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## **POLAND**

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

Review team:

Mohammed El Raey (Egypt)

Jiri Balajka (Slovakia)

Bert Borst (Netherlands)

Mijke Hertoghs (UN-ECE)

Harald Diaz-Bone (UNFCCC secretariat, coordinator)

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

### A. Introduction

1. The secretariat received Poland's third national communication under the Framework Convention on Climate Change, hereinafter referred to as the NC3, on 30 November 2001. An in-depth review was carried out between February and July 2003, including a visit to Warsaw from 24 to 28 February 2003. The review team consisted of Mr. Mohammed El Raey (Egypt), Mr. Jiri Balajka (Slovakia), Mr. Bert Borst (Netherlands), Ms. Mijke Hertoghs (United Nations Economic Commission for Europe) and Mr. Harald Diaz-Bone (UNFCCC secretariat, coordinator).

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

### B. National circumstances

3. **Geography:** With a national territory of 312,685 km<sup>2</sup>, Poland is one of the largest countries in central Europe. It is situated on the southern coast of the Baltic Sea and borders on Russia's Kaliningrad exclave in the north, Lithuania, Belarus and Ukraine in the east, Slovakia and the Czech Republic in the south, and Germany in the west. The landscape in Poland is predominated by vast lowlands. Farmland and forests are the prevalent forms of land use, accounting altogether for almost 89 per cent of the national territory. The country has a variety of natural resources including coal, copper, zinc, iron, gypsum, lignite, and some oil and natural gas reserves. The two longest rivers crossing the country northward are the Vistula (1047 km) and the Odra (854 km). Compared to other European countries, Poland is poor in water resources; retention reservoirs are rather small and do not sufficiently protect against droughts and floods.

4. **Demography:** Poland's slight population growth from 37.89 million in 1988 to 38.64 million in 2000 is characterized by a decreasing birth rate and constant emigration. Long-term demographic trends up to 2030 show an insignificant variation in the population, which is expected to remain between 38 and 39 million, with a downward tendency. Because of increased life expectancy, the proportion of elderly people is expected to increase to 24 per cent in 2030. Less than 62 per cent of the population lives in towns and cities.

5. **Economy:** Poland has undergone a successful economic transformation since the beginning of the 1990s. The economy grew by some 5 per cent per annum on average between 1992 and 2000. Inflation showed an impressive decline, to just over 1 per cent in 2001. The rapidly developing private sector is now responsible for 70 per cent of the country's economic activities. The service sector generates more than half of total GDP (52.6 per cent in 1999, compared to 47.2 per cent in 1995), while industry generates less than one quarter (23.6 per cent in 1999, compared to 27.6 per cent in 1995). Poland will become a full member of the European Union (EU) in May 2004. Nevertheless, despite the remarkable record of achievement over the past decade, Poland faces considerable economic challenges in the period ahead. Overall economic growth slowed to less than 1 per cent in 2001, and unemployment rapidly rose to 16 per cent. Particularly the agriculture sector, in which about one fifth of all Poles are employed, lags behind the transformation process. Agriculture and forestry have mostly preserved their traditional extensive nature; their share of GDP dropped from 6.0 per cent in 1995 to 3.4 per cent in 1999. Almost one quarter of the population still lives on small, inefficient farms. The income of these

households declined during the second half of the 1990s and they will be confronted with further challenges during the EU accession process.

**Table 1. Main macroeconomic indicators and GHG emissions for Poland<sup>a</sup>**

	1988	2000	Change (%) <sup>b</sup> 1988–2000
Population (millions)	37.89	38.64	+ 2.1
Gross domestic product – GDP (billions US\$ of 1995) <sup>c</sup>	272.11	348.35	+28.0
Industrial production index (1995=100)	121.00	143.50	+18.6
Total primary energy supply – TPES (Mtoe <sup>d</sup> )	127.73	90.05	–29.5
Electricity consumption (TWh)	134.98	124.58	–7.7
Greenhouse gas (GHG) emissions <sup>e</sup> (Tg <sup>f</sup> CO <sub>2</sub> equivalent)	565.26	386.19	–31.7
GHG emissions per capita (Mg CO <sub>2</sub> equivalent)	14.93	9.99	–33.1
GHG emissions per GDP unit (kg CO <sub>2</sub> equivalent per US\$ of 1995)	2.08	1.11	–46.6

<sup>a</sup> Data for population, GDP, TPES, and electricity are from “Energy balances of OECD countries, 1999–2000”, OECD/IEA, Paris, 2002. GHG data are from the Polish inventory submission in 2002.

<sup>b</sup> Difference of 2000 and 1988 values in per cent of 1988 values.

<sup>c</sup> Calculated using the method of purchasing power parities (PPP).

<sup>d</sup> Millions of tonnes of oil equivalent.

<sup>e</sup> Without accounting for land-use change and forestry (LUCF).

<sup>f</sup> One teragram (Tg) is equal to 1,000 gigagrams (Gg) or one million tonnes (Mt).

6. **Energy:** Since 1988, Poland’s energy profile has changed considerably. Between 1988 and 2000, the total primary energy supply (TPES) decreased by almost 30 per cent; the consumption of solid fuels (mostly hard coal) fell by 40 per cent. The share of hard coal in TPES decreased considerably from 67.6 per cent in 1988 to 52.4 per cent in 1999 but all other primary energy sources increased their shares (brown coal 11.1 to 13.8 per cent, petroleum 11.5 to 18.9 per cent, natural gas 8.1 to 10.3 per cent, renewable energy sources (RES) 1.7 to 4.6 per cent). The reduction in per capita GHG emissions by about one third reflects these changes in the energy profile (see table 1).

7. **Political structure:** The Republic of Poland is a constitutional republic based on a mixed model of presidential and parliamentary power. The new democratic constitution passed in 1997 vests legislative power in the Parliament (Sejm) and the Senate, which jointly form the National Assembly. The supreme executive authorities are the President of the Republic and the Council of Ministers. The Council of Ministers, chaired by the Prime Minister, assumes responsibility over domestic and foreign policy. In 1999, a new three-level territorial system of administration came into force, dividing the country into 16 provinces (voivodships), 315 counties (poviats) and 65 cities, and 2,489 communes (gminas). Since 1996, Poland has been a member of the Organisation for Economic Co-operation and Development (OECD). In 1999 Poland joined NATO and began negotiating its full membership of the European Union (EU), which will come into force in May 2004.

8. **Institutional arrangements:** The Department of Ecological Policy within the Ministry of Environment is responsible for the coordination of the national climate change policy, while the Department of Environmental Protection Instruments coordinates the work relevant to the implementation of the flexible mechanisms and project-based activities. The Polish UNFCCC Executive Bureau, located in the Air Protection and Climate Convention Department at the National Fund for Environmental Protection and Water Management, has the function of a national secretariat to the United Nations Framework Convention on Climate Change (UNFCCC). The Department of Energy Security within the Ministry of Economy, Labour and Social Policy holds the main responsibility for energy policy.

### **C. Key developments in climate change policies**

9. Poland ratified the UNFCCC in July 1994 and submitted three national communications, in 1994, 1998 and 2001. During the visit, the review team analysed the information provided in the NC3

together with data from the most recent inventory submission of Poland to the Convention secretariat, which contains data on trends in emissions for the period 1988–2000. The results of this analysis suggest that Poland contributed to achieving the aim of the Convention, as its total GHG emissions decreased by 32 per cent in the period from 1988 to 2000, without considering CO<sub>2</sub> from LUCF, and by 35 per cent if CO<sub>2</sub> from LUCF is considered.

10. Accession to the EU has been set as the highest political priority for Poland. The negotiation process towards full EU membership started in 1998. In January and February 1999 the first technical phase of the negotiations on the environment chapter of the *acquis communautaire* began with the review of the environmental legislation system. The transposition of more than 170 EU legislative acts, some of which also directly or indirectly affect the national GHG emission profile, was completed in December 2002.

11. Given the challenges both of the economic transformation process and of the EU accession process, at the beginning of the 21st century climate policy is not seen as a political priority in Poland. Correspondingly, the review team noted a low financial budget and very limited administrative capacity in this field. Still, Poland expresses its intention to make use of the flexibility mechanisms of the Kyoto Protocol. Poland has undertaken several activities to mitigate emissions of GHGs; these activities were jointly implemented (AIJ) or joint implementation (JI) projects with Norway (coal to gas conversion in 30 non-industrial boiler houses, energy efficiency improvements in new residential buildings), with the Netherlands (heating system modernizations, district heating systems, biomass boiler installations) and with Canada (small hydropower plants). Poland intends to join the EU emissions trading market, starting in 2005.

12. In December 2002, Poland ratified the Kyoto Protocol, thus making a commitment to reduce its aggregate emissions of GHGs so that average annual emissions in the period 2008–2012 do not exceed its assigned amounts, calculated pursuant to its quantified emission limitation and reduction commitment inscribed in Annex B of the Protocol (6 per cent lower than the 1988 total GHG emissions level). Total GHG emissions (without LUCF) in Poland fell by 32 per cent between 1988 and 2000, largely reflecting the restructuring of its economy and energy sector. The greatest emission reductions were achieved in energy supply (–32 per cent) and energy use in the residential/commercial sector (–59 per cent). Nonetheless, the review team gained the impression that major domestic GHG reduction potentials have not been fully exploited, as Poland's GHG emissions intensity (e.g. per unit GDP, per capita) is high compared to that of western European countries.

13. In 2002, in conjunction with the ratification of the Kyoto Protocol, a number of preparatory arrangements were made. In order to have an advisory body to the Council of Ministers, a Council of Sustainable Development was established. It is chaired by the Minister of the Environment, and all other relevant ministries are represented. Membership will also be open to representatives of local government authorities, NGOs and other organizations. The first meeting was held in March 2003. In 2001, the Parliament adopted the second national environmental policy for 2003–2006. In 2002, the Council of Ministers adopted the national environmental policy for 2003–2006 with perspectives for 2007–2010 and the executive programme for the second national environmental policy. A draft of the national *Climate change strategy* and an amendment to the Energy Law for the implementation of the *Strategy for renewable energy* are currently being discussed. In July 2003, a national inventory report (NIR) for the year 2001 was submitted to the UNFCCC secretariat.

