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

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Under Articles 4 and 12 of the Convention, Parties are required to prepare national communications on their implementation of the Convention. Guidelines for the preparation of national communications and the process for their review were agreed on by the Intergovernmental Negotiating Committee for a Framework Convention on Climate Change, by its decisions 9/2 and 10/1, and by the Conference of the Parties, at its first session, by its decisions 2/CP.1 and 3/CP.1 (see FCCC/CP/1995/7/Add.1). In accordance with these decisions, a compilation and synthesis of the first 15 national communications from Annex I Parties was prepared (A/AC.237/81).

When reviewing the implementation of the Convention by Parties, the subsidiary bodies and the Conference of the Parties will have this report available to them in English as well as the summary of the report in the six official languages of the United Nations. (These bodies will also have before them the executive summary of the first national communication of Switzerland and country-specific information drawn from a compilation and synthesis report covering all countries that have submitted national communications.)

Summary¹

1. The in-depth review of the first national communication of Poland was carried out between March and May 1996 and included a visit to Warsaw from 25 to 29 March 1996. The review team included experts from the Czech Republic, Germany, the Philippines, and the United Nations Industrial Development Organization (UNIDO).
2. The in-depth review substantially improved the transparency of the national communication, and the team's understanding of the challenges facing Poland in its process of economic transition. As a result of the radical reforms carried out in the period 1989-1993, which entailed a substantial drop in economic activity, greenhouse gas emissions expressed as carbon dioxide in (CO₂) equivalent decreased by over 25 per cent. The Polish economy remains highly carbon intensive, partly because of its large coal reserves. Poland is the fourth largest hard coal producer in the world. In addition, Poland's industry is mainly heavy industry with 75 per cent of the final energy consumed by engineering, metallurgy and the chemical industry. Poland's energy related CO₂ emissions per capita amount to 10.9 tonnes (t)CO₂ compared to 12 (t) on average for member countries of the OECD. In view of its candidacy for membership of the European Union, Poland is likely to adopt policies and measures relating to climate change that are in accordance with those decided upon by the European Union.
3. Poland is seeking flexibility in implementing its commitments, in accordance with Article 4.6 of the Convention, and requests acceptance of the 1988 level of greenhouse gas emissions, as the base level for the stabilization of emissions.
4. The in-depth review of inventories was prepared in a transparent and facilitative manner. In addition to the inventory submitted in the Polish national communication, a new and more comprehensive version of the 1988 inventory was given to the review team. Drawing on several documents, which were also made available during the review, the review team was able to reconstruct 1988 emissions by sector. In making its calculations, Poland used country-specific emission or conversion factors, for example for the calculation of CO₂ methane and emissions.² The factors were generally speaking lower than those assumed under the Intergovernmental Panel on Climate Change (IPCC) guidelines. Poland does not produce sulphur hexafluoride (SF₆), perfluorocarbons (PFCs) or hydrofluorocarbons (HFCs). The team noted that bunker fuels, although not included in the emission totals, should be reported.
5. During the review, comprehensive literature was provided on the projections, which considerably facilitated their understanding. The review team was impressed by the analytical capacity supporting the projections. Two projections of greenhouse gases (GHGs) were prepared

¹ In accordance with decision 2/CP.1, the full draft of this report was communicated to the Government of Poland, which had no further comments.

² While the new version of the 1988 data was made available to the review team, Poland has not transmitted new inventory data for 1990 or 1992 to the secretariat.

by the Institute of Fundamental Technological Research of the Polish Academy of Science (IFTRPAS) and the Foundation for Energy Efficiency (FEWE) with the support of the United States Country Studies Program. The results generally indicate that Poland will meet its aim under the UNFCCC of limiting emissions to the 1988 level in the year 2000. A reduction of between 1 per cent and 14 per cent, depending on the growth rate of gross national product is, in fact estimated for the year 2000, but projections for the year 2010 differ as to whether emissions will remain below the 1988 level.

6. The review team was given information on the status of implementation of measures described in the national communication as well as details of new policies and legislation, currently under government consideration, mainly concerned with energy, industry, transport and municipal development. The measures are not specifically designed to control greenhouse gas emissions, but rather to encourage economic efficiency and rational energy use, which may in turn affect GHG emissions.

