and sectors, as well as generally complete in terms of categories and gases. CH_4 emissions from solid waste disposal on land and N_2O emissions from wastewater handling were underestimated. During the review, Slovakia provided revised estimates to resolve issues related to underestimates. For the LULUCF sector, the changes in the carbon stock in the following pools are reported as "NE" due to a lack of data: DOM and soils in forest land remaining forest land; DOM in grassland converted to forest land; living biomass and soils in cropland remaining cropland; living biomass and soils in grassland remaining grassland; living biomass and DOM in land converted to grassland; living biomass in land converted to other land (except for forest land converted to other land which was reported as "IE"); and DOM in land converted to other land.

149. 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.

150. The Party's inventory is generally in line with the UNFCCC reporting guidelines, the Revised 1996 IPCC Guidelines, the IPCC good practice guidance and the IPCC good practice guidance for LULUCF. However, Slovakia should implement a number of recommendations for further improvement including those highlighted by Slovakia in its NIR, and the recommendations of previous review reports not yet implemented. These include recommendations to address time-series consistency and the implementation of QA/QC procedures, to review and improve methods in the energy, solvent and other product use, agriculture, LULUCF and waste sectors and to improve the transparency of the NIR.

151. The ERT is concerned about the ability of Slovakia to obtain accurate and consistent annual information and data on GHG emissions and removals for activities under Article 3, paragraph 3, of the Kyoto Protocol for the commitment period. The ERT points out that the second cycle of the NFI is planned to take place in 2015–2016, which is beyond the end of the first commitment period and too late to be of any relevance for the provision of information required on the reporting and accounting of carbon pools for activities under Article 3, paragraph 3, of the Kyoto Protocol during the first commitment period.

152. 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.

153. The national system continues to perform its required functions as set out in the annex to decision 19/CMP.1.

154. 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.

155. Slovakia has reported the information requested in 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 2010 annual submission. The information was provided on 15 April 2010. The reported information is considered complete and mostly transparent.

156. In the course of the review, the ERT formulated a number of recommendations relating to the completeness of the annual submission (including information required under Article 7, paragraph 1) and the transparency of the AD, EFs and assumptions used for the waste and LULUCF sectors, and on cross-cutting issues and on the allocation of fuels and emissions between sectors. The key recommendations are that Slovakia:

(a) Improve the completeness of the inventory for the early years in the time series for waste (1990–2001), and report mandatory non-reported categories in the LULUCF sector and non-estimated pools for activities under Article 3, paragraph 3, of the Kyoto Protocol;

(b) Include more transparent information in specific-sector chapters of the NIR including on the reference and sectoral approach comparison, on the allocation of fuels and emissions between the energy and the industrial processes sectors, on the AD, EFs and assumptions used for the waste and LULUCF sectors and for sector-specific QA/QC;

(c) Include qualitative approaches to identifying key categories;

(d) Explain how the key categories for activities under Article 3, paragraph 3, of the Kyoto Protocol have been identified;

(e) Include a description of how the key category analysis is used to prioritize improvements of the inventory;

(f) Demonstrate that Slovakia is able to provide the information required for the reporting and accounting of carbon pools for activities under Article 3, paragraph 3, of the Kyoto Protocol during the commitment period, given that the second cycle of the NFI, which is expected to provide data and information, is planned to take place after the end of the commitment period in 2015–2016;

(g) Document clearly the reasons for changes in uncertainty estimates between submissions and provide more detailed descriptions on data sources for uncertainties in the LULUCF sector;

(h) Provided information on the uncertainty estimates associated with emissions and removals from activities under Article 3, paragraph 3, of the Kyoto Protocol;

(i) Ensure that all recalculations are fully explained in the NIR and update CRF table 8(b) with information on the rationale for changes in the inventory estimates;

(j) Implement the recommendations identified in the NIR and those outstanding improvements from previous review reports;

(k) Improve the implementation of the QA/QC procedures across all sectors to avoid errors in the CRF tables and inconsistencies between the NIR and the CRF tables;

(l) Enhance the availability of public information referred to in paragraphs 46 and 47 of the annex to decision 13/CMP.1 and report on any changes to that public information available on the public user interface of the national registry;

(m) Explore further steps in implementing Article 3, paragraph 14, of the Kyoto Protocol and report information on how Slovakia is striving to implement these commitments.