14. The review and the additional information provided during the visit allowed the review team to conclude that Poland's NC3 is a comprehensive document, reflecting the most important aspects of the

Polish climate change policy at the time it was prepared and published. It covers the GHG inventory, policies and measures, some sectoral projections and other issues required by the UNFCCC guidelines.<sup>1</sup>

## II. GREENHOUSE GAS INVENTORY INFORMATION

### A. Inventory preparation and reporting

15. The Ministry of Environment is responsible for preparing and reporting on the Polish national inventory and submits the relevant reports (common reporting format (CRF) and NIR) to the UNFCCC secretariat. On behalf of the Ministry of Environment, the Institute of Environmental Protection (National Emission Centre) collects and compiles all the data. For this purpose, published data from several relevant institutions, such as the Central Statistical Office, were used. Also, data from the Institute of Automobile Transport (engine fuel) and from the State Forest Enterprise (biomass increment) were taken into account. The review team was informed that the current institutional arrangements lacked a solid legal basis with respect to inventory data collection. This hindered the flow of information in some cases.

16. The NC3 provides data on the Polish GHG emission inventory for the base year 1988 and for the period from 1990 to 1999, and includes emission data for the gases carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), nitrous oxide (N<sub>2</sub>O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF<sub>6</sub>). An estimate for the CO<sub>2</sub> removal from land-use change and forestry (LUCF) in Poland is provided. CO<sub>2</sub> emissions from bunker fuels and from biomass are documented. The review team noted that the NC3 chapter on inventory does not describe the factors underlying the emission trends. However, the social and economic characteristics affecting the emission trends are reported in detail and on a sectoral basis in the NC3 chapter on national circumstances.

17. According to the 2003 NIR, the Polish GHG inventory has not been subject to any recalculations yet. Therefore, inventory data for the years 1988–1994 as presented in the NC2, in the NC3 and in Poland's latest inventory submission from 2002 are consistent. However, the review team noted that calculations for the different years were based on different methodologies: the years 1991, 1993 and 1995–1999 were reported according to the revised 1996 Intergovernmental Panel on Climate Change (IPCC) Guidelines,<sup>2</sup> whereas the years 1988, 1990 and 1994 were prepared according to the previous (1995) IPCC Draft Guidelines; the year 1992 was calculated according to the 1994 OECD/IPCC methodology. Furthermore, as a result of some country-specific methodological changes, the following emission trends are inconsistent and need to be recalculated:

- (a) CO<sub>2</sub> emissions from fuel combustion in transport does not reflect the actual growth in transport emissions due to methodological changes (see paragraph 27);
- (b) CO<sub>2</sub> emissions from LUCF show an artificial increase for 1998;
- (c) CO<sub>2</sub> emissions from the abandonment of managed lands were included in other subcategories for 2000, because of changes in forest site typologies;
- (d) CH<sub>4</sub> emissions from waste management show some artificial increases for 1996 and 1997;

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<sup>1</sup> "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.

<sup>2</sup> *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories*, IPCC, 2000.

- (e) N<sub>2</sub>O emissions from agriculture include manure management only since 1999;
- (f) N<sub>2</sub>O emissions from agricultural soils show an artificial increase for 1999.

18. In April 2002, Poland submitted its national GHG inventory to the UNFCCC in the CRF for the first time. Some detailed inventory data for the year 2000 were provided, as well as emission trend tables for the years 1988 and 1990–2000. The 2002 inventory submission included almost all the requested tables for the year 2000; tables not provided include 3.A–D (solvent use), 6.C (waste incineration) and 9 (completeness). The review team noted that no reference approach data for CO<sub>2</sub> emissions were provided, and thus no differences between the sectoral and the reference approach could be identified (tables 1.A(b) and 1.A(c)). The review team also noted that within the CRF tables, no information on recalculations (tables 8(a) and 8(b)) was provided.<sup>3</sup>

19. The review team acknowledged the submission of the GHG inventory in the CRF format and encouraged Poland to continue to improve the system, to harmonize the methodology for the different years, to recalculate the emission trends where necessary and to address the existing minor gaps.

20. The inventory for the year 2000 was generally assessed to be transparent. Uncertainties were documented only qualitatively. The team noted that a number of successive studies were performed on particular emission sources in Poland, with the aim of reducing uncertainty in the estimation of GHG emissions and removals. In particular, the review team was impressed by the amount and detail of country-specific elements that were developed in the estimation of GHG emissions from LULUCF. These elements included harvest data and estimates of unreported harvest, conversion and biomass expansion factors (BEFs), data on area of land subjected to land-use change, estimates of biomass loss (per hectare) data on land subjected to land-use change, fractions of biomass burned and subjected to decay, carbon content in soils, estimates of the distribution of land-use and management systems by soil types, and data on limestone use.

21. Except for the LUCF sector, where both country-specific and default IPCC emission factors were applied, mostly country-specific emission factors were used. Some national emission factors for industrial processes were supplied by the relevant industrial partners. Emission factors for CO<sub>2</sub>, CH<sub>4</sub> and N<sub>2</sub>O were derived from a number of different national studies. The following analysis of the GHG emission profile and trends is based on the data reported in the 2002 inventory submission.

### **B. Emission profile and trends**

22. The Polish GHG emissions profile shows a clear domination by the energy sector, with CO<sub>2</sub> as the main GHG. Overall emission trends in Poland show a clear downward tendency, mainly due to the economic transition process. Table 2 shows the emission trends by gas in the period from 1988 to 2000.

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<sup>3</sup> In July 2003, Poland submitted its NIR for the year 2001 to the UNFCCC secretariat. A centralized review of the Polish GHG emission inventory was carried out in September 2003.

**Table 2. GHG emission trends by gas**

	Gg CO <sub>2</sub> equivalent							Change(%) 1988–2000
	1988 <sup>d</sup>	1990	1992	1994	1996	1998	2000	
CO <sub>2</sub> <sup>a</sup>	476 625	380 697	371 591	371 588	372 530	337 448	314 812	–34
CH <sub>4</sub>	65 954	58 824	51 957	51 811	47 299	49 045	45 852	–30
N <sub>2</sub> O	21 840	19 428	15 562	15 574	16 715	15 984	23 896	~ –17 <sup>e</sup>
Fluorinated gases	845	–	–	–	843	1 040	1 627	92
Net GHG <sup>b</sup>	530 518	414 286	398 295	397 020	394 772	373 695	343 093	–35
<b>Total GHG<sup>c</sup></b>	<b>565 264</b>	<b>458 949</b>	<b>439 110</b>	<b>438 973</b>	<b>437 388</b>	<b>403 516</b>	<b>386 187</b>	<b>–32</b>

<sup>a</sup> CO<sub>2</sub> emissions without LUCF.

<sup>b</sup> Total GHG (with net CO<sub>2</sub> emissions/removals from LUCF).

<sup>c</sup> Total GHG (without CO<sub>2</sub> from LUCF).

<sup>d</sup> 1995 for fluorinated gases.

<sup>e</sup> Excluding N<sub>2</sub>O from manure management.

23. **Overall GHG emissions:** In 1988, CO<sub>2</sub> accounted for 84 per cent of the total GHG emissions (without LUCF), followed by CH<sub>4</sub> (12 per cent) and N<sub>2</sub>O (4 per cent). A similar pattern can be seen for the year 2000, when the proportion of CO<sub>2</sub> was 82 per cent, followed by CH<sub>4</sub> (12 per cent) and N<sub>2</sub>O (6 per cent). The increase in the proportion of N<sub>2</sub>O is an artefact due to inconsistent time series (see paragraph 17).

24. Total GHG emissions excluding CO<sub>2</sub> from LUCF decreased by 32 per cent between 1988 and 2000, while the total GHG emissions including net removals from LUCF decreased by 35 per cent. The decrease was mainly attributed to the decline in CO<sub>2</sub> emissions, which fell by 34 per cent, and to the decrease in CH<sub>4</sub> emissions by 30 per cent. The N<sub>2</sub>O emissions (excluding manure management, which was only estimated for 1999 and 2000) decreased by 17 per cent up to 2000. A major portion of these decreases were achieved during the first two years (trends for 1988–1990: CO<sub>2</sub> –20 per cent, CH<sub>4</sub> –11 per cent, N<sub>2</sub>O –11 per cent, total GHG –19 per cent). Emissions of fluorinated gases accounted for less than 0.5 per cent over the whole period since 1995, which was chosen to be the base year for these gases.

25. **Carbon dioxide:** Total emissions of CO<sub>2</sub> in Poland were 314,812 Gg in 2000. The major emitters were energy industries (56 per cent of total CO<sub>2</sub> emissions), followed by energy use in industry (17 per cent), energy use in other sectors (14 per cent), fuel combustion in transport (9 per cent) and industrial processes (4 per cent).

26. As shown in table 3 and figure 1, the decline of 34 per cent between 1988 and 2000 was determined by the decrease in emissions in all energy subsectors, except for transport. Between 1990 and 2000, total CO<sub>2</sub> emissions declined by only 17 per cent, mainly due to a smaller reduction rate in CO<sub>2</sub> emissions from energy industries (–25 per cent) and the stabilization trend of CO<sub>2</sub> emissions from energy use in industry, transport, construction and housing.

27. The review team noted some inconsistencies in the emission trend for CO<sub>2</sub> from fuel combustion in transport. These inconsistencies can be partly explained by different methodologies used for different years resulting in overestimation of emissions particularly for the years 1988, 1990, 1992 and 1994. At the same time, fuel consumption data from the Chief Statistical Office for petrol and diesel fuel show an increase between 1991 and 2000. The review team noted that harmonizing the methodology and comparing the results with a top-down calculation (tier 1, IPCC good practice guidance 2.3.1.1) for emissions from fuel combustion in transport might help to reduce the inconsistency of the emission trend.

