COMPLIANCE COMMITTEE

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Report of the centralized in-depth review of the fourth national communication of Slovakia

Note by the secretariat

The report of the centralized in-depth review of the fourth national communication of Slovakia is being forwarded to the Compliance Committee in accordance with section VI, paragraph 3, of the annex to decision 27/CMP.1.

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Report of the centralized in-depth review of the fourth national communication of Slovakia

CONTENTS

I. Introduction and summary

A. Introduction

1. Slovakia has been a Party to the UNFCCC since 1994 and to the Kyoto Protocol since 2002. Under the Kyoto Protocol, Slovakia committed itself to reducing its greenhouse gas (GHG) emissions by 8 per cent compared to the base year (1990) level during the first commitment period from 2008 to 2012.

2. This report covers the centralized in-depth review (IDR) of the fourth national communication (NC4) of Slovakia, coordinated by the UNFCCC secretariat in accordance with decision 7/CP.11. The review took place from 5 to 10 June 2006 in Bonn, Germany, and was conducted by the following team of nominated experts from the UNFCCC roster of experts: Mr. Didier Goetghebuer (Belgium), Mr. David Lesolle (Botswana), Ms. Thelma Krug (Brazil), Mr. Ismael Concha[1] (Colombia), Mr. Naoki Matsuo (Japan) and Ms. Natalya Parasyuk (Ukraine). Ms. Krug and Dr. Matsuo were the lead reviewers. The review was coordinated by Mr. Sergey Kononov (UNFCCC secretariat).

3. During the IDR, the expert review team (ERT) examined each part of the NC4. The ERT also evaluated the information contained in Slovakia's report demonstrating progress (RDP) in achieving its commitments under the Kyoto Protocol, and the supplementary information provided by Slovakia under Article 7, paragraph 2, of the Kyoto Protocol.

4. 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, in this final version of the report.

B. Summary

5. The ERT found that Slovakia's NC4 was prepared in accordance with the UNFCCC reporting guidelines.[2] As required by decision 22/CP.8, the RDP provides information on the progress made by Slovakia in achieving its commitments under the Kyoto Protocol. Supplementary information under Article 7, paragraph 2, of the Kyoto Protocol[3] is provided in both the NC4 and the RDP. The ERT acknowledged a high degree of coherency and consistency in Slovakia's reporting.

1. Completeness

6. The ERT noted that Slovakia's NC4 contains all sections required by the reporting guidelines, except for a section on financial resources and transfer of technology.[4] It also noted that Slovakia's RDP contains all parts stipulated by decisions 22/CP.7 and 25/CP.8. Furthermore, the ERT noted that Slovakia has provided the supplementary information under Article 7, paragraph 2, except for two reporting elements (see section III.B).

2. Timeliness

7. The NC4 and RDP were submitted on 30 December 2005. Decision 4/CP.8 requested the submission of the NC4 by 1 January 2006. Decision 22/CP.7 set the same date for Parties to submit their RDPs.

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[1] Mr. Concha was not able to take part in the review visit to Bonn but supported the review from his office.

[2] "Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part II: UNFCCC reporting guidelines on national communications." Document FCCC/CP/1999/7, pages 80–100.

[3] Decision 15/CMP.1, annex, chapter II (FCCC/KP/CMP/2005/8/Add.2).

[4] According to the UNFCCC reporting guidelines (document FCCC/CP/1999/7, page 91, paragraph 50), reporting on financial resources and technology transfer is required for Parties included in Annex II to the Convention (Annex II Parties). Slovakia is not an Annex II Party.

3. Transparency

8. The ERT acknowledged that Slovakia's NC4 is well structured and concise. In the course of the review, the ERT formulated a number of recommendations aimed at further increasing the transparency of the reporting, such as a recommendation that Slovakia describe the methodologies used for its GHG projections in more detail, in particular for the non-energy sectors. The ERT noted that the information contained in the NC4 and the RDP is consistent.

II. Technical assessment of the reviewed elements

A. National circumstances relevant to greenhouse gas emissions and removals

9. In its NC4, Slovakia has provided a description of its national circumstances affecting GHG emissions and removals as required by the UNFCCC reporting guidelines. This description covers the national framework for environmental policy making and legislative process, the geographic profile, the climate profile, population development, the economic profile, the energy sector, industry, transport, agriculture and forestry, waste management, and the housing sector, including households and public buildings. Table 1 illustrates the national circumstances of the country by providing some indicators relevant to GHG emissions and removals.

Table 1. Indicators relevant to greenhouse gas emissions and removals for Slovakia

	1990	1995	2000	2003	Change 1990–2000 (%)	Change 2000–2003 (%)	Change 1990–2003 (%)
Population (million)	5.30	5.36	5.40	5.38	1.9	–0.4	1.5
GDP (billion USD 2000 PPP)	53.3	48.5	58.1	65.9	9.2	13.4	23.8
TPES (Mtoe)	21.4	18.0	17.8	18.5	–17.0	4.1	–13.6
GDP per capita (thousand USD 2000 PPP)	10.1	9.0	10.8	12.3	7.1	13.9	22.0
TPES per capita (toe)	4.0	3.3	3.3	3.4	–18.6	4.5	–14.9
GHG emissions without LULUCF (Tg CO_2 eq)	72.1	53.3	48.6	51.6	–32.6	6.2	–28.4
GHG emissions with LULUCF (Tg CO_2 eq)	69.7	50.7	46.2	46.8	–33.7	1.3	–32.9
CO_2 emissions per capita (Mg)	11.2	8.2	7.4	8.0	–33.8	7.1	–29.1
CO_2 emissions per GDP unit (kg per USD 2000 PPP)	1.12	0.90	0.69	0.65	–38.1	–6.0	–41.8
GHG emissions per capita (Mg CO_2 eq)	13.6	9.9	9.0	9.6	–33.9	6.6	–29.5
GHG emissions per GDP unit (kg CO_2 eq per USD 2000 PPP)	1.35	1.10	0.84	0.78	–38.2	–6.4	–42.2