7. Concerning electricity generation, which is the major source of CO₂ emissions, the team was given to understand that energy policy will, *inter alia*, address the elimination of subsidies and price rationalization, and the demonopolization and privatisation of generation, transmission and distribution. Future CO₂ emissions from energy generation and transformation will be a function of (1) the ability of the new private generating companies to secure investment for modernizing existing plant, installing environmental protection (such as end-of-pipe technology), equipment and constructing new coal-fired and gas-fired combined cycle stations with higher efficiencies; (2) the availability of natural gas; and (3) the effectiveness with which the regulatory components of the new energy policy are implemented. Progress in this sector depends upon adoption by the parliament of a proposed new energy law and its implementing acts. Under this proposal, an independent Office of Energy Regulation will be created to monitor the production, transportation and distribution of energy, including electric power.

8. According to the national communication, the volume of road traffic in Poland is expected to almost double by the end of the year 2000 with respect to the level of 1988. Far-reaching modernization and reconstruction of the whole transportation system, leading to large increases in road traffic for personal and even more for freight transport, is planned. The communication indicates that an ecological infrastructure fee is to be introduced for road traffic in order to maintain competition and 2,600 km of highways and 3,600 km of expressway are to be constructed. It is not clear what the trend in emissions from the transport sector will be in the future, that is, whether improvements in efficiency will off-set the growth in the number of vehicles or not.

9. While much of the land surface of Poland is dedicated to agriculture and forestry, Poland has thus far only assessed the possible impacts of climate change on water management and on coastal areas. The results of water basin studies were considered to have low reliability because of uncertainty in the general circulation model results. They nevertheless pointed to the need for a "minimum regrets" strategy which solves current problems while preparing for droughts and floods.

10. While Poland is not an Annex II Party, the team attempted to determine the extent to which technology was being transferred to developing countries, given the rapid economic changes that are occurring and the shifting trade patterns. No new initiatives regarding technology transfer were reported during the review.

11. Poland participates in all major international programmes concerning global climate change, in particular the International Geosphere-Biosphere Programme, the IPCC, and the World Ocean Circulation experiment. Coordination of these programmes is the responsibility of the Polish Academy of Sciences. The most significant part of these studies has been undertaken by the Polish Hydrometeorological Service which is responsible for systematic observation of the climate in Poland.

12. Poland has a strong non-governmental ecological movement, including such groups as the Polish Ecological Club, Polish Foundation for Energy Efficiency (FEWE), and the League for the Preservation of Nature. These groups conduct activities which support its aims of the national communication, including the promotion of energy efficiency and lower GHG emitting transportation options. One group, the Polish Ecological Club drafted the chapter on non-governmental organizations in the communication.

I. INTRODUCTION AND NATIONAL CIRCUMSTANCES

13. Poland ratified the Convention on 28 July 1994. Its national communication was received on 2 February 1995. The in-depth review of the national communication was carried out between March and May 1996 and included a visit by a team to Warsaw from 12 to 19 May 1996. The team included Mr. Milos Tchy (Czech Republic), Dr. Rolf Sartorius (Germany), Ms Raquel Francisco (Philippines) and Mr. Robert O. Williams (United Nations Industrial Development Organization). In the course of the visit, the team met representatives of the ministries concerned and members of the scientific and academic community, as well as representatives of a number of non-governmental organizations.

14. Poland is situated on the North European Plain between the Baltic Sea and the Carpathian Mountains. It covers an area of 312,683 square kilometers; in 1990 it had a population of 37.9 million that is projected to grow slightly to 41.0 million by 2010. The climate is highly variable, with continental and oceanic types, and wide variations in temperature and precipitation. Poland has a large area of arable land (18 million hectares) with approximately one third of the population making its livelihood from agriculture. There is substantial scope for enhancing productivity through intensive cultivation; the liberalisation of markets has had a great impact on the food industry. Forests cover about 28 per cent, 8 million hectares, of the land area in state forests. Significant enhancement of sinks in areas covered with forests and agricultural soils has been reported.

15. Poland initiated a radical programme of policy reform in the period 1989-1993 in its transition to a market economy. The immediate result was an economic recession, characterized

by a drop in industry activity and rising energy prices, which resulted in a decrease of greenhouse gas (GHG) emissions (carbon dioxide CO₂ equivalent) of over 25 per cent. The extensive process of fiscal and financial reforms, including privatization, deregulation of prices and abolition of quantitative controls, the almost complete elimination of subsidies, and the dissolution of state monopolies in retailing in coal and energy are having a positive impact on the economy. The growth rate of gross national product (GNP) was approximately 5 per cent in 1994, 6.5 per cent in 1995 and, according to estimates, over 6 per cent in 1996.