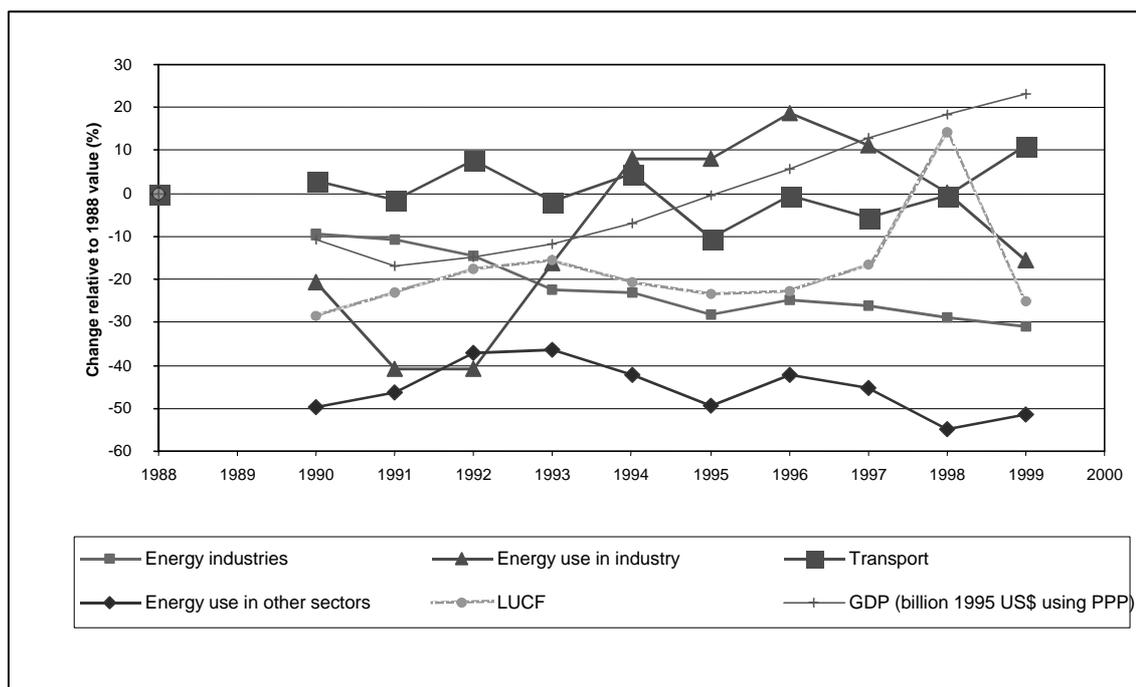
**Table 3. Carbon dioxide emission trends**

GHG gas source and sink categories	Gg							Change (%) 1988–2000
	1988	1990	1992	1994	1996	1998	2000	
Energy	463 051	371 485	360 988	362 166	363 592	326 962	302 465	-35
Energy industries	260 537	236 582	223 009	200 331	195 987	184 916	176 324	-32
Energy use in industry	62 994	49 999	37 259	68 068	74 682	63 186	52 056	-17
Transport	28 238	29 103	30 475	29 533	28 098	28 126	28 207	0
Energy use in other sectors	111 229	55 749	70 184	64 151	64 106	50 103	45 400	-59
Industrial processes	13 574	9 212	10 603	9 422	8 938	10 486	12 347	-9
Land-use change and forestry (LUCF)	-34 746	-44 663	-40 815	-41 953	-42 616	-29 821	-43 094	-24
Total CO <sub>2</sub> emissions/ removals with LUCF	441 879	336 034	330 776	329 635	329 914	307 627	271 718	-39
Total CO <sub>2</sub> emissions without LUCF	476 625	380 697	371 591	371 588	372 530	337 448	314 812	-34

28. The marked decline in CO<sub>2</sub> emissions from energy industries and from energy use in industry, construction and housing in the 2-year period between 1998 and 2000 can be partly explained by structural changes in the economy (see paragraphs 5 and 6), energy efficiency improvements, an overall decline in energy consumption, a shift from coal to lower-carbon fuels, and a reduction of energy-intensive production. Changes in the statistical system and in applied accounting methodologies might also have contributed to these drastic changes.

29. Given the inconsistency of the underlying time series (see paragraph 17), fluctuations since 1990 in some of the trend lines (e.g. transport, see figure 1) cannot be interpreted.

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



30. **Methane:** Emissions of CH<sub>4</sub> amounted to 45,852 Gg CO<sub>2</sub> equivalent in 2000. Waste management accounted for the largest share (41 per cent), followed by the energy sector (38 per cent) and agriculture (21 per cent).

31. As shown in table 4, CH<sub>4</sub> emissions declined steadily between 1988 and 2000 by 30 per cent overall, which was largely attributed to the decline in fugitive emissions from coal mines (–46 per cent), the largest source within the energy sector. A significant reduction in cattle population, stemming from, inter alia, gradual implementation of the rules for the EU common agricultural market, was the major driver for a 46 per cent reduction in emissions from enteric fermentation. Emissions from solid waste disposal decreased by 3 per cent, but the time series are not consistent and are therefore difficult to interpret.

**Table 4. Methane emission trends**

GHG gas source and sink categories	Gg CO <sub>2</sub> equivalent							Change (%) 1988–2000
	1988	1990	1992	1994	1996	1998	2000	
Energy	27 196	21 658	17 248	20 050	20 967	18 356	17 213	–37
<i>Fugitive emissions from coal mines</i>	21 910	16 774	13 199	15 208	15 667	13 142	11 898	–46
Agriculture	18 133	17 849	14 776	13 577	12 410	12 217	9 858	–46
<i>Enteric fermentation</i>	16 922	16 658	13 585	12 525	11 443	11 213	9 075	–46
Waste management	20 279	19 038	19 758	17 962	13 685	18 278	18 602	–8
<i>Solid waste disposal on land</i>	17 536	16 105	17 733	15 984	11 805	16 467	17 004	–3
<b>Total emissions</b>	<b>65 954</b>	<b>58 824</b>	<b>51 957</b>	<b>51 811</b>	<b>47 299</b>	<b>49 045</b>	<b>45 852</b>	<b>–30</b>

32. **Nitrous oxide:** Emissions of N<sub>2</sub>O reached 45,852 Gg CO<sub>2</sub> equivalent in 2000, but the figures for this year cannot be compared to estimates for former years because of major modifications of the methodology. Major sources were emissions from agricultural soils (45 per cent), manure management (24 per cent) and the chemical industry (18 per cent). Table 5 shows that, during the period from 1988 to 1992, total N<sub>2</sub>O emissions fell by 26 per cent and broadly remained stable after that. This was due to a drop of 35 per cent in emissions from the chemical industry and 25 per cent from agricultural soils. Emissions from energy dropped by 12 per cent until 1991 and have been rising since then (showing the same fluctuations as CO<sub>2</sub> from fuel combustion in transport) as a result of the growing market diffusion of three-way catalytic converters in passenger cars. Emissions from manure management were estimated only for 1999 and 2000. The review team was informed that recalculations for the preceding years (1988, 1990–1998) are planned to be made in the second half of 2003.

**Table 5. Nitrous oxide emission trends**

GHG gas source and sink categories	Gg CO <sub>2</sub> equivalent							Change (%) 1988–1998
	1988	1990	1992	1994	1996	1998	2000	
Energy	2 226	1 798	1 795	1 925	2 244	2 300	2 229	3
<i>Energy industries</i>	1 101	1 001	949	849	871	828	784	–25
Industrial processes	6 231	5 003	4 005	4 436	5 025	4 002	4 349	–36
<i>Chemical Industry</i>	6 231	5 003	4 005	4 436	5 025	4 002	4 349	–36
Agriculture	13 383	12 626	9 762	9 213	9 446	9 681	16 511	–28
<i>Agricultural soils</i>	13 358	12 605	9 743	9 195	9 424	9 660	10 711	–28
<i>Manure management</i>	NE <sup>a</sup>	NE	NE	NE	NE	NE	5 782	NE
<b>Total emissions</b>	<b>21 840</b>	<b>19 428</b>	<b>15 562</b>	<b>15 574</b>	<b>16 715</b>	<b>15 984</b>	<b>23 896</b>	<b>–27</b>

<sup>a</sup> NE = not estimated.

33. **Fluorinated gases:** Emissions of fluorinated gases almost doubled between 1995 and 2000, when they still accounted for less than 0.5 per cent of total GHG emissions. Within the different groups of gases, a considerable variation can be observed (see table 6): HFC emissions, mainly from air conditioning, refrigeration, aerosols and metered dose inhalers, increased notably, substituting for the substances phased out under the Montreal Protocol. Decreases in PFC emissions (mainly originating from aluminium production) more than compensated for the increases in SF<sub>6</sub> emissions, which originate from insulation in electrical equipment. The base year for fluorinated gases is 1995.

**Table 6. Fluorinated gases emission trends**

	Gg CO <sub>2</sub> equivalent						Change (%) 1995–2000
	1995	1996	1997	1998	1999	2000	
HFCs	22	68	192	224	555	890	3 861
PFCs	820	775	829	810	777	720	-12
SF <sub>6</sub>	2	1	3	6	17	17	616
<b>Total</b>	<b>845</b>	<b>843</b>	<b>1 024</b>	<b>1 040</b>	<b>1 349</b>	<b>1 627</b>	<b>92</b>

### III. POLICIES AND MEASURES

#### A. Overview

34. The NC3 outlines the general context of climate policy in Poland and describes the most important policies and measures (PaMs) implemented in the following sectors: power engineering, hard coal mining, cement industry, metallurgical industry, refrigerator production, transport, construction and households, waste and sewage management, agriculture and forestry. It contains a summary table of exemplary PaMs aimed at mitigation of GHG emissions in the energy sector. During the visit, the review team was provided with much additional information on recent developments and activities.