Sources: GHG emissions data are from Slovakia's 2005 inventory submission; population, GDP and TPES data are from the IEA.
Note 1: The ratios per capita and per GDP unit are calculated relative to GHG emissions without LULUCF; the ratios are calculated using the exact (not rounded) values and may therefore differ from a ratio calculated with the rounded numbers provided in the table.
Note 2: For the abbreviations used, see annex II.

10. Slovakia has provided a summary of information on GHG emission trends for the period 1990–2003. This information is consistent with its 2005 national inventory submission. Summary tables, including trend tables for emissions in CO_2 equivalent (given in the common reporting format (CRF)), are provided in an annex to the NC4. Descriptions and diagrams on emission trends are available but the ERT noted that the description of the drivers behind the emission trends is only limited, and could be expanded in Slovakia's next national communication.

11. Total GHG emissions excluding emissions/removals from land use, land-use change and forestry (LULUCF) decreased by 28.4 per cent between 1990 and 2003, whereas total GHG emissions including net emissions/removals from LULUCF decreased by 32.9 per cent. From 1990 to 2003, CO_2 emissions decreased by 28.0 per cent, CH_4 emissions decreased by 25.8 per cent and N_2O emissions decreased by 34.7 per cent. Emissions of fluorinated gases, or F-gases (HFCs, PFCs and SF_6 taken together), decreased by 37.5 per cent during this period but accounted only for approximately 0.3 per cent of total GHG emissions in 2003 (0.4 per cent in 1990).

12. In the early 1990s, GHG emissions declined along with the decline in gross domestic product (GDP), which accompanied the process of transition to a market economy. Since 1993, however, GDP

has been growing while both energy consumption and GHG emissions have remained relatively stable, thanks to changes in economic structure and efficiency improvements in energy supply and use, with a remarkable decline in the CO_2- and GHG-intensity of GDP (i.e. in CO_2 and GHG emissions per GDP unit; see table 1).

Table 2. Greenhouse gas emissions by sector for Slovakia, 1990–2003

	GHG emissions (Tg CO_2 equivalent					Change (%)		Share[a] (%)	
	1990	1995	2000	2002	2003	1990–2003	2002–2003	1990	2003
1. Energy	57.7	42.8	38.7	40.6	41.4	–28.1	2.0	80.0	80.3
A1. Energy industries	51.4	37.0	32.9	33.6	34.9	–32.1	3.9	71.3	67.6
A3. Transport	5.17	4.54	4.51	5.83	5.37	3.9	–7.8	7.2	10.4
B. Fugitive emissions	1.08	1.24	1.32	1.25	1.18	9.0	–5.3	1.5	2.3
2. Industrial processes	4.26	3.56	3.91	3.99	3.94	–7.6	–1.4	5.9	7.6
4. Agriculture	8.06	5.10	4.14	4.14	4.0	–50.2	–2.9	11.2	7.8
5. LULUCF	–2.41	–2.67	–2.43	–5.26	–4.86	101.9	–7.6	–3.3	–9.4
6. Waste	2.09	1.93	1.86	2.13	2.22	6.5	4.5	2.9	4.3
GHG total with LULUCF	69.7	50.7	46.2	45.6	46.8	–32.9	2.4	–	–
GHG total without LULUCF	72.1	53.3	48.6	50.9	51.6	–28.4	1.4	–	–

[a] The shares of sectors are calculated relative to GHG emissions without LULUCF; the negative values for the LULUCF sector indicate the share of GHG emissions which was offset by GHG removals through LULUCF.

Note 1: The changes in emissions and the shares by sector are calculated using the exact (not rounded) values and may therefore differ from values calculated with the rounded numbers provided in the table.

Note 2: Consistent with the NC4 and with Slovakia's 2005 inventory submission, the solvent and other product use sector and some subsectors of energy are not included in this table because data are not available. Slovakia's 2006 inventory submission contains data for all the energy subsectors for 1990 and 2000–2004.

Note 3: For the abbreviations used, see annex II.

B. Policies and measures

13. In its NC4, Slovakia has provided information on its policies and measures adopted to implement its commitments under the UNFCCC and its Kyoto Protocol, as required by the UNFCCC reporting guidelines. Table 3 summarizes the major policies and measures described in the NC4.

Table 3. Summary information on policies and measures

Major policies and measures	Examples / comments
Framework policies and cross-sectoral measures	
Integrated climate programme	Strategy to Achieve Commitments under the Kyoto Protocol, 2002
Energy/electricity/emissions taxation	Excise tax
Emissions trading	EU ETS (Act 572/2004) (820 Gg CO_2)
Support of research and development	National Climate Programme (NKP)
Other	Act 478/2002 on Air Protection
Energy sector	
Energy sector liberalization	EC Directive 2003/54/EC (on electricity), Directive 2003/55/EC (on gas)
CHP generation	EC Directive 2004/8/EC
Renewable energy sources	EC Directive 2001/77/EC (477 Gg CO_2)
Energy efficiency improvements	EC Directive 2001/91/EC; the 2006 Energy Policy
Transport	
Vehicle and fuel taxes	Excise tax
Biofuels	EC Directive 2003/30/EC (324 Gg CO_2)
Industry	
Pollution prevention and control	IPPC Directive of the EC; Act on Protection of Ozone Layer
Agreements/partnerships	EU ETS for the largest producers of cement and lime; Waste Management Act
Agriculture	Acts on the protection and utilization of agricultural soil, on manures, on the application of sludge and bottom sediments to soil, and on protection against pollution by nitrates
Waste management	Waste Management Programme; Acts on waste management, on packaging, on water and on charges on waste disposal
Forestry	Medium-term Agriculture Policy for 2004–2006 – Forest Management

Note 1: The GHG reduction estimates, given for some measures (in parentheses) in the table, are reductions in CO_2 for the year 2010.

