COMPLIANCE COMMITTEE

CC/ERT/2008/8
7 October 2008

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

Note by the secretariat

The report of the centralized in-depth review of the fourth national communication of Bulgaria was published on 29 September 2008. For purposes of rule 10, paragraph 2, of the rules of procedure of the Compliance Committee (annex to decision 4/CMP.2), the report is considered received by the secretariat on the same date. This report, FCCC/IDR.4/BGR, contained in the annex to this note, is being forwarded to the Compliance Committee in accordance with section VI, paragraph 3, of the annex to decision 27/CMP.1.

UNITED
NATIONS

UNFCCC Framework Convention on Climate Change

Distr.
GENERAL

FCCC/IDR.4/BGR
29 September 2008

ENGLISH ONLY

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

According to decision 4/CP.8, Parties included in Annex I to the Convention are requested to submit to the secretariat, in accordance with Article 12, paragraphs 1 and 2, of the Convention, a fourth national communication by 1 January 2006. This report presents the results of the in-depth review of the fourth national communication of Bulgaria conducted by an expert review team in accordance with relevant provisions of the Convention and Article 8 of the Kyoto Protocol.

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I. Introduction and summary

A. Introduction

1. Bulgaria has been a Party to the Convention since 1995 and to its Kyoto Protocol since 2005. Under the Kyoto Protocol, Bulgaria committed itself to reducing its greenhouse gas (GHG) emissions by 8 per cent in relation to the 1988 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 Bulgaria, coordinated by the UNFCCC secretariat, in accordance with decision 7/CP.11. The review took place from 12 to 17 May 2008 in Bonn, Germany, and was conducted by the following team of nominated experts from the UNFCCC roster of experts: Mr. Marko Aunedi (Croatia), Mr. Daniel Bouille (Argentina), Mr. Mustafa Coskun (Turkey), Mr. Javier Gonzales (Bolivia), Mr. Bernd Gugele (European Community), Ms. Ashley King (United States of America) and Mr. Daniel Martino (Uruguay). Mr. Gugele and Mr. Martino were the lead reviewers. The review was coordinated by Mr. Harald Diaz-Bone (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 Bulgaria's report demonstrating progress (RDP) in achieving its commitments under the Kyoto Protocol, and the supplementary information provided by Bulgaria 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 Bulgaria, which provided comments that were considered, as appropriate, in this final version of the report.

B. Summary

5. The ERT noted that Bulgaria's NC4 complies in general with the "Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part II: UNFCCC reporting guidelines on national communications" (hereinafter referred to as the UNFCCC reporting guidelines). As required by decisions 22/CP.7 and 25/CP.8, the RDP provides clear information on the progress made by Bulgaria in achieving its commitments under the Kyoto Protocol. Supplementary information required under Article 7, paragraph 2, of the Kyoto Protocol[1] is provided in both the NC4 and the RDP.

1. Completeness

6. The ERT noted that the NC4 covers all sections required by the UNFCCC reporting guidelines, but the description of some parts (e.g. policies and measures (PaMs)) is rather limited. The ERT also noted that Bulgaria's RDP contains all parts stipulated by decisions 22/CP.7 and 25/CP.8. Furthermore, the ERT noted that Bulgaria has provided the supplementary information required under Article 7, paragraph 2, except for information on what efforts Bulgaria is making to implement PaMs in such a way as to minimize adverse effects (see chapter III.B).

2. Timeliness

7. The NC4 and the RDP were both submitted on 31 August 2006. 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 RDP.

[1] Decision 15/CMP.1, annex, chapter II.

3. Transparency

8. The ERT acknowledged that Bulgaria's NC4 is well structured and provides information on all aspects of implementation. It is structured following the outline contained in the annex to the UNFCCC reporting guidelines. In the course of the review, the ERT formulated a number of recommendations which could help Bulgaria to further increase the transparency of its reporting, such as a recommendation to return to the reporting quality of the NC3, especially as it pertains to the description of non-energy PaMs. The review team noted that the information contained in the NC4 is consistent with that contained in the RDP.

II. Technical assessment of the reviewed elements

A. National circumstances relevant to greenhouse gas emissions and removals

9. In its NC4, Bulgaria has provided a description of its national circumstances, how these national circumstances affect GHG emissions and removals in Bulgaria, and how national circumstances and changes in national circumstances affect GHG emissions and removals over time. The ERT noted that the main drivers on emission trends in Bulgaria include demographic developments, economic activity (including changes in the sectoral structure), changes in energy use and transport patterns, and information on waste production. Also a climatic profile is given but no time series are included on annual variations in precipitation or winter temperatures (e.g. number of heating degree days).
In addition, the ERT noted that more information on the structural changes within the manufacturing industry and more detailed information on power production (split by fuel) would have been useful. Table 1 illustrates the national circumstances of the country by providing some indicators relevant to GHG emissions and removals.

10. In general, economic development in Bulgaria in the 1990s was driven by the radical economic transition process from a centrally planned economy to a market economy. This led to a sharp decline of gross domestic product (GDP) per capita between 1990 and 1995. Since 2000 GDP per capita has recovered: in 2006 it was approximately 12 per cent above the 1990 level. In recent years the implementation of European Union (EU) legislation has been an important driver for economic, energy and environmental policies.
The transition to a market economy implied the abolition of subsidies and privatization of industrial enterprises, which led to a sharp reduction of the share of industry in GDP. Bulgarian energy markets are being liberalized in the course of implementing appropriate EU legislation. Electricity production is based to a large extent on nuclear power and local lignite. Bulgaria has changed from a net importer of electricity in 1990 to an important net exporter of electricity in the course of the past 10 years. Bulgaria's transport policy focuses on the development of the infrastructure and its integration into the overall European transport network.