35. NC3 reporting on PaMs to mitigate GHG emissions follows the revised UNFCCC guidelines to some extent. The chapter on PaMs does not describe a cohesive package of climate policy measures, nor does it systematically describe policies being pursued as part of economic restructuring and EU accession. Instead, the chapter provides some information on trends, expected developments, technical options for reducing emissions and some policies expected to influence future emission trends. The presentation of information on PaMs is not structured in sectoral summary tables, as required by the UNFCCC reporting guidelines. The team noted that the textual description of the key PaMs could benefit from more detail, especially with regard to the type of PaMs, the status of implementation and the implementing entity. The team acknowledged that against the background of the huge changes that are taking place in Poland, quantitative mitigation effects of individual PaMs were difficult to estimate.

36. As noted during the review of the NC2 in 1999, several policies within the framework of economic transition were already delivering a reduction in GHG emissions, especially in the energy sector. This trend has continued and is projected to continue further in the near future. Therefore, when describing the general context of climate policy in the NC3, the government of Poland does not deem it necessary to undertake specific GHG mitigation actions for the period until 2008. On the other hand, both the ongoing restructuring process of the national economy and the EU accession process are conducive to the goal of GHG mitigation.

**Table 7: Overview of governmental documents relevant to the Polish climate policy**

<b>Policy field</b>	<b>Government documents relevant to the Polish climate policy</b>
EU accession	National programme for integration with the EU
Energy policy	Guidelines for Poland's energy policy until 2020 Assumptions for Poland's energy policy until 2020 (2000) Framework plan for implementation of the energy policy assumptions Master plan study for energy conservation in the Republic of Poland (1999) (includes the action plan for improving energy efficiency in industry) Strategy for development of renewable energy sources (2001) (an implementation programme is currently being prepared) Energy efficiency strategy and action plan (to be developed)
Ecological policy	Second national environmental policy (2001) National environmental policy for 2003–2006 with perspectives for 2007–2010 (2002) Executive programme for the second national environmental policy Poland 2025: long-term strategy for sustainable development (2000)
Climate policy	Draft strategy for GHG emissions reduction until 2020 (under interministerial negotiation) Draft climate change strategy (to be adopted)
Sectoral policies	Guidelines of the national policy for rationalization for energy consumption in the municipal and household sector Programme for the restructuring of the iron and steel industry (1998, updated in 2003) Reform programme for the coal-mining industry in Poland 1998–2002 Assumptions of long-term industrial policy until 2010 (1997) Programme to reduce SO <sub>2</sub> in the power plants National transport policy for 2001–2015 Development programme for ecological farming (1997)

37. More than a dozen government documents are relevant to climate policy (see table 7). Reflected in all these documents are three key policy approaches that will contribute to the reduction in national GHG emissions: improving energy efficiency, shifting the energy supply mix towards less polluting fuels and promoting renewable energy resources. More specifically, the NC3 stressed the following policy goals:

- (a) Reduction of the share of hard coal and lignite in TPES from 66 per cent in 2000 down to 60 per cent in 2025;
- (b) Increase of the share of energy from renewable sources in the national primary energy balance to 7.5 per cent by 2010 and to at least 14 per cent by 2020 (at least 1 per cent of this to be energy recovered from waste);
- (c) Limitation of thermal and electrical energy losses in the transmission systems to a level not exceeding 20 per cent.

38. A draft *Climate change strategy* has been prepared, and is expected to be adopted in the course of 2003. Its overall goal is to integrate climate policy into all sectoral policies. Furthermore, a draft *Strategy for GHG emissions reduction till 2020* is under interministerial negotiation. Both documents will facilitate the interministerial coordination of the elements of national climate policy and help to access further GHG mitigation potentials (table 8).

**Table 8: Further potentials for carbon dioxide mitigation in Poland in 2003–2010**

Sector	CO <sub>2</sub> emission reduction potential in 2010	
	Tg CO <sub>2</sub> per year	
Energy	12–15	
Industry	–	
Housing	7–10	
Biomass (wood, straw)	2.3–3.5	
"Energy plants"	2–3.5	
Liquid fuels	1–1.5	
Wind energy	2.4–3	
Other renewables	0.8–1	
<b>Total</b>	<b>27.5–37.5</b>	

Source: ECOFUND.

39. The *Second national environmental policy* defines short-, medium- and long-term air quality management objectives, and covers a wide range of air pollutants, including non-methane volatile organic compounds (NMVOCs), heavy metals and persistent organic pollutants (POP); national emission reduction targets for sulphur dioxide (SO<sub>2</sub>), oxides of nitrogen (NO<sub>x</sub>) and dust were revised and targets for NMVOCs and ammonia were introduced, to be achieved by 2010. The executive programme for the *Second national environmental policy* contains some elements of climate change policy. One of the policy instruments that have been implemented is fees for the emission of air pollutants.

## **B. Energy**

### 1. Energy supply

40. In 2000, emissions from fuel combustion in energy industries accounted for of 46 per cent of total GHG emissions. Between 1988 and 2000, they declined by 32 per cent, as a result of a significant reduction in energy demand and restructuring of the Polish energy industries. The energy sector is undergoing a transformation process, and its market orientation and removal of the state support system have major implications for energy prices. During the 1990s all power plants (except for the new one in the city of Opole) have been modernized, some of them completely (e.g. the Turów power plant), resulting in an increase of average energy efficiency from 35 per cent in 1990 to 38.9 per cent in 2001.

41. Several documents set the framework for the reform of the energy sector. The *National programme for integration with the EU* defines the main principles for the development of the energy market (law adaptation, organizational reform, privatization), and the 1997 Energy Law provides the necessary legal conditions for economic activities in the area of energy production, transmission, distribution and trade; introduces third party access; and sets the general framework for gradual market opening. The Government's energy policy, as set out in the document *Assumptions for Poland's energy policy until the year 2020*, comprises a set of five strategies:

- (a) Strategy for a transitional period (including revision of long-term energy contracts, restructuring of the Polish Oil and Gas Company, consideration of a monitoring system);
- (b) Strategy of integrated management of energy and environment (including pinch technology analysis, promotion of RES, SO<sub>2</sub> and CO<sub>2</sub> emissions trading);
- (c) Strategy of organizational and technological decentralization of energy industries (investment policy, small combined heat and power (CHP) plants, development of local energy markets);
- (d) Energy market liberalization strategy (privatization, regulation and price policy);

(e) Energy efficiency improvement strategy (rational energy use, research, education and public outreach policy). The team was informed that most of these policies are at an early stage of implementation.

42. The three most important PaMs implemented in energy industries aimed at GHG mitigation were reported to be (a) the obligation to purchase electricity from CHP; (b) the obligation to purchase heat and electricity generated from RES and unconventional energy sources; and (c) a statutory determination of the maximum level of fixed transmission charges (amounting to 40 per cent for gaseous fuels and 30 per cent for heat). These actions have so far led to a decrease in the share of hard coal and fuel oil in favour of natural gas. In March 1999, new tariffs for electricity, heat and gaseous fuels were introduced, which now (pursuant to principles laid down in the Act on Energy Law) will be determined by the energy supplier, subject to an approval by the President of the Energy Regulation Agency.

43. Restructuring of the coal-mining sector started in the 1990s and is continuing through the *Reform programme for the coal-mining industry in Poland 1998–2002* (June 1999). The main goal is to improve the economic performance of the mining industry through the reduction of subsidized coal extraction by about 20 million tons by 2002. Implementation of this programme is expected to lead to reductions in fugitive emissions from coal mining. Furthermore, the review team was informed that recent efforts to diversify the fuel supply offer the prospect of large reductions in GHG emissions.

44. **Renewable sources of energy:** According to EC Directive 2001/77/EC, energy from RES will become increasingly important in the energy balance of the EU in the coming years. Poland's ongoing integration with the EU encourages it to undertake actions to utilize its RES. The Minister of Economy, Labour and Social Policy has obliged electric energy distribution companies to gradually increase the share of energy from renewable sources in their energy balance up to 7.5 per cent in 2010.

45. In August 2001, the Parliament adopted the *Strategy for development of renewable energy sources*, which defines quantitative objectives for the development of RES, with its share of the primary energy balance in Poland being up to 7.5 per cent in 2010 and up to 14 per cent in 2020. It is estimated that fully achieving the goals will lead to a reduction in GHG emissions by around 18 Tg CO<sub>2</sub> equivalent per year and the creation of about 30,000–40,000 additional jobs. Moreover, the development of RES is expected to create regional development opportunities for local communities as well as environmentally friendly modernization of infrastructure, diversification and decentralization of the energy sector.

46. In order to achieve the established objectives, development programmes for all types of RES are to be prepared and implemented. A first model programme for wind energy was finalized in 2002. This programme provides the framework for the development of wind energy in the next 4 years, including legal and economic mechanisms supporting RES projects. On the basis of this model programme, a new act on the utilization of RES is under preparation, with the aim of securing long-term stability of the terms for investment projects and operation of the RES sector.

47. The technical potential of RES is estimated at around 2,500 PJ/year, which is comparable with that of EU countries. Because of its relatively late start, Poland will face some difficulties in achieving the ambitious targets set by the EU in 2002. In the near future, biomass utilization in particular is expected to increase.

## 2. Energy demand

48. CO<sub>2</sub> emissions from energy use in other sectors (mainly in the residential sector) fell by 50 per cent between 1988 and 1990 and have broadly remained at that level since. In 2000, this sector accounted for 12 per cent of total GHG emissions. Energy consumption in the residential sector in Poland is 2–3 times higher than in western European countries with similar climatic conditions. This is

due to a low efficiency of heat production, significant losses in heat transmission and insufficient building insulation. The review team was informed that the gradual introduction of market rules to the Polish economy during the past 10 years has led to some improvements in overall efficiency. However, the municipal sector in particular still offers great potential for further GHG reductions, for example through measures to promote the rational use of heat energy.

49. The Government has established a two-step policy objective for reducing energy intensity in the residential sector: by 25 per cent between 2000 and 2010 and by 50 per cent between 2000 and 2025. Environmental costs in energy pricing and further improvements in the efficiency of large combustion units and in private households will need to be considered in order to meet these objectives. Policy elements to improve energy efficiency in this field can also be found in the *Second national ecological policy*, the *Guidelines for Poland's energy policy until 2020*, and the *Strategy for development of renewable energy sources*.

