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Report on the in-depth review of the third national communication of Bulgaria

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I. INTRODUCTION AND NATIONAL CIRCUMSTANCES RELEVANT TO GREENHOUSE GAS EMISSIONS AND REMOVALS

A. Introduction

1. The secretariat received Bulgaria's third national communication under the United Nations Framework Convention on Climate Change, hereinafter referred to as NC3, on 31 July 2002. An in-depth review was carried out between May and July 2003, including a visit to Sofia from 23 to 27 June 2003. The review team consisted of Ms. Batima Punsalmaa (Mongolia), Mr. Marko Aunedi (Croatia), Ms. Maria Wellisch (Canada) and Mr. Harald Diaz-Bone (UNFCCC secretariat, coordinator).

2. The review team had a number of meetings and discussions on all aspects of the Bulgarian climate policy as outlined in the NC3. During these meetings with governmental officials, academics, and business and environmental non-governmental organizations (NGOs), the team was given a wealth of additional materials and information which supported and updated the information provided in the NC3.

B. National circumstances

3. ***Geography*****:** With a national territory of 110,994 km^2, Bulgaria is a middle-sized country in south-eastern Europe. It is situated on the western coast of the Black Sea and borders on Romania in the north, Serbia and Montenegro and Macedonia in the west, and Greece and Turkey in the south. The landscape is dominated by the Balkan mountains in the centre, which slope gently towards the Danube plains in the north, and drop more abruptly to the south. Further to the south are the Rhodope Mountains and in the west rises the highest mountain of the Balkan peninsula, Mount Rila, which is almost 3000 m high. Farmland and forests are the prevalent forms of land use, accounting altogether for almost 74 per cent of the national territory. The country has limited indigenous energy resources, consisting primarily of a single large deposit of low-grade lignite. Bulgaria is among the countries with the poorest clean water resources in Europe, despite the fact that over 60 rivers flow through the country.

4. ***Demography:*** Bulgaria's population decreased drastically from 8.98 million in 1988 to 8.17 million in 2000[1] and is characterized by a decreasing birth rate and a constant emigration of young people. Long-term demographic trends show a further decline, and the proportion of elderly people is increasing. About 70 per cent of the population lives in towns and cities.

5. ***Economy:*** Bulgaria has undergone a radical economic transition process since the beginning of the 1990s from a centrally planned economy to a market economy. Among other reform programmes, privatization and inflation control by the Bulgarian government and the IMF during the course of the 1990s managed to slow down the strong economic decline of more than 9 per cent per annum in the early 1990s and to achieve growth rates of up to 5.8 per cent in the late 1990s. However, following the trade embargo on former Yugoslavia and some stagnation in the internal reform process, in 1996 and 1997 there was further strong economic decline (6.9 and 10.1 per cent respectively), and high inflation rates reappeared. In 1997, a new agreement with the IMF was signed, comprising the introduction of a currency board and a set of austere new reform measures, which allowed the resumption of macroeconomic stabilization, and set the basis for economic growth and successful inflation control. In 1998, practically all prices were liberalized, except for household power consumption, district heating, post and telephone services. In 2001, the rapidly developing private sector was responsible for 69.3 per cent of Bulgaria's economic activities, and direct foreign investments were rapidly growing.

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[1] The results of a 2001 national census indicate that the population further decreased to 7.97 million in 2001, a decrease of 11.2 per cent in the period 1988–2001. 1988 was chosen as the base year for Bulgaria's GHG mitigation target under the Kyoto Protocol.

Nevertheless, despite the record of achievements over the past decade, Bulgaria faces considerable economic challenges in the period ahead. Foreign debts account for more than US$ 10 billion, per capita GDP is at 28 per cent of the EU average, and unemployment rose to 19.5 per cent in 2001. The energy sector in particular encountered some difficulties and delays in its transformation process. It is recognized that a stable legal, regulatory and institutional framework needs to be in place before restructuring and privatization can be completed.

Table 1. Main macro-economic indicators and GHG emissions for Bulgaria[a]

	1988	2000	Change (%) 1988–2000 [b]
Population (millions)	8.98	8.17	–9.1
Gross domestic product – GDP (billions US$ of 1995[c])	60.98	43.98	–27.9
Total primary energy supply – TPES (Mtoe[d])	31.72	18.78	–40.8
Electricity consumption (TWh)	44.37	30.01	–32.4
GHG emissions[e] (Tg[f] CO_2 equivalent)	144.40	64.50	–55.3
GHG emissions per capita (Mg CO_2 equivalent)	16.08	7.90	–50.9
GHG emissions per GDP unit (kg CO_2 equivalent per US$ of 1995)	2.37	1.47	–38.1

[a] Data for population, GDP, TPES and electricity are from "Energy balances of OECD countries, 1999–2000", OECD/IEA, Paris, 2002. greenhouse gas (GHG) data are from Bulgaria's inventory submission in 2003.
[b] Difference of 2000 and 1988 values in per cent of 1988 values.
[c] Calculated using the method of purchasing power parities (PPP).
[d] Millions of tonnes of oil equivalent.
[e] Without accounting for land-use change and forestry (LUCF).
[f] One teragram (Tg) is equal to 1,000 gigagrams (Gg) or one million tonnes (Mt).

6. ***Energy:*** Since 1988, the Bulgarian energy profile has changed considerably. Between 1988 and 2000, the total primary energy supply (TPES) decreased by more than 40 per cent. The consumption of oil products fell by 61 per cent and electricity consumption fell by 32.4 per cent. Energy imports account for more than 70 per cent of TPES. In 2002, the most important energy sources were coal (40 per cent) and crude oil (37 per cent), followed by natural gas (12 per cent) and nuclear energy (9 per cent). Biomass, hydropower and other renewable energy sources accounted for less than 2 per cent. The halving of per capita greenhouse gas (GHG) emissions reflects these dramatic changes in the energy profile (see table 1). In 2002, two of the six units of the only nuclear power plant (NPP) in Bulgaria (Kozloduy 1 and 2) were shut down, resulting in a substantial decrease in the share of nuclear energy in the TPES (22 per cent in 1999, 9 per cent in 2002). For the last few years, the country has had surplus power capacity and has been a net exporter of electricity.

7. ***Political structure:*** The Republic of Bulgaria is a parliamentary republic. The democratic constitution passed in 1991 vests legislative power in the National Assembly, a one-chamber parliament with 240 members. The President represents the Republic at the international level. The Council of Ministers, chaired by the Prime Minister, is responsible for domestic and foreign policy. The country is divided into 28 regions and 278 municipalities. All international treaties that are ratified pursuant to the constitutional procedure are considered as part of domestic legislation.

8. ***Institutional arrangements:*** The Ministry of the Environment and Waters (MoEW) is responsible for national coordination of all environmental issues, including climate change. The Interministerial Committee on Climate Change, comprised of representatives from the Ministries of Environment and Waters, Energy and Energy Resources, Economy, Justice and EU-Integration, Industry, Agriculture and Forestry, Science and Education, Regional and Urban Development, oversees the implementation of the National Climate Change Action Plan (NCCAP). MoEW takes part in the interministerial National Executive Committee for JI which evaluates potential joint implementation (JI) projects. The Ministry of Energy and Energy Resources (MEER) is responsible for the energy sector, and the State Energy Regulation Committee (SERC) regulates access to the energy network, sets energy

prices and issues licences. The Energy Efficiency Agency coordinates the implementation of energy efficiency programmes.

C. Key developments in climate change policies

9. Bulgaria ratified the United Nations Framework Convention on Climate Change (UNFCCC) in May 1995 and has submitted three national communications, in 1996, 1999 and 2002. During the review, the team analysed the information provided in NC3 together with data from the most recent inventory submission of Bulgaria to the Convention secretariat, which contains data on emissions trends for 1988–2001. The results of this analysis suggest that Bulgaria contributed to achieving the aim of the Convention, as its total GHG emissions decreased by 55 per cent in the period from 1988 to 2000, without considering CO_2 from LUCF, and by 60 per cent if CO_2 from LUCF is considered.

10. The review team was informed that accession to the European Union (EU) has been set as the highest political priority for Bulgaria. The negotiation process leading to full EU membership was initiated in March 2000. The Government has set an ambitious agenda to be completed by the beginning of 2007. The review team was informed that the negotiations on some important chapters, including energy, transport and environment (including waste), have already been finalized. The review team recognized that many synergies exist between the EU accession process and GHG mitigation, since many measures that are undertaken to comply with EU directives also have clear benefits in the field of climate change.

11. Given the challenges both of the economic transition process and of the EU accession process, climate policy is not seen as a political priority in Bulgaria at the beginning of the 21st century. Correspondingly, the review team noted a low financial budget and very limited administrative capacity in this field. Still, Bulgaria has expressed its intention to make use of the flexibility mechanisms of the Kyoto Protocol. Bulgaria has implemented a pilot JI project jointly with the Netherlands (district heating systems), and signed a Host Country Umbrella Agreement with the Prototype Carbon Fund, as well as four memorandums of understanding with Austria, Denmark, the Netherlands and Switzerland. Bulgaria intends to join the EU emissions trading market in 2007.

12. In July 2002, Bulgaria ratified the Kyoto Protocol, thus committing itself to reducing its aggregate emissions of GHGs, so that average annual emissions in the period 2008–2012 are at least 8 per cent lower than 1988 levels. In conjunction with the ratification of the Kyoto Protocol, a number of preparatory arrangements have been taken. In order to have an advisory body to the Council of Ministers, an Interministerial Committee on Climate Change was established. It is chaired by the Deputy Minister of Environment, and all other relevant ministries are represented (see paragraph 8). Furthermore, in 2002 an Executive Agency was established within MoEW, which is responsible for the development of strategies in the field of climate change, GHG inventory preparation and the supervision of the previously founded JI Unit. The national energy strategy was revised in 2002, and it was decided to update the current NCCAP.

13. The review of the NC3 and the additional information provided during the visit allowed the review team to conclude that Bulgaria's NC3 is a comprehensive document, which reflects all aspects of Bulgarian climate change policy at the time it was prepared and published. It covers the GHG inventory, policies and measures, projections and all other topics required by the UNFCCC guidelines.[2]

[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.