16. The economy of Poland is highly carbon intensive. Industry occupies a dominant position, contributing over 40 per cent of gross domestic product (GDP) which places Poland among the most heavily industrialized countries. Engineering, metallurgy and chemicals manufacture account for nearly half of the industrial output, and over 75 per cent of the final energy consumption. The energy intensity of production is two times higher than that of the OECD as a result of past policies which paid little regard for the cost of energy. There are signs of a declining trend, however, and energy and raw material conservation is a major focus of policy, including improvement of production management and steam economy as well as utilisation of coal bed methane. Technological reconstruction of the energy-intensive industry should give lower energy costs or additional production or quality and suggests a substantial GHG reduction potential.

17. Poland has a level of energy related CO₂ emissions per capita that is approximately 10.9 (t) CO₂ compared to 12 (t) CO₂ for member countries of the OECD and 8 (t) for OECD-Europe. Current trends show that in spite of the GDP growth in 1992, emissions declined to 78 per cent of 1990 levels in 1992.

18. Coal is the principal primary fuel in energy production and this domination is likely to continue. With proven recoverable reserves of 31,000 million tonnes, Poland is the fourth largest hard coal producer in the world. Coal also constitutes an important raw material for the chemical industry. In 1989 coal mining received subsidies equivalent to 50 per cent of costs and 85 per cent of sales. Over the period 1989-1990 coal prices tripled. The Government's current approach is to keep the price of coal at the international level. Social factors will be important in lowering levels of production. The share of natural gas in energy production is about 10 per cent. This share is expected to increase as imports expand. The aim is to replace coal by gas or fuel in small boiler houses, households and small production plants. The focus is on 'no regret' policies, introducing fluidized bed combustion, improving building insulation and increasing the efficiency of energy end-use. Currently only about 15 per cent of the hydroelectric potential is used. About 3 per cent of energy demand is met by renewable energy sources. Poland both exports (coal) and imports (gas, fuel oil) fuels to generate electric energy.

19. The transport system has been undergoing a transformation with a shift from rail to road in both passenger and goods transport. Car ownership has been growing rapidly, and the number of cars per household increased from 0.3 per cent in 1988 to 0.4 per cent in 1992; the number is expected to double by 2005.

20. Implementation of the Convention in Poland is under the general supervision of the Ministry of Environment Protection, Natural Resources and Forestry. The Ministry also chairs the National Sustainable Development Commission which brings together representatives of all the ministries concerned. In drafting the national communication there was significant stakeholder involvement.

21. In accordance with a decision of the Council of Ministers in 1994 new environmental legislation is to be harmonised with the legislation of the European Union. An environmental information system to serve as a policy tool is being planned. A new constitution is being considered and is expected to decentralize some government functions. Present constitutional arrangements include the limitation of CO₂ emission levels in accordance with the United Nations Framework Convention on Climate Change, as a long-term goal of the environment policy as approved by the Polish parliament in May 1991.

22. In accordance with Article 4.6 of the Convention, which “allows a certain degree of flexibility”, Poland is seeking acceptance of the 1988 level of greenhouse gas emissions, as the base year for implementing the commitments for the stabilization of emissions, and partial implementation of the commitment to communicate the detailed description of policies for limiting emissions. The reason indicated is the far-reaching programme of policy reform started in 1989, and its immediate effect on the economy including GHG emissions. The year prior to the initiation of the reform programme, 1988, has been proposed as being more representative of the national circumstances of Poland. During the review it was pointed out that there are a number of uncertainties in policy making in the context of structural change and rapid economic growth. Poland has a broad strategy for reducing greenhouse gas emissions, and is in the process of translating this into sectoral policies.

23. Given successful implementation of the strategies adopted to influence underlying longer term trends, and access to environmentally sound technologies, CO₂ emissions in 2000 would most likely not exceed the 1988 levels; they may, however, exceed the 1990 levels because of the high growth rates of the economy - at present around 5 per cent per year.