50. In 1998, the Parliament adopted the *Guidelines of the national policy for rationalization for energy consumption in the municipal and household sector*. On the basis of these guidelines, the Thermo-Modernization Act became effective, and the Thermo-Modernization Programme and Fund were introduced. Since 1999, the latter has provided technical and financial support for energy efficiency improvements in residential buildings, reduction of energy losses in heat distribution networks and substitution of conventional energy by unconventional sources, including RES. By March 2003, 874 grants had been awarded to applicants for thermal modernization of buildings, totalling 23.5 million Zloty (i.e. about US\$ 6.2 million).

51. The Thermo-Modernization Act was amended in June 2001. Its aim is to create a system of incentives and co-financing for individual and institutional investors undertaking measures to reduce losses in local heating networks, to partly or completely replace conventional energy sources by RES and above all to reduce energy consumption in housing (by enhanced heat insulation).

52. Under the SAVE II Programme of the EU (aimed at promoting the rational use of energy within the Community) a technical and economic assessment report, *Possible improvements of energy efficiency of the residential building/heating systems in Poland*, was prepared. This report identifies the obstacles to implementation of energy policy in the residential sector, and proposes certain steps for improvement.

53. In addition, there are a number of policy instruments available to the Government for enhancing energy efficiency of the building stock. They include construction standards, fiscal instruments and labelling. The team was informed that building codes, construction standards and fiscal instruments have been widely used, but labelling has not been implemented so far.

### C. Industry

54. Industry is a major energy user: energy-related GHG emissions from industry increased by 4 per cent between 1990 and 2000, and accounted for 14 per cent of total GHG emissions in 2000. Non-energy-related emissions from industrial processes increased by 28 per cent in the same period, and accounted for 5 per cent of total GHG emissions in 2000. The Polish industrial sector has been undergoing restructuring and privatization since 1989. Important developments contributing indirectly to reducing GHG emissions are the improved efficiency of fuel use, the change in fuel mix from coal to gas in some energy-intensive industries, and the modification and upgrading of old technologies.

55. Although the restructuring of the industrial sector has resulted in energy efficiency gains since 1990, the energy intensity of many industries is still above the average OECD level, and there is still considerable potential for highly profitable energy conservation measures. The *Master plan study for energy conservation in the Republic of Poland* (1999) provided concrete recommendations for

programmes (i.e. the action plan for improving energy efficiency in industry) and instruments to promote energy efficiency in industry.

56. The NC3 reports on PaMs in three different industry subsectors – the cement industry, the metallurgical industry and refrigerator production.

57. The *Programme for the restructuring of the iron and steel industry* (adopted in 1998) and other modernization and restructuring activities have led to significant improvements in the metallurgical sector. Basic objectives are: the reduction of material and energy consumption, reduction of environmental nuisance, and setting up new products designed for domestic and international markets. In January 2003, the Council of Ministers adopted an updated *Programme for the restructuring of the iron and steel industry 2003–2006*. This programme envisages a further reduction in production capacity.

58. CO<sub>2</sub> emissions in the cement industry have decreased by 25 per cent since 1988, as a result of modernization of the production process and a change from wet to dry method (decreasing heat demand and particulate emissions). Heat demand decreased by 50 per cent per unit production, and particulate emissions decreased by a factor of 20. According to the government document *Assumptions of long-term industrial policy until 2010* (approved in June 1997) it is planned to phase out the wet method completely by 2010 and to maintain the CO<sub>2</sub> level below the 1999 level.

59. In refrigerator production, measures have been taken to substitute cooling gases subject to the Montreal Protocol, to improve operational efficiency of industrial systems, and to introduce waste energy recovery. In conjunction with the implementation of further PaMs, including new insulation materials and technologies for household refrigerators, GHG emissions from refrigeration and foaming are intended to be reduced by 20 per cent, and energy consumption by 6 per cent.

#### **D. Transport**

60. Between 1991 and 2000, consumption of petrol and diesel fuel increased by 40 per cent and 66 per cent respectively, with major implications for the trend in CO<sub>2</sub> emissions from fuel combustion in transport. This increase is mainly driven by the increase in the number of road vehicles and road traffic volume in Poland. Between 1990 and 2000, the number of registered passenger cars and lorries and of road tractors increased by 90 per cent and 80 per cent respectively; the number of motorized two-wheelers dropped by 41 per cent. Annual road traffic volume (in vehicle-km) tripled in the 1990s, growing much faster than GDP. Per capita, car ownership (24 cars per 100 inhabitants) and road traffic volume (4 500 vehicle-km per capita) are still significantly lower (by 38 per cent and 27 per cent respectively) than the OECD European averages.

61. To improve the environmental performance of the transport sector, in 1997 a package of regulations was introduced to define and set standards for the technical requirements for vehicles. Under these new regulations, an import ban for old vehicles with two-stroke engines (more than 10 years old) was imposed, and stringent emission standards for new road vehicles were implemented, in accordance with the vehicle emission standards of the United Nations Economic Commission for Europe (UN-ECE). These efforts were accelerated in the late 1990s, when new EU exhaust emission regulations were introduced. Although the energy efficiency of transport is projected to improve in the future, the reduction effect of this is likely to be offset by the expected increase in transport activity induced by the modernization of road infrastructure and the increased use of private cars in line with economic growth.

62. The main policy document in this sector is the *National transport policy for 2001–2015* which elaborates the concept of sustainable development and includes a set of comprehensive measures, such as regulatory instruments (e.g. emission and fuel quality standards, inspection requirements), economic instruments (e.g. road pricing), physical planning and strategic environmental assessment (SEA),

technology development and raising public awareness (e.g. with respect to driving behaviour). This new direction in Polish transport policy is also reflected in the *Second national environmental policy*. However, the national transport policy does not contain concrete targets for reduced GHG emissions from the transport sector.

63. Implementation of the national transport policy will progress in stages in conjunction with the EU integration process: the first stage (before accession to the EU) includes transport organization and development programmes, and is already being implemented. The second stage (from the date of accession until the end of the first budgetary period of the EU) will include full integration and improvement of management and regulation models in transport as well as intensification of transport infrastructure development programmes. In the third stage (up to 2015), the fully integrated system will start to function.

64. The review team was informed that the draft *Climate change strategy* will contain quantitative objectives to reduce GHG emissions from the transport sector.

### **E. Agriculture**

65. Agriculture in Poland has largely retained its traditional character. Agricultural production is managed extensively and without clear specialization in more than 40 per cent of individual farms, while 33 per cent focus on arable crops and another 20 per cent on animal breeding and housing. The contribution of this sector to GNP declined from 6.6 per cent in 1988 to 3.3 per cent in 2000.

66. GHG emissions from the agricultural sector declined by 16 per cent in the period 1988–2000 and accounted for 7 per cent of total GHG emissions in 2000. The main driver behind this trend is the decline in agricultural production and livestock population since 1988. The highly fragmented structure of land ownership and partition discourages the implementation of modern farming techniques.

67. Policy objectives for the development of rural areas and agriculture in Poland include restructuring of the agriculture sector, reducing the fragmentation of farmland, modernizing farms and striving for environmental sustainability. The 1997 *Development programme for ecological farming* includes nine sub-programmes (e.g. on soil protection, adaptation of mineral and organic fertilizer techniques, grassland technologies, animal production techniques, promotion of good practices, environmental education in rural communities) directly affecting the GHG emissions of this sector.

### **F. Forestry**

68. Forests cover an area of more than 28 per cent of the national territory. Coniferous trees predominate in almost 77 per cent of the forested area. Around 80 per cent of the forested area falls into the category of managed forest. CO<sub>2</sub> removals have broadly remained stable since 1990 and represent 11 per cent of total GHG emissions (excluding LUCF).

69. The forestry policy as formulated in the *State forestry policy* and the *National programme of increasing forest cover* assumes an increase in the area covered by forests from 28 per cent to 30 per cent by 2020 and to 33 per cent by 2050. The review team was informed that a national plan for priority areas for afforestation is to be worked out.

### **G. Waste management**

70. Methane emissions from waste management (including waste water handling) decreased by 4 per cent in the period from 1988 to 2000. In 2000, CH<sub>4</sub> accounted for 5 per cent of total GHG emissions.

71. Municipal waste accounts for 9 per cent of total waste generated in Poland. It increased in the mid 1990s, but levelled off in the late 1990s, resulting in a 10 per cent increase from the 1990 level, while GDP grew by 43 per cent. The team interpreted these figures as a weak decoupling of municipal waste generation from economic growth. In 2001, 290 kg per capita of municipal waste was generated, which is still below the western European average. Municipal waste recovery is not yet developed; in 2000 only 5 per cent of municipal waste was collected separately for composting, combustion or recycling. Considering the present low recovery rate for municipal waste, the review team noted that meeting EU obligations (EU Landfill Directive and EU Packaging and Packaging Waste Directive) will be very challenging for Poland.

72. In total, 95–98 per cent of solid waste, excluding industrial waste, is landfilled. Many of the 1,700 landfills and dumpsites in Poland are illegal and unmanaged. The technical conditions and maintenance of landfills are unsatisfactory, and currently only a small number of them have degassing installations (gas venting).

73. A range of primary and secondary legislation constitutes the regulatory framework for waste management. To ensure full compliance with EU legislation, the 2001 Waste Act introduced an obligation to develop waste management plans, more stringent requirements for waste landfills and incineration plants, and special measures for the management of certain waste types.

74. The *Second national environmental policy* contains short-term, medium-term and long-term objectives for the waste sector, but does not include concrete measures for reducing emissions. Objectives are to harmonize with EU legislation; to develop waste strategies and plans at national, regional and local level; and to maintain the amount of municipal waste at 300 kg per capita. In response to the objectives, a national waste management plan was adopted in 2002, and will be followed by regional and local waste management plans.