Note 2: For the abbreviations used, see annex II.

1. Policy framework and cross-sectoral measures

14. The UNFCCC National Focal Point at the Air Protection Department of the Ministry of the Environment is the key source of expertise and the principal legal actor to support the achievement of

Slovakia's commitments under the UNFCCC and its Kyoto Protocol. In addition, the Ministry of Economy, the Ministry of Agriculture, the Ministry of Construction and Regional Development, and the Ministry of Transport, Post and Telecommunications contribute to climate change mitigation within their respective areas of responsibility.

15. Under the overall strategy, principles and priorities of the State Environmental Policy, the Strategy to Achieve Commitments under the Kyoto Protocol (2002) prescribes national objectives in a step-wise manner for three periods: short-term (before 2002), medium-term (2003–2007), and long-term (2008–2020). Slovakia's target under the Kyoto Protocol is to reduce its GHG emissions by 8 per cent compared to the base year (1990) level during the first commitment period. The strategy is consistent with this objective and also envisages establishing the conditions for an additional 5 per cent reduction in the second commitment period under the Kyoto Protocol. Different economic sectors contribute in different propotions to this additional reduction.

16. In order to implement the strategy and other related policies, the energy policy in particular, a proposal entitled Action Plan for Fulfilment of the Kyoto Protocol Commitments of the UNFCCC has been developed. It provides "analyses" – background documents for the decision-making process – of direct and indirect measures in the light of their emission reduction potential, investment requirements, estimates of the costs of abatement, and the time horizon for implementation, focusing on the demand and supply sides of the energy sector. Total estimated mitigation potential is estimated as a 9 per cent reduction in the first commitment period (2008–2012) compared to the "without measures" scenario. In addition, the objective of increasing energy efficiency was declared in the Energy Policy proposed in 2005 and approved in January 2006.

17. According to the NC4, the key policies and measures are those under the coordinated policy of the European Union (EU); the estimates of GHG emission reductions in the NC4 take into account mainly these measures. Slovakia has made extensive efforts to meet the environmental requirements for EU member States. On the other hand, from the perspective of climate change, GHG emissions in Slovakia are expected to be far below the target level specified by the Kyoto Protocol.

18. Slovakia intends to utilize emissions trading under the EU Emissions Trading Scheme (EU ETS) as a means to promote energy efficiency and fuel switching. It is estimated that, if the maximum potential for energy efficiency and fuel switching is realized, it will lead to an additional saving of 820 Gg CO_2 per year (by fuel switching, from coal to biomass and from heavy fuel oil to natural gas) compared to the emissions level under the National Allocation Plan (NAP), which is a business-as-usual (BaU) scenario. This will provide an opportunity for selling the associated EU allowances (backed by assigned amount units (AAUs)) to private entities in other EU countries.

19. The ERT noted that there are several "concepts" as well as "strategies" currently under discussion, mostly as part of the Action Plan mentioned in paragraph 16 above. However, emission reductions have been estimated for measures under the EU policies only. Nevertheless it is estimated that full implementation of the measures specified in the Action Plan analyses, including combined heat and power (CHP) and demand-side energy-saving options, would provide abatement effects several times larger than the measures currently in place, leading, potentially, to Slovakia's being able to sell a larger number of emission reduction units, as well as reducing energy cost and strengthening energy security. The ERT was therefore of the view that timely realization of the measures specified in the Action Plan analyses would yield sizeable benefits. However, it seems that there are not enough measures currently in place to realize the full potential of the Action Plan.

20. The ERT also noted that all the measures are of a legislative nature and felt that, in addition, support for well-designed voluntary actions could help to promote "soft" approaches to GHG mitigation, which are part of the policy packages of many industrialized countries.

2. Policies and measures in the energy sector

21. GHG emissions from the energy sector amounted to approximately 80 per cent of total GHG emissions in 2003 (see table 2). Of the emissions from the sector, 32 per cent are accounted for by energy industries, 36 per cent by manufacturing industries and construction, 13 per cent by transport, and 16 per cent by other sectors.[5] It is expected that GHGs from the energy sector will increase in the coming decades under all scenarios, driven by economic growth.

22. The NC4 provides estimates of GHG reductions for four implemented measures: (a) support for electricity generation from renewable sources (Directive 2001/77/EC; the estimated effect is 477 Gg CO_2 per year in 2010); (b) support for the use of biofuels and other renewable energy sources in transport (Directive 2003/30/EC; 324 Gg CO_2 per year in 2010); (c) energy saving in buildings (Directive 2001/91/EC; no effect in 2010 but 79 Gg CO_2 per year in 2015); and (d) trading of emission allowances (Act 572/2004; 820 Gg CO_2 per year). The effects of the other measures are not estimated, apparently because estimating them was too difficult (they may be positive or negative).