II. GREENHOUSE GAS INVENTORY INFORMATION

A. Inventory preparation and reporting

14. ***Reporting.*** MoEW is responsible for the preparation of and reporting on the Bulgarian national inventory and submits the relevant reports to the UNFCCC secretariat. On behalf of MoEW, the Energy Institute JSC collects and compiles all the data and emissions estimates for the source categories energy, industrial processes, solvent use, agriculture, land-use change and forestry (LUCF), and waste. Since 2000, Bulgaria has submitted its annual GHG inventory to the UNFCCC in the common reporting format (CRF). In 2001 and 2003, a national inventory report (NIR) accompanied the CRF file. The 2003 GHG inventory submission will be subject to a separate review (in-country review) in September 2003.

15. ***Comprehensiveness.*** The NC3 provides data on the Bulgarian GHG emission inventory for the base year 1988 and for the period from 1990 to 1999, and includes emission estimates for the gases carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), ozone precursors (nitrous dioxide (NO_2), carbon monoxide (CO), non-methane volatile organic compounds (NMVOC)) and sulphur dioxide (SO_2). Estimates for five hydrofluorocarbon gases (HFCs) and two perfluorocarbon gases (PFCs) for the years 1995, 1998 and 1999 are reported for the first time, but figures for sulphur hexafluoride (SF_6) are not reported. An estimate for the CO_2 removals from LUCF is provided; CO_2 emissions from bunker fuels and those from biomass (for 1999 only) are documented. CO_2 emissions from agricultural soils were not reported. The review team noted with appreciation that the NC3 chapter on inventory describes some methodological aspects of the Bulgarian GHG inventory, some details on the inventory reporting under the UNFCCC and some of the factors underlying the emission trends. It also describes the history of recalculations by comparing the current inventory with those from NC1 and NC2; shows the results of a key sources analysis for the latest inventory year, following the 2000 IPCC Good Practices Guidance and Uncertainty Management in National GHG Inventories; and reports on the initial steps taken to assess uncertainties in the estimation of GHG emissions in Bulgaria. The team commended Bulgaria for its comprehensive and transparent reporting on its GHG inventory. The inventory was generally assessed to be consistent with the UNFCCC reporting guidelines and the IPCC guidelines.[3]

16. ***Methodology.*** The inventory data for the years 1998 and 1999 as reported in NC3 are calculated according to the Revised 1996 IPCC Guidelines; earlier years follow the 1994 draft version of the IPCC guidelines. The estimation of GHG emissions from fuel combustion is based on a sectoral approach ("bottom-up"). The emissions from mobile sources are calculated according to the IPCC methodology, with a more detailed disaggregation by vehicle weight and engine volume, following the 1994 CORINAIR methodology.

17. The basic source for **emission factors** is the revised IPCC guidelines. Where the IPCC default emission factors were not suitable to the Bulgarian circumstances, country-specific emission factors were determined by experimental measurement or expert judgement, for example for CO_2 from mining and combustion of domestic lignite coal. An overview of methodology and emission factor sources used, by source category, is presented in table 2.

[3] Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories, IPCC, 2000.

Table 2. Methodology and emission factor sources used for the Bulgarian GHG inventory

Source category	Methodology	Emission factor
Energy (fuel combustion)	Sectoral approach, IPCC tier 2 and tier 3	IPCC default and country-specific Transport: CORINAIR 94
Industrial processes	IPCC default, IPCC tier 1	IPCC default and country-specific
Solvent and other product use	CORINAIR 94 and 90	Country-specific
Agriculture	IPCC default, IPCC tier 1 and tier 3	IPCC default and country-specific
Land-use change and forestry	Country-specific	Country-specific
Waste	IPCC default	IPCC default and country-specific

18. ***Activity data*** were mostly taken from official publications of the National Statistical Institute (NSI). The catalogue of important sources includes the statistical report for the production of industrial goods and services from the NSI stock balances; the report on the type and number of vehicles from the Road Control Department (RCD) within the Ministry of Internal Affairs; the data report on agricultural production from the Statistical Unit within the Ministry of Agriculture and Forestry (MAF); the data report on forest status from the Forestry Department within MAF; and the data report on solid waste and waste water from the NSI. Some executive agencies, including the Executive Agency within MoEW and the Soil Resource Executive Agency within MAF, also collect and process data from separate sources.

19. ***Recalculations for 1990–1995.*** The estimates for the total CO_2 emissions in the period 1990–1995 are between 1.2 and 3.0 per cent lower in the NC3 than in the NC2, mainly as a result of changes in the emission factors and precision and rearrangement of activity data in the two IPCC categories "1.A fuel combustion" and "2. industrial processes", and the exclusion of the category "6. waste disposal on land" from the overall CO_2 emissions. The NC3 estimates for the total CH_4 emissions in the same period are between 0.2 and 1.5 per cent lower than those reported in NC2, mainly as a result of revised methodology and revised and new activity data in the categories "1.B fugitive emissions from solid fuels" and "6. solid waste disposal on land". In contrast to these minor changes for CO_2 and CH_4, the NC3 estimates for N_2O are significantly higher than those reported in the NC2, by a factor ranging from 2.6 to 3.1, because of a complete change in methodology following the revised 1996 IPCC Guidelines for the estimation of N_2O emissions from agricultural soils.

20. The 2003 inventory submission takes back some of these increases by a second recalculation, which resulted in figures for total N_2O emissions 34–64 per cent lower than the NC3, thus leading to a smaller increase factor (1.4–1.8) in comparison with the NC2 figures. Whereas the estimates for CO_2 emissions remain broadly unchanged, the 2003 inventory figures for CH_4 are 10–14 per cent lower than those reported in NC3. The decrease is due to methodological changes in the estimation of fugitive emissions from the natural gas distribution network and changes in the indices for organic content in waste water, according to the IPCC Good Practice Guidance. The team noted that except for CO_2 emissions and removals from LUCF, all sectors have been subject to recalculations.

21. ***Recalculations for the base year 1988.*** When the emission estimates for the base year 1988, as reported in the NC2, NC3 and the 2003 GHG inventory submission are compared, major differences can be observed (see table 3). The review team was informed that these revisions for the base year resulted mainly from inaccurate and incomplete statistical data for the base year, as well as from the recalculations described above . The review team noted that recent (June 2003) results of a third revision ranged from 131,317 to 136,790 Gg CO_2 equivalent for the total GHG emissions in 1988, thus returning to the level of estimates reported in NC2. The estimates for CO_2 emissions from fuel combustion in 1988 resulting from sectoral approach calculations ("bottom-up") are still 4.1 per cent higher (i.e. 3,883 Gg CO_2 in absolute terms) than the figures from the reference approach ("top-down"). The review team encouraged Bulgaria to continue its efforts to reduce the uncertainties in the estimates of the base year emissions.

Table 3. Estimates for emissions in 1988. Results of recalculations

	Gg CO_2 equivalent			Change (%)	Change (%)
	NC2	NC3	Inventory submission (IS03)	NC2–NC3	NC3–IS03
Total CO_2	96 878	103 856	103 011	+7	–1
Total CH_4	29 667	28 009	24 482	–6	–13
Total N_2O	9 548	25 225	16 904	+164	–33
Total GHG	**136 093**	**157 090**	**144 398**	**+15**	**–8**

22. A quantitative assessment of uncertainties was not documented. The review team noted that a number of successive studies were performed on particular emission sources in Bulgaria, with the aim of reducing uncertainty in the estimation of GHG emissions and removals. The team was informed that an uncertainty assessment of the GHG inventory as a whole is planned, which will follow the 2000 IPCC Good Practices Guidance and Uncertainty Management in National GHG Inventories.

B. Emission profile and trends

23. ***Total GHG emissions.*** The Bulgarian GHG emissions profile shows the clear domination of the energy sector, with CO_2 as the main GHG. Overall emission trends in Bulgaria show a general downward tendency, with some minor fluctuations, mainly due to the economic transition process. Table 4 shows the emission trends by gas in the period from 1988 to 2000.

Table 4. GHG emission trends by gas

	Gg CO_2 equivalent							
	1988[a]	1990	1992	1994	1996	1998	2000	Change (%) 1988–2000
CO_2 [b]	103 011	83 255	58 948	58 590	60 142	51 868	46 842	–55
CH_4	24 482	25 623	23 646	15 420	15 064	11 769	10 182	–58
N_2O	16 904	15 789	10 372	8 576	8 991	7 294	7 440	–56
Fluorinated gases	50					69	31	–39
Net GHG[c]	98 354	77 455	51 312	51 615	52 952	45 635	37 866	–62
Total GHG[d]	**144 398**	**124 667**	**92 967**	**82 586**	**84 196**	**71 001**	**64 495**	**–55**

[a] CO_2 emissions without LUCF.
[b] Total GHG (with net CO_2 emissions/removals from LUCF).
[c] Total GHG (without CO_2 from LUCF).
[d] 1995 for fluorinated gases.

24. In 1988, CO_2 made up 71 per cent of the total GHG emissions (without LUCF), followed by CH_4 (17 per cent) and N_2O (12 per cent). A similar pattern can be seen for the year 2000, when the share of CO_2 was 73 per cent, followed by CH_4 (16 per cent) and N_2O (12 per cent).

25. Total GHG emissions, excluding CO_2 from LUCF, decreased by 55 per cent between 1988 and 2000, while the total GHG emissions, including net removals from LUCF, decreased by 60 per cent. This decrease was attributed to declines in all three main GHGs (CO_2 –55 per cent, CH_4 –58 per cent, N_2O –56 per cent). More than half of the decreases for CO_2 and N_2O were achieved during the first three years (trends for 1988–1991: CO_2 –36 per cent, N_2O –23 per cent, total GHG: –28 per cent), while CH_4 emissions increased by 2 per cent until 1991, owing to increases in emissions from solid waste disposal on land. Emissions of fluorinated gases accounted for less than 0.05 per cent over the whole period since 1995, which was chosen to be the base year for these gases.

26. ***Carbon dioxide.*** Total emissions of CO_2 in Bulgaria were 46,842 Gg in 2000. The main source was energy industries (56 per cent of total CO_2 emissions), followed by energy use in industry (18 per cent), fuel combustion in transport (13 per cent), industrial processes (9 per cent) and energy use in other sectors (4 per cent).

27. As shown in table 5 and figure 1, the decline of 55 per cent between 1988 and 2000 was determined by the decrease of emissions in all energy subsectors, especially in the period until 1991. Between 1991 and 2000, total CO_2 emissions declined by 29 per cent only, due to smaller reduction rates in CO_2 emissions from energy industries (–29 per cent), energy use in industry (–29 per cent), transport (–10 per cent), energy use in other sectors (–54 per cent) and industrial processes (–14 per cent).