#### IV. PROJECTIONS AND THE TOTAL EFFECT OF POLICIES AND MEASURES

75. The NC3 presents a number of potential future scenarios for GHG emissions and removals with respect to six economic sectors, including electrical power engineering, manufacturing industries, transport, agriculture, forestry, services and households. Additionally, GHG emission projections for the entire energy supply system and macroeconomic scenarios of GHG emission reduction on a national level are shown. The review team noted that no projections were presented for CH<sub>4</sub> emissions from waste management, for fugitive emissions from coal-mining, for emissions of fluorinated gases or for emissions from bunker fuels.<sup>4</sup> Table 9 gives an overview of the sectoral and overall scenarios presented, their assumptions with regard to the implementation of PaMs, the GHGs estimated and the modelling approach. The time horizon for the different projections is 2020 and most emission levels are projected for the years 2005, 2010, 2015 and 2020.

76. The review team was informed that the NC3 projections were developed in 1999 (i.e. two years before the publication of the NC3) and hence did not apply the provisions for reporting on projections as contained in the revised 1999 UNFCCC reporting guidelines. The review team also noted that due to the same reason overall projections were consistent with the inventory data only until 1996, and do not reflect the drop in emissions thereafter (as shown in figure 5.1 on page 50 of the NC3).

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<sup>4</sup> The review team noted that the 2002 study (see paragraph 78 below) contains these projections.

**Table 9. Scenarios applied in individual sectors and at aggregated level**

Sector	Scenario name in NC	Assumption of PaMs	GHG estimated	Modelling approach
Electrical power engineering	Baseline	WM <sup>a</sup>	CO <sub>2</sub>	Bottom-up
	Passive			
Manufacturing industries	Baseline	WM	CO <sub>2</sub>	Bottom-up
	Reduction	WAM <sup>b</sup>		
Transport	Reference baseline	WOM <sup>c</sup>	CO <sub>2</sub> , CH <sub>4</sub> , N <sub>2</sub> O	Bottom-up
	Reduction baseline	WM		
Agriculture	Baseline	WM	CO <sub>2</sub> , CH <sub>4</sub> , N <sub>2</sub> O	Bottom-up
Forestry	Baseline	WM	CO <sub>2</sub> removals	Bottom-up
	Passive	WOM		
Public utility, services and households	Baseline	WM	CO <sub>2</sub> , CH <sub>4</sub> , N <sub>2</sub> O	Bottom-up
	WAM	WAM		
Energy (total)	Baseline	WM	CO <sub>2</sub>	Bottom-up
	Passive			
Aggregated CO <sub>2</sub> emissions	Baseline	WM	CO <sub>2</sub>	Top-down
	Passive			
Aggregated N <sub>2</sub> O emissions (Strategy of N <sub>2</sub> O emission reduction)	Reference	WM	N <sub>2</sub> O	Bottom-up
	Survival			
	Progress			
Chemical industry	Reference	WM	N <sub>2</sub> O	Bottom-up
	Reduction-chance			
	Reduction-progress			
	Reduction-moderate			
Aggregated GHG emissions 2002 <sup>d</sup>	Low (passive)	WM	Net CO <sub>2</sub> , CH <sub>4</sub>	Bottom-up
	High (baseline)			
	Sensitivity analysis		CO <sub>2</sub>	

<sup>a</sup> WM: with measures.

<sup>b</sup> WAM: with additional measures.

<sup>c</sup> WOM: without measures.

<sup>d</sup> As presented to the review team during the country visit.

77. Under the coordination of the Ministry of Environment, the various scenarios were developed by expert groups working independently, using a variety of different modelling instruments and methods. The review team noted that for this reason the projection results were not fully consistent, especially with regard to macroeconomic assumptions for the energy sector modelling, the total effect of PaMs, and the definitions for sectors and subsectors. The review team noted a limited degree of transparency in the presentation of the Polish projections and identified some potential for improvement in future reporting. These include a presentation of emission projections relative to actual inventory data for the preceding years, a consistent use in all sectoral projections of the three types of scenario defined by the UNFCCC reporting guidelines,<sup>5</sup> a complete explanation of the coverage (gases, (sub-)sectors, PaMs encompassed) of the different scenarios, and an assessment of the total effect of PaMs.

78. During the country visit, a new projection of total GHG emissions was presented (see last line in table 9). This projection was compiled by the Warsaw-based consultant EnergSys in 2002, within the framework of the preparation of the draft national climate policy. Two with-measures scenarios (high and low) are included, with differences in key macroeconomic assumptions and in the level of energy conservation policy. The “high” scenario is based on an in-depth analysis of additional PaMs (e.g. biomass, full market approach), and is connected with a cost-benefit analysis. While CO<sub>2</sub> emissions and removals as well as CH<sub>4</sub> emissions for the whole national balance are covered, the review team was informed that emissions of N<sub>2</sub>O and fluorinated gases were not included in these recent projections. The

<sup>5</sup> With measures: adopted and implemented PaMs encompassed; with additional measures: planned, adopted and implemented PaMs encompassed; without measures: all PaMs excluded after the year chosen as the starting point.

review team acknowledged the progress that has been made in this field and based its analysis of the projected emission trends on these 2002 emission projections.

79. In general, the team had difficulties in analysing the differences between the different scenarios (without measures, with measures and with additional measures). This item was discussed with the Polish projection experts, who explained the problems of designing a “without measures” scenario<sup>6</sup> under the conditions of an economy in transition. The economic transition processes and the restructuring of huge parts of industry and energy sectors are stimulating the implementation of energy efficiency improvements, new technologies and changes in the fuel mix, even in the absence of any state-driven GHG mitigation policies and measures. In some sectors, two scenarios were presented, following the rate of structural changes as accompanied by efficiency improvements: the so-called “passive” and “baseline” or reference scenarios. Both can be described as “with measures” scenarios. During the discussion with the Polish experts the review team was informed that the scenarios presented in the chapter on projections were prepared earlier (1999) than the summary of PaMs presented in chapter 4 (2001), leading to unavoidable inconsistencies between these two chapters of the NC3.

#### A. Scenario definition, key assumptions and methods used

80. The 2002 emission projections as presented to the review team during the country visit encompass two different scenarios: a “baseline” or “high” scenario, with high economic growth (4.0 per cent per year on average until 2020), a twofold decrease of the energy intensity of the economy (per GDP), and a growing share of natural gas and RES in the energy balance until 2020; and a “passive” or “low” scenario, with a slower continuation of the economic reform (2.3 per cent GDP growth per year on average until 2020), on a moderate level of both structural changes and decreases in energy intensity of the economy. The differences in key assumptions are shown in table 10. The review team noted that in both cases the changes in the national energy structure are assumed to be small. Both scenarios were compiled on a bottom-up approach for the whole national economy. Emission levels were calculated for CO<sub>2</sub> and CH<sub>4</sub>, covering more than 92 per cent of the total GHG emissions.

**Table 10: Differences in key assumptions for the “high” and “low” scenarios**

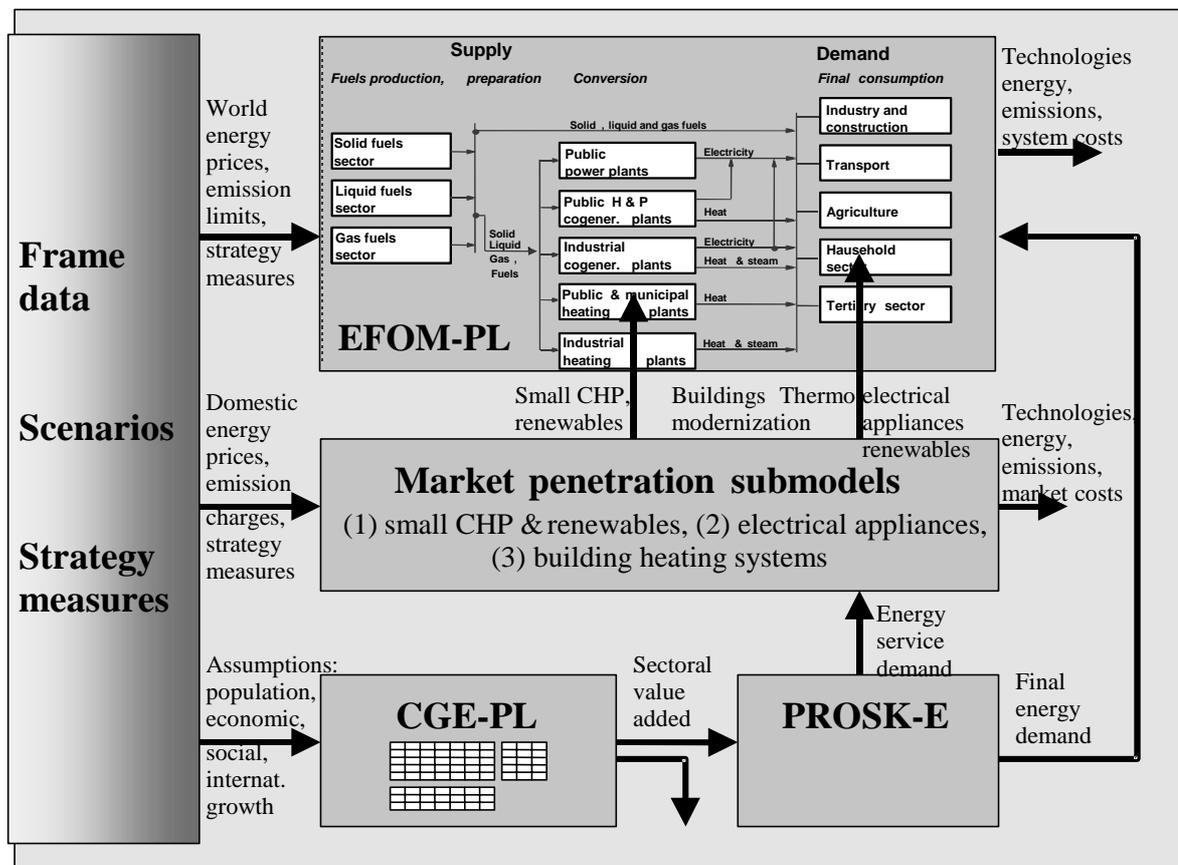
	Reference scenario	
	High	Low
Population	39.3 million in 2020 (3 per cent growth rate)	
GDP growth rate (average to 2020)	4.0 per cent per annum	2.3 per cent per annum
Changes in economic structure	Significant	Small
Energy efficiency improvements (until 2020)	2.8 per cent per annum	1.4 per cent per annum
Changes in energy structure	Small	Very small

Source: EnergySys.