23. In addition, European Community (EC) directives on support for co-generation and on the energy efficiency of final utilization of energy and energy services will be implemented (currently under preparation). The target is to increase the share of energy production by CHP from 11 per cent in 1998 to 18 per cent in 2010. Directive 92/75/EC on energy labelling may provide additional reductions, although the size of these reductions has not been estimated.

3. Policies and measures in other sectors

24. Between the base year (1990) and 2003, GHG emissions from the non-energy sectors[6] decreased by approximately 29 per cent (by 4.2 Tg CO_2 equivalent), mainly driven by a decrease in emissions from the agriculture sector (by approximately 50 per cent or 4.0 Tg CO_2 equivalent per year).

25. ***Industrial processes***. In 2003, GHG emissions from industrial processes were approximately 8 per cent below the 1990 level. The decrease was mainly due to the reduction of CO_2 emissions from the production of mineral products, iron and pig iron. The largest producers of cement and lime are obliged to participate in the EU ETS (Act 572/2004). For the F-gases (HFCs, PFCs and SF_6), the legal framework has been adjusted to EU standards, which involves requirements for the collection, recycling and final disposal of coolants, non-returnable packaging, and the use of coolants in different sectors. The Waste Management Act has been adapted to meet the requirements of the EC Directive on waste from electrical equipment (such as freezers and other cooling equipment).

26. ***Agriculture***. From 1990 to 2003, GHG emissions from agriculture decreased by about one-half (50.2 per cent) as a result of the change in the economic structure of the sector and the effect of the EC's Common Agricultural Policy (CAP), with declining numbers of animals, which affects emissions of CH_4 and N_2O. Subsidies under the CAP have been utilized to limit the numbers of livestock. The objectives of the Programme for the Development of Agriculture include adjusting the country's agriculture to environmental requirements. The acts on the application of sludge and bottom sediments to soil, on water and on protection against pollution by nitrates from agricultural sources are key measures designed to comply with EU directives.

27. ***Forestry***. From 1990 to 2003, the LULUCF sector was a net sink of 2–5 Tg CO_2 equivalent per year (2.4 Tg in 1990 and 4.9 Tg in 2003; see table 2). The LULUCF sector offset approximately 9 per cent of total national GHG emissions in 2003. However, in the projections the annual net sink decreases

[5] These percentages (calculated relative to total emissions from the energy sector) are for the 2004 data, taken from the 2006 inventory submission, because the 2005 inventory submission, which is used elsewhere in this report, does not contain data for a number of subsectors within the energy sector.

[6] This includes industrial processes (7.6 per cent of total GHG emissions in 2003), agriculture (7.8 per cent) and waste (4.3 per cent).

in all scenarios. This is due to the impact of the storms of 2005 and a continuous increase in wood harvesting as the volume of wood stock increases. The Medium-term Agriculture Policy for 2004–2006 – Forest Management creates a framework for the implementation of measures aimed at the sustainable management of forests and the prevention of excessive wood harvesting.

28. ***Waste***. GHG emissions from the waste sector increased by 6.5 per cent between 1990 and 2003. The increase was mainly due to an increase in N_2O and CH_4 emissions from solid waste disposal sites. The Waste Management Programme defines the objectives to be achieved in municipal waste disposal. An important economic instrument is the Recycling Fund established to collect the revenues associated with the relevant taxes and allocate them to projects dealing with waste collection, recovery and processing. Various acts have translated the relevant EU directives on waste into national legislation: Act 529/2002 on Packaging sets out requirements on the composition, properties and labelling of packaging; Act 364/2004 on Waters is the framework legislation designed to provide sewage systems and treat waste water in agglomerations of more than 10,000 person equivalent (PE)[7] by 2010 and in agglomerations with less than 10,000 PE by 2015; and Act 17/2004 on Charges for Waste Disposal regulates payments for waste disposal. These measures are expected to reduce GHG emissions in the sector.

C. Projections and the total effect of policies and measures

1. Projections

29. In its NC4, Slovakia has provided GHG projections for three scenarios, "without measures", "with measures" and "with additional measures", which are presented in five-year steps for the period 2005–2025. The projections are presented relative to actual inventory data for the period 1990–2003. The year 2003 was chosen as the reference year for modelling emission scenarios on the basis of the availability and reliability of data. The projections are disaggregated by sector (presented for energy and its subsectors, including transport, industry, agriculture, LULUCF and waste) and by gas (for CO_2, CH_4, N_2O, PFCs, HFCs and SF_6). The projections are also presented as GHG totals, using the corresponding global warming potential (GWP) values, for each sector as well as for a national total. Emission projections relating to fuel sold for use by ships and aircraft engaged in international transport, and emissions from the solvent and other product use sector, have not been reported. Table 4 and figure 1 present summary information on the GHG projections provided by Slovakia in its NC4.