11. In accordance with Article 4, paragraph 6, of the Convention and decision 9/CP.2, Bulgaria, as a Party with an economy in transition, is allowed to use 1988 as its base year.

12. Bulgaria has provided a summary of information on GHG emission trends for the period 1988–2003. This information is broadly consistent with the 2008 national GHG inventory submission. Major recalculations have been made of emissions of nitrous oxide (N_2O) from energy industries and of methane (CH_4) from landfills. Summary tables, including trend tables for emissions in carbon dioxide equivalent (CO_2 eq) (given in the common reporting format), are also provided in an annex to the NC4. Emission estimates for hydrofluorocarbons (HFCs) are given only for 1995 in the NC4, but they are included for the whole time series in the 2008 inventory submission. In contrast to this, perfluorocarbon (PFC) emissions are reported in the NC4 but are no longer included in the GHG inventory submissions.

This is due to a study which found that no PFCs are emitted in Bulgarian aluminium production (in contrast to what had been previously assumed).

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

	1988	1995	2000	2006	Change 1988–2000 (%)	Change 2000–2006 (%)	Change 1988–2006 (%)
Population (million)	8.98	8.40	8.06	7.69	–10.3	–4.6	–14.3
GDP (2000 USD billion using PPP)	66.22	50.98	48.90	67.40	–26.2	37.8	1.8
TPES (Mtoe)	31.79	23.45	18.73	20.69	–41.1	10.5	–34.9
GDP per capita (2000 USD thousand using PPP)	7.37	6.07	6.07	8.76	–17.7	44.4	18.8
TPES per capita (toe)	3.54	2.79	2.33	2.69	–34.2	15.7	–23.9
GHG emissions without LULUCF (Tg CO_2 eq)	132.61	88.01	68.70	71.34	–48.2	3.9	–46.2
GHG emissions with LULUCF (Tg CO_2 eq)	107.13	67.47	49.49	53.12	–53.8	7.3	–50.4
CO_2 emissions per capita (Mg)	11.00	7.90	6.26	7.16	–43.1	14.3	–34.9
CO_2 emissions per GDP unit (kg per 2000 USD using PPP)	1.49	1.30	1.03	0.82	–30.8	–20.9	–45.2
GHG emissions per capita (Mg CO_2 eq)	14.77	10.48	8.52	9.27	–42.3	8.8	–37.2
GHG emissions per GDP unit (kg CO_2 eq per 2000 USD using PPP)	2.00	1.73	1.40	1.06	–29.8	–24.7	–47.1

Data sources: (1) Bulgaria's 2008 inventory submission; (2) Population, GDP and TPES data: International Energy Agency (IEA).
Abbreviations: GDP = gross domestic product, GHG = greenhouse gas, LULUCF = land use, land-use change and forestry, PPP = purchasing power parities, TPES = total primary energy supply.
Note: 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.

13. Total GHG emissions excluding emissions and removals from land use, land-use change and forestry (LULUCF) decreased by 46.2 per cent between the base year and 2006, whereas total GHG emissions including net emissions/removals from LULUCF decreased by 50.4 per cent (see table 2). This was mainly attributed to CO_2 emissions, which decreased by 44.3 per cent over this period. Also, emissions of CH_4 and N_2O decreased, by 47.3 and 65.1 per cent respectively. A major part of these decreases was experienced before 2000 (trends for 1990–2000: CO_2 –48 per cent, CH_4 –9 per cent, N_2O –7 per cent, total GHG –64 per cent). Emissions of fluorinated gases (HFCs, PFCs and sulphur hexaflouride) accounted for about 1 per cent of total GHG emissions in 2006; no emissions of fluorinated gases are reported for the base year. Table 2 provides an overview of GHG emissions by sector from the base year to 2006 (see also discussion of sectoral trends in chapter II.B).

14. The main reasons for the declining GHG emissions in Bulgaria are the structural changes of the economy due to the radical economic transition process from a centrally planned economy to a market economy. This led to a decrease in power production in thermal power stations (and an increase in hydropower and nuclear power), structural changes in industry (including a reduction in energy-intensive production and energy efficiency improvements), better insulation of houses and a shift from solid and liquid fuels to natural gas. The main reasons for declining GHG emissions from agriculture and waste were a decline in the cattle and sheep populations and a decline in the amount of waste landfilled.

15. The ERT encourages Bulgaria to provide more information on national circumstances, including more detailed information on precipitation or winter temperatures (e.g. number of heating degree days), structural changes within the manufacturing industry and power production (for example, split by fuel).

B. Policies and measures

Table 2. Greenhouse gas emissions by sector in Bulgaria, 1990–2006

	GHG emissions (Tg CO_2 eq)					Change (%)		Shares[a] by sector (%)	
	1990[b]	1995	2000	2005	2006	1990[b]–2006	2005–2006	1990	2006
1. Energy	94.67	61.97	48.18	51.23	52.20	–44.9	1.9	71.4	73.2
A1. Energy industries	43.54	31.84	26.46	28.94	29.30	–32.7	1.2	32.8	41.1
A2. Manufacturing-industries and construction	24.81	18.07	11.89	10.45	10.29	–58.5	–1.5	18.7	14.4
A3. Transport	13.98	6.93	5.96	8.21	8.72	–37.6	6.2	10.5	12.2
A4.– A5. Other	9.07	3.03	2.07	1.90	2.10	–76.8	10.8	6.8	2.9
B. Fugitive emissions	3.27	2.11	1.79	1.74	1.79	–5.2	3.3	2.5	2.5
2. Industrial processes	10.57	8.96	6.08	6.53	6.79	–35.7	4.1	8.0	9.5
3. Solvent and other product use	0.08	0.07	0.07	0.05	0.06	–27.1	3.6	0.1	0.1
4. Agriculture	14.56	5.94	5.39	4.80	4.72	–67.6	–1.7	11.0	6.6
5. LULUCF	–25.49	–20.54	–19.21	–18.36	–18.22	–28.5	–0.8	–19.2	–25.5
6. Waste	12.74	11.07	8.98	7.88	7.57	–40.6	–4.0	9.6	10.6
7. Other	NA	NA	NA	NA	NA				
GHG total with LULUCF	107.13	67.47	49.49	52.14	53.12	–50.4	1.9	80.8	74.5
GHG total without LULUCF	132.61	88.01	68.70	70.50	71.34	–46.2	1.2	100.0	100.0

