

POLAND'S CLIMATE POLICY

**The strategies for greenhouse gas emission reductions
in Poland
until 2020**

The Ministry of the Environment

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1. INTRODUCTION

The decade of the 1990s brought growing unfavourable atmospheric phenomena causing a variety of weather anomalies. The international research and development and political communities quite generally believe that the dynamics of atmospheric phenomena now to be observed may be the effect of cumulated global change in the Earth's climate – change caused e.g. by the long-term impact of man's activities on ecosystems. The scientific communities working for the purposes of the Intergovernmental Panel on Climate Change (IPCC) are convinced that there is a dependency between the growth of greenhouse gas concentrations in the atmosphere and the growing trend of global temperatures on the Earth, threatening serious consequences for climatic stabilisation and equilibrium. The possible climate change causes increasing concern, since its effects may be very painful for the entire international community – irrespective of its place of residence or affluence. The correct assessment and the launch of political mitigating action is now one of the greatest developmental challenges facing the world. This challenge won understanding and support on the forum of the United Nations Organisation, which adopted at the Earth Summit in Rio de Janeiro in 1992 the United Nations Framework Convention on Climate Change, which was then signed by more than 150 countries, including Poland. The Convention came into effect in March 1994. Poland has been Party to the Convention since 1994, which means the obligation to take action to stabilise greenhouse gas contents in the atmosphere at levels preventing permanent global climate change.

The preparation of this document was the effect of the commitment under the Convention e.g. to develop and implement the national strategy for greenhouse gas emission reductions, also including economic and administrative mechanisms and periodical monitoring of its implementation. The Convention¹ imposed on Poland the commitment to stabilise greenhouse gas emissions and increase their removals by sinks in 2000 at the levels of the base year, which is 1988 for Poland. This commitment applied to all the countries listed in Annex I to the Convention, including the economically developed countries and countries undergoing political and economic transition. The Convention obliges the individual countries to make periodical inventories and report on the emissions and removals by sinks of all greenhouse gases which are

¹ Official Journal of 1996, No. 53, Item 238.

not covered by the Montreal Protocol², using comparable methodologies approved by the Conference of the Parties to the Climate Convention.

Poland met its commitment to reduce greenhouse gas emissions with a significant surplus. In 1988-2001 the emissions fell by more than 30% (Annex I). For the most part, such large reductions were the effect of the processes of political and economic transition initiated in the early 1990s. The achieved favourable effects on climate and the environment involved high social costs – as a result of necessary transformations on a huge scale in the national economy.

In the second half of the 1990s, the countries - Parties to the Convention recognised that it was necessary to take measures to reduce anthropogenic emissions after 2000, too. In the course of the 3rd Conference of the Parties to the Convention in Kyoto, in 1997, the Protocol to the Convention was signed. It obliges the Parties to enhance their efforts to reduce their greenhouse gas emissions. For countries with their economies in transition, including Poland, it provides an opportunity for partly compensating for the costs and relinquishments incurred through the mechanisms of the Kyoto Protocol allowing for the purchase and possible sales of the ownership rights to their accumulated surpluses of greenhouse gas emission reductions. Poland's ratification of the Kyoto Protocol, which took place in accordance with the international procedure on 13 December 2002³, makes it possible for our country to participate in these mechanisms.

The implementation of the commitments under the Convention and the ratification of the Protocol are treated by the international community as a measure of Poland's involvement in the pursuit of the global policies of sustainable development, including the policy of climate change mitigation. A large number of countries and international organisations, including the European Union (EU), attribute high importance to the ratification of the Protocol. The European Union ratified the Protocol on 31 May 2002. In addition, in June 2002, the European Union adopted the comprehensive European Climate Change Programme, setting out the detailed directions of action to reduce emissions from the manufacturing sectors in the Member States – laid down in accordance with the core principles of environmental efficiency and cost effectiveness of the reduction measures taken.

² The Montreal Protocol on Substances that Deplete the Ozone Layer, adopted in Montreal on 16 September 1987 (Official Journal of 1992, No. 98, Item 490, as amended).

³ The Act of 26 July 2002 on the Ratification of the Kyoto Protocol to the United Nations Framework Convention on Climate Change (Official Journal No. 144, Item 1207).

The climate protection issues have not been an essential problem of Poland's development in the transition period compared with the other daunting political, economic, social and environmental concerns. There is no doubt that a positive effect of the transition is e.g. the significant improvement in the quality of practically all the elements of the natural environment, including the very large reductions in greenhouse gas emissions. In the process of the restructuring of the economy aimed at improving its efficiency, strengthened by the requirements of the process of integration with the European Union, including mostly the harmonisation of legislation – measures were taken which should result in the maintenance and even the strengthening of the favourable trends in environmental protection – including climate change mitigation.

2. BASIC PROBLEMS AND FACTORS OF POLAND'S CLIMATE POLICY

The growing dynamics of atmospheric phenomena as observed in the several recent years in the world, Europe and Poland may indicate the emergence of the first signs of climate change. The IPCC predictions published in 2000 in the *Third Assessment Report* (IPCC, 2000) suggest that in 2100 climate change may cause the temperatures to grow from 1 to 6°C, contributing to a sea level rise of about 90 cm and a significant growth of such climatic events as droughts, floods, periodical spells of cold weather and strong storms. The IPCC analyses indicate that unless the existing trends are stopped the predicted climate change may come at such a pace that the natural environment, society and the economy will not be able to adapt to the new climatic conditions without incurring additional costs.

The analyses and assessments made to date concerning the implementation of projects to mitigate climate change in the Member States of the European Union indicate that they need not mean a drop in the economic growth rate, nor in social prosperity, but that in the longer term they may have a positive effect on economic growth. However, this is possible on the condition that restructuring and adaptive work is urgently launched in the economy and that production and consumption patterns are deliberately managed, an effect of which would be the weakening of the dependency between the economic growth rate and the magnitude of the related greenhouse gas emissions. The early experiences of the EU countries indicate that policies and measures to mitigate climate change are a powerful force driving technological innovations and improvements in economic efficiency, including particularly the efficient management of fuels and energy.

2.1. Poland's international commitments in the field of climate change

Poland's international commitments in the field of climate change result from the provisions of the United Nations Framework Convention on Climate Change and particularly the Kyoto Protocol. Poland ratified the Convention on 28 July 1994⁴ and its commitments include e.g.:

1. the development and implementation of the national strategy for greenhouse gas emission reductions, including as well economic and administrative mechanisms, and the periodical monitoring of its implementation;
2. the performance of inventories of the emissions and removals by sinks of greenhouse gases for each year, in accordance with the methodology adopted by the Conference of the Parties, and, on this basis, the monitoring of change in the emissions;
3. the development of long-term scenarios for the emission reductions for all the economic sectors, separately for each gas;
4. the conduct of scientific research on climate change problems;
5. the preparation of periodical national communications (every two years) to the Conference of the Parties containing detailed information on the meeting of the aforementioned commitments.

The Kyoto Protocol will enter into force after it has been ratified⁵ by at least 55 countries – Parties to the Convention. These countries must include the countries listed in Annex I to the Convention whose total CO₂ emissions in 1990 represented at least 55% of the total emissions for that year from the countries – Parties to the Convention listed in the said Annex. The basic commitment which the countries listed in Annex I to the Convention made in Kyoto was to reduce their greenhouse emissions into the atmosphere in 2008-2012 by a total of 5.2% below the 1990 levels. Poland is committed to reduce its emissions by 6% with respect to 1988⁶. Each of the Parties is also obliged to demonstrate significant progress in the reduction of its emissions as early as 2005. In addition, the countries listed in Annex I to the Convention are obliged to implement the following directions of action to reduce greenhouse gas emissions by gases and sectors:

⁴ In Poland's case the Convention entered into force on 26 October 1994.

⁵ To date, the Kyoto Protocol has been ratified by 117 countries, with the countries in Annex I to the Convention representing 44.2% of the emissions (according to the data as of 5 September 2003).

⁶ Countries with economies in transition were allowed to choose a base year other than 1990; Poland chose 1988 as its base year. 1988 was the last year of the relatively normal functioning of the economy before the crisis, when the greenhouse gas emission levels were the highest in the decade. Different levels of burdens were adopted for

- ❑ the enhancement of the energy efficiency of the economy;
- ❑ the protection of sinks and reservoirs of greenhouse gases through promoting sustainable forest management;
- ❑ the promotion of sustainable agricultural practices;
- ❑ the promotion and implementation of technologies using renewable energy sources, sequestering carbon dioxide etc.;
- ❑ the progressive reduction of market barriers hampering emission reductions in economic sectors, including phasing out of subsidies and introduction of tax reliefs;
- ❑ the encouragement of the implementation of reforms contributing to emission reductions and removals by sinks of greenhouse gas emissions;
- ❑ the launch of measures to reduce emissions from transport;
- ❑ the limitation of methane emissions from landfills of waste and from the processes of production, transport and distribution of energy.