II. INVENTORIES OF ANTHROPOGENIC EMISSIONS AND REMOVALS

24. The greenhouse gas inventory submitted by Poland for 1988, was based on the IPCC/OECD (1991) guidelines. The inventory was incomplete and it lacks a description of the basic data and methodology used to make the evaluations. The Communication also includes emission data for 1990 based upon the Corinair³ methodology and emission data for 1992. The 1990 inventory also lacked complete documentation. The 1992 inventory covers more sources and is based on draft Intergovernmental Panel on Climate Change (IPCC) Guidelines (OECD, 1994).

³ CORINAIR is the component dealing with air emissions inventories of the European Community CORINE (Coordinated Information System on the State of Natural Resources and the Environment).

25. During the review visit, a new version of the 1988 inventory was given to the team. The new version is much more comprehensive, but, no supporting documents were provided. Instead, the team was given an opportunity to examine The Greenhouse Gas Emission Inventory for 1988 in Poland, Final Report, Case Study on Greenhouse Gas Emissions in Poland by the Poland Foundation for Energy Efficiency (FEWE) and a draft version of the Polish Country Study to Address Climate Change released in 1996. The first document mentioned basic data used for the 1988 inventory while the second document gave a more detailed description of the methodology used to make the 1992 inventory. Drawing on these documents, the team were able to reconstruct 1988 emissions by sector. A comprehensive set of documentation has not however, been forwarded to the secretariat.

26. The re-estimated values of greenhouse gas emissions in the energy sector were obtained using the bottom-up approach while those shown in the communication was based on the reference approach. Less than 0.5 per cent difference was noted between the two approaches which were applied several years apart.

27. The 1988 inventory shows that Poland emitted 477,473 Gg CO₂, 3042 Gg Methane (CH₄), and 59 Gg Nitrous Oxide (N₂O) or a total of 570,882 Gg of CO₂ equivalent using the global warming potential (GWP) concept (IPCC, 1994). CO₂ accounted for 84 per cent. Other tropospheric precursors emitted by Poland in 1988 include 1,588 Gg nitrogen oxides (NO_x) 1,546 Gg carbon monoxide (CO) and 602 Gg non-methane volatile organic compounds (NMVOC).

A. Carbon dioxide

28. The energy sector contributes 97 per cent of the total emissions of CO₂, 56 per cent of which come from the energy and transformation industries subsector. In making its calculations, Poland used country-specific emissions factors. An example of this is gasoline for which the IPCC default value is 69.3 t CO₂ / TJ while the value used by Poland is 72.49 t CO₂/TJ. In addition, a small amount of wood is used in the residential sector accounting for 3000-4,000 Gg CO₂ which is practically negligible.

29. In 1988, the industrial subsector accounted for 13,599 Gg CO₂ or 3 per cent of the total CO₂ emitted by Poland. Of the former, 89 per cent came from non-metallic mineral products, particularly from the cement industry.

30. The national communication indicates that the agricultural sector is a net sink. During the review visit, experts from Warsaw Agricultural University explained that the ploughing of manure into the soil, which is extensively practised in Poland, gave rise to the net sink of carbon in agriculture. To support this opinion they provided the team with a detailed paper. However, the new 1988 and 1992 data do not indicate whether agriculture is a net source or sink.⁴

⁴ This sink is not included in the IPCC methodology for inventorying GHGs.

31. The land use change and forestry sector represented in 1988 a net sink of 1,408 Gg CO₂, approximately 6,888 Gg CO₂ were sequestered in forests, 5,236 Gg, were emitted from grassland conversion and 244 Gg were emitted from forest clearing and on-site burning. The figures are an approximation and will be subject to further analysis. The biomass density used by Poland (95Gg dry matter per hectare for evergreen forest) is lower than the default value recommended by IPCC (1995) which is 200 Gg/ha. For deciduous trees, Poland used 133 Gg dm/ha which is also lower than the IPCC default value of 175.

B. Methane

32. In 1988, methane emissions accounted for 13 per cent of the total direct GHG emissions. Approximately 33 per cent of methane emissions came from coal mining, 28 per cent from animal production and 30 per cent from landfills and wastewater. In estimating methane emissions from coal mining, Poland used country-specific conversion factors which are lower than those recommended by IPCC. In the case of animal wastes, Poland used emission factors for cattle and swine 30-48 per cent lower than those of the IPCC. For other animal types, the emission factors were the same. With regards to fugitive methane emissions from gas production and distribution, the team was impressed with the detailed approach used by the Polish experts.