81. **Methods used:** The aggregated 2002 emission scenarios were compiled using three main models: a macroeconomic general equilibrium model (CGE-PL), an energy demand simulation model (PROSK-E) and an energy supply optimization model (EFOM-PL). Three market penetration sub-models for (1) small CHP and RES, (2) electrical appliances and (3) building insulation and heating systems were linked to the main models, as shown in figure 2.

<sup>6</sup> According to paragraph 41 of the UNFCCC reporting guidelines, Parties may calculate the total effect of their PaMs by taking the difference between a “with measures” and a “without measures” projection.

**Figure 2: Flowsheet of the modelling approach**



Source: EnergySys.  
 EFOM-PL: an energy supply optimization model.  
 CHP: combined heat and power .  
 CGE-PL: a macroeconomic general equilibrium model.  
 PROSK-E: an energy demand simulation model.

82. The general equilibrium model CGE-PL is used for a complex macro-scale analysis of long-term changes in the economic structure (i.e. production structure, changes in resource allocation and prices). Taking assumptions on both demographic developments in Poland and international economic growth rates as input data, the main results of this first modelling step are the GDP growth rates in individual sectors. In a second step, the energy demand simulation model PROSK-E calculates the trajectories for final and useful energy demand. In a third step, the energy supply optimization model EFOM-PL analyses the structural data for energy resources, including the supply of primary energy carriers, expenditures and costs of energy production, processing and distribution of primary energy carriers, marginal costs of emission reduction and optimum technological structure, primary and final energy balances. Three specialized market penetration submodels for small CHP and RES, electrical appliances, and building heating systems support the evaluation of the effects of PaMs in these fields. The team was informed that the overall projection results were compared with detailed evaluations of the economic efficiency of various power technologies.

83. Considering the complexity of this modelling approach, the review team noted the difficulty of evaluating the effect of individual PaMs. The team was informed that some of the policy options for the energy sector (constrains on coal-mining activity, biomass penetration) were implemented in recent

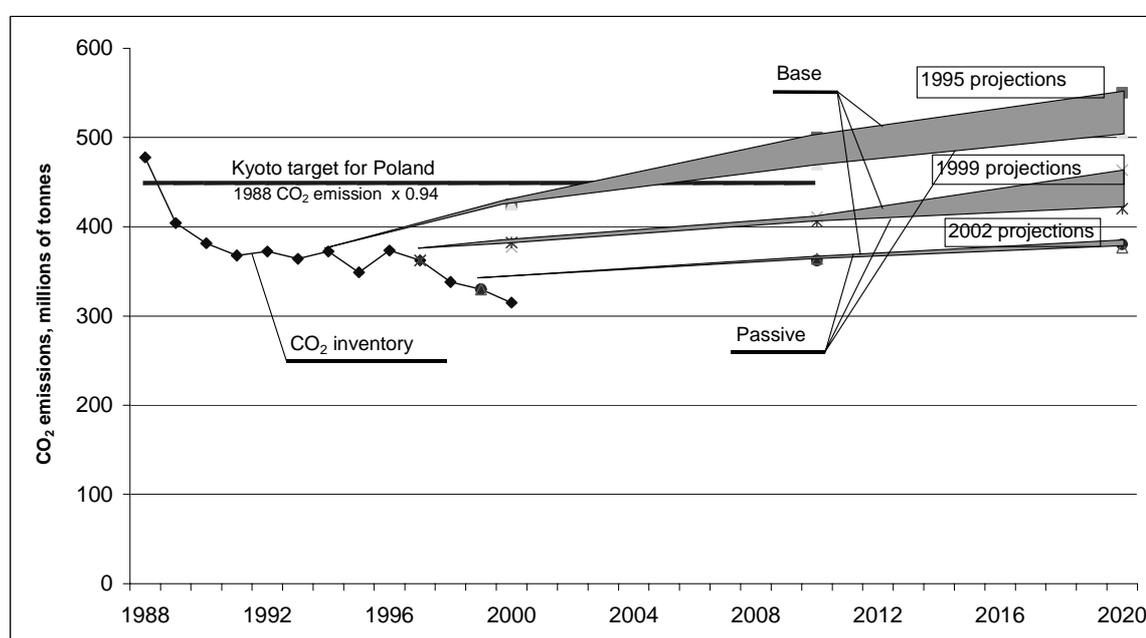
EFOM modelling. No reference was made to how the PaMs described in chapter 4 of the NC3 were affecting the modelling process.

84. Several different models were used for the six sectoral projections (see table 9). The review team was informed that sophisticated models were used for all sectors except for agriculture, where a simplified expert-based methodology was applied.

### **B. Projected emission trends and comparison with the NC2**

85. Figure 3 shows a comparison of previous and recent projections of CO<sub>2</sub> emissions, which account for more than 92 per cent of the total GHG emissions in Poland. The 1995 projections were reported in the NC2 and the 1999 projections in the NC3; the 2002 projections were presented to the review team during the country visit and will be part of the draft *Climate change strategy*.

**Figure 3: Projected emission trends – total carbon dioxide emissions**



Source: EnergSys.

Remarks: Base = "high" scenario, Passive = "low" scenario.

Kyoto target: Only valid under the assumption that reductions for N<sub>2</sub>O and CH<sub>4</sub> are in line with those for CO<sub>2</sub>.

86. The team noted that in all three sets of projections:

(a) The emissions are expected to rise in the near future, although the actual inventory data show a continuously declining trend in recent years;

(b) The growth rates of projected emissions declined slightly from the 1995 to the 1999 to the 2002 projection;

(c) The differences between the high and low scenarios within the projections are small (compared to the level of total emissions), and decrease further from the 1995 to the 1999 to the 2002 projections.

87. The team found that the main difference between these three sets of projections arises from the different starting years and their emission levels. These differences are larger than the differences between the "high" and "low" scenarios within the projections.

88. According to the 2002 projections, overall CO<sub>2</sub> emissions (excluding LUCF) in 2010 are expected to be 24–26 per cent lower than the 1988 levels. Overall CO<sub>2</sub> emissions in 2000 were already 34 per cent below the 1988 levels, and have shown a declining tendency since 1997. Although the scenarios presented in figure 3 represent only CO<sub>2</sub> emissions, the team concluded that Poland can achieve its Kyoto target (94 per cent of the 1988 GHG emissions) domestically and without any additional efforts. The projection results define the potential for the use of the flexibility mechanisms of the Kyoto Protocol.

89. During the visit the review team was provided with the results of a recent economic analysis of GHG reduction costs in Poland. Compiled by EnergSys on behalf of the Ministry of Environment, the study identifies further emission reduction potentials of around 30 Tg CO<sub>2</sub> equivalent that can be achieved at negative cost (by switching from coal to oil in residential heating for detached buildings, and by the implementation of organizational measures in transport). A second set of additional measures shows a potential of more than 100 Tg CO<sub>2</sub> equivalent at low cost (less than 100 PLN per Mg CO<sub>2</sub>).

90. The review team was informed that for the year 2020 GHG emission reductions of up to 40 per cent of the 1988 levels seem to be realistic. Reduction cost estimates for the energy sector range from EUR 4 billion (policy option: legally enforced emission limit at 60 per cent of 2000 level) through EUR 2.5 billion (policy option: 40 per cent reduction in emissions resulting from investments in RES) down to zero additional cost (policy option: increased share of natural gas as a result of energy market liberalization). The financial resources necessary to achieve such reductions are expected to be provided to a large extent from external sources, like the EU funding mechanisms and international financial institutions. If a wider economic context is considered, both the RES policy option and the energy market liberalization option are estimated to have similar macroeconomic costs.

## **V. VULNERABILITY ASSESSMENT, CLIMATE CHANGE IMPACTS AND ADAPTATION MEASURES**

91. The vulnerability assessments, as reported in the NC3, address three vulnerable sectors in Poland: agriculture, the coastal zone and water resources. The assessments are based on two atmospheric general circulation models from the Goddard Institute for Space Studies and the Geophysical Fluid Dynamic Laboratory. The review team noted that no evaluation of uncertainties has been carried out for the various scenarios.

92. Vulnerability assessments for the agricultural sector found potential benefits from an extended growth period which may create favourable conditions for pasture management and the cultivation of maize, soybeans and sunflower. Adverse impacts are expected from intensification of plant pests, increased frequency of extreme events and water deficits.

93. The 790-km coastal zone along the Baltic Sea may be exposed to a rise in sea level, resulting in deterioration of beaches, changing circulation pattern, excessive erosion and salt water intrusion. Agricultural resources, water resources and forestry in the coastal zone may also be vulnerable. The NC2 reported that the expected losses from a 1-metre rise in sea level may exceed USD 40 billion. The review team noted that even though information on land subsidence for the coastal zone of Poland is missing, and a 50-cm rise in sea level is more likely for the next century, the direct and indirect impacts of rising sea level rise on the coastal zone provide sufficient reason for the support of a full programme for coastal zone protection and adaptation.

94. Poland's already scarce water resources are also expected to suffer from the impacts of climate change, including reduction of water outflow and increased pollution, decreased soil moisture, water

retention within the river basin and evapo-transpiration. The current water resources in Poland are estimated at only 1,600 m<sup>3</sup> per capita per year, which is about one third of the European average.

95. The high vulnerability of the forestry sector was reported in the NC2 but was not included in the NC3. For many years, the health of the forests in Poland has been badly affected by permanent hazards, due to insects, fungi, unfavourable climatic phenomena, fires and air pollutants. Observations carried out since 1989 in the framework of international biological monitoring of forests show that the condition of the forest has improved, although some tree stands are still endangered. In the future, negative impacts on forests in Poland are expected to increase, in view of a changing climate, calling for consideration of adaptation policies and measures.