Table 5. CO_2 emission trends

GHG gas source and sink categories	Gg							Change (%)
	1988	1990	1992	1994	1996	1998	2000	1988–2000
Energy	94 673	75 942	54 839	53 659	54 541	48 113	42 649	–55
Energy industries	*37 002*	*38 801*	*33 903*	*30 993*	*30 726*	*27 199*	*26 267*	*–29*
Energy use in industry	*35 755*	*19 890*	*9 694*	*11 985*	*14 010*	*11 401*	*8 605*	*–76*
Transport	*12 639*	*10 864*	*6 435*	*6 547*	*6 306*	*6 475*	*5 881*	*–53*
Energy use in other sectors	*7 612*	*5 381*	*4 610*	*3 325*	*3 238*	*2 989*	*1 896*	*–75*
Industrial processes	8 338	7 313	4 110	4 931	5 601	3 755	4 193	–50
LUCF	–4 657	–5 800	–7 636	–6 975	–7 190	–6 233	–8 976	93
Total CO_2 emissions/ removals with LUCF	98 354	77 455	51 312	51 615	52 952	45 635	37 866	–62
Total CO_2 emissions without LUCF	103 011	83 255	58 948	58 590	60 142	51 868	46 842	–55

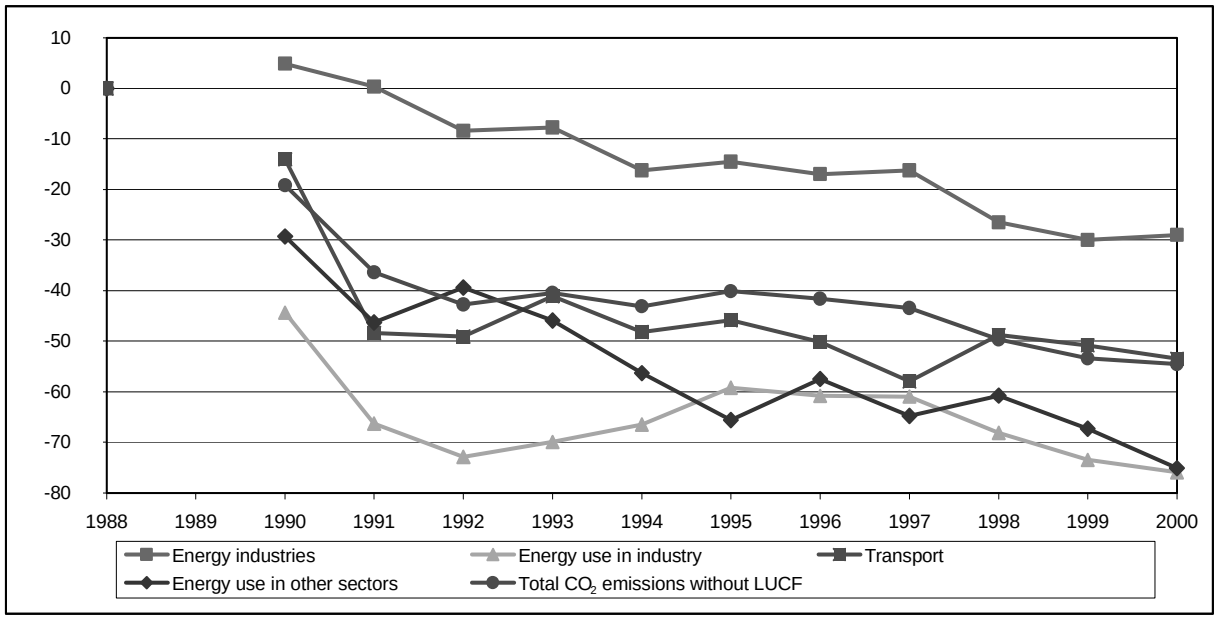
28. The notable decline of CO_2 emissions from energy use in industry, and energy use in other sectors can be partly explained by structural changes in the economy (see para. 5), a reduction in energy intensive production, energy efficiency improvements, and overall decline of energy consumption. Changes in the statistical system and accounting methodologies[4] might also have made some contribution to these drastic changes.

29. Declines and fluctuations in emission trends since 1991 (see figure 1) can be interpreted as reactions to international energy price developments, progressive fuel and energy price liberalization, reductions in energy demand (energy industries, energy use in other sectors), the decline of industrial output and energy-intensive production and the increase of energy efficiency in the industrial sector (energy use in industry).

30. For the forestry sector, estimates are limited to emissions and removals from managed forests, since data on forest clearing or land-use change was not available. The input data for the calculation are based on the forest inventory, which has been carried out every 5 years since 1985, and annual statistics on forest harvests. Past afforestation efforts, in combination with a decrease in the annual cut due to the economic decline, created a considerable CO_2 removal throughout the period 1985–2000. Reduced CO_2 removals were observed in the period 1997–1999, due to increased felling activity. The marked increase in 2000, by 44 per cent compared to 1999 levels, is partly explained by reduced felling rates. Most of this increase in CO_2 removals results from a revision of the forest growth statistics, resulting from a new regular forest inventory that was carried out in 2000.

[4] The team noted that although the sectoral approach estimates for CO_2 emissions from fuel combustion in the period 1988–1991 are 2.4–5.5 per cent *higher* that those from the reference approach, the sectoral approach figures for the period 1992–2001 are 1.3–5.6 per cent *lower* that the results from the reference approach. The review team was informed that this is mainly due to differences in the methodological approach, conversion factors and emission factors, as well as different accounting methods, including not taking into account the losses during fuel transformation and the emissions from non-energy fuel use in the sectoral approach.

Figure 1. Carbon dioxide emissions, percentage change from 1988, by source



31. ***Methane.*** Emissions of CH_4 amounted to 10,182 Gg CO_2 equivalent in 2000. The main source was waste management (47 per cent), followed by the energy sector (30 per cent) and agriculture (22 per cent).

32. As shown in table 6, CH_4 emissions declined steadily between 1988 and 2000 (–58 per cent). This can be partly attributed to the decline of emissions from solid waste disposal (–67 per cent) and from livestock production (enteric fermentation, –59 per cent). About half of this decline was observed in one year, 1994 (–28 per cent, compared to 1993), mainly as a result of a change in the NSI accounting method for landfilled municipal solid waste. The review team was informed that accurate tracking of waste volumes and composition was difficult as disposal companies were inclined to report higher than actual volumes. A significant reduction in livestock population, stemming from the transition process and the implementation of the rules for the EU common agricultural market, was the major reason for a 59 per cent reduction of CH_4 emissions from enteric fermentation. Fugitive emissions from coal mines decreased by 38 per cent, broadly following the decrease in coal production.

Table 6. CH_4 emission trends

GHG gas source and sink categories	Gg CO_2 equivalent							Change (%)
	1988	**1990**	**1992**	**1994**	**1996**	**1998**	**2000**	**1988–2000**
Energy	4 895	4 649	3 801	3 649	4 109	3 265	3 010	–39
Fugitive emissions from coal mines	*4 730*	*4 505*	*3 712*	*3 553*	*4 018*	*3 182*	*2 934*	*–38*
Agriculture	5 731	5 414	4 027	2 654	2 429	2 388	2 278	–60
Enteric fermentation	*4 049*	*3 784*	*2 887*	*1 893*	*1 730*	*1 717*	*1 665*	*–59*
Waste management	13 813	15 502	15 777	9 053	8 461	6 056	4 820	–65
Solid waste disposal on land	*12 877*	*14 442*	*14 975*	*8 436*	*7 477*	*5 336*	*4 226*	*–67*
Total emissions	**24 482**	**25 623**	**23 646**	**15 420**	**15 064**	**11 769**	**10 182**	**–58**

33. ***Nitrous oxide.*** Emissions of N_2O amounted to 7,440 Gg CO_2 equivalent in 2000. Emissions from agricultural soils accounted for the largest share of N_2O emissions (42 per cent), followed by energy industries (30 per cent) and nitric acid production (18 per cent).

Table 7. N_2O emission trends

GHG gas source and sink categories	Gg CO_2 equivalent							Change (%) 1988–2000
	1988	1990	1992	1994	1996	1998	2000	
Energy	4 733	3 655	3 031	2 909	2 975	2 666	2 411	–49
Energy industries	*2 877*	*2 964*	*2 717*	*2 568*	*2 609*	*2 394*	*2 248*	*–22*
Energy use in industries	*1 547*	*524*	*217*	*230*	*289*	*180*	*62*	*–96*
Industrial processes	2 422	2 255	1 324	1 338	1 962	968	1 314	–46
Nitric acid production	*2 422*	*2 255*	*1 324*	*1 338*	*1 962*	*968*	*1 314*	*–46*
Agriculture	9 514	9 655	5 816	4 147	3 886	3 496	3 557	–63
Agricultural soils	*8 445*	*8 613*	*5 048*	*3 631*	*3 421*	*3 039*	*3 122*	*–63*
Manure management	*1 056*	*1 030*	*760*	*510*	*461*	*452*	*429*	*–59*
Total emissions	**16 904**	**15 789**	**10 373**	**8 576**	**8 991**	**7 294**	**7 440**	**–56**

34. As shown in table 7, total N_2O emissions fell by 56 per cent between 1988 and 2000. More than half of this decrease was observed in the period 1990–1992, when emissions declined by 34 per cent, mainly as a result of substantial reductions in emissions from energy use in industry (58 per cent), nitric acid production and fertilizer application on agricultural soils (41 per cent each). This sharp drop is largely attributed to the closing down of some inefficient industrial production units. Since 1992, N_2O emissions from agriculture and energy have decreased by 39 per cent and 20 per cent respectively, whereas emissions from industrial processes have broadly remained stable. The intermediate increase of N_2O emissions from nitric acid production for the period 1995–1997 can be explained by increased production rates following the higher demand from export markets.

35. ***Fluorinated gases.*** Potential emissions of fluorinated gases, as reported in the 2003 GHG inventory submission, decreased by 39 per cent between 1995 and 2000, when they still accounted for less than 0.05 per cent of total GHG emissions. However, the estimates for emissions of fluorinated gases are still incomplete. Within the different groups of gases, a considerable variation can be observed (see table 8): HFC emissions (mainly from air conditioning, refrigeration, and aerosols and metered dose inhalers) were estimated only for the year 1995. PFC emissions (mainly from aluminium production) increased until 1998 but dropped below the 1995 levels in 2000. SF_6 emissions (from insulation in electrical equipment) were estimated only for the year 2000. The base year for fluorinated gases is 1995.