In order to meet the commitments use may be made of auxiliary mechanisms allowing the costs of greenhouse gas emission reductions to be diminished. They include:

- ❑ the mechanism for the joint implementation of commitments (Joint Implementation – JI), allowing one country to include in its greenhouse emission reductions the emission reductions achieved as the result of an investment project in another country (this applies to the developed countries and those with their economies in transition which are obliged to reduce their emissions);
- ❑ the emissions trading between the countries listed in Annex I to the Convention, allowing a country – Party to the Protocol to sell its surplus of greenhouse gas emission reductions achieved over and above the commitments under the Protocol to another country – Party to the Protocol;
- ❑ the clean development mechanism (CDM), resembling JI, allowing for transactions to be concluded between countries obliged to reduce their greenhouse emissions (developed countries and those with economies in transition) and countries having no commitments (developing countries).

individual countries (some countries were obliged to reduce their emissions, others to stabilise their emissions and still others may even increase their greenhouse gas emission levels).

2.2. The process of integration with the European Union

The European Union gave a high priority to climate change issues in the process of negotiations conducted in the framework of successive Conferences of the Parties to the United Nations Framework Convention on Climate Change or the ratification of the Kyoto Protocol. The incorporation of the Convention and the Kyoto Protocol into the Community legislation gave direction to the scope of amendments successively made to the Community policies and legal measures in the field of air quality.

In the recent few years, the European Union repeatedly stressed that climate protection policy was the highest priority in its environmental strategies and programmes until 2010. The authorities of the European Parliament issued recommendations for the selection in EU and national programmes and development strategies of such sectoral policies and measures as would not be in contradiction with measures in favour of climate policy, but would instead support them. The European Union Member States agreed a Common Position on the Sixth Environment Action Programme⁷, which indicates the necessity of the integration of environmental issues into all the other sectoral and problem policies of the European Union. Among the main objectives (priorities) of the Programme, the issues of climate change policy took the first place.

The aim of the European Climate Change Programme (ECCP) is to co-ordinate measures to reduce greenhouse gas emissions. In the medium- and long-term, ECCP will certainly provide a platform for international co-operation addressing as well such issues as adaptation to climate change, technology transfer, training and education.

In the light of the above, it should be said that the main challenges facing Poland include:

1. The preparation for its participation in the work under the Sixth Environmental Action Programme of the European Union.
2. The preparation for the meeting of the provisions of the Council Decision for a monitoring mechanism of Community CO₂ and other greenhouse gas emissions and evaluating progress towards meeting commitments in respect of these emissions⁸.

The Council Decision stresses the responsibility of the Member States for devising their own policies and measures to reduce their greenhouse gas emissions. Their effectiveness will have to

⁷ Decision 1600/2002/EC of the European Parliament and of the Council of 22 July 2002.

be continuously monitored. The monitoring mechanisms will be an effective tool for the assessment/estimation of all the measures relating to the Kyoto Protocol.

3. The preparation for the implementation of the provisions of the Directive of the Council and the European Parliament establishing a scheme for greenhouse gas emission allowance trading within the Community and amending Council Directive 96/61/EC, which was approved by the Council of Europe on 22 July 2003, including the adoption of amendments to legislation allowing for emissions trading.

The Kyoto Protocol does not allow for other countries to be included in the bubble of the European Union. This means that a country acceding to the European Union will participate in the emissions trading on the basis of its Kyoto target, just as any other country which is not a member of the EU. On its accession to the European Union Poland will become subject to Community legislation, including the Emissions Trading Directive⁹.

The data and reporting requirements will need substantial efforts from Poland, in order to ensure e.g. the timely provision of reports, data verification, access to original data at the level of emission sources and the establishment and maintenance of the register of allowances (e.g. for allocation purposes).

According to the implementation timetable, in June 2004 the European Commission will approve or reject the National Allocation Plan (NAP). On 1 May 2004, the date of accession, Poland will be obliged to submit the NAP. In turn, in September 2004, a Member State will decide on the total number of allowance and their allocation to particular plants (installations).

At present, Poland is preparing its emissions trading system, including carbon dioxide.

4. The preparation of the position for the negotiations on the commitments in the second period, i.e. 2013-2018, taking into account with the new EU legislation.

The requirement to reduce greenhouse gas emissions follows from numerous Decisions and Directives of the European Union concerning different economic sectors. A list of these documents is provided in Annex 2. In fulfilling its commitments to align its national regulations to the legal requirements of the European Union, Poland transposes Community legal acts in the field of air protection. In addition to the EU legislation mentioned above, the regulations of

⁸ Council Decision 1999/296/EC of 26 April 1999 amending Decision 93/389/EEC. The most recent proposal for a new Decision of the European Parliament and of the Council of the European Union on the mechanism for monitoring greenhouse gas emissions in the Community and the implementation of the Kyoto Protocol.

⁹ In accordance with the Directive, a Member State must include 5 major sectors in the system, in line with specific threshold values. These sectors are: power production, heat production, oil refineries, iron and steel production, paper production and production of construction materials (cement etc.). Initially, the trading will only cover carbon dioxide. A Member State may include entities below the threshold values set out in the Directive in the period 2005-2007 as well as other gases and sectors in the period 2008-2012. The European Commission may propose the inclusion of other gases and sectors in the system in the phase 2008-2012.

greatest significance for climate policy include the provisions of Council Directive 96/62/EC of 27 September 1996 on ambient air quality assessment and management, Council Directive 96/61/EC concerning integrated pollution prevention and control (IPPC), Directive 2001/80/EC of the European Parliament and of the Council of 23 October 2001 on the limitation of emissions of certain pollutants into the air from large combustion plants, Directive 2001/81/EC of the European Parliament and of the Council of 23 October 2001 on national emission ceilings for certain atmospheric pollutants and Directive 2000/76/EC of the European Parliament and of the Council of 4 December 2000 on the incineration of waste. The fulfilment of the requirements of the aforementioned Directives poses a substantial challenge for our country.

With respect to Council Directive 96/61/EC concerning integrated pollution prevention and control (IPPC), the introduction of integrated permits will lead to greenhouse gas emission reductions and involve the requirements for the application of BAT both in the energy sector and in industrial processes. Moreover, given its restrictive emission standards envisaged for solid fuels, Directive 2001/80/EC of the European Parliament and of the Council of 23 October 2001 on the limitation of emissions of certain pollutants into the air from large combustion plants will influence the diversification of the fuels applied, causing as a result reductions in greenhouse gas emissions.

2.3. Policies and measures to reduce greenhouse gas emissions in Poland

The climate change issue is a global problem and it is only the efforts of all the countries that can bring tangible benefits in the form of the stabilisation of, and then reductions in, anthropogenic greenhouse gas emissions into the atmosphere. For this reason, the efforts taken by individual countries should be mutually co-ordinated, since significantly beneficial effects of policies can then be expected as result of the emergence of synergy effects. A distinct feature of the proposed measures and instruments for climate change mitigation are the individual circumstances of the states, with the limits of their involvement determined by their economic potential conditioning the effectiveness of the implementation of measures to maintain a global climatic equilibrium.

12.3.1. The factors involved in the implementation of climate policy

The basic factors involved in the implementation of Poland's climate policy originate from problems which are typical of most countries undergoing political and economic transition. They include:

- ❑ The low profitability of enterprises, which makes it difficult to allocate indispensable resources for urgent technical and technological modernisation. This situation is particularly difficult in many enterprises where the State Treasury is a dominating shareholder.
- ❑ The relatively low purchasing power of the population, narrowing the scope of manoeuvre to the cheapest, immediate policy measures the effects of which are mainly short-term in nature, instead of the desired long-term effect. The basic factor hampering the improvement in the income levels of society is the great tension on the national labour market.
- ❑ The coal-based structure of the primary fuel balance, which is historically conditioned by the availability of domestic resources and the related social factors. Such a structure of the national energy balance has a direct adverse on the quality of the natural environment, including climate change.
- ❑ The excessive operating costs of the power, gas and heat sectors where incomplete market conditions apply.
- ❑ The dynamic growth of road transport.

In addition, external factors should be considered. They are related to:

- ❑ the likelihood that the Kyoto Protocol will soon enter into force and the expected more demanding reduction requirements in the second and third commitment periods;
- ❑ the measures undertaken or planned in the European Union, i.e.:
 - the reduction of greenhouse gas emissions by 1% annually compared with 1990 until 2020;
 - the growth in the share of renewable energy sources in the production of electricity to 22% by 2020 (a mean indicator, indicative for the European Union);
 - the planned measures to reduce the role of road transport, contributing to a greater role of rail in the framework of transport policy;
 - the programme for liberalisation of the energy market.