IV. Questions of implementation

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

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/gpglulucf/gpglulucf.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 2010. Available at <http://unfccc.int/resource/docs/2010/asr/svk.pdf>.

Synthesis and assessment report on the greenhouse gas inventories submitted in 2010. Available at <http://unfccc.int/resource/webdocs/sai/2010.pdf>.

FCCC/ARR/2009/SVK. Report of the individual review of the greenhouse gas inventory of Slovakia submitted in 2009. Available at <http://unfccc.int/resource/docs/2010/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>.

B. Additional information provided by the Party

Responses to questions during the review were received from Ms. Janka Szemesova (Slovak Hydrometeorological Institute), including additional material on the methodologies and assumptions used. The following documents[1] were also provided by Slovakia:

Tomlein, P., Tomlein, Mi., Tomlein, Ma. 2010. *Refridgerations logging and reporting, Stockholm, 2nd IIR Conference on Sustainable Refrigeration and Heat Pump Technology.*

Slovak Hydro meteorological Institute 2008 *QUALITY ASSURANCE / QUALITY CONTROL PLAN FOR THE GREENHOUSE GAS INVENTORY IN THE SLOVAK REPUBLIC* Bratislava

Slovak Hydro meteorological Institute 2010 *PRÍRUČKA KVALITY SLOVENSKÉHO HYDROMETEOROLOGICKÉHO ÚSTAVU pre Národný inventarizačný systém emisií skleníkových plynov podľa článku 5 Kjótskeho protokolu* (Quality Manual), Bratislava

Slovak Hydro meteorological Institute 2010 *SPRÁVA Z RECERTIFIKAČNÉHO AUDITU SYSTÉMU MANAŽÉRSTVA KVALITY(Report Audit ACERT)* Bratislava

Slovak Hydro meteorological Institute 2010 Example *nomination letter for experts nominated to the GHG inventory tasks (Nomination_Projections_Balajka.pdf and Nomination_F_gases_Tomlein.pdf) All sectoral experts provided in table 1.2 have these letters.* Bratislava

Slovak Hydro meteorological Institute 2010 *detailed key category analysis,* Bratislava

Slovak Hydro meteorological Institute 2010, *two examples of half year meetings with sectoral experts. (Meeting_Farkas_08_07_10.jpg, Meeting_Danielik_22_06_10.jpg).* Bratislava.

[1] Reproduced as received from the Party.

Annex II

Acronyms and abbreviations

AD	activity data
C	carbon
$CaCO_3$	calcium carbonate
CH_4	methane
CO_2	carbon dioxide
CO_2 eq	carbon dioxide equivalent
CMP	Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol
CPR	commitment period reserve
CRF	common reporting format
DOC	degradable organic carbon
DOM	dead organic matter
EF	emission factor
ERT	expert review team
EU ETS	European Union emissions trading scheme
F-gas	fluorinated gas
GHG	greenhouse gas; unless indicated otherwise, GHG emissions are the sum of CO_2, CH_4, N_2O, HFCs, PFCs and SF_6 without GHG emissions and removals from LULUCF
HFCs	hydrofluorocarbons
IE	included elsewhere
IEF	implied emission factor
IPCC	Intergovernmental Panel on Climate Change
ITL	international transaction log
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
LULUCF	land use, land-use change and forestry
MCF	methane correction factor
Mg	megagram (1 Mg = 1 tonne)
$MgCO_3$	magnesium carbonate
N	nitrogen
NA	not applicable
NE	not estimated
NMVOC	non-methane volatile organic compounds
NO	not occurring
N_2O	nitrous oxide
NIR	national inventory report
NR	not reported
PFCs	perfluorocarbons
QA/QC	quality assurance/quality control
SEF	standard electronic format
SF_6	sulphur hexafluoride
SIAR	standard independent assessment report
TJ	terajoule (1 TJ = 10^{12} joule)
UNFCCC	United Nations Framework Convention on Climate Change