Table 8. Fluorinated gases emission trends

	Gg CO_2 equivalent						Change (%) 1995–2000
	1995	1996	1997	1998	1999	2000	
HFCs	3	–	–	–	–	–	
PFCs	47	–	–	69	44	29	–37
SF_6	–	–	–	–	–	1	
Total	**50**	**–**	**–**	**69**	**44**	**31**	**–39**

III. POLICIES AND MEASURES

A. Overview

36. The NC3 presents a comprehensive overview of Bulgaria's climate change policies and measures (PaMs) and other PaMs that contribute to climate change mitigation. The review team noted continuity between the PaMs presented in the NC2 and the NC3, demonstrating that climate change mitigation is becoming more integrated into Bulgaria's relevant national policies and programmes. When compared with the NC2, the NC3 shows progress in the following areas: identification of mitigation opportunities in the energy, industry, agriculture and waste sectors; implementation of energy efficiency programmes at the local level; power sector restructuring; and liberalization of fuel and energy prices.

37. The team noted that the PaMs section in the NC3 broadly follows the UNFCCC reporting guidelines. In particular, the PaMs are reported by sector and gas, and the impact of individual PaMs is

quantified wherever possible. The required table format is followed and, for each listed policy or measure, it is indicated whether the PaM is implemented, adopted or planned. The review team noted that the NC2 contained more detail on many of the PaMs, especially on the estimation method for the mitigation effect. For example, the NC2 specified the GHG mitigation effect of a reduction in electricity demand. Also, some of the PaMs listed in the NC3 were quite aggregated, and had a broad range of potential reduction. The team noted that greater detail and better linkage to a specific year or timeline would have improved transparency.

38. As noted under "National circumstances" above, the economic transition process and accession to the EU are the main priorities for Bulgaria and define the guiding principles and overarching policy context. The period of change that Bulgaria is currently undergoing appears to be providing an opportunity to integrate environmental considerations more fully into new policies and programmes.

B. Cross-sectoral policies and measures

39. The National Strategy for the Environment defines the long-term environmental priorities of Bulgaria. Climate change is part of the "Air" component, and meeting the obligations of UNFCCC and Kyoto Protocol is one of the listed objectives. The Strategy for the Environment is closely tied to the National Plan for Economic Development of the Republic of Bulgaria 2000–2006, National Strategy for Energy Saving till 2014, National Plan for the Development of Agriculture, National Programme for Adoption and Implementation of the Acquis, and the Environment Sector of the National IPSA Strategy.

40. Although there is no specific climate change legislation in Bulgaria, several pieces of environmental legislation, including the Environmental Protection Act, Ambient Air Act and Environmental Assessment Act, support the principles of climate change mitigation. At the project level, the Environmental Assessment Act is an important piece of legislation that requires GHG impacts to be identified and minimized. However, the GHG impacts do not have to be mitigated by the project proponent through the purchase of offsets, for example.

41. The National Climate Change Action Plan (NCCAP) was adopted by the Council of Ministers in 2000. This plan, developed between 1996 and 1998 under the Support for National Action Plans Programme (SNAP), describes Bulgaria's climate change strategy and a breath of PaMs, including institutional, legislative, financial and technical PaMs. The NCCAP obliges all ministries with activities relevant to GHG emissions or removals to incorporate climate change measures into their planning and programme development, i.e. to develop specific measures and acquire the necessary funds and resources. An interministerial committee, comprised of representatives from the Ministries of Environment and Waters, Energy and Energy Resources, Economy, Justice and EU Integration, Industry, Agriculture and Forestry, Science and Education, and Regional and Urban Development, oversees the implementation of the NCCAP. Each ministry is to provide MoEW with an annual progress report describing how climate change mitigation was addressed. The committee meets once a year to review progress and, if necessary, to amend the action plan. Primarily as a result of changes in the European Climate Change Programme (ECCP) and Bulgaria's National Energy Strategy, it was decided in 2002 to update the current NCCAP. Supported financially by the Dutch government, the NCCAP update is expected to include an economic analysis of PaMs. The update will involve NGO input and should be completed at the end of 2004.

42. Compliance with the Kyoto Protocol target is Bulgaria's only GHG emission reduction target. As the total GHG emissions have declined substantially since 1988, Bulgaria expects to be well below its Kyoto Protocol target in 2010. Consequently, tough domestic policies such as CO_2 taxes or mandatory emission reduction programmes for large emitters are not included as a short-term measure. Bulgaria anticipates that it will have GHG emission quota to sell, and has signed memorandums of understanding

(MoU) with Austria, the Netherlands and Switzerland to explore JI ventures. To what extent Bulgaria will participate in future GHG emissions trading will depend on a number of factors, including the future of units 3 and 4 at Kozloduy NPP, future energy prices, natural gas supply, growth in domestic energy demand, electricity export opportunities, and the rate of economic development and privatization.

43. Funding for the development and implementation of PaMs comes from a variety of sources. Many climate change measures are co-benefits of other measures that are designed, for example, to improve energy efficiency, expand the transportation infrastructure, implement sustainable agriculture and sustainable forestry, and improve waste management. Consequently, numerous measures are not directly funded as "climate change" initiatives. It is important to note that one key fund, the Energy Efficiency Fund, has not yet been established.

44. The National Environmental Protection Fund and the Municipal Environmental Protection Fund are the main sources of funding for environmental projects. These funds are derived from a percentage of the collected fuel taxes and pollution fines, and they grew significantly between 1994 and 1999. In 1999, approximately 10 per cent was used for climate change initiatives such as preparation of the inventory and national communications and co-funding the municipal energy programmes. Foreign investment is a third, important source of funding that Bulgaria hopes to attract.

45. Participation in emissions trading and JI are important elements of Bulgaria's medium and longer-term strategy as they could provide the investment needed to realize climate change measures and further economic development. Bulgaria is preparing to meet the requirements of the EU Directive on Emissions Trading. As such, the country has strong incentives to develop and implement effective climate change PaMs, and submit a solid report on demonstrable progress in 2005.

C. Energy

46. The energy sector, both supply and demand, is the most important sector from the perspective of GHG mitigation, accounting for two thirds of total GHG emissions. Accordingly, most of the PaMs reported in the NC3 focused on reducing CO_2 emissions from this sector. Some restructuring efforts have already provided a first price signal to reduce energy consumption and consequently GHG emissions. However, most of the emission reductions in the energy sector (1988–2000: –55 per cent) resulted from a steep drop in energy demand (–40 per cent), mainly due to the overall economic decline. In both the NC2 and the NC3, numerous energy efficiency measures were identified for the energy supply, industry and residential sectors. The main barriers to further implementation appear to be lack of investment funds and incentives.

47. The **energy supply** sector experienced some delays in restructuring because the necessary legal and institutional framework had not been in place. Further liberalization and privatization efforts are foreseen for the near future, which could lead to further increases in end-user energy prices. The new Energy Strategy (adopted in 2002) and Laws on Energy and Energy Efficiency (put forward for adoption) are key instruments for achieving a competitive domestic energy market, efficiency improvements, energy security, and improved environmental performance of energy production in Bulgaria.

48. During the country visit, the review team was informed that there was still a substantial **demand side** potential for both energy and GHG reduction. The respective PaMs sections of the NC2 and the NC3 show continuity and moderate progress in the areas of fuel and energy price liberalization, elaboration of an Energy Savings Action Plan and implementation of cost-effective measures. The team noted that the Energy Efficiency Fund, mentioned in both the NC2 and the NC3, has not yet been established but is included in the draft Law on Energy Efficiency.

49. Bulgaria's 1999 Energy Strategy, referred to in the NC3, was revised in 2002. The team was informed that the two previous strategies could not be implemented successfully. Energy sector **restructuring** and privatization were attempted before a stable legal, regulatory and institutional framework existed. Consequently, privatization was only partially completed and numerous problems resulted. The new Energy Strategy provides high-level direction and the overall energy policy needed to build a competitive energy market in Bulgaria. The establishment of a sound framework, specifying the major changes required in the financial, institutional and legal areas, is now recognized as an integral element of the energy policy and an essential prerequisite for foreign investment. It recognizes that both supply and demand need to be addressed at the same time, and lists key short-term actions (for the period 2002–2005) related to the legal framework, regulatory framework, privatization, electricity sector, gas supply, heat supply, coal mining and social protection.

50. The Law on Energy and Energy Efficiency (LEEE, 1999) was revised twice between the NC2 and the NC3. The team was informed that although the LEEE allowed liberalization to begin, it did not encourage competition and therefore had to be complemented by two separate laws drafted in 2002 – the Energy Law and the Energy Efficiency Law.

51. The draft Energy Law defines the terms and conditions needed to establish a competitive energy market, attract investment, improve efficiency at all stages, stimulate combined heat and power production and the use of renewable energy, integrate the Bulgarian system with the EU system and develop new market opportunities. The draft law also identifies the roles and responsibilities of MEER, the Energy Regulatory Commission, etc. and clearly defines the electric power industry, heat supply and renewable energy sources, as well as licensing, bidding, penalties and other administrative issues. The team was informed that the draft has satisfied all of the requirements (i.e. economic, environmental, energy and EU accession requirements) and is in the final stage of approval with the National Assembly.

52. The draft Law on Energy Efficiency was adopted by the Council of Ministers and was forwarded to the Parliament in autumn 2003. It is intended to provide the legislative framework for measures to improve energy efficiency and increase the use of renewable energy. It includes a section on the establishment of an Energy Efficiency Fund, an important measure that is needed to implement further energy efficiency programmes. In this context, a National Strategy on Energy Efficiency will be developed.

53. The Energy Efficiency Agency (EEA) was established in 1992 to implement projects of the EU's Phare programme.[5] It is currently housed within MEER and has the status of an executive agency. EEA implements state policy in the area of energy efficiency on the one hand by developing energy programmes and projects that improve energy efficiency and increase the use of renewable energy sources, and on the other hand by facilitating technology transfer, training, financing and project execution. Its work covers standards development, labelling, energy audits, monitoring, etc. EEA also carries out work needed for EU accession, such as the harmonization of legislation.