Table 4. Summary of greenhouse gas emission projections for Slovakia

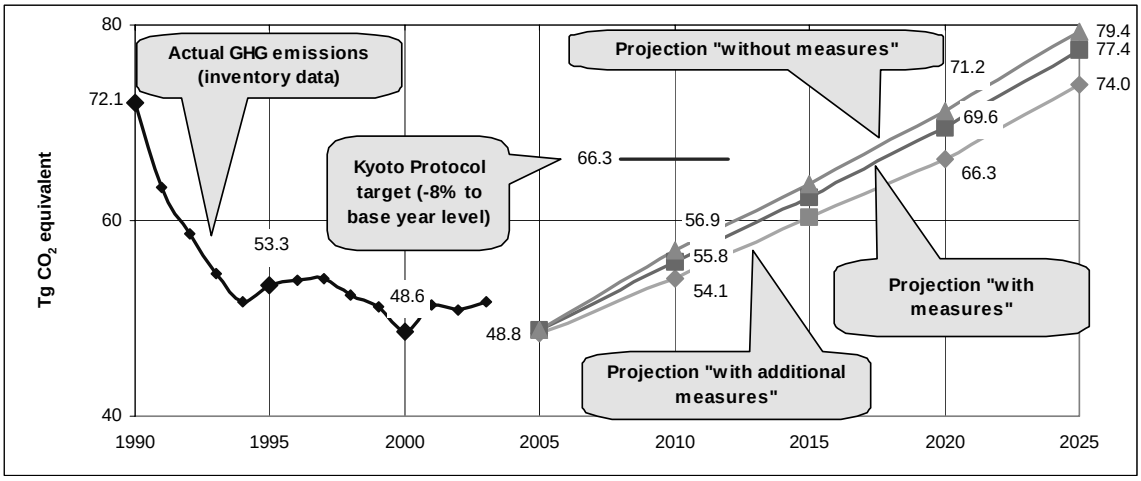
	GHG emissions (Tg CO_2 equivalent per year)	Changes compared to base year level (%)
Inventory data 1990[a, c]	72.1	not applicable
Inventory data 2003[a]	51.6	–28.4
Kyoto Protocol base year[b, c]	71.1	not applicable
Kyoto Protocol target[c]	66.3	–8
"Without measures" projection for 2010	56.9	–21.1
"With measures" projection for 2010	55.8	–22.7
"With additional measures" projection for 2010	54.1	–24.9

[a] *Source*: Slovakia's 2005 GHG inventory submission; the emissions are without LULUCF.
[b] *Source*: Slovakia's NC4.
[c] The inventory data for 1990 (72.1 Tg) differ slightly from the base year (1990) projections (71.1 Tg) because the projections used a different version of the GHG inventory.
Note 1: The GHG projections shown in the table are without the LULUCF sector (projections for LULUCF are available in the NC4).
Note 2: For the abbreviations used, see annex II.

[7] 1 PE (person equivalent) produces 60 g of biological waste a day.

30. The assumptions for each scenario are presented clearly and transparently in the NC4. The methodology used is briefly described for the energy sector. An optimization model called MESSAGE and a simulation model, ENPEP, were used to develop projections of CO_2 emissions from combustion and transformation of fossil fuels. The ERT recommends that Slovakia describe the methodologies used for its projections in more detail, in particular for the non-energy sectors.

Figure 1. Greenhouse gas emission projections for Slovakia



Note: The GHG projections shown in the figure are without the LULUCF sector (projections for LULUCF are available in the NC4).

31. Projections of GHG emissions in the power sector have been calculated based on the government decision to retire two units at the Jaslovske Bohunice nuclear power plant and to replace this capacity with new gas-fired combined-cycle units and coal-fired units with fluidized bed combustion.

32. Total GHG emissions (without LULUCF) are projected to remain well below the Kyoto Protocol target during the first commitment period (2008–2012). For example, the projected 2010 emissions are below the base year level by 21.1, 22.7 and 24.9 per cent under the scenarios "without measures", "with measures" and "with additional measures", respectively, whereas the Kyoto Protocol requires an 8 per cent reduction below the base year level. In absolute terms, in 2010 GHG emissions (without LULUCF) are projected to be below the Kyoto Protocol target by 9.4, 10.6 and 12.2 Tg CO_2 equivalent for the scenarios "without measures", "with measures" and "with additional measures", respectively. At the same time, the projections indicate that GHG emissions in Slovakia will grow steadily (at an almost constant rate) from 2005 to 2025 and may exceed the 1990 level between 2020 and 2025.

33. The ERT recommends that Slovakia prepare GHG emission projections relating to fuel sold for use by ships and aircraft engaged in international transport, and emission projections for the solvent and other product use sector.[8]

2. Total effect of policies and measures

34. As Slovakia has provided the scenarios "without measures", "with measures" and "with additional measures", the total effect of policies and measures can be estimated both for implemented and adopted policies and measures (calculated as the difference in GHG emissions between the "without measures" and "with measures" scenarios) and for additional (planned) measures (calculated as the

[8] During the review, the Party clarified that no national statistical information is available at present to distinguish between the fuels sold for use nationally and those sold for use in international transportation. The emissions from the sector of solvent and other product use were assessed for the first time in 2002, and they seem to be negligible. Slovakia plans to improve data for this sector in the future, when other, higher priority concerns on the quality of the national inventory system have been addressed.

difference between the "with measures" and "with additional measures" scenarios). Table 5 provides an overview of these effects.

35. Table 5 shows that the greatest effect from the measures implemented and adopted is in the energy sector, followed by waste, agriculture and industrial processes. The effect of the planned (additional) measures is distributed across the sectors more evenly. The total effect of policies and measures amounts to a decrease in emissions by approximately 1.6 and 2.4 per cent in 2010 compared to the base year level, for the "with measures" and "with additional measures" scenarios, respectively.

Table 5. Total effect of policies and measures, estimated for 2005 and projected for 2010

	Effect of implemented and adopted measures (Tg CO_2 equivalent)	Relative value (% of base year emissions)	Effect of planned measures (Tg CO_2 equivalent)	Relative value (% of base year emissions)
Energy (without transport)	0.82	1.14	0.48	0.66
Transport	0	0	0.32	0.45
Industrial processes	0.01	0.01	0.13	0.18
Agriculture	0.08	0.13	0.35	0.49
LULUCF	0	0	0.07	0.09
Waste	0.22	0.30	0.36	0.49
Total	**1.12**	**1.55**	**1.70**	**2.36**

Note: For the abbreviations used, see annex II.