Abbreviations: GHG = greenhouse gas, LULUCF = land use, land-use change and forestry.
Note: 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.
[a] The shares of sectors are calculated relative to GHG emissions without LULUCF; for the LULUCF sector, the negative values indicate the share of GHG emissions that was offset by GHG removals through LULUCF.
[b] Base year (1988) data are used instead of 1990 data (see para. 1 of this document).

16. As required by the UNFCCC reporting guidelines, Bulgaria has provided in its NC4 well-organized information on the package of PaMs implemented, adopted and planned in order to fulfil its commitments under the Convention and its Kyoto Protocol. Each sector has its own textual description of the principal PaMs, supplemented by summary tables on PaMs by sector. However, the number of PaMs and the descriptions of them are rather limited. Bulgaria has also provided information on how it believes its PaMs are modifying longer-term trends in anthropogenic GHG emissions and removals consistent with the objective of the Convention. However, the ERT noted that Bulgaria did not provide the following reporting elements required by the UNFCCC reporting guidelines: information on PaMs subdivided by GHG (UNFCCC reporting guidelines, para. 17). Also, the tabular presentation of each policy and measure did not follow exactly the reporting guidelines (para. 22); in particular information on the following subject headings was missing in the tables – objectives of the policy or measure, the GHG affected, and the implementing entity or entities. Also the status of implementation of the measures is not always clearly reported in the NC4, but an update of this information was provided during the review. In addition, the estimated mitigation effects of PaMs were provided only for 2010, not for other years, as is required in the UNFCCC reporting guidelines. The link of PaMs with the projections was not transparent and information on the effect of sectoral totals in the overview tables of the PaMs would be useful. The ERT recommends that Bulgaria provide this information in its next national communication.

17. Table 3 provides a summary of the reported information on PaMs of Bulgaria.

Table 3. Summary of information on policies and measures

Major policies and measures	Examples/comments
Framework policies and cross-sectoral measures	
Integrated climate programme	National strategy for the Environment and Second National Action Plan 2005–2014; the Environmental Protection Act (2002) and Clean Air Act (1996); the Energy Law (2003); the Energy Efficiency Law and related secondary legislation (2004); the Law on Waste Management (2004); Bulgarian Energy Strategy (2002)
Regional partnerships/agreements	Seven Intergovernmental Memoranda of Understanding in the field of joint implementation projects under the Kyoto Protocol
Emissions trading	European Union emissions trading scheme; Green Investment Scheme
Policies and measures by sector	
Energy	Upgrading of cogeneration plants and district heating boilers which could result in 80–90% increased overall efficiency; biomass for electricity and heat production
Combined heat and power generation	Upgrading of cogeneration plants and district heating boilers which could result in 80–90% increased overall efficiency; biomass for electricity and heat production
Renewable energy sources	Green Certificate Scheme; accelerated development of hydro energy
Energy efficiency improvements	Energy efficiency funds; improvement of the operation of Kozloduy nuclear power plant; improvement of natural gas supply to the industry by development of gas infrastructure; reduction in heat and electricity transmission and distribution losses; introduction of monitoring systems for energy consumption; reduction of thermal losses in industry
Residential and commercial buildings	Gas supply programme for residential and servicing sector
Transport	
Integrated transport planning	Central information dispatching system; railway transport power dispatching system; modernization of railways; improving public transport, reducing transport flows in cities and renewing the vehicle fleet
Alternative fuel	Introduction of biofuels
Agriculture	State Agricultural Fund; manure management; irrigation; quality of production of fertilizers
Waste management	Utilization of captured methane for the production of electricity

1. Policy framework and cross-sectoral measures

18. The Ministry of Environment and Water (MOEW) is the governmental institution authorized to develop and carry out the State policy relating to the protection of the environment. The MOEW is responsible for the preparation and reporting of the annual inventories of GHG emissions, as well as for the formulation and implementation of the PaMs to mitigate climate change. The Inter-Ministerial Committee on Climate Change (IMCCC) was set up to coordinate the implementation of the National Climate Change Action Plan (NCCAP) in July 2000. The IMCCC consists of representatives from most of the ministries and from the Energy Efficiency Agency and an observer from Sofia Municipality, and is chaired by the Deputy Minister of the MOEW. The Executive Environmental Agency within the MOEW monitors the implementation of measures relating to climate change.

19. Bulgaria has developed its second NCCAP (2005–2008) based on its experience with its first NCCAP. The following four categories of actions are included in the updated plan:

- Actions to implement mitigation PaMs which result in GHG emission reductions in the various economic sectors in Bulgaria;
- Actions to create the necessary conditions for the implementation of mitigation measures, for instance institutional arrangements and awareness raising;
- Actions relating to the monitoring and registration of GHG gases and the systematic evaluation of emission trends and projections, including the evaluation of policies;
- Actions for the implementation of the joint implementation and EU emissions trading schemes.

20. The second NCCAP comprises mainly measures which do not require budget financing, because of the economic situation in Bulgaria. Nevertheless, the plan includes a set of "backup" measures which

can be implemented if GHG emissions grow faster than expected, or when the economic situation in Bulgaria allows the Government to be more active in climate policy.