C. Nitrous oxide

33. Nitrous oxide contributed to 0.3 per cent of GHG emissions in 1988, with most of the emissions originating from agricultural soils (53 per cent) and industrial processes (34 per cent). Poland estimated N₂O emissions from the application of fertilizers, manure, legumes and soil organic matter using the equation: $E(N_2O) = 0.82 + 0.0080N$ where N is the amount of the mineral fertilizer applied in kg N/ha and 0.82 is the average losses of N₂O in kg/ha in soils to the atmosphere (Mercek *et al.*, 1994).

D. Sulphur hexafluoride

34. Poland does not produce any sulphur hexafluoride (SF₆), perfluorocarbons (PFCs) or hydrofluorocarbons (HFCs).

E. Bunker fuels

35. Bunker fuels or fuels used for international transportation were not reported in the new 1988 inventory whereas they were reported in the national communications. Although not included in the totals, bunker fuels should be reported. According to the study by the Polish Foundation for Energy Efficiency the amount of CO₂ emitted from bunkers is estimated at 3,351 Gg.

III. PROJECTIONS OF GREENHOUSE GASES

36. Two projections of GHGs are presented in the national communication. The first was prepared by the Institute of Fundamental Technological Research of the Polish Academy of Science (IFTRPAS). The main conclusions are presented in the national communication. Preliminary results of the second study carried out by the Foundation for Energy Efficiency under the framework of the United States Country Studies Program are also mentioned in the national communication. These results are sometimes in contradiction with the previously mentioned study.

37. The national communication indicated that, on the basis of three scenarios and two different GNP growth rates, Poland will meet its aim under the Convention to limit emissions to 1988 levels in the year 2000. A reduction of between 1 per cent and 14 per cent depending on GNP growth is estimated. However, information contained in the national communication is rather limited. During the visit of the review team an extensive amount of material was presented and this improved understanding of the estimates as outlined in the following paragraphs.

38. Projections of greenhouse gas emissions are based on approved energy policy, environmental policy and other major official documents such as resolutions of the parliament and official statistics etc. The results were presented to several international institutions (World Bank, United States Agency for International Development, International Energy Agency), and peer reviewed by 15 Polish experts. Three scenarios for the period 1988-2010 were drawn up. The first one included unlimited development. Two sets of GNP growth rates were considered: low (2.3 per cent until 2000 and 3 per cent thereafter) and high (3.2 per cent until 2000 and 5 per cent thereafter). This macroeconomic forecast including structural changes was developed by a spreadsheet based model called STRUK. Major structural changes are expected to reduce the share of industry in the economy from 57 per cent to 46 per cent with the service sector growing by a corresponding amount. The general assumption is that the structure of Polish GNP will become similar to that of the European Union (EU).

39. A final energy demand scenario was calculated using the PROSK - E model driven by energy intensity and activity level variables derived from the MEDEE model of Enerdata Grenoble. The final energy demand is provided as an input to the DORSEK - E model, a tool to specify and optimize requirements for primary energy resources. Based on the information provided to the review team, it appears that this model optimizes only the supply side of the energy sector.

40. The results indicate that primary energy consumption resources and CO₂ emissions show the same pattern, that is, after a 16 per cent drop in the period 1988-1990 an almost steady increase should be observed. As mentioned previously, according to all scenarios, emissions in the year 2000 will remain below the 1988 level but 1990 levels will be surpassed. With the lower GDP growth rate the 1988 level is not reached until 2010. The higher GDP growth rate

causes emissions to exceed 1988 levels between 2000 and 2005. In these scenarios renewable sources are negligible and no nuclear energy is expected until 2010.

41. During meetings with environmental non-governmental organizations, the team was informed that substantial energy savings (of about 50 per cent) could occur in the building sector. These measures which could be introduced have an average payback time of about four years. It was not clear whether this potential saving was included in the projection. Also, the environmental organizations estimate the potential of renewables as much higher than that presented by the representative of the Ministry of Trade and Industry.

42. The review team was impressed by the robustness of the projections. This is based on the presentations made during the mission rather than the facts contained in the national communication and on the general consensus of the local experts. The review team could not check the extensive assumptions used to make the energy projection.