36. In reviewing Slovakia's GHG projections, the ERT noted again (see paragraphs 16 and 19) that the total effects of policies and measures are rather small in comparison to the mitigation potential estimated by the analyses of the Action Plan of Fulfilment of the Kyoto Protocol Commitments of the UNFCCC (where the total estimated mitigation potential amounts to a reduction by 9 per cent during the period 2008–2012 compared to the "without measures" scenario).

D. Vulnerability assessment, climate change impacts and adaptation measures

37. In its NC4, Slovakia has provided information on the expected impacts of climate change in Slovakia and on the action taken to implement Article 4, paragraph 1 (b) and (e), of the Convention with regard to adaptation. According to the NC4, temperatures in Slovakia are expected to increase on average by 3.1° C by 2100. Three sectors have been identified as vulnerable to climate change: water resources, agricultural production and forest ecosystems. Table 6 summarizes the information reported by the NC4 on vulnerability and adaptation to climate change.

Table 6. Summary information on vulnerability and adaptation to climate change

Vulnerability area	Examples / comments / adaptation measures reported
Water resources	***Vulnerability***: reduction in production and distribution of drinking water; decrease in the quality of life; impacts on landscape and urban planning; water resources management and planning ***Adaptation***: introduction of new technologies (rainwater harvesting); construction of divided water supply systems; demand-side management for water (water taxes, charges and fines); education and public awareness; systematic monitoring of water quality and quantity
Agricultural production	***Vulnerability***: earlier droughts leading to shortages in soil moisture; change of phenological conditions: acceleration of physiological processes (start of phenophases, phenophase intervals and vegetation periods); changes in agro-climatic conditions (changes in evapotranspiration and increases in the occurrence of extreme minimum temperatures); changes in agro-climatic production potential; changes in the incidence of disease, pests and weeds ***Adaptation***: application of crop-growing technologies; changes in crop varieties; integrated pest management; weed control; measures to address water and wind erosion (fodder cropping, grassing of shallow soil); public awareness and information dissemination
Forest ecosystems	***Vulnerability***: change in the bioclimate of forests; decrease in water availability; more frequent droughts; impact of extreme weather and climate on forests; increases in the incidence of pests and diseases

Note: Adaptation options are not reported in the NC4 for forest ecosystems.

38. As in the previous (third) national communication, vulnerability assessments for other sectors and socio-economic impacts have not been reported; Slovakia may wish to report on them in its future national communications. The ERT also noted that adaptation strategies are yet to be approved by the Government of Slovakia. Slovakia could also report on possible adaptation strategies for the forestry sector.

E. Financial resources and transfer of technologies

39. Although Slovakia is not a Party included in Annex II to the Convention (Annex II Party), in its RDP it has provided a brief description of activities under Article 10(c) of the Kyoto Protocol, relating to support for the transfer of environmentally sound technologies. The potential to export technologies from Slovakia has been growing during recent years, mainly with respect to energy production from biomass and other renewable energy sources, mostly because Slovakia has developed these technologies in response to the EU's legal requirements.

F. Research and systematic observation

40. Slovakia has provided information on its actions relating to research and systematic observation. It is not yet participating in the Global Climate Observing System (GCOS). The ERT noted that there is ongoing research at the Faculty of Mathematics, Physics and Informatics of the Comenius University (Bratislava) under a project with the Slovakian Agency for Science and Technology.

41. The NC4 reports on the institutional framework for research and systematic observation as set by Slovakia's National Climate Programme.

G. Education, training and public awareness

42. Slovakia has provided information on its actions relating to training and public awareness. As regards education, only the legal environmental framework is described in the NC4. The Ministry of Education has developed the "National Education Programme – Millennium" which aims to incorporate sustainable development issues into education. The concept of environmental education is also devoted to this issue. However, legal and institutional support for education and public awareness specifically on climate change is lacking. An increase of public awareness on climate change has, nevertheless, considerably improved recently through new information technologies and the Internet.

43. The advisory and information centres of the Slovak Energy Agency provide information on energy efficiency, energy management and renewable energy sources.

III. Evaluation of information contained in the report demonstrating progress and of supplementary information under Article 7, paragraph 2, of the Kyoto Protocol

A. Information contained in the report demonstrating progress

44. Slovakia's RDP includes five chapters that contain the information required by decisions 22/CP.7 and 25/CP.8. The ERT found the information contained in the RDP to be consistent with that provided in the NC4.

45. Total national GHG emissions excluding emissions/removals from LULUCF decreased by 28.4 per cent between 1990 and 2003, whereas total GHG emissions including net emissions/removals from LULUCF decreased by 32.9 per cent. Since 1993, GHG emissions have been relatively stable despite the growth in GDP (in 2003, GDP was approximately 24 per cent above the 1990 level).

46. The considerable reductions in GHG emissions in Slovakia resulted mainly from measures designed for purposes other than climate change mitigation (such as the Air Pollution Act, measures to

support wider use of renewables, and some energy efficiency and energy saving measures). The RDP provides an evaluation of the anticipated effect of domestic policies and measures on GHG emission reductions until the year 2025, by sector and gas. Most of the policies and measures are regulatory and have already been implemented; the remainder are already adopted or approved policies or measures that are yet to be implemented. The largest impact is expected to come from the EU ETS.