21. Given current GHG emission levels (which are far below the Kyoto Protocol target) the commitments under the Convention and the Kyoto Protocol are a less important driver with regard to implementing climate change policies in Bulgaria. Other drivers are the implementation of EU legislation relating to energy and climate change, such as the implementation of standards and the development of the Green Certificate Scheme under the Renewable Energy Directive and the EU emissions trading scheme (EU ETS). Under the EU ETS, the national allocation plan for 2008–2012 provides for allowances of 42.3 million tonnes of GHG emission allowances, which is about 59 per cent of the total GHG emissions in 2006. An additional driver is the fact that climate change measures will lead to energy efficiency improvements and therefore contribute to long-term cost savings.

22. The ERT acknowledges the difficult economic situation of Bulgaria and the fact that its total national emission level is far below the Kyoto Protocol target. Nonetheless, the ERT noted that Bulgaria has a potential to be more active in identifying PaMs which have double benefits for both the domestic economy and the environment.

23. The ERT noted that in general the quality of reporting in the NC4 is below that of the NC3. The ERT encourages Bulgaria to return to the quality of reporting exhibited in NC3. In addition, the ERT recommends that Bulgaria follow the UNFCCC reporting guidelines, more closely by identifying the gas targeted and the implementing entity for each individual policy and measure, as laid out in paragraph V.4.

2. Policies and measures in the energy sector

24. Between 1988 and 2006, GHG emissions from energy industries decreased by 32.7 per cent (–14,236 Gg), mainly driven by decreasing power production in thermal power stations. Total gross electricity production increased by about 5.0 per cent; the shares of hydropower and nuclear power combined increased to about 50 per cent of electricity production. The trend in GHG emissions from fuel combustion also showed notable decreases in manufacturing industries and construction (–58.5 per cent or 14,524 Gg). This decline can be mainly explained by structural changes in the economy, a reduction in energy-intensive production and energy efficiency improvements. Also GHG emissions declined in transport (–37.6 per cent or 5,258 Gg) and in energy use in other sectors (–76.8 per cent or 6,967 Gg). The main reasons for declining emissions from energy use in other sectors are improvements in building insulation and a shift from solid and liquid fuels to natural gas.

25. The Bulgarian energy strategy foresees that Bulgarian electricity production will continue to be based to a large extent on nuclear power and local lignite. The PaMs relating to the energy sector are projected to lead to GHG emission reductions of about 4 million tonnes compared to the without measures projections. The measures include the modernization of blocks 5 and 6 of the Kozloduy nuclear power plant (after blocks 1–4 have been closed), the upgrading of the combined heat and power plants and district heating plants, the modernization of the electricity and heat transmission networks, and the construction of new hydropower plants. Compared to the measures in the energy sector, PaMs in industry and transport have a minor role. Measures in industry include reductions of thermal losses, fuel switching from liquid fuels to natural gas, and the introduction of systems for monitoring energy consumption. The main transport-related measures are the modernization of the railways and the introduction of a transport dispatching system aimed at reducing the number of empty return trips of freight vehicles. The most important measure in the buildings sector is the extension of the gas network to about 290,000 additional households by 2010; this is expected to deliver emission reductions of 2.3 million tonnes.

3. Policies and measures in other sectors

26. Between 1988 and 2006, GHG emissions from industrial processes (including solvent and other product use), agriculture and waste decreased by 50 per cent, from 38 Tg CO_2 eq in the base year to 19.1 Tg CO_2 eq in 2006. During the 1990s emissions from all non-energy sectors declined considerably, especially up to 1995, as a result of decreased industrial and agricultural production associated with the transition from a centrally planned economy to a market economy. Since 2000, moderate growth in emissions from industrial processes (11.7 per cent or 0.7 Tg CO_2 from 2000 to 2006) has partially offset continuing decreases in the agricultural and waste sectors.[2] Non-energy emissions (excluding LULUCF) constitute about 25 per cent of total GHG emissions.

27. ***Industrial processes.*** Emissions from industrial processes declined considerably through the 1990s, but have been growing moderately since 2000. Emissions dropped from 10.6 Tg CO_2 in the base year (1988) to 6.1 Tg CO_2 in 2000 before rising again to 6.8 Tg CO_2 by 2006. The growth of non-energy emissions since 2000 is due to increased emissions of fluorinated gases, particularly in the semiconductor and electricity industries, as well as general growth across all industrial sectors. The sectors contributing the largest amounts of process emissions in Bulgaria are iron and steel production (23 per cent), cement production (22 per cent), and lime production (15 per cent). Bulgaria currently has no policies or measures targeting emissions from industrial processes, but given recent trends in the emissions of fluorinated gases, the ERT encourages Bulgaria to consider implementing preventative measures.

28. ***Agriculture.*** Between 1988 and 2006, emissions in the agriculture sector decreased by almost 70 per cent, from 14 Tg CO_2 to 4 Tg CO_2. The major sources of GHG emissions in this sector – which constitute about 6 per cent of total GHG emissions in Bulgaria – are N_2O emissions from soils (50 per cent), enteric fermentation by livestock (30 per cent), and manure management (18 per cent). The lack of detail in this part of the NC4 and the lack of consistency between the NC3 and the NC4 prevented the ERT from clearly understanding the evolution of policies in this sector. However, information provided by Bulgaria during the IDR indicates that it has largely completed the harmonization of national legislation with EU policy, and that measures in the sector are focused on modernization of assistance in areas such as manure management, soil fertility and irrigation technologies. Although these policies do not have GHG emission reduction as a primary goal, in total they are still expected to contribute reductions of 0.24 Mt CO_2 eq in 2010.