54. Both the NC2 and the NC3 demonstrate that under the coordination of EEA successful steps towards the identification and cost assessment of energy efficiency measures have been made. Programmes, in some cases with targets, have been developed for the following sectors: housing construction, centralized district heating, industry, households, transport and agriculture. Measures were evaluated for each programme on the basis of economic criteria and CO_2 savings. They are grouped into consecutive 3-year time blocks. Focus is now on developing the conditions for the implementation of measures. The EEA currently oversees the following four major programmes:

[5] The Phare programme is one of the three pre-accession instruments financed by the European Union to assist the applicant countries of central Europe in their preparations for joining the European Union.

- National Energy Savings Programme and 3-year Action Plan
- National Programme for Utilization of Renewable Energy Sources
- Programme to Promote Development of Combined Heat and Power
- Programme to Develop Energy Efficiency Fund.

55. The team was informed that the two main hurdles for the implementation of these programmes were the lack of investment and lack of incentives for consumers.

1. Energy supply

56. In 2000, emissions from fuel combustion in energy industries accounted for 41 per cent of total GHG emissions. Coal-fired thermal power plants (TPPs) emitted approximately 60 per cent of the country's CO_2. Whereas the reduction of GHG emissions by 29 per cent since 1988 was mainly demand-driven, attention has recently been focused on the reform of the energy supply sector.

57. Several measures listed in the NC3 are under way or have been completed. They include: the rehabilitation and modernization of the Maritza East TPP, the integration of the electricity system with the Union for Coordination of the Transmission of Electricity, the upgrading of heat transmission networks and the installation of instrumentation to measure and control heat. However, the liberalization of energy prices, the status of Bulgaria's energy sector reform and some changing market conditions have affected several important investment decisions. A number of the large energy projects cited in the NC3 are now "on hold", including: a new 670-MW lignite plant in Maritza East TPP; three new 170-MW hydropower plants in the Gorna Arda cascade; a new 300-MW natural gas cogeneration plant; and the construction of a new NPP. Also, high gas prices have reduced the consumption of natural gas and postponed the approval of several district heating projects. Another important change since the NC3 relates to the planned phase-out of units 3 and 4 at the Kozloduy NPP in 2007, five years before the end of their technical lifetime. The team was informed that after some safety improvements, these plans might be reconsidered.

58. Whereas the previous energy strategy tried to maintain Bulgaria's role as a net electricity exporter, the new Energy Strategy builds on risk management in energy supply through the diversification of energy sources by type and location, taking into account long-term trends in regional and global energy supply. The review team was informed that energy trading could increase in importance, making use of Bulgaria's geographic location to connect Russia, central Asia and central Europe. The new strategy supports:

- preservation of the nuclear energy share in the overall energy balance (e.g. continued operation of units 3 and 4 at the Kozloduy NPP or construction of new NPP)
- increased use of natural gas for power generation
- priority for construction of cogeneration plants
- implementation of preferential policy for the development of renewable energy
- upgrading of TPPs with more than 20,000 h operation
- reduction of transmission losses
- greater penetration of natural gas in the residential sector.

59. ***Renewable energy sources (RES).*** Bulgaria has a significant reserve of low-grade lignite and sub-bituminous coal that is planned to be mined for future energy use, but its share of Bulgaria's future energy mix is unclear. Unless new technology is developed that can mitigate the resulting GHG emissions, increased use of coal has the potential to increase Bulgaria's GHG emissions. RES, in particular biomass (forest), small hydro, geothermal and solar, also exist, but their high investment costs are seen as a barrier. Their maximum collective contribution is estimated to be 6 per cent of Bulgaria's energy supply, however no official RES targets have been set.

60. The draft new Energy Law (awaiting final approval in 2003) provides incentives to increase electricity production from RES and combined heat and power (CHP). The RES measures include: purchasing RES generated electricity (under 10 MW) at preferential buy-back rates; priority access to the electricity grid for RES electricity producers ; and the use of green certificates based on a minimum compulsory 10-year quota for electricity production from RES. Similarly, incentives exist to stimulate CHP. These include: purchasing CHP-generated electricity (if not less than 50 per cent is intended for sale for heating, air conditioning or hot water) at preferential prices; and the use of green certificates based on a minimum compulsory 5-year quota for electricity production from CHP.

2. Energy use in the residential and commercial sector

61. After a steep fall to one quarter of the 1988 levels, CO_2 emissions from energy use in other sectors (mainly in the residential sector) accounted for 3 per cent of total GHG emissions in 2000. According to the figures in the NC3, in 1999, the residential sector still consumed about 30 per cent of the domestic energy demand, and the service sector consumed about 13 per cent. As most heating systems do not meet modern efficiency standards and home insulation is generally poor, the potential to reduce emissions further in the residential sector is assessed as high. However, as the economy improves, it is expected that some of the energy savings will be offset by higher demand.

62. In 1999, district heating systems operated in 21 cities. Electric heating is also a common mode of domestic heating. Public buildings use centralized (generally oil and natural gas) heating systems. Energy efficiency measures have been identified for the residential and centralized district heating sectors. District heating, home insulation, energy consumption controls and street lighting have been identified as areas where substantial energy and GHG reductions could be achieved. As natural gas prices have been relatively high, there has been little conversion to natural gas in this sector. Residential fuelwood consumption has tripled in the last 2 years, but still represents a small portion of the residential energy supply.

63. The Municipal Energy Efficiency Network (Ecoenergy) (MEEN) was established in 1997 as a collective initiative by the mayors of 23 municipalities. Its main goals are to coordinate the efforts of member municipalities to consider and improve energy efficiency; and to reduce energy costs for municipalities and individual households. MEEN currently covers approximately 68 per cent of the population. The network has initiated several pilot projects with the aim of developing a set of actions, ranging from policy development to economic instruments and technical measures, that a municipality could employ to reduce its energy consumption. The best-known pilot project is the Energy Efficiency Demonstration Zone in the city of Gabrovo. It comprises six projects in two areas: capacity-building (i.e. municipal energy efficiency policy; specialized training in energy efficiency; and overcoming financial barriers to energy efficiency) and demonstration projects (i.e. street lighting; district heating and end-use; and four building types – hospital, school, residential building and industrial building). An information database has been developed, and the lessons learned from the Gabrovo pilot have been used to initiate other pilots and establish energy efficiency programmes in 18 municipalities. This initiative appears to hold much promise for reducing GHG emissions at the household and municipality level.

D. Industry

64. Including energy transformation, industry accounts for more than 50 per cent of domestic energy consumption. In 2000, energy-related GHG emissions from industry accounted for 13 per cent of total GHG emissions, and non-energy-related emissions from industrial processes accounted for another 7 per cent. As a result of the economic transition process, the Bulgarian industrial sector has undergone dramatic change over the last decade, including a large decline in heavy industry, the shutdown of inefficient operations and the modernization (i.e. efficiency improvements) of potentially profitable

operations. These changes are reflected in the Bulgarian GHG inventory, which shows a 70 per cent reduction of GHG emissions from industry in the period 1988–2000 (energy-related –77 per cent; non-energy-related –48 per cent). The NC3 attributes 4,300 Gg CO_2 reduction to plant closures, 2,000–4,000 Gg to restructuring (including privatization-related efficiency improvements) and 2,500–6,000 Gg to industry-targeted energy efficiency programmes.

65. Currently, Bulgaria's major industries include the chemical and petrochemical industry (23 per cent of GDP); food-processing, beverages, tobacco (14 per cent); textile and other light industry (12 per cent); mechanical engineering (10 per cent); metallurgy (8 per cent); ore mining (5 per cent); and electrical and electronics (4 per cent). Approximately 70 per cent of industrial assets have been privatized. The current priorities for industrial development are to achieve stable economic growth; to complete restructuring and privatization; and to develop enterprises that are competitive in the EU and other markets.

66. Through programmes delivered by EEA and other institutions, energy efficiency know-how is available to Bulgarian industry. The Programme for Energy Efficiency Improvements in Industry categorizes measures into three cost groups. Low-cost measures with an internal rate of return of less than 1 year have been implemented. Also, an Energy Efficiency Centre has been established that offers energy audit and management services. The review team noted that lack of investment appears to be the major barrier to further implementation.

67. The review team noted that reporting on PaMs in the industrial sector is highly aggregated in the NC3. The NC2 provided both greater detail on the individual PaMs by industry subsector and a broader scope of activities, including non-CO_2-related PaMs. PaMs in the field of fluorinated gases were not reported.

E. Transport

68. GHG emissions from fuel combustion in transport dropped by 48 per cent between 1988 and 1991 and have generally remained stable since. In 2000, the transport sector accounted for 9 per cent of total GHG emissions. Bulgaria's road, rail, marine and air transportation networks are being restructured and upgraded to fulfil EU requirements. This huge undertaking, estimated to cost €4.2 billion, is defined in the National Strategy for Development of the Transport Sector which has the following priorities: harmonization of national legislation and transport regulation with those of the EU member states; development of transport infrastructure; and implementation of structural reform and privatization in the transport sector. During 1997–2001, many acts were prepared to allow reforms in the transport sector to proceed and to harmonize national legislation with that of the EU.

69. The Ministry of Transport and Communications has developed the Programme for Transport Infrastructure Development for the Period 2001–2005. Whereas the NC3 recognizes that it could be challenging to address the potential environmental issues, the review team was informed that several of the Programme's goals explicitly take environmental considerations into account. They include: developing environmentally sound transport systems; electrifying railway transport; and promoting and accelerating the development of combined transport. Measures have been identified that could reduce environmental impact, such as: mandatory environmental impact assessments of all transportation infrastructure projects; limiting the increase of transit interurban car traffic; improving urban bus transport; promoting the use of rail transport; extending rail electrification; promoting the use of combined transport; and enhancing the use of maritime and inland waterway transport. The review team noted that as most of the projects are still in the planning stage, the net effect of the resulting increased transportation activity on GHG emissions was difficult to assess.

F. Agriculture

70. In 2000, GHG emissions from agriculture accounted for 9 per cent of total GHG emissions. The two main sources were N_2O emissions from agricultural soils (54 per cent) and CH_4 emissions from enteric fermentation (29 per cent). Over the last decade, both crop production and livestock population have declined dramatically as a result of factors such as dismantling of collective agricultural production; restitution; price liberalization; increased fertilizer prices; and declining rural population. Consequently, this has reduced the GHG emissions from enteric fermentation (–59 per cent), manure management (–59 per cent) and nitrogen fertilizer application (–63 per cent).