IV. POLICIES AND MEASURES

A. General

43. The review team was given information on the status of implementation of measures described in the national communication as well as details of new policies and legislation, currently under government consideration, mainly concerned with energy, industry, transport and municipal development. The measures are not specifically designed to control greenhouse gas emissions, but rather to encourage economic efficiency and the rational energy use, which may in turn affect greenhouse gas emissions.

B. Energy

44. Whereas Poland will most probably succeed in keeping GHG emissions in 2000 below the 1988 level, the picture beyond 2000 is less clear. The national communication states that "sectoral strategies are in various stages of development" and that "Poland's Energy Policy is approved by the Ministry of Industry and Trade". Concerning electricity generation, which is the major source of CO₂ emissions, the team was given to understand that the aims of energy policy will include:

- (a) Elimination of subsidies and price rationalization; and
- (b) Demopolization and privatisation of generation, transmission and distribution.

45. Some insight into the impacts of policies currently under consideration, on CO₂ emissions from power generation can be obtained from the macroeconomic projections of CO₂ emissions being made by Polish experts within the framework of the United States Country Studies Program. They are based on a range of assumptions concerning policy direction and economic growth and consider different levels of penetration of natural gas, renewables and after 2020, into the fuel mix for power generation. All scenarios show a limited growth of emissions

until 2015 relative to the 1992 level. Subsequently, the impact of alternative scenarios depends on demand growth and availability of energy imports. Projected CO₂ emissions in 2030 are 120 to 250 Mt over 1988 levels.

46. Future CO₂ emissions from energy generation and transformation will be a function of (1) the ability of the new private generating companies to secure investment for modernizing existing plant, installing environmental protection, (such as end-of-pipe technology), equipment and constructing new coal-fired and gas-fired combined cycle stations with higher efficiencies; (2) the availability of natural gas; and (3) the effectiveness with which the regulatory components of the new energy policy are implemented.

47. To attract investment, the new energy policy enables power generators to establish long-term contracts with their customers. Estimates have been made of the investments required to modernise the power sector, which are in the order of US\$ 7.4 billion for the period 1995-2000, and US\$ 7.0 billion for 2001-2005. Net conversion efficiencies for public thermal plants currently average 34 per cent (fuel to power), and 83 per cent (heat generation). Projects, both underway and for which investment is being sought, target power station refurbishment, introduction of electrostatic precipitators, flue-gas desulphurization systems and low-NO_x burners, construction of new, high-efficiency plants, including fluidized bed combustion and combined heat and power development. Recently established strategic alliances between Polish and foreign power engineering companies will strengthen the already high level of technical capability available in Poland to undertake this work. Over the next 10 years, plans call for about 20,000 MW(e) of installed capacity to be refurbished and at least 2,800 MW(e) to be decommissioned.

48. Beyond 2000 policies and programmes to promote fuel diversification may have a decisive impact on reducing the growth of atmospheric emissions from power generation. The introduction of natural gas in the power, industrial and residential sectors may be accelerated subject to completion of a new supply pipeline from Russia. Renewables, particularly biofuels, are expected to play an increasing but nevertheless, still very small, role. According to the new energy policy, distribution companies will be able to purchase renewable-derived power, but the quantities to be purchased are not fixed. Consideration may also be given to a more decentralized power supply.

49. A mechanism to regulate sulphur dioxide (SO₂), NO_x and particulate emissions from the power sector is in place. Emission standards are established at the provincial (voivod), level by the respective offices for environmental protection. Evidence of the successful enforcement of these standards is seen in the continuing reduction of SO₂ and NO_x emissions adjusted for increases in GDP.

50. If the parliament adopts a proposed new energy law and its implementing acts, an independent Office of Energy Regulation will be created to monitor the production, transportation and distribution of energy, including electric power. This new body will be empowered to issue, (and suspend), permits to Power Generators. Permits will take into account

fuels to be used in power generation, emissions and tariffs. Fines will be introduced for non-compliance. New planning tools will facilitate the introduction of demand-side management schemes. Coal mining operations are a source of methane emissions and there are plans to increase the amount of coal bed methane used to generate power and heat.

C. Industry

51. In 1993 Polish industry emitted over 157 Mt of GHG (in CO₂ equivalent), including emissions from industrial consumption of heat and power. These originated mostly from the metallurgy, chemical and mineral industries as well as indirectly from heat and power plants. Options in the industry sector evaluated in the United States Country Study Program which mainly entail increases in point-use efficiency through the introduction of new technologies and through fuel switching, could reduce emissions in 2010 by 88 Mt. Many technology options in industry involve negative investment costs.