29. ***Forestry.*** One of the five goals of the Bulgarian Government Programme 2001–2005 for the forestry and agricultural sectors was sustainable management of forest resources. Between 1993 and 2003 the forested area increased by 3.5 per cent, at least partially due to planned afforestation efforts. However, afforestation has decreased by 50 per cent over the past decade, perhaps limiting the growth of forested areas in Bulgaria. No policies or measures for this sector were discussed in the NC4. Overall, CO_2 removals in the LULUCF sector were 18.22 Mt CO_2 in 2006, equivalent to about 25 per cent of total GHG emissions.

30. ***Waste.*** Emissions in the waste sector decreased by 40 per cent between 1988 and 2006, and currently constitute about 10 per cent of total emissions.[3] The decline was steady except for a small sharp increase in 2003 (resulting from a large discharge from the tailing ponds of a wastewater treatment facility). The ERT noted that the NC4 does not provide the same quality of discussion of the PaMs as the NC3. A number of targets for waste reduction, recycling, landfilling and wastewater treatment were outlined in the NC3, but there is no discussion of these measures in the NC4. Bulgaria informed the ERT during the IDR that the strategy in the sector has shifted to focus exclusively on modernization of the

[2] Bulgaria reports potential emissions of fluorinated gases. Actual emission levels may be different and could effect the rate of emissions growth observed in the sector.
[3] Based on 2008 inventory information (2006 data).

nation's landfills – the only sectoral measure listed in the NC4. The estimated mitigation effect in 2010 is 0.9 Mt CO_2; however, the ERT noted that this is the same value given for the measures listed in the NC3. It is therefore unclear whether Bulgaria expects future reductions in the sector from these efforts. The ERT encourages Bulgaria to improve the transparency of reporting and contextual discussion of PaMs in its next national communication.

C. Projections and the total effect of policies and measures

1. Projections

31. The GHG emission projections provided by Bulgaria in the NC4 include a "with measures", a "with additional measures" and a "without measures" scenario until 2020, and are presented relative to actual inventory data for the period 1988–2003. Projections were presented on a sectoral basis, using the same sectoral categories used in the PaMs section, and on a gas-by-gas basis for CO_2, CH_4 and N_2O, which account for more than 99 per cent of overall country emissions. Additionally, projections were provided in an aggregated format for each sector as well as for a national total, using global warming potential values. The emission projections for the transport sector were not reported separately, but were included in the energy sector emission projections. Bulgaria uses 1988 as its base year for emissions (Article 4, paragraph 6, of the Convention), and actual data for the base year were provided. The ERT noted that Bulgaria did not provide separate emissions projections relating to fuel sold to ships and aircraft engaged in international transport (para. 36). Table 4 and the figure below provide a summary of GHG emission projections for Bulgaria, presented jointly with the historical emission trends as reported in the most recent inventory submission (from 2008).

32. The methodology for preparing the projections in the energy sector was developed in detail, because this sector is the major contributor to GHG emissions. The main modelling tools used were the Energy and Power Evaluation Program package modules (MACRO – macroeconomic projections; DEMAND – forecasting energy demand; BALANCE – market-based simulation tool; WASP – least-cost power system planning tool; and IMPACTS – quantifying environmental impacts from the energy sector). Projections in other sectors were based on estimates from sectoral plans and strategies. For the purpose of projections, the assumed GDP growth rate changed from 5.6 per cent in 2006 to 5 per cent by the end of the projection period, and final energy demand was assumed to grow by 37 per cent between 2005 and 2020, with the fastest increase (71 per cent) in the transport sector. However, the input assumptions on forecasted fuel price trends were not provided (those contained in the NC3 seem to be outdated).

Table 4. Summary of greenhouse gas emission projections for Bulgaria

	Greenhouse gas emissions (Tg CO_2 eq per year)	Changes in relation to base year level (%)
Inventory data 1990[a]	116.7	–12.0
Inventory data 2006[a]	71.3	–46.2
Kyoto Protocol base year[a]	132.6	NA
Kyoto Protocol target[a]	122.0	–8.0
"With measures" projections for 2010[b]	91.0	–31.4
"With additional measures" projections for 2010[b]	82.8	37.6

Abbreviation: NA = Not applicable.

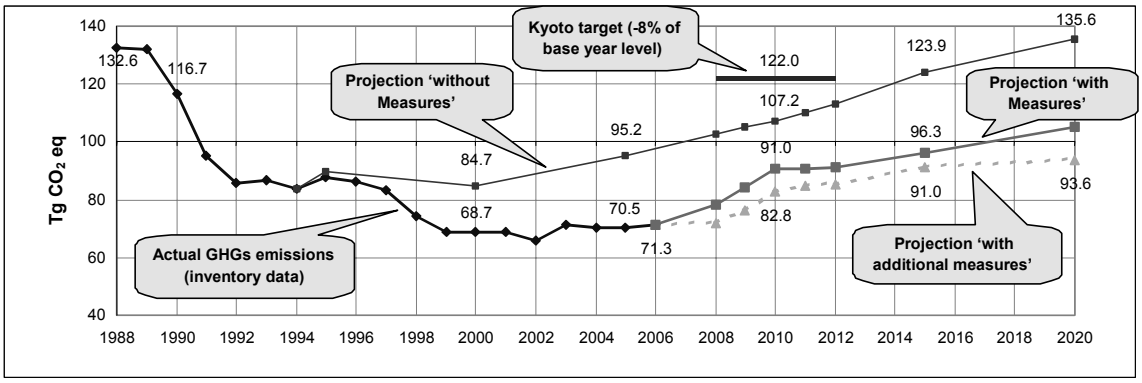
[a] *Data source:* Bulgaria's 2008 Greenhouse gas (GHG) inventory submission; the emissions are without land use, land-use change and forestry (LULUCF). Note: 1988 is the base year.