71. In 1999, the Council of Ministers accepted the National Agriculture and Rural Development Plan for 2000–2006 (NARDP) developed by MAF. Its main goals are to improve production efficiency, to promote a competitive food-processing sector, and to implement sustainable rural development. The National Agricultural Advisory Service, under MAF, is responsible for the implementation of sustainable development of agriculture in rural areas, and has the following long-term objectives: to improve the quality of environmental products; to protect and upgrade the environment and natural resources in rural areas; and to improve the social and financial status of rural communities.

72. The review team acknowledged the progress made between the NC2 and the NC3, in building the institutional and legislative framework needed to implement NARDP and the EU Common Agricultural Policy (CAP). New legislation was developed, a Code of Good Environmental Practices was prepared that set the minimum requirements for farmers to be eligible to participate in the EU accession programme SAPARD, and a new agro-statistical unit was formed to track agricultural statistics better and assess progress. Attention has been centred on harmonizing Bulgarian legislation with EU requirements, and providing training and extension services to agriculture producers in order to stimulate sector development.

73. Over the last years, attention has been focused on harmonizing Bulgarian legislation with EU requirements. The review team recognized that much work is needed to help stimulate the agriculture sector's development. Training and extension services are therefore being provided to agricultural producers.

G. Forestry and land-use change

74. In 2000, CO_2 removals by forestry were estimated to be 11 per cent of total GHG emissions. Between 1990 and 2000, the total forest area in Bulgaria increased from 3.77 to 3.91 million hectares. Forest composition is approximately two thirds deciduous and one third coniferous species. Its average age is 49 years and the mean annual increment has been increasing. In 2000, 34 per cent of the forest area was either in protected and recreational forests, or forests in protected areas. Over the last few years, a drier climate has been observed and the habitat of some species appear to be moving upwards on mountain slopes. There was a particularly high incidence of forest fires in 2000 and 2001.

75. A new Forest Strategy is under development. Currently, Bulgaria's main priorities are: conservation and expansion of forest area; sustainable forest development and protection of biodiversity; multiple forest use; and the introduction of environmental certification of forest practices. Two new acts, the Forestry Act and the Forestry Restitution Act, were adopted in 1997 and secondary legislation has been developed over the last few years.

76. The NC2 identified three main types of forestry mitigation measures: increasing forest area (afforestation); maintaining existing stands; and use of forest biomass for energy (partly replacing fossil

fuels). Of these three, afforestation[6] is the main GHG-specific mitigation measure. NC3 states that all of the forestry measures listed in the NCCAP have been implemented. The review team was informed that while official annual harvest rates are below the mean annual increment, it is likely that there is some fuelwood harvest that is not captured in the official statistics.

H. Waste management

77. CH_4 emissions from waste management accounted for 8 per cent of total GHG emissions in 2000. Since 1992, GHG emissions have declined by 69 per cent, mainly as a result of reduced waste generation. This is attributed to the economic downturn, reduced consumption and improved monitoring of waste management by municipalities.

78. For the most part, Bulgaria's current systems for solid waste management and wastewater treatment are either very basic or non-existent. For both environmental and health reasons, this area is expected to undergo much improvement over the next decade. The chapters on the EU directives on waste and waste management have just been finalized. With substantial support (70–75 per cent of costs) from the EU Instrument for Structural Policies for Pre-Accession (ISPA), numerous wastewater treatment plants and engineered landfills are under construction in Bulgaria.

79. MoEW, together with EEA and the 15 regional inspection divisions, develop and implement the country's waste management strategies, legislation, international programmes, monitoring and control. In 1997, the Limitation of the Harmful Impact of Waste upon Environment Act was adopted and secondary legislation was developed the following year. The Ministry of Regional Development and Public Works is responsible for the operational aspects of waste management such as the design of disposal facilities for municipal solid waste (MSW). A new Waste Management Law is undergoing the first stage of approval in the National Assembly. This law includes rules on separate collection, recycling of packaging, management of hazardous waste, fees for importers, end-of-life requirements for batteries and vehicles, etc.

80. The National Waste Management Plan specifies the mitigation measures for the waste sector. The main objective of Bulgaria's waste management policy is to prevent waste generation and thereby avoid future GHG emissions and other environmental problems. A target generation rate (350 kg per capita per year) has been set; new waste disposal fees have been established; regulations have been developed to establish producer responsibility; waste separation, recycling, and reuse are encouraged; and public awareness campaigns have been undertaken. The corresponding GHG benefit is estimated to result in 550 Gg CO_2 equivalent of emissions avoided by 2005.

81. The second objective is to encourage environmentally sound disposal of waste that cannot be recycled or reused. This includes composting and landfilling with gas collection. New landfills are being constructed with liners and gas collection systems. The review team was informed that Bulgaria's MSW has a substantial biodegradable content, and composting appears to be a viable alternative for this portion of waste. Several composting pilot projects have been undertaken, and regional composting installations are been planned.

82. Wastewater treatment plants are being developed for towns or cities with populations over 10,000 people. Several existing plants are being reconstructed and over 70 new plants are being built. The review team noted that details on sludge disposal or industrial effluent treatment were not reported.

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[6] Afforestation is planting of forests on non forest lands, while reforestation is planting on forest land after fires or forest cut.

IV. PROJECTIONS AND THE TOTAL EFFECT OF POLICIES AND MEASURES

83. The NC3 provides a set of projections of the future levels of GHG emissions, based on model calculations. It includes projections by gas and by sector, and also projections of the overall emission levels. The review team noted that reporting on projections broadly conforms with the UNFCCC reporting guidelines. In particular, projections cover all sectors and GHGs (CO_2, CH_4 and N_2O, but not fluorinated gases). Projections for the transport sector were included in the energy sector and were not reported separately. To improve transparency, the review team was provided with a separate table of projections for the transport sector during the visit. Projections of emissions from international bunkers were not reported separately, although this was the case in the NC2. The time horizon for projections is 2015 and emission levels are projected for the years 2005, 2010, 2015, amended by an extrapolation to 2020. CO_2 removals by forestry were projected to 2035.

84. The review team acknowledged that projections in the "with measures" and "with additional measures" scenarios were broadly consistent with the inventory data that had been submitted in 2001. The base year for these projections is 2000. The "without measures" scenario was taken from the NC2 and thus differs from actual data since its base year 1995. Inventory and projection data are represented jointly in sectoral diagrams, as requested by the UNFCCC guidelines.

85. The overall GHG emissions were presented as a total, and expressed in CO_2 equivalent, using the IPCC default GWP factors. During the visit the review team was provided with an updated aggregate projection, which was developed from the updated GHG inventory.

86. The overall responsibility for the Bulgarian GHG emission projections lies with MoEW. Projections of emissions in the energy sector were commissioned by MoEW and MEER and prepared by the Energy Institute JSC with input from several institutions. The projection of electricity demand, according to the Energy Law, was prepared by the national power transmission company (NEK). Demand forecasts for other forms of energy (heat demand, primary energy demand, final energy consumption) were taken from the National Energy Strategy (minimal scenario). The industry sector was analysed by the Ministry of Economy, MAF was responsible for projections in the agriculture and forestry sectors, and MoEW prepared the projections in the waste sector. Some input assumptions (e.g. GDP growth) were prepared by the Agency for Economic Analysis and Forecasts (within the Ministry of Finance) in cooperation with IMF and the currency board.

A. Scenarios, input assumptions and methodology

87. The NC3 presents two main scenarios: a "with measures" scenario, which comprises all implemented and adopted PaMs within the NCCAP, and a "with additional measures" scenario, which takes into account the planned PaMs as well. The third scenario ("without measures") is identical to the 1998 baseline scenario as reported in the NC2, and describes energy-intensive economic development. It also assumes relatively high GDP growth (6.5 per cent in the early years, decreasing to 5.2 per cent by 2020), and a steady increase in energy demand. The review team noted that both assumptions proved unrealistic at the time of the NC3, which was the main reason for significant discrepancies of up to 36 per cent between the projections in the "without measures" scenario and actual emissions in the period 1996–2000.

88. The construction of the 2001 "with measures" scenario places emphasis on the energy sector, in which the PaMs are elaborated in detail (power system expansion plan), whereas projections for other sectors encompass only separate measures, without long-term implementation programmes. Projected GDP growth in this scenario varies from 5 per cent (2001) to 3 per cent (2015), electricity demand grows by 26 per cent, heat demand by 15 per cent and final energy consumption by 21 per cent (which is

20–40 per cent lower than in the "without measures" scenario), while energy intensity of GDP decreases by 20 per cent until 2015. A population decrease from 8.2 million (1998) to 7.4 million (2015) is forecast; it had already declined to 7.974 million by 2001, according to the census carried out in that year. Additional information on the assumptions relating to fuel prices were requested by the review team and provided by host country officials during the country visit (see table 9). Following a proposal by World Bank experts, fuel prices are assumed in general to decrease from their current high levels.

89. The 2001 "with additional measures" scenario builds on the same assumptions as the "with measures" scenario (GDP, demand). It encompasses additional (planned) PaMs in the energy sector (modified development of power sector). No effects of additional measures have been projected in the industrial processes, agriculture and forestry sectors, whereas the effects of the implementation of the EU directives on landfill on the CH_4 emissions from waste management were roughly estimated.

90. **Key assumptions** for "with measures" and "with additional measures" scenarios were related to MEER's Power Sector Expansion Schedule. The "with measures" scenario envisages a decommissioning of units 3 and 4 of Kozloduy NPP by 2007, as a result of stricter safety requirements, whereas in the "with additional measures" scenario both units will continue operating until 2012. The "with measures" scenario also assumes a stronger increase in electricity exports, whereas the "with additional measures" scenario assumes a moderate level of exports. Key assumptions are shown in table 9.