52. Actions implemented and to be implemented in the Industry Sector reflect both structural changes away from energy-intensive, raw materials processing towards automotive, electronic, food processing, textiles, light manufacturing, and fine chemical industries, and growth in the contribution of the service sector to GDP (currently above 50 per cent). The foregoing structural changes are being driven by the need to improve industrial material and energy efficiency and the need to compete in the world market. GHG emissions control is not the major objective of these measures.

53. Several economic instruments of structural change are either in place or to be introduced with the industrial policy. Fiscal tools include tax credits on efficiency investments, credit guarantees, and liberalized duties on certain imports. Locational policies include establishing special economic zones. Companies are encouraged to seek international cooperation to support cleaner production practices and technologies.

54. Standards for industrial atmospheric emissions are in place and a regulatory mechanism, including permitting, compliance monitoring and enforcement, is administered at the state, voyvod and local community levels. Environmental considerations are integrated into industrial planning through environmental impact assessment. Expanding the use of energy audits in industry is called for in the new energy policy.

D. Transportation

55. According to the national communication, the volume of traffic in Poland is expected to almost double by the end of the year 2000 with respect to the level of 1988. Far-reaching modernization and reconstruction of the whole transportation system, leading to large increases in road traffic for personal and even more for freight transport, is planned. The communication indicates that an ecological and infrastructure fee will be introduced for road traffic in order to maintain competition, and 2,600 km of highway and 3,600 km expressway are to be constructed.

56. The review team was given more information on measures and actions planned in connection with the restructuring process during the visit.

57. A programme of development of the transport sector for the next 10 years is before the parliament. The main objectives are quality, economy and efficiency of transportation.

58. The following additional information on action was provided:

(a) Priority in modernization will be given to international road and rail connections (in line with international conventions);

(b) Highways and expressways, mainly privately financed by concessions will be constructed, subsequently the usage of these roads will have to be paid by the customer;

(c) Standard speed for personal trains by extension of airports and exchange of the Polish aircraft fleet (already completed);

(d) Improvements will be made in urban public transportation systems (with obligatory periodical inspections of buses every six months, and possible upgrading of the vehicle fleet aiming at better fuel efficiency and optimization of size, bus lanes, parking fees in cities, etc. All these measures are up to the municipalities);

(e) ECE/EU regulations on car emissions will be applied;

(f) Passenger cars will be categorized with respect to (fuel) economy, and the most inefficient cars labelled;

(g) Fuel prices, hitherto set by the Government, are to reflect market prices in future, possibly with the addition of an excise tax (and perhaps also a fee);

(h) Subsidies are to be given only to domestic public bus and rail traffic.

E. Residential/commercial sector

59. Large potentials to reduce energy consumption and CO₂ emissions in space heating exist owing to the inefficiency of the heating devices and poor state of building insulation in Poland. For new buildings, insulation standards are to be set.

60. For existing buildings, heating charges have been increased significantly (up to a factor of 30 and they now constitute 50 to 60 per cent of the operational costs). Thus, a basic incentive for improvements is created, but their realization is difficult. Although payback times for new heating systems are short, those for insulation and new windows are long. This has caused difficulties in financing, aggravated by different conditions of property and interest situations. As the previous system of subsidies proved to be inefficient, lines of credit are now offered.

61. The installation of heat measuring devices (mainly for building, rather than for individual flats), is being carried out through loans from the World Bank and the European Investment Bank. Existing district heating networks are targeted for expansion, but cogeneration in this connection has not yet been considered.

62. Landfills are generally in relatively bad condition; about 10-15 come into consideration for collecting methane and using this as fuel. Regulations concerning waste treatment and landfills are being prepared within two acts (waste act and the public cleanness act).

F. Agriculture

63. Large scale restructuring, including a drastic reduction in the number of farms and an increase in average farm area, is already necessary with respect to Poland's intention to join the European Union.

64. An increase in nitrogenous fertilizer application of about 50 per cent is estimated, although this is still well below the previous level of 1988/89 and even lower than the amounts applied in most EU member States. A further increase in nitrogen fertilization will be avoided mainly by optimizing application.