Under these conditions, the success of climate policy will be primarily determined by such measures as will create mechanisms encouraging investors to make long-term capital investments. An opportunity for this is e.g. the creation of the emissions trading system, which is one of the short-term priorities of Poland's climate policy.

2.3.2. The legal framework for the implementation of climate policy

In the transition period, the entire national legal system was radically restructured, including the environmental legislation. It became easier to basically order the system of environmental legislation after the Constitution of the Republic of Poland was adopted in April 1997. This involved in particular the provision of Article 5 of the Constitution, in accordance with which the implementation of environmental protection should be ensured on the basis of the principle of sustainable development. This principle is expanded and specified in the provisions of Article 74 of the Constitution – e.g. obliging the public authorities to ensure environmental safety for the present and the future generations.

The strategic documents, discussed below, which were approved by the Council of Ministers and the Parliament of the Republic of Poland, are particularly significant for climate protection measures.

The Second National Environmental Policy¹⁰ – as one of the basic objectives, this document sets out the directions of action to reduce the energy intensity of the economy and lays down the priorities in respect of the use of renewable energy sources. The *National Environmental Policy for 2003-2006 Considering the Outlook for 2007-2010*¹¹ refers to the priority directions of action laid down in the adopted *Sixth Environment Action Programme of the European Community*. Poland will already be a member of the European Union when it implements a large part of the measures set out in this document, including particularly the measures planned for 2004-2006. To an increasing extent, the National Environmental Policy will be implemented through change in production and consumption patterns, the reduction in material intensity, water intensity and energy intensity of the economy as well as the use of the best available techniques and good management practices.

¹⁰ Adopted by the Council of Ministers on 13 June 2000 and by Parliament on 23 August 2001. On 10 December 2002, the Council of Ministers adopted the *Implementation Programme for the Second National Environmental Policy*.

¹¹ Adopted by the Council of Ministers on 17 December of 2002.

The environmental concerns should be integrated on a mandatory basis into the sectoral policies in the all the fields of the economy and into the development strategies and programmes at regional and local levels. An instrument supporting or forcing the greening of sectoral policies will be the strategic assessments of their environmental impact, performed primarily for the policies and programmes required by statute. This document formulated the tasks in the scope of combating climate change.

Poland 2025 – A Long-term Strategy for Sustained and Sustainable Development¹² – this document specifies the provision of Article 5 of the Constitution of the Republic of Poland. The overriding objective of the *Strategy* is “to ensure the growth of the prosperity of Polish families, to strengthen their financial self-sufficiency and the feeling of security”. One of the objectives of the *Strategy* is the need for “the progressive elimination of economic activities harmful for the environment and human health, the promotion of environmentally sound ways of management, change in the production and consumption models and the restoration of good condition of the environment wherever the natural equilibrium has been disturbed”. Although the *Strategy* does not explicitly address climate change, the issues related to greenhouse gas emission reductions are significantly reflected in this document, both indirectly and directly. The *Strategy* recognises that Poland shares the responsibility for dangers to the environment and that it is obliged to take appropriate action in proportion to its share in the global production and consumption. This document mentions the need for reducing the energy intensity of the economy in relation to the fulfilment of its commitments under the Kyoto Protocol. The Long-Term Strategy for Sustained and Sustainable Development lays down the appropriate framework for the implementation of climate policy.

In **The Assumptions of the Energy Policy of Poland Until 2020**¹³, the most important objectives are defined as the care of the energy security of the country, the pursuit of improvements in the competitiveness of domestic economic operators and their products and services in the country and abroad as well as the care of the protection of the natural environment; in this case, in respect of the minimisation of the adverse impact of the energy sector.

“The Economic Strategy of the Government”, which was approved at the turn of January and February 2002, requires a different approach to the formulation of certain objectives and the ways of their implementation of “The Assumptions of the Energy Policy of Poland Until 2020”. This involves in particular a clear definition of the objective of the strategy in the transitional period.

¹² Adopted by the Council of Ministers on 26 July 2000.

¹³ Adopted by the Council of Ministers on 22 February 2000.

The slower rate of economic growth caused a lower demand for fuels and energy. In consequence, the levels of the consumption of fuels and energy were lower than those predicted in “The Assumptions of the Energy Policy...”. The costs of maintaining substantial production capacities in the branches of the fuel and energy sector (power plants, heat and power plants, heating plants and hard coal mines) cause essential burdens for citizens, the economy and the national finance. The measures to be taken by the Government and its institutions in accordance with “An Assessment of the Implementation and the Adjustment of the Assumptions of the Energy Policy Until 2020”, which was adopted by the Council of Ministers on 2 April 2002, cover three functional horizontal fields, specifically: the creation of energy policy, the regulatory policy for the power sector and the ownership-based policy for part of the broadly conceived energy capacity of the national economy.

The Strategy for the Development of Renewable Energy Sources¹⁴ assumes the share of energy from renewable sources in the fuel and energy balance of the country to grow to 7.5% in 2010 and to 14% in 2020 in the primary fuel mix. The increased use of renewable energy sources (RES) will first of all facilitate the attainment of the objectives set out in the environmental policy in the scope of reducing the emissions of pollutants responsible for climate change and acidifying substances.

The Transport Sectoral Operational Programme for 2004-2006¹⁵ contains Priority 1 – The development of the transport system which is sustainable in terms of its modes. The Priority lays down such measures as the modernisation of railway lines between urban agglomerations and in the agglomerations, the improvement of the infrastructure providing access to seaports and the development of intermodal systems. Priority 2 – Safer road infrastructure – lays down such measures as the rebuilding of trunk roads, the improvement of travels through towns and localities as well as the implementation and monitoring of the means of improving safety.

A large number of legal acts include factors stimulating the launch of action to limit greenhouse gas emissions. They are:

1. **The Environmental Protection Act of 27 April 2001**¹⁶, primarily its provisions imposing the obligation:

¹⁴ Adopted by the Council of Ministers on 5 September 2000 and by Parliament on 23 August 2001.

¹⁵ It is one of the five operational programmes serving to implement the National Development Plan. It sets out the directions, priorities, measures and levels of resources to be allocated for the development of the field of transport and the maritime economy. The strategy for Poland’s use of the Structural Funds and the Cohesion Fund in the transport sector guarantees positive economic and social effects (including environmental ones).

¹⁶ Official Journal No. 62, Item 627, as amended.

- to develop the national environmental policy on a cyclical basis every 4 years and for Parliament to adopt it;
 - to develop environmental protection programmes (at Voivodship, Powiat and Gmina levels), where the climate protection issues should be appropriately reflected;
 - to obtain permits for the release of gases or dust into the air;
 - to develop air protection programmes¹⁷;
 - for enterprises to have an integrated permits for the operation of installations which, given the type and size of the activities conducted in them, may cause substantial pollution of the particular elements of nature or the environment as a whole. The condition for obtaining an integrated permit is for a given installation to meet the requirements of the best available technique (BAT);
 - for assistance to be provided from the resources of the Funds for Environmental Protection and Water Management, e.g. through supporting the measures to prevent pollution, the use of local renewable energy sources and assistance in the introduction of more environmentally sound energy carriers or support for environmentally friendly modes of transport;
 - to lay down and comply with the environmental quality standards and emissions standards in the energy sector;
 - to pay the fees for the use of the environment, including the fees for the release of gases and dust into the air.
2. **The Energy Act of 10 April 1997**¹⁸ - from the point of view of climate policy, its most important provisions are those setting out the principles of energy management and for saving its resources as well as those supporting the growth of the use of renewable energy resources. The basic mechanism stimulating the growth of the use of electricity from renewable energy sources is the Regulation of the Minister of Economy, Labour and Social Policy of 30 May 2003 on the detailed extent of the obligation to purchase electricity and heat from renewable energy sources as well as electricity from combined heat and power generation (Official Journal No. 104, Item 971). This Regulation entered into force on 1 July 2003, replacing the Regulation of the Minister of Economy of 15 December 2000 which had been previously been in effect. In accordance with the Regulation, energy distributors have to demonstrate an adequate share of electricity from

¹⁷ The air protection programmes are laid down by the Voivodes, after they have been given opinions of the competent Starosts, by way of Regulation, for zones where the level of at least one substance exceeds the limit value plus a margin of tolerance (Article 91(1) of the Environmental Protection Act).

renewable energy resources in the total annual sales of such energy and this share is to grow every year up to 7.5% in 2010. The obligation to purchase also applies to heat from renewable energy sources and electricity from combined heat and power generation.

Pursuant to the Energy Act, the Minister of Economy, Labour and Social Policy issued the Regulation of 2 April 2003 on the requirements in the scope of energy efficiency (Official Journal No. 79, Item 714, as amended).

The provision of the Energy Act requiring the preparation of consistent development plans of enterprises and local governments, which need to include e.g. projects for the use of renewable energy sources, is also important for climate policy.