47. Under the Kyoto Protocol, the GHG emission target for Slovakia is to reduce national GHG emissions to 8 per cent below the base year (1990) level. Total GHG emissions (without LULUCF) are projected to remain well below the Kyoto Protocol target during the first commitment period (2008–2012), by 21.1, 22.7 and 24.9 per cent under the scenarios "without measures", "with measures" and "with additional measures", respectively, or, in absolute terms, by 9.4, 10.6 and 12.2 Tg CO_2 equivalent, respectively.

48. For the Kyoto Protocol mechanisms, Slovakia has formal procedures in place to approve joint implementation (JI) projects. However, it may take some months more before the second NAP can be finalized in such a way as to resolve the issues associated with interaction (especially the double-counting issue) between the EU ETS and the national system. In addition, Slovakia supports AAU trading backed by underlying GHG emission reduction projects that are not covered by the EU ETS; there is already a specified group of facilities that plan to sell AAUs. The Green Investment Scheme is intended to be used but is still at an early stage of consideration.

B. Supplementary information under Article 7, paragraph 2, of the Kyoto Protocol

49. Slovakia has provided most of the supplementary information under Article 7, paragraph 2, of the Kyoto Protocol in its NC4 and RDP. This information reflects the steps it has taken to implement the relevant provisions of the Kyoto Protocol. The supplementary information is placed in different sections of the NC4 and the RDP. Table 7 provides a reference to the RDP and NC4 chapters in which supplementary information is provided.

Table 7. Overview on supplementary information under Article 7, paragraph 2, of the Kyoto Protocol

Supplementary information	Reference
Supplementarity relating to the mechanisms pursuant to articles 6, 12 and 17	RDP, pp. 6, 18, 28 NC4, p. 45
Policies and measures in accordance with Article 2	NC4, pp. 41–54; RDP, pp. 5–8
Domestic and regional programmes and/or legislative arrangements and enforcement and administrative procedures	RDP, pp. 16–17
Information under Article 10	RDP, pp. 14–18
Financial resources[a]	RDP, p. 20

[a] As an EIT country, Slovakia does not have to report on the implementation of Article 11 of the Kyoto Protocol, including on the provision of new and additional resources.

Note: For the abbreviations used, see annex II.

50. Slovakia has included in its RDP information relating to the capacity framework for the national inventory system, the national registry, support to education and training, support for education about and public awareness of climate change, the dissemination of information on climate change, and public participation in the decision-making process. The national system for estimating anthropogenic emissions and removals is under development, and will be implemented in two phases, the first focusing on methodological and organizational aspects, and the second on implementation of quality assurance and quality control for the GHG inventory. The ERT recommends that Slovakia include a more detailed description of the national system and national registry in the next national communication, covering both the technical and the capacity-building aspects.

51. Although Slovakia, as a Party with an economy in transition (EIT) (and not an Annex II Party), does not have to report on activities under Article 11 of the Kyoto Protocol, the RDP includes a

description of initiatives in developing countries sponsored since 2004, mostly relating to technology transfer (gabion technologies, piston pumps), capacity building, and climate monitoring systems.

52. Slovakia has not reported the following elements of the additional information under Article 7, paragraph 2, of the Kyoto Protocol: (a) information on the efforts it is making to implement policies and measures to minimize adverse effects, including effects of climate change, effects on international trade, and social, environmental and economic impacts on other Parties, particularly those identified in Article 4, paragraphs 8 and 9, of the Convention; and (b) a description of national legislative arrangements and administrative procedures relating to the implementation of activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol. The ERT recommends that Slovakia include these reporting elements in its next national communication. The ERT also recommends that Slovakia review its table P3[9] on the implementation of the flexible mechanisms under the Kyoto Protocol, in particular the obstacles identified.

IV. Conclusions and recommendations

53. In the early 1990s, GHG emissions in Slovakia declined along with the decline in GDP which accompanied the process of transition to a market economy. Since 1993, however, GDP has been growing while GHG emissions have remained relatively stable thanks to changes in the economic structure and efficiency improvements in energy supply and use. In 2003, national GHG emissions (without LULUCF) were 28.4 per cent below the base year (1990) level.

54. A large portion of GHG reductions achieved in the 1990s and early 2000s is the result of efforts to meet the environmental requirements on EU member States as well as the change in Slovakia's economic structure. Among the measures which specifically address climate change mitigation, Slovakia includes the implementation of the EU ETS as a key measure to promote energy efficiency and fuel switching. However, Slovakia does not consider the EU ETS as a measure to help it meet its Kyoto target. It intends to maximize the potential reductions of 820 Gg CO_2 per year and to sell the corresponding volume of EU allowances.

55. For the year 2010, total GHG emissions (without LULUCF) are projected to remain well below the Kyoto Protocol target – by 21.1, 22.7 and 24.9 per cent under the scenarios "without measures", "with measures" and "with additional measures", respectively – whereas the Kyoto Protocol requires an 8 per cent reduction. At the same time, the projections indicate that GHG emissions in Slovakia are likely to grow steadily (at an almost constant rate) from 2005 to 2025 and may exceed the 1990 level in 2020–2025.

56. During the course of the IDR, the ERT formulated a number of recommendations to Slovakia, relating to the completeness and transparency of Slovakia's reporting under the UNFCCC and its Kyoto Protocol. The key recommendations[10] are that Slovakia:

- Extend, in its next national communication, the description of the drivers behind the emission trends;
- Further elaborate its policy to utilize JI projects and AAU trading (possibly with the Green Investment Scheme) in order to maximize the combined benefits, and describe it in the next national communication;
- Describe the methodologies used for GHG projections in more detail in its next national communication, in particular for the non-energy sectors;

[9] See page 28 of the RDP.
[10] For a complete list of recommendations, the relevant sections of this report should be consulted.