[b] *Data source:* Bulgaria's fourth national communication; the projections are for GHG emissions without LULUCF.

33. The results of the GHG emission projections (see the figure below) imply that Bulgaria should not experience difficulties in meeting its Kyoto Protocol target for the first commitment period in any of the analysed scenarios. The average aggregate emissions in the 'with measures' scenario are projected to

be 28.6 per cent lower than the Kyoto Protocol target level, whereas the same emissions in the 'with additional measures' scenario are 34.3 per cent below this target. Even the emission level under the 'without measures' scenario is well below the Kyoto Protocol target level, although this scenario (with 1995 as the base year) is based on a different set of input assumptions from other scenarios, and some of these assumptions diverge substantially from the actual data during the period 1995–2005.
The projections presented do not include effects from LULUCF, which would bring total emissions even further below the Kyoto Protocol target level.

Greenhouse gas emission projections for Bulgaria



Data sources: (1) Bulgaria's fourth national communication; (2) 2008 inventory submission (the emissions exclude land use, land-use change and forestry).

34. The projections presented in Bulgaria's NC4 seem to be internally consistent, but the ERT noted that there is little connection between the set of assumptions and policies described for the 'with measures' and 'with additional measures' scenarios in the projections chapter, and the list of measures in the energy sector (or other sectors) in the chapter on policies and measures. For instance, the envisaged electricity demand growth for the period 2000–2020 in the 'with measures' scenario is 63 per cent, whereas in the 'with additional measures' scenario it is only 37 per cent, and there are no PaMs that would justify such a profound effect. Similar lack of transparency exists for the relation between the reported PaMs and the difference between the 'with measures' and 'without measures' scenarios. Also, the ERT recommends that Bulgaria prepare GHG emission projections relating to fuel sold for use by ships and aircraft engaged in international transport, and include them in its next national communication.

35. The results of the projections imply that in both the 'with measures' and 'with additional measures' scenarios a substantial potential exists for trading the unused part of the GHG emissions quota. This potential amounts to average annual emissions of 34.9 Tg CO_2 eq in the 'with measures' scenario, and to 41.8 Tg CO_2 eq in the 'with additional measures' scenario. It is recognized that this amount of unused quota results primarily from the restructuring of the country's economy, characterized by the transition to a market-based economy. Combined with the lack of capacity for investing in GHG-oriented projects, this helps to explain why further emissions reduction potential is currently not being more intensively pursued.

2. Total effect of policies and measures

36. In its NC4, Bulgaria has presented three emission scenarios ('without measures', 'with measures' and 'with additional measures'), from which the implied effect of PaMs can be calculated as the difference in emission levels between the relevant scenarios. The effects can be deduced for all sectors and GHGs covered by the projections, and the same applies for the aggregate effects on a CO_2 equivalent basis. It also presents relevant information on factors and activities for the energy sector (being the major source of GHG emissions) for the years 2005 to 2020. It should be noted again that there is a

substantial discrepancy between the implied effects of PaMs obtained from GHG projections and the effects of PaMs reported in the measures chapter, as the list of measures does not demonstrate the differences in emission levels between the scenarios. Table 5 provides an overview of the total effect of PaMs as reported by Bulgaria.

Table 5. Projected effects of planned, implemented and adopted policies and measures in 2010

	Effect of implemented and adopted measures (Tg CO_2 eq)	Relative value (% of base year emissions)	Effect of planned measures (Tg CO_2 eq)	Relative value (% of base year emissions)
Energy (including transport)	7.8	6.4	7.4	6.1
Industrial processes	2.5	2.0	0.2	0.2
Agriculture	0.7	0.6	0.4	0.4
Waste management	5.6	4.6	0.0	0.0
Total	**16.5**	**13.5**	**8.1**	**6.6**

Data source: Bulgaria's fourth national communication.
Notes: The total effect of implemented and adopted policies and measures is obtained as the difference between the 'without measures' and 'with measures' scenarios; the total effect of planned policies and measures is defined as the difference between the 'with measures' and 'with additional measures' scenarios. The energy sector includes the emissions from transport. The base year is 1988.

37. The projections of the total effect of PaMs provided by Bulgaria suggest that the implemented and adopted measures will reduce the 2010 emissions by 16.5 Tg CO_2 eq, and that the reduction effect of planned measures will reduce emissions by an additional 8.1 Tg CO_2 eq. However, the relevance of comparing 'with measures' effects to the reported 'without measures' scenario, which diverges from historical trends, is debatable. In both scenarios the majority of the effect comes from the energy sector, and is about 6 per cent of base year emissions.

38. The ERT encourages Bulgaria to improve the description of its projections by establishing a clear relationship between the total effect of PaMs and the estimates of individual effects of the PaMs listed for individual sectors. Any differences in input assumptions between projection scenarios should be supported by the appropriately reported measures, with individual estimated effects quantified. Also, the ERT recommends that the projections for the transport sector be reported separately from the energy sector (paras. 17, 34), especially considering that transport emissions are one of the main drivers for the growth of total emissions.

D. Vulnerability assessment, climate change impacts and adaptation measures

39. In its NC4, Bulgaria has provided the required information on the expected impacts of climate change in the country and on adaptation options with regard to agriculture and forestry. However, the ERT noted that Bulgaria did not provide information on the expected impacts of climate change on health, and the information provided on water resources and tourism was insufficient. Table 6 summarizes the information on vulnerability and adaptation to climate change presented in the NC4.

40. Bulgaria used the global climate models ECHAM4, HadCM2, HadCM3, CGCM1, CSIRO-Mk2b, GFDL-R15 in its impact assessments. The ERT noted that the resolutions of these models are relatively coarse, when compared to dynamic (PRECIS, RegCM3, etc.) or statistical (SDSM) downscaling models, or PRUDENCE[4] and encouraged Bulgaria to consider using one of the latter models in order to improve assessments of regional climate impacts. Previous reviews have already suggested the use of regional climate models.