3. **The Act of 18 December 1998 on Support for Thermal Modernisation Projects**¹⁹ aims at diminishing energy consumption for heating buildings and domestic water, reducing energy losses in local heating networks and local heat sources as well as replacing conventional energy sources by renewables. The main financial instrument is the thermal modernisation bonus paid by the Bank for National Economy (BGK).
4. **The Forest Act of 28 September 1991**²⁰ lays down the principles of the preservation, protection and expansion of forest resources and the principles of forest management in connection with the other elements of the environment and the national economy.
5. **The Act of 8 June 2001 on the Designation of Farmland for Afforestation**²¹ lays down the principles of the designation of farmland for afforestation.

In addition, from the point of view of climate policy, important provisions can be found in:

1. **The Waste Act of 27 April 2001**²², which lays down the principles of waste management in a manner ensuring the protection of human life and health and the environment in accordance with the principle of sustainable development; and in particular, it sets out the principles of waste generation or the limitation of the quantities of waste and their adverse impact on the environment as well as those of waste recovery or disposal.
2. **The Act of 11 May 2001 on Packaging and Packaging Waste**²³, which sets the requirements for packaging and packaging waste in the light of the principles of environmental protection as well as the principles of handling packaging and packaging waste to ensure the protection of human life and health and the protection of the environment, in accordance with the principles of sustainable development.

¹⁸ Official Journal No. 54, Item 348, as amended.

¹⁹ Official Journal No. 162, Item 1121, as amended.

²⁰ Official Journal of 2000, No. 56, Item 679, as amended.

²¹ Official Journal No. 73, Item 764.

²² Official Journal 62, Item 628, as amended.

3. **The Act of 11 May 2001 on the Economic Operators' Obligations in the Scope of Managing Certain Types of Waste and on the Product and Deposit Charges**²⁴, which introduces a new economic instrument to rationalise the management of packaging and post-consumer waste.
4. **The Act of 30 August 2002 on the System for Conformity Assessment**²⁵; the Regulation of the Council of Ministers of 19 February 2002 on the basic requirements for the energy efficiency of new water heating boilers fired by liquid and gaseous fuels as well as the Regulation of the Council of Ministers of 11 September 2001 on the basic requirements for the energy efficiency of refrigeration systems²⁶ were adopted pursuant to this Act.
5. **The Act of 20 March 2002 on Financial Support for Investment Projects**²⁷, which lays down the principles and forms of providing financial support to entrepreneurs making new investment projects or creating new jobs related to such projects.

3. THE OBJECTIVES AND PRIORITIES OF POLAND'S CLIMATE POLICY

Poland's climate policy is an important, integral element of the national environmental policy. In the scope of climate change mitigation, it is one of the examples of the practical implementation of the principle of sustainable development, given its huge effect on the state of a global equilibrium in the natural environment which is formed in long-term cycles.

3.1. The strategic goal of the policy

The strategic goal of climate policy is “for Poland to join the efforts of the international community for the protection of the global climate through the implementation of the principles of sustainable development, particularly in the scope of the improvement of energy consumption, the expansion of the national forest and soil resources, the rationalisation of the use of raw materials and industrial products as well as the

²³ Official Journal, No. 63, Item 638, as amended

²⁴ Official Journal, No. 63, Item 639, as amended.

²⁵ Official Journal, No. 166, Item 1360, as amended.

²⁶ Official Journal, No. 120, Item 1277.

²⁷ Official Journal, No. 41, Item 363, as amended.

rationalisation of waste disposal in a manner ensuring the achievement of the maximum, long-term economic, social and political benefits”²⁸.

This goal is consistent with the objectives of the European Union climate policy.

As analyses and studies indicate, the implementation of Poland’s present environmental policy allows it to meet its current commitments under the Climate Convention, as about the 30% greenhouse gas emission reductions (with respect to the base year 1988) are achieved without the implementation of an additional climate policy until 2010. Therefore, the quantitative aim of the present climate policy is to enhance the extent of the greenhouse gas emission reductions to the level of 40% until 2020. The launch of such efforts is encouraged, on the one hand, by the high likelihood that the European Union and the international community will expect Poland to achieve greater reductions in the later commitment periods under the Climate Convention, and, on the other, by the possibility of gaining benefits from the broadly conceived international emissions trading. The alternatives considered are described in greater detail in Annex 4.

3.2. The specific objectives of the policy

The strategic goal of Poland’s climate policy can be achieved by the implementation of short-, medium- and long-term objectives and measures.

3.2.1. Short-term objectives and measures (for 2003-2006)

The short-term objectives involve mostly measures designed to fully implement systems allowing for the fulfilment of the provisions of the Convention and the Kyoto Protocol and to ensure that Poland can benefit from its participation in the auxiliary mechanisms. In this period, the integration of climate policy with the other national policies should be initiated; as a priority, with policies of infrastructural nature and with the reform of financial and tax policies. In addition, action should be taken to ensure Poland’s full, active participation in the negotiations on the objectives of the second commitment period (2013-2018).

The short-term priorities of Poland’s climate policy include:

1. the implementation of the tasks resulting from the Accession Treaty;

²⁸ This strategic goal was formulated pursuant to the provisions of “The National Environmental Policy for 2003-2006 Considering the Outlook for 2007-2010”.

2. the integration of Poland's climate policy with the European Union policy (as from 1 May 2004);
3. the integration of climate policy into the other national policies;
4. greenhouse gas emission reductions through measures in the energy sector, industry, transport, agriculture, forestry and waste management;
5. the fulfilment of the decisions of the authorities of the Climate Convention and the Kyoto Protocol applicable to the countries listed in Annex I to the Convention;
6. the development of the national programme for greenhouse gas emission reductions (the implementation programme for the present document), with a view to maximising the benefits for Poland;
7. the development of long-term strategies for the economic sectors, containing specific measures and scenarios for greenhouse gas emission reductions for individual sectors and separately for each gas enumerated in Annex A to the Kyoto Protocol;
8. the creation of organisational, institutional and financial conditions for meeting the commitments which Poland made in the scope of reporting, monitoring and verification of the emission levels achieved;
9. the creation of the institutional capacity for the effective adaptation of the auxiliary mechanisms of the Kyoto Protocol;
10. the establishment of the greenhouse gas emission trading scheme and its implementation as well as the application of the Joint Implementation (JI) mechanism;
11. the determination of the reduction targets for the second commitment period in the years 2013-2018 as the basis for the negotiations on another Protocol to the Convention;
12. the improvement of the system for public information and education in the scope of climate protection.

The achievement of the aforementioned objectives requires the implementation of the detailed tasks listed below in 2003-2006. They include:

1. the demonstration of progress in Poland's meeting its commitments under the Kyoto Protocol; in accordance with Article 3.2, this should be done in 2005 at the latest;
2. the creation of the legal frameworks and the operational system (registration, monitoring, verification and certification of emission reduction units) allowing for Poland's participation in the auxiliary mechanisms (in particular, Joint Implementation (JI) and its harmonisation with the European Union scheme (2005);

3. the establishment of the national system for inventories and assessments of changes in greenhouse gas emissions at the levels of plants, Voivodships and the country as well as of the removals of these gases by forests and soils (2003 – 2004);
4. the periodical verification of the long-term strategies for greenhouse gas emission reductions in Poland until 2020;
5. the launch of research aimed at gaining better knowledge of the climate-forming processes, the assessment of the impact of climate on society and the economy as well as the capability to adapt to the changed climatic conditions (continuous work);
6. the preparation of inventory reports and national communications as well as the periodical preparation of the emission scenarios for 2008-2020.

3.2.2. Medium- and long-term objectives and measures (for 2007-2012 and 2013-2020)

The medium-term objectives and measures involve the further integration of climate policy with economic and social policies. The long-term objectives and measures (for 2013-2020 and the subsequent years) will cover the successive commitment periods under the Kyoto Protocol (after 2020). It is assumed that the long-term quantitative objective will be the pursuit of the achievement of greenhouse gas emission reductions by about 30 – 40% in 2020 with respect to the base year. The basic priorities, both in the medium term and the long term, will be measures creating more climate friendly patterns of behaviour related to production and consumption, diminishing the adverse impact of anthropogenic activities on climate change. The practical implementation of the principle of sustainable development will require the widespread use of the so-called good practice in the sectors and fields of the economy and in the systems of environmental management, including climate policy. This approach is characterised by the maximisation of the economic efficiency and environmental effectiveness of the measures being taken, with their adjustment to the political and administrative feasibility.