Table 9. Key assumptions for the preparation of the different scenarios

Scenario	With measures	With additional measures
Electricity exports	3.2 TWh in 2000, 8 TWh in 2004 and thereafter	3.2 TWh in 2000, 4.2 TWh in 2002 and thereafter
Kozloduy NPP decommissioning	Units 3 and 4 closed by 2007	Units 3 and 4 closed at the end of their lifetime (2012)
GDP (annual growth)	5 per cent in 2000, 3 per cent in 2015	
GDP (energy intensity)	27.4 TJ/Million Bulgarian Lewa in 2005, 22.4 in 2015	
Population	Drop from 8.2 million (1998) to 7.4 million (2015)	
Energy prices		
– Natural gas	13 US cent/m^3 in 2000, 8 in 2005, 7.5 in 2010 and after	
– Oil and products	18.06 US$/boe, –7 per cent for 2002–2005, –1.4 per cent for 2006–2020	
– Domestic lignite (Maritsa East)	6.07 US$/t in 2001, –0.9 per cent decrease for 2002–2015	
– Imported coal	9.3 US$/boe, –1 per cent decrease for 2000–2010	
– Electricity price	0.053–0.098 BGL/kWh (night-day) for households; 10 per cent rise in 2003, constant thereafter	

91. The review team was informed that, because of limited resources, a quantitative sensitivity analysis of uncertainties in the input assumptions was not carried out. The review team noted that key uncertainties related to GDP growth, the status of nuclear units, electricity exports to Turkey and domestic energy demand forecast. During the discussions with national experts, the review team gained the impression that most of the assumptions taken relating to these uncertainties tend to project the maximum GHG emissions which were based on a relatively high forecast of energy demand growth. The review team learned that future work in the area of GHG emission projections will depend very much on the availability of funds.

92. In the forestry sector, two different scenarios were developed, pursuant to the provisions of the Forestry Act. The "optimistic scenario" envisages no change in the afforested area until 2035 and moderate harvesting; whereas in the "pessimistic scenario" the forested area is projected to decrease by 5 per cent until 2020, due to higher annual felling. The team was informed that because harvesting has

been lower than planned during the last decade, the future development of the CO_2 removals by forestry appears to be following the "optimistic scenario".

93. ***Methods used.*** Methodology for preparing the projections in the energy sector was the most detailed, since it makes the most significant contribution to GHG emissions. The main software used was the DOS version of the ENPEP package, consisting of several modules: MACRO (macroeconomic projections), DEMAND (forecasting final and useful energy demand by sectors), BALANCE, WASP and IMPACTS. BALANCE is a non-linear equilibrium model that matches supply and demand in the energy sector and all its subsectors using a market-based simulation approach. WASP is a linear optimization model that is used to determine the least-cost power system expansion schedule, with respect to various constraints in the system. The purpose of the IMPACTS module is to determine the impacts (pollutant emissions, waste generation, etc.) from energy-related activities in the energy sector, and in transport, industry and agriculture. The review team was informed that the IRP Manager model was used by NEK to forecast electricity demand. Projections in other sectors were built on expert judgments, and based on sectoral plans and strategies.

B. Projected emission trend by sector

94. Aggregate emissions from the energy sector[7] in the "with measures" scenario are projected to grow from 50,000 Gg CO_2 equivalent in 2000 to 91,000 Gg CO_2 equivalent in 2020, which means an increase by 85 per cent in the period 2000–2020. If additional measures in the power sector are implemented ("with additional measures" scenario), a further reduction in aggregate GHG emissions of 6–8 per cent of the "with measures" scenario level can be achieved.

95. The projections for the **transport sector** were extracted from the overall emissions of the energy sector. The results indicate an increase in GHG emissions from fuel combustion in transport by 76 per cent during the period 2000–2020, i.e. an annual growth rate of 2.9 per cent. Taking into account significantly higher growth rates observed in the transport sector of other countries with economies in transition, the review team felt that future national communications would benefit from a more elaborated projection of emissions from this sector.

96. GHG emissions from **industrial processes** (excluding energy-related emissions) are expected to increase by 82 per cent from 2000 to 2020 ("with measures" scenario). As a result of the ongoing restructuring processes in the industry sector, a decrease of industry's share in Bulgaria's GDP is forecast, from 36 per cent to 31 per cent in the period 2000–2020. The restructuring process is expected to continue the present trend of shutting down obsolete and energy-intensive industries, as opposed to the expansion of other sectors (especially services). No additional measures ("with additional measures" scenario) were considered in the industry sector.

97. Emission projections in the **waste management** sector for the period 2000–2020 in the "with measures" scenario reveal an increase in aggregate emissions by a factor of 2 (from 5,100 to 10,300 Gg CO_2 equivalent). The "with additional measures" scenario shows potential for an additional 20-24 per cent reduction in emissions, based on expert judgments. The team was informed that emission projections from the waste sector will be revised as a result of a number of additional PaMs (solid waste treatment, CH_4 recovery and flaring) that are likely to be implemented.

98. Emissions from the **agriculture sector** are projected to grow from 18,000 to 25,400 Gg CO_2 equivalent by 2020. No additional measures were considered in this sector, mainly because of difficulties in predicting future developments. An additional source of uncertainties in this sector is the

[7] Emissions projected in the energy sector include CO_2, CH_4 and N_2O from fuel combustion, as well as fugitive CH_4 emissions from production, transport and distribution of coal, natural gas and crude oil.

EU accession process, which will have a major influence on trends in agricultural production. The team was informed that N_2O emissions from agricultural soils were probably overestimated as it was expected that there would be less fertilizer use and more organic agricultural production in the future.

99. When considering **CO_2 emissions or removals from LUCF**, the team noted that projections included only CO_2 removals by forestry; while land-use change and agricultural soils were not regarded. The optimistic scenario forecasts an increase of CO_2 removals to 27,000 Gg CO_2, while in the pessimistic scenario this parameter decreases to 13,000 Gg CO_2 in 2020. This would account for 16 per cent (optimistic) or 8 per cent (pessimistic) of aggregate GHG emissions in 2020.

C. Total effect of policies and measures

100. The total effect of adopted and implemented PaMs, assessed by the difference between the "with measures" and the "without measures" scenarios, ranges from 22 to 30 per cent of total aggregated emissions. However, the review team noted that this mainly results from the "without measures" scenario having 1995 as the base year, and huge differences in energy demand trends observed since 1995 (the projected energy demand in the "with measures" scenario is 23–43 per cent lower than in the "without measures" scenario).

101. The total effect of planned PaMs is obtained from the difference between the "with measures" and the "with additional measures" scenarios and ranges from 5–8 per cent of total aggregated emissions. The review team noted that the set of planned PaMs included in the "with additional measures" scenario of the projections chapter does not fully correspond to the list of planned PaMs as reported in the chapter on policies and measures. Moreover, the "with additional measures" scenario considers planned PaMs only in the energy and waste management sector; the effects of planned PaMs in other sectors were not estimated accurately enough to be incorporated.

102. The review team noted that the sum of individual effects of PaMs for every sector differs from the total sectoral effect, as reported in the projections chapter. The review team was informed that the main reasons were the inconsistencies in sector definitions between the PaMs and the projections chapter, as well as uncertain or unknown effects of individual PaMs. Furthermore, some of the PaMs listed in chapter 4 of the NC3 were mutually exclusive (e.g. phasing out nuclear units or keeping them in operation), and some measures mentioned in the projections chapter were not reported in the PaMs chapter (e.g. commissioning new TPPs which would use imported coal).

103. Some of the PaMs reported have the effect of increasing GHG emissions (e.g. phasing out NPPs, constructing new coal units). The review team was informed that these effects were also taken into account when estimating the projections of GHG emissions in individual scenarios, as part of the corresponding expansion strategy in the power sector.

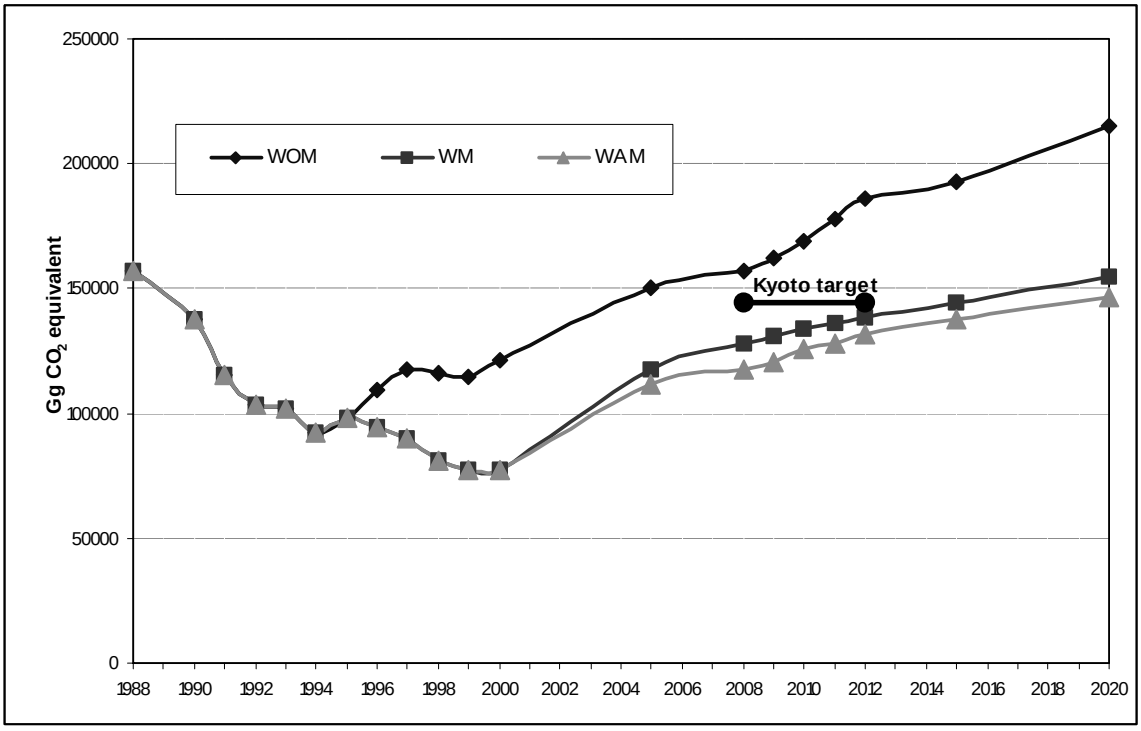
104. After projections for individual sectors were compiled, the totals were calculated for each gas, as well as aggregated into CO_2 equivalent emissions. Total emission trends are given in table 10. According to the NC3, CO_2 emissions should grow by 50–62 per cent, CH_4 emissions by 114–133 per cent and N_2O emissions by 64–67 per cent in the period 2000–2010. Aggregated GHG emissions are expected to grow by 62–72 per cent.