[4] PRUDENCE: Prediction of Regional scenarios and Uncertainties for Defining European Climate change risks and Effects.

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

Vulnerability area	Examples/comments/adaptation measures reported
Agriculture and food security	***Vulnerability:*** An increase in the occurrence, intensity and level of impact on the soil of droughts is expected; simulation models projected a shorter vegetative and reproductive crop growing season, and reductions in precipitation leading to decreased crop yield; the most severe adverse impacts are expected to be on: spring agricultural crops, due to the expected precipitation deficit during the warmest half of the year; crops cultivated on infertile soils; crops in non-irrigated areas; and arable lands in south-east Bulgaria, where even with the present climate, precipitation is insufficient for normal growth and productivity of agricultural crops ***Adaptation:*** Improve management, use and protection of water resources in irrigated agriculture; improve management efficiency and use of existing irrigation systems and develop technological and technical means for irrigation and cultivation; use of rational and economically viable irrigation regimes for irrigated crops; new zoning of agroclimatic resources and agricultural crops; new cultivars and hybrids; phytosanitary measures
Biodiversity and natural ecosystems	***Vulnerability:*** Tree species diversity reduction in lowlands; increased tree biodiversity expected in mountains; increased biomass productivity accompanied by increased CO_2 absorption in both lowlands and mountains ***Adaptation:*** Preservation of biodiversity and genetic resources of the flora and fauna to guarantee forest reproduction; strategic management of forest resources; introduction of system of protected natural territories
Soils	***Vulnerability:*** Serious impacts will be observed for soils with light mechanical content and bad irrigation characteristics, and partly for heavy clay soils; about 30% of the soils are subject to wind erosion ***Adaptation:*** Soil monitoring; improvement of soil water content, soil structure and performance; actions against erosion and for better nutrition mode; effective use of mineral fertilizers relevant to soil diversity; update of technologies which preserve soil water and structure
Water resources	***Vulnerability:*** Possibility of decrease in groundwater reserves; decrease in river flows in autumn and winter, and increase in summer months; increase in evaporation losses ***Adaptation:*** Improving efficiency of management and use of existing irrigation facilities and development of the technological and technical facilities for irrigation; use of rational and economically sound irrigation regimes and development of technologies for cultivation of crops in conditions of drought and water deficit

41. The ERT noted that Bulgaria did not follow the suggestion from previous reviews to broaden its impact assessments in the areas of human health, water resources and tourism. The impact on health assessment is left to the Government's National Strategy for the Environment and its second NCCAP.

E. Research and systematic observation

42. Bulgaria has provided information on its actions relating to research and systematic observation activities in the field of climate change, which are carried out by the Energy Institute under the MOEW and various institutes of the Bulgarian Academy of Sciences (BAS), including the National Institute of Meteorology and Hydrology (NIMH).

43. The BAS established the National Coordination Centre for Global Change, which coordinates and carries out activities among the related institutes both nationally and internationally. Currently projects are ongoing or are at the planning stage. These are mainly funded by international sources, and to a minor extent by the State budget.

44. The NIMH is responsible for Bulgaria's participation in the Global Climate Observing System (GCOS). According to the NC4 there are no Global Surface Network (GSN) or Global Upper Air Network (GUAN) stations located in Bulgaria, and there is only one global atmosphere watch station, which is located in Rojen.

45. The ERT stresses that urgent investment is needed for new GSN and GUAN stations, and also to replace old stations with modern ones. After signing an agreement with the European Organization for the Exploitation of Meteorological Satellites (EUMETSAT), the NIMH has access to EUMETSAT products. A project related to the microsatellite BALKANSAT with regard to ecological monitoring for educating students is also on the agenda.

F. Education, training and public awareness

46. In its NC4, Bulgaria has provided information on its actions relating to education, training and public awareness, as required by the UNFCCC reporting guidelines (para. 65). However, it informed the ERT that it lacks national programmes or projects for education, training and information for raising public awareness with regard to climate change.

47. Under the guidance of the Ministry of Education and Science, the projects have been initiated for replacing liquid fuels by natural gas, installing thermal isolation and introducing solar, hybrid and alternative hot water installations in buildings. Completion of these projects is expected to be accompanied by special classes for schoolchildren on the need for efficient use of energy, the reduction of emissions to the environment, and the improvement of the living space.

48. At international level, the Centre for Global Change contributes to education and public awareness by supporting participation in projects, publications and reports on climate change and global change.

49. The ERT noticed that the NC4 contains no information about whether the second NCCAP is integrated into National Development Plan or not. The review team encourages the Party to clarify this matter, which is important for making policies and taking measures on climate change issues.

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

50. Bulgaria's RDP includes four chapters, which contain all 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, but it noted that both documents would benefit from more detailed discussion of PaMs.

51. Given the decline of GHG emissions in the early 1990s resulting from the transition from a centrally planned economy to a market economy, Bulgaria is expected to be able to achieve its emissions reductions commitments without using the flexibility mechanisms of the Kyoto Protocol. Under the Kyoto Protocol, Bulgaria is committed to reducing its emissions by 8 per cent below the base year. Current projections in the 'with measures, 'without measures' and 'with additional measures' scenarios all show Bulgaria to be well below its target for the first commitment period.

52. Given its current emission trends and other pressing economic and environmental issues, climate change is not a high priority in Bulgaria. Nonetheless, Bulgaria has institutional and administrative infrastructure in place to implement the provisions of the Kyoto Protocol. Bulgaria is in the process of implementing its second NCCAP (2005–2008), which contains measures which do not require extensive funding but should have mitigation impacts in the 2008–2012 commitment period. Bulgaria has passed the necessary legislation to participate in the EU ETS, and has established the Interministerial Working Group on Climate Change to facilitate coordination between ministries with regard to the coherent implementation of climate policy.