The priority directions of medium- and long-term measures will include:

1. the implementation of the tasks resulting from the Accession Treaty;
2. the integration of Poland's climate policy with the policy of the European Union, allowing for the adoption of joint commitments in the second period (after 2012);
3. the integration of climate policy into the other national policies;
4. the implementation of the decisions of the authorities of the Climate Convention and the Kyoto Protocol addressed to the countries listed in Annex I to the Convention;

5. the fulfilment of the commitments made by Poland to reduce greenhouse gas emissions in the first period, i.e. the achievement in 2008 – 2012 of the levels of greenhouse gas emissions not exceeding 94% of the emissions in 1988 and the successive commitment periods;
6. the continued integration of climate policy into the government sectoral policies;
7. ensuring the implementation of climate protection policy at the levels of economic sectors and enterprises by creating a system of appropriate mechanisms and incentives (for 2013 – 2018 and subsequently);
8. the protection and the enhancement of the effectiveness of sinks and reservoirs of greenhouse gases, the promotion of sustainable forest management, afforestation and reforestation;
9. the promotion of sustainable forms of agriculture in respect of climate protection;
10. the promotion, development and growth of the use of new and renewable energy sources, the technologies of CO₂ sequestration, as well as advanced and innovative, environmentally friendly technologies and the identification and elimination of barriers to their use;
11. the continued use of the auxiliary mechanisms of the Kyoto Protocol;
12. support for the restructuring processes in the economy promoting policies and measures adopted to limit or reduce greenhouse gas emissions, with priority given to: the energy sector, energy intensive industrial sectors, transport and waste management;
13. in the medium term (until 2010), the reduction of the energy intensity of the unit Gross National Product by 25% compared with 2000 and in the long term (until 2025) by 50% compared with 2000;
14. the wide introduction of the best available techniques in energy efficiency and the use of renewable energy sources;
15. the deep rebuilding of the model of energy production and consumption towards the improvement in energy and raw-material efficiencies, the wider use of renewable energy sources and the efforts to minimise greenhouse gas emissions from all the basic emission sources.

4. MEASURES BY SECTORS UNTIL 2020

The main goal for the energy sector, industry, transport policy, agriculture and forestry in the scope of climate policy is to reduce greenhouse gas emissions, with the additional enhancement of carbon dioxide sinks for forestry.

Annex 3 shows the potential for greenhouse gas emission reductions, while Annex 4 presents the projections of greenhouse gas emissions until 2020.

The measures are presented below by sectors, broken down into:

- basic measures, i.e. resulting from the strategies and policies adopted and the measures already launched,
- additional measures, serving to ensure the achievement of additional greenhouse gas emission reductions.

4.1. Energy sector

□ Specific objectives

- the implementation of the provisions of Community legislation;
- energy security and diversification of energy sources (without nuclear energy);
- the improvement of the competitiveness of national economic entities and their products and services;
- the protection of the natural environment against the adverse effects of the impact of energy generation processes, including through such programming of measures in the energy sector as would ensure the preservation of resources for the present and the future generations;
- energy saving production;
- the liberalisation of the energy market;
- the enhancement of the use of energy from renewable sources;
- the promotion of energy efficiency and economical use of energy;
- the use of emissions trading and the other auxiliary mechanisms of the Kyoto Protocol.

Table 1. Measures to reduce greenhouse gas emissions in the energy sector

Item	Name of measure	Purpose of adoption	Greenhouse gas	Implementing Ministry	Type of instrument
BASIC MEASURES					
1.	Obligation to purchase energy from renewable sources	Promotion of renewable energy generation	CO ₂	Ministry of Economy, Labour and Social Policy (MGPiPS)	Legal
2	Financial support for investment projects in combined heat and power production	Promotion of combined heat and power production	CO ₂	Ministry of Finance (MF)/ MGPiPS	Financial

3	Introduction of a system of incentives for enterprises encouraging energy saving investment projects	Improvement of energy efficiency and promotion of renewable energy generation	CO ₂	MF/ MGPiPS	Financial
4	Introduction of a system of incentives for the public sector concerning the launch of investment projects leading to rational energy consumption	Improvement of energy efficiency and promotion of renewable energy sources	CO ₂	MF/ MGPiPS	Financial
5	Prevention and reduction of methane emissions from fuel production and distribution	Improvement of energy efficiency	CH ₄	Ministry of Environment (MS)/ MGPiPS	Legal
6	Energy efficiency labels	Improvement of energy efficiency	CO ₂	MGPiPS	Legal
ADDITIONAL MEASURES					
7	Use of the best available techniques (BAT)	Implementation of the IPPC Directive	CO ₂	MS	Legal
8	Introduction of financial mechanisms supporting energy production from renewable sources	Promotion of renewable energy generation	CO ₂	MS/MF	legal/ financial
9	Certificates of origin of electricity from renewable energy sources	Promotion of renewable energy generation	CO ₂	MGPiPS	Legal
10	Introduction of green certificates	Promotion of renewable energy generation and combined heat and power production	CO ₂	MS	Legal
11	Exemption from excise tax on electricity production from hard coal-bed methane	Emission reductions	CH ₄	MF	Legal

4.2. Industry

□ Specific objectives

- the rationalisation of energy consumption;
- the promotion of low-emission technologies;
- the improvement of the energy efficiency standards for electrical equipment;
- the improvement of the energy efficiency standards for industrial processes;
- the phase of the use of fluorinated gases (HFCs, PFCs and SF₆);
- the use of emissions trading and other auxiliary mechanisms of the Kyoto Protocol;
- voluntary agreements.

Table 2. Measures to reduce greenhouse gas emissions in industry

Item	Name of measure	Purpose of introduction	Greenhouse gas	Implementing Ministry	Type of instrument
BASIC MEASURES					
1	Improvement of energy efficiency of light sources	Improvement of standards (energy-saving lighting standards)	CO ₂	MGPiPS (Ministry of Economy, Labour and Social Policy)	legal
2	Improvement of the efficiency of electrical engines	Improvement of standards	CO ₂	MGPiPS	legal
ADDITIONAL MEASURES					
3	Adoption of regulations limiting the consumption of fluorinated greenhouse gases	Reduction of emissions of fluorinated greenhouse gases	HFCs, PFCs, SF ₆	MGPiPS	legal
4	Application of the best available techniques (BAT)	Implementation of the IPPC Directive	CO ₂	MS (Ministry of Environment)	legal
5	Commitments of enterprises to reduce CO ₂ levels from industrial processes, i.e. iron and steel production	Improvement of standards	CO ₂	MS	legal

6	Support for the development of environmentally friendly and technically viable methods for greenhouse gas emission reductions	Improvement of standards	HFCs, PFCs, SF6	MGPiPS	legal/ financial
7	Prevention and reduction of methane emissions from fuel production and distribution processes	Improvement of standards	CH ₄	MS/ MGPiPS	legal
8	Voluntary agreements with industry	Energy efficiency	CO ₂	MGPiPS	legal
9	Development of a set of instruments to support the activity of small and medium-sized enterprises, mainly in the scope of handling innovations and improvement of productivity	Rational energy consumption	CO ₂	MGPiPS	financial
10	Promotion of environmentally friendly and efficiently practices and technologies in industrial activities	Improvement of standards, promotion of low-emission technologies	CO ₂	MS	educational
11	Determination of the priorities of research and development work on modern environmentally friendly and material- and energy-saving production technologies	Improvement of standards, development of modern technologies	CO ₂	MGPiPS, KBN (Committee for Scientific Research)	legal

4.3. Transport

□ Specific objectives

- the promotion of urban public transport;
- the promotion of the use of alternative fuels;
- incentives encouraging the use of other modes of transport, e.g. the combined transport mode;
- the rationalisation of parking rules;

- the reduction of pollution from vehicles;
- the promotion of “clean” vehicles;
- the improvement of infrastructure for bicycle riders and pedestrians.

Table 3.Measures to reduce greenhouse gas emissions in transport

Item	Name of measure	Purpose of introduction	Greenhouse gas	Implementing Ministry	Type of instrument
BASIC MEASURES					
1	Improvement of infrastructure for bicycle riders and pedestrians	Promotion of the use of bicycles	CO ₂ , N ₂ O, ozone	MI (Ministry of Infrastructure)	legal and administrative
2	Construction of motorways, ring roads and expressways	Improvement of air quality by increasing traffic smoothness	CO ₂ , N ₂ O, ozone	MI	legal
3	Adoption of more demanding emission standards for internal-combustion engines	Emission reductions	CO ₂ , N ₂ O, ozone	MI	legal
ADDITIONAL MEASURES					
4	Promotion of public transport	Improvement of air quality by the use of public transport	CO ₂ , N ₂ O, ozone	MI/MF (Ministry of Finance)	legal and administrative
5	Development of rail transport, including combined transport	Improvement of air quality	CO ₂ , N ₂ O, ozone	MI	mixed
6	Implementation of local transport plans (schools and enterprises)	Collective transport (school students and enterprise employees)	CO ₂ , N ₂ O, ozone	MI	organisational
7	Promotion of transport plans to service enterprises	Collective transport of enterprise employees	CO ₂ , N ₂ O, ozone	MI	voluntary
8	Promotion of cycling transport	Promotion of the use of bicycles	CO ₂ , N ₂ O, ozone	MI/MS (Ministry of Environment)	educational
9	Promotion of “environmentally clean” vehicles	Change of the consumer lifestyle	CO ₂ , N ₂ O, ozone	MI/MF	legal and educational
10	Improvement of the quality of waterway transport	Growth of the quantity of commodities transported by waterways	CO ₂ , N ₂ O, ozone	MI/MS	legal and administrative