96. Vulnerability assessments of other sectors such as industry, livestock, fish catch and tourism were not reported. Vulnerability due to shifts of bioclimatic zones and afforestation has not been considered. The relationship between climate change and the severe summer rainfalls that led to devastating floods of the river Odra in the years 1997 and 2002 has not been investigated.<sup>7</sup> The review team noted that although the cost of long-term impacts of loss of habitats may far exceed short-term economic losses, no socio-economic impacts were addressed.

97. Different adaptation strategies to address the impacts of climate change are outlined in the NC3. For the agriculture sector, adaptation options include choosing appropriate crop varieties, changing the mode of land use and crop structure, improving production zones, upgrading water collection and storage systems, and introducing water-efficient technologies. For the coastal zone adaptation strategies include the elaboration of long-term shoreline protection and preservation measures, and integrated management of the riparian zone among Baltic countries. For water resources, adaptation measures include: the development of new legal and economic efforts for water conservation; effective enforcement of water management measures; and construction of new reservoirs and the management of transfer between catchments in drought periods. The team noted that prioritization of options, suggested mechanisms for implementation and financial support have not yet been worked out. The adaptation strategies are yet to be approved.

## **VI. FINANCIAL RESOURCES, TRANSFER OF TECHNOLOGY AND JOINT IMPLEMENTATION PROJECTS**

98. Although Poland is not listed in Annex II to the UNFCCC, it participates in many international projects which are co-financed by the Polish government. Since 1998 Poland has been providing official development assistance (ODA) and official assistance (OA) in the range of USD 28.9–43.8 million. Protecting the natural environment and providing sustainable development on a global scale are both included in the priorities list of Poland's development assistance, as outlined in the 2001 annual report of Pol-Aid. The Pol-Aid Foundation "Know-How" supports the transfer of Poland's experience of political, social and economic transformation to stakeholders in central and eastern European countries undergoing a similar process. Regional emphasis is given to Central and East European Countries/New Independent States and more recently to the Yemen and Viet Nam.

99. Poland has implemented AIJ/JI projects jointly with Norway (coal to gas conversion in 30 non-industrial boiler houses, energy efficiency improvements in new residential buildings), the Netherlands (heating system modernizations, district heating systems, biomass boiler installations), and Canada (small hydropower plants).

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<sup>7</sup> See Christensen and Christensen: Severe summertime flooding in Europe. *Nature*, Vol. 421. 20 February 2002.

## VII. RESEARCH AND SYSTEMATIC OBSERVATION

100. **Research:** The NC3 reports in detail on activities in this field. Co-financed by the State Committee for Scientific Studies, a variety of scientific monitoring experiments are already in progress or planned. Investigations of meteorological and geophysical aspects are conducted and supported mainly by international programmes, including the World Climate Research Programme, International Geosphere–Biosphere Programme, Global Climate Observing System and IPCC.

101. These studies are carried out by a number of scientific institutions, including the Polish Academy of Science and universities as well as R&D institutions subordinate to the Ministry of Environment, mainly the Institute of Meteorology and Water Management (IMGW). National activities and contributions to capacity-building appear to be progressing under the support of these programmes, especially the development of the national network of GHG monitoring. Levels have been recorded by the monitoring stations, and analysis and comparison to conditions in other parts of the world is already in progress.

102. **Systematic observation:** Poland has a long tradition of meteorological and atmospheric observation, dating back to 1779. A substantive amount of data is now collected from more than 1000 monitoring stations. The review team was informed that because of low research funding in the last 3 years, observations in 11 of a total of 61 meteorological GSN stations have been interrupted. The related activities of the Polish Meteorological Services, concerning the international free exchange of data and information, have been restricted. IMGW is responsible for analysing satellite data relevant to climate change.

103. The national focal point of IPCC was established in 1990 at IMGW. Supervision of the focal point is carried out by the Ministry of Environment and is focused on the coordination of IPCC activities in Poland.

## VIII. EDUCATION, TRAINING AND PUBLIC AWARENESS

104. Since the publication of the NC1 and NC2, environmental education has been expanded and specific projects have been undertaken to increase public awareness of climate change issues. The Department of Promotion and Information of the Ministry of Environment is responsible for education, training and public awareness on climate change issues. The NC3 reports in detail on the educational policy, formal education, training courses and information centres, public information campaigns and the involvement of governmental and non-governmental organizations, as well as on Poland's participation in related international activities.

105. The general policy is stated in the *Second national environmental policy*, which contains a section on access to information, public participation and environmental education. The main goal is to create an efficient system for the publication of information and to promote public participation in environmental protection in line with the Act on Environmental Protection. The latter document states that issues of environmental protection and sustainable development shall be covered in the basic curricula of education for all types of schools. For this purpose, a memorandum of understanding has been signed by the Minister of Education and the Minister of Environment.

106. The Ministries have jointly prepared a National Environmental Strategy that identifies and prioritizes major goals for environmental education. One of the main objectives is to integrate sustainable development and environmental concepts at all levels of the education system. The draft National Environmental Education Programme, *Through Education to Sustainable Development*, which serves as the implementation programme for the strategy, identifies educational tasks and objectives as well as entities responsible for their execution (currently under discussion).

107. In April 1997, the Vice Minister of Education signed the agreement for cooperation in the GLOBE Programme (Global Learning and Observation to Benefit the Environment). The programme is currently being implemented in several secondary schools. Workshops have been organized for the teachers to train them in the different topics included in the programme.

108. **Public participation and outreach:** The *Second national environmental policy* contains a section about access to information, public participation and environmental education. The main goals are to provide public registers and support for NGOs. According to Article 74 of the Constitution, everyone enjoys the right to access information on the state of the environment. In addition, the Act on Environmental Protection contains several articles about public participation in procedures relating to environmental protection and the dissemination of information to the public. The Ministry of Environment and the Environmental Inspectorate have web sites containing environmental information at the national level.

109. In February 2002, Poland ratified the Aarhus Convention on Access to Information, Public Participation in Decision-Making and Access to Justice in Environmental Matters. Several meetings were organized to implement this convention.

110. The Ministry of the Environment, with the cooperation of NGOs, prepares information bulletins to increase public awareness of climate change and related issues. Examples of public information campaigns are World Environment Day, Clean up the World – Poland, and the European Car-Free Day. In 2000 a Polish NGO, the Institute for Sustainable Development, organized a project entitled *Our municipality protects climate*, with the aim of involving local communities in international action for climate protection. Good cooperation between the Ministry of Environment and some major NGOs has been established, and NGOs were consulted in the preparation of the NC3.

## IX. CONCLUSIONS

111. When reviewing the information reported in the third national communication of Poland, the review team concluded that the document broadly complies with the provisions of the UNFCCC guidelines. The team was of the opinion that the NC3, in combination with the annual GHG inventory submission and some updated information on the Polish GHG projections, provided a comprehensive overview of the current status of climate policy in Poland. Some potential for increasing transparency of reporting was identified, especially in the chapters on inventory, policies and measures and projections.

112. Given the challenges of the economic transformation process and the EU accession process, climate policy does not rank very high on Poland's political agenda at the beginning of the 21st century. Correspondingly, the review team noted a low budget and limited administrative capacity in this field. Still, Poland expresses its intention to make use of the flexibility mechanisms of the Kyoto Protocol, has implemented several AII/JI projects and intends to join the EU emissions trading market, starting in 2005. A precondition is the successful implementation of the new UNFCCC reporting requirements that were decided at the Eighth Conference of the Parties in New Delhi.

113. Poland is expected to meet its emissions target under the Kyoto Protocol, mainly as a result of economic restructuring, reduced coal usage, improvements in energy efficiency and ambitious afforestation programmes. Between 1988 and 2000, the overall GHG emission declined by 32 per cent (excluding LUCF) and 35 per cent (including LUCF), largely reflecting the restructuring of Poland's economy and energy sector. GHG emissions are projected to increase slightly between 2000 and 2010, resulting in a GHG emission reduction of about 25-30 per cent, compared to the 1988 level. The review team was informed that for the period 2000–2020 a further GHG emission reduction potential of up to 40 per cent (compared to a business-as-usual scenario) is economically feasible.

114. The review team noted that while the Ministry of Environment is responsible for the national climate change policy, other important ministries (e.g. Ministry of Infrastructure) are yet to actively integrate climate policy into their policy fields. The Energy Department within the Ministry of Economy, Labour and Social Policy has the main responsibility for energy policy. Overall coordination of the national climate change policy is still to be established. The setting up of a new steering committee is currently under discussion. The review team concurred with the views expressed by several host-country representatives on the need to strengthen the existing institutional arrangements. Also, the national inventory system needs a solid legal backing to ensure steady financial support.

115. The review team acknowledged the submission of the NIR for the year 2001 and the GHG inventory in the CRF and encouraged Poland to continue to improve the system, to harmonize the methodology for the different years, to recalculate the emission trend lines where necessary and to address the existing minor gaps.

116. Poland's success stories include a remarkable decoupling of GDP growth from GHG emissions, an increasing use of renewable energy sources (biomass use for heating), starting to improve building insulation through its ThermoModernization programme, a long tradition of sustainable forestry, several NGOs being very active in the field of climate change, and the setting up of several national funds for environmental protection.

117. The team noted with interest that a draft *Climate change strategy* has been prepared, and will be adopted in the course of 2003. Its overall goal is to integrate climate policy into all sectoral policies. Furthermore, a draft *Strategy for GHG emissions reduction till 2020* is under interministerial negotiation. Both documents are expected to facilitate the interministerial coordination of the elements of national climate policy and help to access further GHG mitigation potentials.

118. The team commended Poland on its ongoing work in the field of public awareness and outreach. The team felt that while the long tradition of climate science by research institutions is commendable, new funding efforts for these activities are needed to maintain the activities at this level. In addition, the research on vulnerability and adaptation should be intensified in view of the severe rainfalls that led to devastating floods of the river Odra.

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