53. Bulgaria has also been active in joint implementation. It has signed seven memorandums of understanding with Parties included in Annex I to the Convention and the World Bank's Prototype Carbon Fund, and as of 2006 has already approved 12 projects.

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

54. Bulgaria 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 taken by Bulgaria to implement the relevant provisions of the Kyoto Protocol. The supplementary information is placed in different sections of the NC4 and RDP. Table 8 provides references to the NC4 and RDP chapters in which supplementary information is provided.

Table 8. Overview on supplementary information under Article 7, paragraph 2, of the Kyoto Protocol[a]

Supplementary information	Reference
Supplementarity relating to the mechanisms pursuant to Articles 6, 12 and 17	RDP chapter 4
Policies and measures in accordance with Article 2	RDP chapter 1 and 3 NC4 chapter 4
Domestic and regional programmes and/or legislative arrangements and enforcement and administrative procedures	RDP chapter 1
Information under Article 10	RDP chapter 5
Financial resources	Not applicable[a]

Abbreviations: NC4 = fourth national communication, RDP = report demonstrating progress

[a] As a country with an economy in transition , Bulgaria does not have to report on the implementation of Article 11 of the Kyoto Protocol, including on the provision of new and additional resources.

55. Bulgaria has not reported the following elements of the supplementary information required under Article 7, paragraph 2, of the Kyoto Protocol: information on what efforts Bulgaria is making to implement PaMs in such a way as to minimize adverse effects, including the 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. The ERT recommends that Bulgaria include these reporting elements in its next national communication.

56. Bulgaria provided limited information on its national inventory system and national registry. The ERT recommends that Bulgaria expand the discussion of these elements in its next national communication.

IV. Conclusions

57. On the basis of the information provided in Bulgaria's NC4 and RDP, as well as additional information provided by Bulgaria in response to questions raised by the ERT during the review, the ERT developed an understanding of the Bulgarian approach to climate policy and the state of the implementation of its commitments under the Convention and the Kyoto Protocol. The ERT noted that, mainly due to the sharp economic decline in the early 1990s, Bulgaria will probably reach its emission reduction commitment under the Kyoto Protocol by means of domestic measures alone.

58. Bulgaria reduced CO_2 emissions between 1988 and 2006 by 44 per cent and reduced its overall GHG emissions by 46 per cent over the same period. Bulgaria has reduced emissions in all major sectors, but most of the reductions were achieved between 1988 and 2000.

59. In the NC4 and RDP, Bulgaria presents GHG projections for the period from 1990 to 2010. Based on this information, and on information provided during the review, three scenarios are included in this report: (a) the baseline ('without measures') scenario; (b) the 'with measures' scenario (including the effect of currently implemented and adopted PaMs); and (c) the 'with additional measures' scenario. The projected reductions in GHG emissions under the baseline scenario, in relation to the base year, and under the 'with measures' and 'with additional measures' scenarios, are 19.2, 31.2 and 37.6 per cent,

respectively. Thus, the projections indicate that Bulgaria can meet its Kyoto Protocol target (which is an 8 per cent reduction) under the 'with measures' scenario.

60. In the course of the IDR, the ERT formulated a number of recommendations relating to the completeness and transparency of Bulgaria's reporting under the Convention and its Kyoto Protocol. The key recommendations[5] are that Bulgaria in its next national communication:

- Provide more information on national circumstances, including more detailed information on precipitation or winter temperatures (e.g. number of heating degree days); the structural changes within the manufacturing industry and power production (for example, split by fuel);
- Return to the quality of reporting exhibited in the NC3, especially as it pertains to the description of non-energy PaMs;
- Follow more closely the guidelines on reporting PaMs by including information on the objectives, the gas targeted and the implementing entity for each individual PaM;
- Report projections for the transport sector separately from the energy sector, and prepare GHG projections on fuel sold for use by ships and aircraft engaged in international transport;
- Include the missing elements of supplementary information required under Article 7, paragraph 2, of the Kyoto Protocol.

[5] The recommendations are given in full in the relevant sections of this report.

Annex

Documents and information used during the review

A. Reference documents

"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>.

"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>.

FCCC/IDR.3/BGR. Report on the in-depth review of the third national communication of Bulgaria. Available at <http://unfccc.int/resource/docs/idr/bgr03.pdf>.

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

FCCC/SBI/2007/INF.6. Compilation and synthesis of fourth national communications. Available at <http://unfccc.int/resource/docs/2007/sbi/eng/inf06.pdf>.

FCCC/SBI/2007/INF.7. Compilation and synthesis of supplementary information incorporated in fourth national communications submitted in accordance with Article 7, paragraph 2, of the Kyoto Protocol. Available at <http://unfccc.int/resource/docs/2007/sbi/eng/inf07.pdf>.

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

FCCC/IRR/2007/BGR. Report of the review of the initial report of Bulgaria. Available at <http://unfccc.int/resource/docs/2008/irr/bgr.pdf>.

Fourth national communication of Bulgaria. Available at <http://unfccc.int/resource/docs/natc/bgrnc4.pdf>.

Report demonstrating progress of Bulgaria. Available at <http://unfccc.int/resource/docs/dpr/bgr1.pdf>.

2008 greenhouse gas inventory submission of Bulgaria. Available at <http://unfccc.int/national_reports/annex_i_ghg_inventories/national_inventories_submissions/items/4303.php>.

B. Additional information provided by the Party

Responses to questions during the review were received from Mr. Stefan Dishovsky and Mr. Yulian Maslinkov (Ministry of Environment and Water).

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