- Prepare and report GHG emission projections relating to fuel sold for use by ships and aircraft engaged in international transport, and emission projections for the solvent and other product use sector;

- Extend vulnerability assessments to those sectors that are not covered in the NC4 and estimate the socio-economic impacts of climate change; timely approval of adaptation strategies by the government is essential;

- Include the following elements of the additional information under Article 7, paragraph 2, of the Kyoto Protocol in its next national communication: (a) information on the efforts Slovakia is making to implement policies and measures to minimize adverse effects, including effects of climate change, effects on international trade, and social, environmental and economic impacts on other Parties, particularly those identified in Article 4, paragraphs 8 and 9, of the Convention; and (b) a description of national legislative arrangements and administrative procedures relating to the implementation of activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol;

- Include a more detailed description of the national inventory system and the national registry in its next national communication, covering both the technical and the capacity-building aspects.

57. The ERT noted that there are several “concepts” as well as “strategies” currently under discussion, mostly as part of the Action Plan as a political background document. However, emission reductions have been estimated for measures under the EU policies only. On the other hand, Slovakia estimates that full implementation of the measures specified in the Action Plan (focusing on the energy sector) will provide abatement effects several times larger than the measures currently in place, leading, potentially, to its being able to sell a larger number of emission reduction units, at the same time as reducing Slovakia’s energy cost reductions and strengthening the country’s energy security. The ERT was therefore of the view that timely implementation (at least partly) of the measures specified in the Action Plan would provide sizeable benefits.

Annex I

Documents and information used during the review

A. Reference documents

UNFCCC. Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part II: UNFCCC reporting guidelines on national communications. FCCC/CP/1999/7. Available at <http://unfccc.int/resource/docs/cop5/07.pdf>.

UNFCCC. Guidelines for the preparation of the information required under Article 7 of the Kyoto Protocol, decision 15/CMP.1. FCCC/KP/CMP/2005/8/Add.2. Available at <http://unfccc.int/resource/docs/2005/cmp1/eng/08a02.pdf#page=54>.

UNFCCC. Guidelines for review under Article 8 of the Kyoto Protocol, decision 22/CMP.1. FCCC/KP/CMP/2005/8/Add.3. Available at <http://unfccc.int/resource/docs/2005/cmp1/eng/08a03.pdf#page=51>.

UNFCCC. Report on the in-depth review of the third national communication of Slovakia. FCCC/IDR.3/SVK. Available at <http://unfccc.int/resource/docs/idr/svk03.pdf>.

UNFCCC. Synthesis of reports demonstrating progress in accordance with Article 3, paragraph 2, of the Kyoto Protocol. FCCC/SBI/2006/INF.2. Available at <http://unfccc.int/resource/docs/2006/sbi/eng/inf02.pdf>.

UNFCCC. Report of the individual review of the greenhouse gas inventory of Slovakia submitted in 2005. FCCC/ARR/2005/SVK. Available at <http://unfccc.int/resource/docs/2006/arr/svk.pdf>.

Slovakian Ministry of the Environment, Slovak Hydrometeorological Institute, Bratislava. The Fourth National Communication of the Slovak Republic on Climate Change 2005. Available at <http://unfccc.int/resource/docs/natc/slknc4.pdf>.

Slovakian Ministry of the Environment, Slovak Hydrometeorological Institute, Bratislava. Report on Demonstrable Progress of the Slovak Republic to Achieve Commitments under the Kyoto Protocol. Available at <http://unfccc.int/resource/docs/natc/slknc4.pdf#page=109>.

B. Additional information provided by the Party

Responses to questions during the review were received from Ms. Helena Princová, Chief State Advisor, Air Protection Department, Ministry of the Environment of the Slovak Republic.

Annex II

Acronyms and abbreviations

AAU	assigned amount unit
AIJ	activities implemented jointly
BaU	Business-as-usual
CAP	Common Agricultural Policy (EU)
CDM	clean development mechanism
CH_4	methane
CHP	combined heat and power
CO_2 eq	carbon dioxide equivalent
CO_2	carbon dioxide
CRF	common reporting format
EC	European Community
EIT	economy in transition
ENPEP	Energy and Power Evaluation Programme
ERT	expert review team
ET	emissions trading
ETS	emissions trading scheme
EU	European Union
F-gas	fluorinated gas
GCOS	Global Climate Observing System
GDP	gross domestic product
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
GWP	global warming potential
HFCs	hydrofluorocarbons
IDR	in-depth review
IEA	International Energy Agency
kg	kilogram (1 kg = 1 thousand grams)
kgoe	kilograms of oil equivalent
IPPC	Integrated Pollution Prevention and Control
JI	joint implementation
LULUCF	land use, land-use change and forestry
MESSAGE	Model for Energy Supply Strategy Alternatives and their General Environmental Impact
Mg	megagram (1 Mg = 1 tonne)
Mtoe	millions of tonnes of oil equivalent
N_2O	nitrous oxide
NAP	national allocation plan
NC4	fourth national communication
NKP	National Climate Programme
PE	person equivalent
PFCs	perfluorocarbons
PPP	purchasing power parities
RDP	Report demonstrating progress under the Kyoto Protocol
SF_6	sulphur hexafluoride
Tg	teragram (1 Tg = 1 million tonnes)
TPES	total primary energy supply
UNFCCC	United Nations Framework Convention on Climate Change

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