11	Improvement of road traffic flow and parking for heavy load vehicles in towns	Improvement of traffic in towns	CO ₂ , N ₂ O, ozone	MI	legal
12	Technical projects related to vehicle design	Promotion of vehicles causing less pollution of the environment	CO ₂ , N ₂ O, ozone	MI	legal
13	Effective organisation of rail and road systems	Emission reductions	CO ₂ , N ₂ O, ozone	MI	organisational
14	Information and upbringing activities concerning the need to change behaviour	Change of consumer lifestyle	CO ₂ , N ₂ O, ozone	MI/MS	educational
15	Measures to change patterns of long-distance travels in favour of railways	Change of behaviour	CO ₂ , N ₂ O, ozone	MI/MS	educational
16	Measures to reduce greenhouse gas emissions from air transport	Emission reductions	CO ₂ , N ₂ O, ozone	MI	legal
17	Promotion of marine and inland navigation	Promotion of freight transport by water	CO ₂ , N ₂ O, Ozone	MI	educational

4.4. Agriculture

□ Specific objectives

- the rational land use;
- the promotion of organic farming;
- the dissemination of agricultural extension in the scope of the application of the principles of good agricultural practice, the use of energy-saving technologies in agricultural production, the use of unconventional energy sources in agriculture and rural areas;
- afforestation of farmland.

Table 4. Measures to reduce greenhouse gas emissions in agriculture

Item	Name of measure	Purpose of introduction	Greenhouse gas	Implementing Ministry/Implementing institution	Type of instrument
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BASIC MEASURES

1.	Dissemination of the Code of Good Agricultural Practice*	Promotion of measures to limit pollutant emissions from agricultural production	N ₂ O, CH ₄ , CO ₂	MRiRW (Ministry of Agriculture and Rural Development)	educational
2.	Dissemination of the use of energy-saving technologies in agricultural production	Promotion of energy-saving technologies	CO ₂	MRiRW	educational
3.	Dissemination of the implementation of new technologies using vegetal products as energy fuel and biogas-generating technologies of manure disposal	Promotion of technologies limiting greenhouse gas emissions	CO ₂	MRiRW	educational
4.	Afforestation of farmland	Promotion of afforestation	CO ₂	MRiRW, MS, MF	financial

ADDITIONAL MEASURES

1.	Dissemination of the use of unconventional energy sources in agriculture and rural areas	Promotion of renewable energy sources	CO ₂	MRiRW	educational
2.	Development of new technologies for growing and harvesting vegetal biomass designed for use as a renewable energy source and raw material for industry	Promotion of new technologies	CO ₂	Scientific units/MRiRW.	research

* The Code of Good Agricultural Practice contains a set of environmentally friendly principles of management in agricultural production. The Code was approved by the Minister of Agriculture and Rural Development and the Minister of the Environment.

4.5. Forestry

□ **Specific objectives:**

- the protection of forests e.g. against fires and pest gradation;
- the integration of carbon dioxide sinks in agriculture;
- the growth of CO₂ sinks as a result of biomass increases and of carbon sinks in the soils of forest ecosystems developed on post-agricultural land;
- measures in support of afforestation;
- the prevention of land-use change;
- the protection of forest soils against a decrease in carbon content;
- the integration of climate issues in the principles of silviculture and forest management instructions;
- the promotion of the use of wood in construction;
- the use of the auxiliary mechanisms of the Kyoto Protocol.

Table 5. Measures to reduce the emissions and to increase the greenhouse gas sinks in agriculture

Item	Name of measure	Purpose of introduction	Greenhouse gas	Implementing Ministry	Type of instrument
BASIC MEASURES					
1	Measures in support of afforestation	Afforestation	CO ₂	MS/MRiRW (Ministry of Environment/ Ministry of Agriculture and Rural Development)	financial
2	Prevention of land-use change	Reduction of deforestation	CO ₂	MS	financial
3	Maintenance of rational forest management	Protection of forest ecosystems	CO ₂	MS	legal
4	Protection of the ecological stability of forests	Conservation and protection of forests	CO ₂	MS	financial
ADDITIONAL MEASURES					
5	Plan for the use of timber for energy generation purposes	Energy supply from timber	CO ₂	MS	educational
6	Research on the magnitude of carbon sinks	Enhancement of knowledge on carbon sinks	CO ₂	MS	research

4.6. Waste

□ **The main goal of the policy in relation to waste management**

The main goal for waste management in the context of climate policy is the minimisation of the quantity of waste and the use of landfill gas as well as the disposal of biodegradable municipal waste deposited at waste landfills.

□ **Specific objectives**

- waste prevention and minimisation
 - waste reduction at source
- ensuring the recovery, including mainly recycling, of waste the generation of which could not be avoided under given technical and economic conditions
 - waste sorting before its landfill
 - incentives to rational waste management
- waste disposal (except its landfill)
 - waste incineration
- the landfill of waste which could not be recovered or disposed of because of technical and economic conditions, in a safe manner for human health and the environment
 - the capture and treatment of biogas from the start of the landfill;
 - the prohibition of the landfill of organic waste;
 - the coverage of the unused parts of the landfills by a compost layer;
 - the modernisation of landfills through:
 - the maintenance of the existing rate of the construction of gas removal facilities,
 - the gradual introduction of active gas removal with heat recovery at medium-sized landfills,
 - the expansion of monitoring of emissions from landfills,
 - the conduct of surveys of the gas content in landfills,
 - the conduct of training courses for investors and landfill personnel.

Table 6.Measures to reduce greenhouse gas emissions in waste management

Item	Name of measure	Purpose of introduction	Greenhouse gas	Implementing Ministry	Type of instrument
BASIC MEASURES					
1	Waste reduction at source	Reduction of the quantity and adverse impact of waste at source	CO ₂ , CH ₄	MS (Ministry of Environment)	legal
2	Waste recovery and recycling	Waste recovery and recycling	CO ₂ , CH ₄	MS	legal
3	Modernisation of solid waste landfills	Legal provisions on the landfill and disposal of waste	CO ₂ , CH ₄	MS	legal/organisational
4	Landfill of organic waste	Limitation of the landfill of organic waste at landfills	CH ₄	MS	legal
5	Minimisation and recycling of waste	Reduction of the quantity and adverse impact of waste	CO ₂ , CH ₄	MS	legal
6	Incentives to rational waste management	Financial incentives to rational waste management		MS	financial
7	Monitoring emissions from landfills	Control of CH ₄ and CO ₂ emissions	CO ₂ , CH ₄	MS	legal
8	Waste sorting before its landfill	Rational waste management	CO ₂ , CH ₄	MS	legal
ADDITIONAL MEASURES					
9	Enhancement of waste reduction	Reduction of the quantity and adverse impact of waste at source	CO ₂ , CH ₄	MS	organisational

4.6.1. Wastewater

- the limitation of greenhouse gas emissions from wastewater treatment plants through:
 - installations using technologies for gas capture and disposal,
 - the implementation of biological treatment processes based on the best available techniques,
 - the reduction of the energy intensity of the treatment process,

- the achievement of energy self-sufficiency of wastewater treatment plants by using biogas for combined heat and power production.

4.7. Sector of public utilities, services and households

In this sector, consideration should be given e.g. to the improvement of the efficiency of the production and transmission of district heat and electricity; the enhancement of the use of natural gas for energy generation; and the implementation of such measures as: the thermal modernisation of housing, the replacement and additional insulation of windows, the revision of the existing standards for thermal protection of new buildings, the introduction of energy certificates for buildings, or the expansion of renewable energy sources (the limitation of the emissions of the greenhouse gases CO₂ and N₂O).

5. THE CHOICE AND MANNER OF IMPLEMENTATION OF THE STRATEGIES FOR GREENHOUSE GAS EMISSION REDUCTIONS

5.1. Climate policy instruments

These instruments were grouped in four main categories and presented in Table 7.

Table 7. Classification of climate policy instruments

Instrument categories	Instrument classes
Regulatory instruments	Plant-specific emission limit values, technical standards, integrated permits
Financial and market economic instruments	Fees for emissions and fines for non-compliance, taxes and tax reliefs, subsidies and preferential credits, technology transfer
Market instruments and instruments supporting the regulating functioning of the market	Emissions trading, the auxiliary mechanisms of the Kyoto Protocol (JI, CDM), “green” certificates, voluntary covenants, market information
Supporting instruments	Research and development programmes, implementation consulting, strategic planning, infrastructure management, information in the mass media, educational programmes

An advantage of *regulatory instruments* is their clear relationship with the reduction targets and the effectiveness of their attainment. Their drawback is the absence of connection with the market mechanisms and the need for the administrative control of compliance with the emission limit values imposed. As a result of this, the systemic costs of the emission reductions achieved by means of these instruments may be significant, thus limiting their application to the indispensable cases. These instruments should not be applied to the emissions the reduction of which is too expensive. This area should be left to the domain of the operation of market instruments. This should be taken into account when designing the relevant legal acts establishing the principles of emission limitation.