Table 10. Total GHG emissions: projections by gas

Year Emission (Gg)	2000	2010		2020	
		"With measures"	"With additional measures"	"With measures"	"With additional measures"
CO_2	48 440	78 563	72 759	90 007	83 455
CH_4	483	1 125	1 033	1 310	1 226
N_2O	61	102	100	121	119
Total (CO_2 equivalent)	**77 546**	**133 694**	**125 485**	**155 082**	**146 214**

105. The inventory data used in the NC3 indicated that the GHG emissions reduction target (equal to 92 per cent of the 1988 level) was 144,500 Gg CO_2 equivalent. The average annual aggregate emissions in the First Commitment Period (2008–2012) in two scenarios were: 133,400 Gg ("with measures"), and 124,600 Gg ("with additional measures"). The review team concluded that Bulgaria should be able to achieve its Kyoto target. Moreover, the 2003 "with measures" scenario indicates a substantial potential for emissions trading. Figure 2 presents the aggregated GHG emission trends for all three scenarios as reported in the NC3.

Figure 2. Total aggregate emission projections (CO_2 equivalent) and Kyoto targets



Note: WOM, without measures, WM, with measures, WAM, with additional measures.

106. Since the publication of the NC3, some projected trends have changed, and some of the statistical data have been improved. Furthermore, major recalculations on GHG inventory data have been carried out, with significant implications on the projection results. Therefore, in 2003 an update of total aggregate GHG emissions for the "with measures" scenario was developed, and the results were presented to the review team. The update used 2002 as its base year, and built on the same energy demand forecasts. Updated projections for the "with measures" scenario are shown in figure 2 (WM 2003). The review team noted that the updated projections indicated a significantly higher potential of about 30,000 Gg CO_2 equivalent for emissions trading.

V. VULNERABILITY ASSESSMENT, CLIMATE CHANGE IMPACTS AND ADAPTATION MEASURES

107. NC3 reporting on vulnerability assessment, climate change impacts and adaptation measures is based on studies and findings that were compiled during the preparation of the NCCAP between 1996 and 1998. The review team noted that most of these findings were already included in the NC2. The team was informed that the lack of financial support hindered further in-depth investigation in this field at the national level.

108. The **impact assessment** as reported in the NC3 focuses on agriculture and forestry in Bulgaria. It is built on climate change scenarios for different time horizons (2020, 2050 and 2080), using several outputs of the Global Circulation Model GCM (ECHAM4, HadCM2, CGCM1, CSORO-Mk2 and GFDL R-15). The review team noted that results from regional climatic models were not considered and uncertainties relating to the different scenarios were not assessed. The impact assessment for the agricultural sector was based on DSSAT (Decision Support System for Agrotechnology Transfer) which includes CERES (simulation model for maize and winter wheat). The results projected a decrease in simulated maize yield, mainly due to a shorter growing season and further decreased precipitation.

109. The review team was provided with the results of a meteorological analysis indicating a significant decreasing trend in mean annual precipitation in Bulgaria for the period 1901–2000. The review team was informed that 30 per cent of the soil in Bulgaria is prone to wind erosion. Although it is expected that the pattern of river flow will change (increase in autumn and winter, decrease in summer), vulnerability and adaptation options in this area have not yet been investigated.

110. The review team acknowledged the quality of the vulnerability assessment for the two sectors agriculture and forestry, and encourages Bulgaria to broaden the scope of its impact assessment on other sectors such as human health, water resources and tourism.

VI. RESEARCH AND SYSTEMATIC OBSERVATION

111. The NC3 provides an overview of research and systematic observation activities in the field of climate change, which are carried out by the Energy Institute and various institutes of the Bulgarian Academy of Sciences, including the National Institute of Meteorology and Hydrology (NIMH).

112. ***Research.*** Research topics include: climate process and climate system studies (palaeoclimatic studies), modelling and prediction (general circulation models), impact of climate change (vulnerability), socio-economic analysis (impact assessment and response options), and mitigation and adaptation technologies. The research budget comes mainly from international sources, including EU research programmes, and to a minor extent from the state budget.

113. ***Systematic observation.*** NIMH is responsible for Bulgaria's participation in the Global Climate Observing System (GCOS). It provides the Word Meteorological Organization with all categories of relevant data (meteorological, atmospheric, oceanological and terrestrial). The review team noted that NC3 reporting of summary information on activities related to GCOS generally follow the UNFCCC reporting guidelines. Data on terrestrial observation do not fully comply with the reporting guidelines, since the detailed table is missing (see table 3 in document FCCC/CP/1999/7, page 105).

114. During the visit the review team was informed that the meteorological equipment used for measurement and observation was very poor and obsolete. Host country representatives stressed the urgent need for investments in replacement and upgrade, particularly for GCOS activities.

VII. EDUCATION, TRAINING AND PUBLIC AWARENESS

115. ***Education and training.*** The NC3 presents a variety of environmental education programmes in primary, secondary and higher education as well as training programmes and participation in international activities. Compared to the NC2, which reported mainly on environmental education, the NC3 highlighted climate change-related education and training.

116. Under the responsibility of the Ministry of Science and Education, climate change is incorporated into the curriculum of environment, agriculture and forestry programmes in universities and technical schools, and into some secondary school subjects, such as biology. The focus is on teaching "what is human-induced climate change, its potential impacts and how to help our forests adapt". Also, there are a few master's degree projects that relate to climate change.

117. ***Energy efficiency training*** is an important vehicle that is used to communicate climate change concerns. Both EEA and EnEffect (an NGO) have been involved in the development of energy efficiency centres and the training of energy efficiency managers, planners and technical experts. The strong connection between energy consumption and climate change is used to build issue awareness and promote efficiency improvements.

118. ***Public awareness.*** The NC3 demonstrates that more attention has been placed on education of the general public since the NC2. The review team was informed that MoEW enabled public access to information on Bulgaria's NCCAP, the Kyoto Protocol, JI and climate change in general. For this purpose, it used a variety of vehicles, including a series of articles in newspaper and journals, TV and radio broadcasts, special events (Earth Day) and greater use of web-based communication (e.g. the MoEW web site). Web-based communication is preferred to printed materials because of its lower costs, although it was noted that most of the population does not yet have Internet access. The review team was informed that because of limited funds and capacities, the involvement of NGOs in the preparation of the NC3 has significantly declined since the NC1. Good cooperation between the MoEW and some major NGOs has been established, and NGOs are being consulted in the current revision of the NCCAP.

119. ***Participation in international activities:*** With the assistance of external funds, government representatives, NGOs and other Bulgarian experts are building capacity and participating in UNFCCC activities (e.g. Conferences of the Parties and meetings of its subsidiary bodies; reviews of inventories and national communications). The United Nations Development Programme (UNDP) is currently supporting a national capacity assessment of the three international conventions on biodiversity, desertification and climate change.

VIII. CONCLUSIONS

120. When reviewing the information reported in the third national communication of Bulgaria, the review team concluded that the document complies well with the provisions of the UNFCCC guidelines. The team was of the opinion that, in combination with the annual GHG inventory submission and some updated information on the Bulgarian GHG projections, the NC3 provided a comprehensive overview of the current status of climate policy in Bulgaria.

121. Given the challenges of both the economic transition process and the EU accession process, climate policy does not rank very high on the political agenda of Bulgaria. Correspondingly, the review team noted a low budget and limited administrative capacity in this field. Nevertheless, Bulgaria joined the Kyoto Protocol, is firmly committed to its goals and expresses its intention to make use of its flexibility mechanisms.

122. It is expected that Bulgaria will meet its emissions target under the Kyoto Protocol, mainly as a result of economic restructuring and associated reductions in energy consumption and improvements in energy efficiency. Between 1988 and 2000, the overall GHG emissions declined by 55 per cent excluding LUCF and 60 per cent including LUCF. The greatest emission reductions were achieved in energy use in industry (–76 per cent) and in the residential/commercial sector (–75 per cent).

123. GHG emissions are projected to increase slightly between 2000 and 2010, resulting in a GHG emission reduction of about 10–30 Mt CO_2 equivalent below the Kyoto target. Nonetheless, the review team gained the impression that major domestic GHG reduction potentials have not yet been fully exploited. Attracting investments will be crucial for progress in implementing further mitigation policies and programmes. The uncertain future of units 3 and 4 of Kozloduy NPP and the implementation of extensive Pan-European transport development plans pose significant uncertainties on these projections.

124. The review team noted that whilst the Ministry of Environment and Waters is responsible for the coordination of the national climate change policy, other important ministries actively integrate climate policy into their policy fields. This is particularly true for the Ministry of Energy and Energy Resources which has the main responsibility for energy policy. In 2000, an Interministerial Committee for the National Action Plan on Climate Change was established. The team concurred with the views expressed by several host-country representatives on the need for further strengthening of the existing institutional arrangements.

125. The review team acknowledged the submission of the GHG inventory in CRF format and a national inventory report in 2003. It noted with appreciation that the NC3 chapter on inventory describes some methodological aspects of the Bulgarian GHG inventory, details on the inventory reporting under the UNFCCC, some of the factors underlying the emission trends, and the history of recalculations. It encouraged Bulgaria to harmonize the methodology for the different years, to recalculate the historic emission trends where necessary and to address the existing gaps.

126. The team noted that the national energy strategy was revised in 2002 and that the National Action Plan on Climate Change will be revised in the course of 2003–2004. Both documents will emphasize the need for consideration of climate change objectives in the shaping of future energy policy. Significant GHG emission reductions and other environmental benefits can also be achieved in waste management, if the list of planned and ongoing activities receives sufficient support. Also, the forestry sector offers a substantial potential for CO_2 removals, if maintenance and enhancement of forest sink capacity is included in forestry management objectives.

127. Bulgaria's success stories include a remarkable decoupling of GDP growth from GHG emission trends, a successful launch of municipal energy efficiency planning through a cooperation of the Ministry of Energy and Energy Resources, the Energy Efficiency Agency and the Municipal Energy Efficiency Network EcoEnergy, initial steps to increasing the use of renewable energy sources (biomass use for heating), successful installation of several national funds for environmental protection, the identification of several mitigation options and JI projects, and JI capacity-building.

128. The review team commended Bulgaria on its ongoing work in the field of public awareness and outreach. It also felt that the long tradition of climate science by research institutions is commendable, and new funding efforts are needed to maintain these activities at this level. In addition, research on vulnerability and adaptation should be intensified and extended to impact assessments in the field of human health, water resources and tourism.

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