65. Possibilities for the reduction of methane emissions exist in improving the efficiency of milk production.

66. Areas no longer needed for agricultural production will cater for industrial and energy purposes.

G. Forestry

67. Afforestation is under way. Between 1993 and 1997, 72,000 hectares were to be afforested, financed by credits from the World Bank and the European Investment Bank. For the period 1998-2020, the afforestation of 700,000 hectares of previously agricultural land is planned. Plantations of rapid-rotation species for purposes of energy generation are also planned.

H. Renewables

68. Hydroelectric power plants (including micro-hydropower) currently sell power to the grid. Conditions for electricity to be generated from other renewables (or co-generation) still have to be decided. However, according to information provided to the team, about one third of Poland has potential for wind energy, particularly along the Baltic coast. The Polish Ecological Club claims that nearly 30 million tons of coal equivalent or 10-15 percent of Poland's energy use could be replaced by biomass, geothermal and wind energy sources.

69. Geothermal heat is currently used in three pilot plants for space heating. If this proves to be profitable, further plants are planned. Ethanol from agricultural production is added to gasoline (up to 5 per cent). One plant produces rape seed oil to be used as motor fuel.

70. The general financial regulation for renewables is that investments can be subsidized, but the product, has to be profitable.

I. Cross-sectional regulations

71. There are two environmental protection funds: the National Fund for Environmental Protection and Works Management and its Regional Structures, and the ECOFUND.

72. The National Fund imposes fees and fines on emissions of air pollutants including greenhouse gases and for non-compliance with other environmental regulations. An important point is that this financial resource is not dependent on the regular budget of the State.

73. The ECOFUND is based on "debt for nature" which the Polish Government has with other countries. A part of these debts have been released and credit to ECOFUND.

V. EXPECTED IMPACTS OF CLIMATE CHANGE

74. While much of the land surface of Poland is dedicated to agriculture and forestry, Poland has thus far only assessed the possible impacts of climate change on water management and on coastal areas. Poland used the CILRUN3 model developed in Poland to assess water management impacts. While it was not clear in the national communication which rivers and basins were covered by this analysis. The results were considered to have low reliability because of uncertainty in the general circulation model results, they nevertheless pointed to the need for a "minimum regrets" strategy, which solves current problems while preparing for droughts and floods. No economic damage costs have been determined for water, agriculture or forestry.

75. Poland also assessed the impacts of a 30-100 cm increase in sea level, including the loss of land, roads, railroads, and bridges. The costs of protection appears to be significantly higher than that of the infrastructure to be protected, so it is assumed that resources for sea-shore protection will not be available.

VI. FINANCIAL ASSISTANCE AND TECHNOLOGY TRANSFER

76. Although Poland is not an Annex II Party, the team attempted to determine the extent to which technology was being transferred to developing countries, given the rapid economic changes that are occurring and shifting trade patterns. No new initiatives regarding technology transfer were reported during the review.

VII. RESEARCH AND SYSTEMATIC OBSERVATION

77. Poland spends about 0.67 percent of its gross national product on research of all types. It participates in all major international programmes concerning global climate change, in particular the International Geosphere-Biosphere Programme, the Intergovernmental Panel on Climate Change, and the World Ocean Circulation Experiment. Coordination of these programmes is the responsibility of the Polish Academy of Sciences. The most significant part of these studies has been undertaken by the Polish Hydrometeorological Service which is responsible for systematic observation of the climate in Poland.

78. It was difficult to arrive at an integrated picture of climate change research in Poland, despite the fact that 7,000 projects supported by the government between 1991 and 1993 were scanned to determine their relationship to climate change. The majority of resources have been assigned to studies of the efficient use of energy and the transportation system. Other studies were made, for example, of climate change scenarios, global changes, oceanology, and polar regions.

VIII. EDUCATION, TRAINING AND PUBLIC AWARENESS

79. The Polish national communication notes that the formal education of children includes courses on ecology and that informal lessons and lectures are available to everyone interested.

80. Poland has a strong non-governmental ecological movement, including such groups as the Polish Ecological Club and the League for the Preservation of Nature. The review team was able to meet with representatives of several groups and learned that they have organized media briefings to increase public awareness, launched highway and bicycle campaigns and worked with banks to encourage energy conservation projects. The review team learned that non-governmental organizations had had little opportunity to comment on the national communication. The representatives also indicated that while they knew relatively little about activities implemented jointly, they were concerned about how such programs would work and how crediting would be apportioned.