Financial and market economic instruments affect indirectly greenhouse gas emissions, stimulating through market mechanisms the low-emission behaviour of economic operators and individual energy users. These instruments provide an opportunity for these entities to flexibly

respond to the requirements imposed. Due to this, the reduction targets can be achieved with relatively low systemic costs.

Market instruments and instruments supporting the regulating functioning of the market are a category of instruments which most effectively cause the minimisation of the costs of achievement of the reduction targets, both in the individual countries and on the international scene (the Kyoto auxiliary mechanisms) . These instruments are particularly suitable for stimulating reduction projects with high unit costs of greenhouse gas emission reductions.

Supporting instruments are a very important category of instruments. Although they do not directly stimulate emission reductions, they do lower the economic and social costs and raise the effectiveness of the action of regulatory and market instruments. It is difficult to estimate the effectiveness of the application of these instruments when using the modelling tools available; nevertheless, the national and foreign experiences indicate the high profitability of their application.

Market instruments and instruments supporting the regulating functioning of the market will play an essential role. These instruments include:

5.1.1. The auxiliary mechanisms of the Kyoto Protocol:

1. Emissions trading

Rational emissions trading will facilitate and diminish the costs of fulfilling the increasingly demanding emission limit values and standards; in addition, since Poland has a significant surplus of greenhouse gas emission reductions, it will be able to obtain tangible capital and political gains. This capital will be allocated for the implementation of successive measures to mitigate climate change, including the improvement of energy efficiency and the compensation for the possible distortions of competition among the participants in the greenhouse gas emissions trading scheme and the entities which will remain outside of this scheme. An important and very sensitive factor, which needs to be considered when designing the emissions trading scheme, is ensuring the equal conditions of competition, both to the participants in the emissions trading scheme and to the economic operators which will remain outside of the scheme. The emissions trading scheme should be characterised by: (a) environmental efficiency (covering all the significant emission sources); (b) economic efficiency (more participants and fewer plant specific emission limit values); (c) good administrative performance in management (control of the number of participants); (d) the capacity to supervise and exercise quantitative control

(verification of reported and measured data, the uniformity of methods for emission estimation); (e) compliance with EU legislation (higher effectiveness in domestic and international trading); (f) the absence of distortions of competition (the manner of allowance allocation, the correct choice and mechanism for adjusting the burdens among the participants in the scheme and those remaining outside of the scheme); (g) the effectiveness of implementation (the uniformity and transparency of the operating principles of the scheme, good legislation).

2. The Joint Implementation (JI) mechanism

The application of this mechanism, in co-operation with the other countries listed in Annex I to the Convention, in Poland's territory will lead to greenhouse gas emission reductions. Its implementation will require compliance with the procedures for the development, approval and verification of JI projects, in accordance with the international and national criteria.

3. **The clean development mechanism (CDM)** provides an opportunity for the national economy to promote Polish technologies designed to reduce greenhouse gas emissions in developing countries, allowing, at the same time, for additional benefits to be gained in the form of emission reduction units acquired in return for the technologies transferred; these units may in turn be traded or serve to meet the national reduction commitments.

5.1.2. "Green certificates"

In the national conditions, it is worthwhile to use solutions based on market-oriented mechanisms, which include the mechanism of quantitative requirements, which is a systemic obligation to purchase energy from renewable energy sources²⁹. On the investors' side, the stimulation of the demand for Green Certificates will cause their willingness to satisfy the demand, thus increasing investments in this sector as well as the growth of installed capacity and the electricity produced from renewable sources. New investment projects will also cause an increase in the demand for technologies related to renewable energy sources, including power plants, and services related to the preparation and implementation of investment projects, allowing in turn for the development of the domestic renewable energy industry.

²⁹ At present, this mechanism works pursuant to the Regulation of the Minister of Economy, Labour and Social Policy of 30 May 2003 on the detailed extent of the obligation to purchase electricity and heat from renewable energy sources as well as electricity from combined heat and power generation (Official Journal No. 104, Item 971).

6. CLIMATE POLICY RECOMMENDATIONS

The implementation of the present Polish climate policy will allow for Poland to meet its current commitments under the Climate Convention – an approximately 30% reduction of greenhouse gas emissions until 2020 (with respect to the base year 1988). The quantitative target of the present climate policy will be to enlarge the extent of greenhouse gas emission reductions to a level of 40% until 2020. However, such a scale of reductions will already need certain additional costs to be incurred, with their levels depending to a large extent on the climate, industrial and forestry policies pursued and the preferences for the development of renewable energy sources.

Recommendations concerning greenhouse gas emission reductions and the enhancement of their removals by sinks:

A prerequisite for the achievement of 40% emissions reductions with economically viable costs is the restructuring of the economic sectors towards diversification of fuels, serving to reduce the air pollution from the energy sector. In addition, the achievement of such reduction levels will require the launch of a set of additional measures, described in Chapter 4, depending primarily on the choice of instruments for the implementation of the energy strategy:

- The implementation of climate policy should primarily use market instruments (emissions trading, “green certificates”), since they involve the lowest costs of achieving the reduction targets.
- The use of fiscal and financial instruments after 2012 should be made dependent on the emission caps adopted in the second commitment period, the domestic regulations of the European Union concerning the division of reduction burdens and the developments on the international market of the emission allowance trading.
- The growth of the use of renewable energy sources should first of all be directed towards a wide development of energy crops, the growth of the production of solid biomass fuels and liquid motor biofuels.
- Without delay and to a wide extent, a full spectrum of supporting instruments should be implemented in the form of information campaigns, educational programmes, research and development programmes, pilot demonstration projects etc. in order to eliminate infrastructural, information and awareness barriers to greenhouse gas emission reductions through the correct functioning of market mechanisms.

Recommendations concerning emission inventories and their projections

It is indispensable to make every year an inventory of emissions and removals by sinks for all the greenhouse gases listed in Annex B to the Protocol. The inventory is the basis of settling the national fulfilment of the commitments under the United Nations Framework Convention on Climate Change and the Kyoto Protocol, including:

- In accordance with the provisions of Article 5.1 of the Kyoto Protocol, a national inventory and reporting system has to be established in Poland to allow for an estimation of emissions and removals by sinks of greenhouse gases in the context of the commitments made by the country.
- It is necessary to periodically assess the degree of uncertainty associated with the inventory and removals by sinks of greenhouse gases.
- It is necessary to identify the general trends in the change of emissions and removals by sinks of greenhouse gases, starting from the base year, in relation to the economic factors and the climate policy adopted.
- These trends should be identified for the particular greenhouse gases for the whole period and the economic sector.

In accordance with the guidelines adopted by the Conference of the Parties, it is necessary to periodically update the projections of emissions and removals by sinks of greenhouse gases:

- taking into account the measures³⁰ for 2005, 2010, 2015 and 2020 (projections “without measures” and “with additional measures” may also be presented);
- separately for CO₂, CH₄ and N₂O as well as for a sum total of HFCs, PFCs and SF₆ by sectors, primarily: the energy sector, transport, industry, agriculture, forestry and waste management.

It is also necessary to prepare periodical national communications for the Conference of the Parties, containing detailed information on the fulfilment of commitments, in accordance with the guidelines³¹.

³⁰ Such measures as e.g. the improvement of the energy efficiency of industrial production through the implementation of economically effective projects within the framework of the national economic policy and also taking into account the additional measures resulting from the introduction of climate policy instruments.

Recommendations concerning measures to adapt the economy to climate change:

Agriculture

1. The following factors will be of basic importance in adapting the agricultural production to the expected climate change: the choice of appropriate plants, change in land-use and the structure of crops, the progressive regionalisation of the production and the introduction of technologies rationally using water resources and the longer vegetation season.
2. The adaptation of Polish agriculture to the expected climate change will require: the improvement of the production efficiency, substantial organisational changes in agriculture and higher capital outlays supported by external financing of agriculture, particular in the scope of the creation of water infrastructure (water reservoirs and intakes).
3. The probable directions of change in the agricultural production should be predicted by scenarios for climate change, taking into account the expected change in Central and Eastern European region.

Water management

Under the conditions of the expected change in the precipitation system and its implications for water resources, particular emphasis should be placed on the protection of water resources through:

1. ensuring the appropriate water quality;
2. preventing the overdrying of soil and its erosion;
3. reducing water losses in industry and the municipal economy;
4. enhancing the capacity to store water, particularly through small retention.

Forestry

Forestry is one of the sectors of the economy which are particularly exposed to the effects of climate change. In order to increase the adaptation capacity of this sector, it is necessary to:

1. ensure a species diversity in forests,
2. enhance the resistance of forest ecosystems to temperature and precipitation variations,
3. integrate the expected climate change into the principles of silviculture and the forest management instruction,
4. enhance capital outlays supported by external financing.

³¹ FCCC/CP/1999/7.

The coastal zone

In order to assess the sensitivity of the coast and the adaptation of the Polish coastal zone to the likely effects of climate change, it is necessary to:

1. conduct systematic measures to track climate change, on an operational basis, including the marine system observations and predictions of hydrometeorological conditions within the framework of the global observation network;
2. conduct analytical studies on the sensitivity of the Polish coastal zone to sea level change;
3. implement the strategy for the protection of the Polish coast against the effects of sea level change e.g. through the integrated management of coastal zones in the Baltic states;
4. increase capital outlays supported by external financing.

Recommendations concerning the institutional and organisational aspects:

In order to properly co-ordinate the measures for the purposes of the Convention and the Protocol, it is necessary to strengthen:

- a) the institutional and organisational structures to serve the Climate Convention and the Kyoto Protocol and to implement the Decision of the European Commission on monitoring greenhouse gas emissions, by establishing the executive body of the Convention;
- b) the administrative structures in the scope of climate protection, due to the transparency of the division of the technical implementation measures from the creation and implementation of policies in the framework of the Climate Convention

Recommendations concerning international co-operation in the scope of climate protection:

It is recommended that bilateral, regional and multilateral co-operation should be pursued, leading to an exchange of experiences in the range of climate policy, an exchange of ideas and technologies (including e.g. JT) and international trading in greenhouse gas emissions.

Other recommendations:

Research

In the scope of research, it is necessary to:

1. conduct surveys on the use of energy and its production;
2. continue surveys aimed at tracking change and variability of climate and climatic processes;
3. continue research in the scope of the climate change scenarios for Poland, in relation to the growing concentrations of greenhouse gases in the atmosphere;
4. continue research on the consequences of climate change and the adaptation to such change in Poland.

Technology transfer

It is necessary to assess the national needs in the scope of technology transfer and the implementation of such transfer on an international scale to limit greenhouse gas emissions and adapt to climate change. In accordance with Articles 4.3, 4.4 and 4.5 of the United Nations Framework Convention on Climate Change, the countries listed in Annex I to this Convention are obliged to provide financial assistance and to implement measures to transfer technology to developing countries and to countries with economies in transition, in order to facilitate the implementation of the provisions of the Convention in these countries and assist them in covering the costs of the adaptation to the changed climate conditions.

Systematic observations

It is necessary to ensure the conduct of systematic observations in the range of:

1. monitoring the variability of Poland's climate;
2. monitoring the emissions of greenhouse gases and their removals by sinks;
3. monitoring the state of the atmosphere, hydrosphere and the sea

as well as to:

4. participate in the Global Climate Observing System;
5. participate in the oceanic observation systems;
6. participate in the Earth's surface observation systems;
7. participate in international programmes e.g. the World Climate Programme, the European Climate Change Programme, the International Geosphere-Biosphere Programme and the Intergovernmental Panel on Climate Change (IPCC).

Public education and awareness

The activities in this field are one of the basic conditions for the success of the implementation of climate policy. For this reason, it should be expanded and intensified through:

1. the dissemination of wide information to the mass media concerning the climate policies pursued at national and international levels;
2. the inclusion of the issues of environmental protection and sustainable development in all the programming frameworks for general education at all types of schools;
3. the implementation of environmental education as interdisciplinary education at all the levels of formal and informal education;
4. the development of Voivodship, Powiat and Gmina environmental education programmes, including the issues of climate change;
5. the coverage of a wide range of environmental issues and knowledge concerning the climate change caused by man's activities at faculties related to environmental protection;
6. the promotion of climate issues through the Internet and the continued updating of websites;
7. the publication of information, the organisation of seminars and conferences on climate change;
8. the promotion of good experiences in the scope of energy saving, the promotion of renewable energy sources and the raising of the awareness in the scope of rational energy use;
9. the enhancement of the effectiveness of projects in the scope of environmental education as launched in the framework of the implementation of the principles of sustainable development and the implementation of Agenda 21;
10. raising the Poles' awareness of the benefits which may be gained as a result of the measures to reduce greenhouse gas emissions, the dangers to expect in the absence of such measures and the likely effects of climate change.

Training

The conduct of training courses in the broadly conceived environmental protection, including climate change issues, for different communities (their main directions should include e.g. the measures designed to ensure efficient energy use, rational waste management, including waste reuse, and the use of renewable energy sources), for decision-makers at different levels,

encompassing the local/regional governments, the government administration, entrepreneurs and non-governmental organisations.

7. THE ROLE OF NON-GOVERNMENTAL ORGANISATIONS

Non-governmental organisations play a very important role in the implementation of the climate policy. Their tasks include:

- ❑ involving local communities in pro-environmental activities;
- ❑ promoting investment in the area of climate protection e.g. by competitions;
- ❑ supporting projects reducing GHG emission and preventing climate changes (energy savings; promotion of renewable energy sources; increased use of methane from coal mines and municipal waste landfills; reduced emission of methane from hard coal mines and of CFCs from production processes);
- ❑ increasing the awareness of the subject of climate changes;
- ❑ disseminating the information on domestic and international activities aimed at the prevention of climate changes;
- ❑ improving the knowledge of members of environmental organisations of the problem of climate changes and the climate convention and its mechanisms as well as building an understanding between non-governmental organisations involved in the environmental protection and public and governmental institutions;
- ❑ increasing the awareness of the public and decision makers.

8. COSTS AND BENEFITS

Costs of implementing the climate policy consist of investment and administrative costs.

The investment costs are connected with the adjustment of installations to the requirements of the Convention and the Protocol aimed at the reduction of GHG emission and will be mainly borne by companies. The role of the government will be to create incentives and mechanisms allowing for the performance of such activities by companies. The administrative costs covered by the State budget will be connected with Poland's co-financing agreed by the Conference of the Parties to the Convention or the Meeting of the Parties to the Protocol, the development of the system for monitoring, control, verification and reporting, the preparation of necessary documents, the

performance of required expert studies etc.. The administrative costs will be spread over time – a rough estimate of their total level is ca. PLN 40 million (by 2010). They cover, *inter alia*, periodical updating of the strategy for emission reduction and increased absorption of greenhouse gases; establishing of the domestic emission inventory and the GHG absorption system; preparing annual inventory reports and GHG emission forecasts; establishing the system for evaluating changes in CO₂ absorption by forests and land use; preparing government reports; carrying out scientific, technical and economic research concerning emission reduction methods and climate change monitoring; preparing the emission trading system.

The above estimate has been based on the assumption that upon its EU accession and by 2012 Poland will not be listed in Annex II to the Convention i.e. among states having financial obligations towards developing countries. Otherwise, the implementation costs for the climate policy will be significantly higher. The above assumption is based on the Convention stating that any changes in Annex II require the ratification by all Parties to the Convention. As a country Poland will not also be included in the so-called joint reduction commitment accepted by the European Union in the first commitment period i.e. between 2008-2012. Yet, it is certain that in the following commitment period Poland will be part of this commitment and reduction targets for individual members states will be allocated at the Community level.

Foreseen sources and scope of financing afforestation activities of the post-agricultural land looks as follows: afforestation of land owned by the state treasury is financed from the state budget and in current prices, its cost amounts to ca. PLN 35 million. As of Poland's accession afforestation of private land will be financed from EU (ca. 80 %) and from national funds (ca. 20%). In the period 2004 – 2006 the demand for the national funds is estimated at ca. EUR 16 million (ca. EUR 5 million per year).

The analyses have shown that provided the current policy is continued, by 2010 Poland is very likely to achieve ca. a 30% reduction in GHG emission in comparison with the emission in 1988. This reduction scale significantly exceeds Poland's reduction commitment of 6% outlined in the Kyoto Protocol. By 2020 Poland can achieve a 40% reduction in GHG emission (in comparison with the emission in the base year 1988).

Overall costs of implementing the climate policy are estimated at ca. PLN 50 billion. Most cost items have been envisaged in the *Executive programme for the Second Environmental Policy of the State*.

- Assuming the planned coal production, under the current climate policy, achieving a 40% emission reduction requires additional costs of ca. PLN 17 billion (this additional cost of the

emission reduction will be borne throughout the whole period i.e. until 2020; it is expressed in the 1999 prices and adjusted for the base year with a 10% discount rate).

- A 40% reduction in GHG emission can be achieved by implementing adequate instruments of the climate policy (in particular the emission allowances trading system) in the unrestricted energy market and without the existing subsidies for domestic coal.
- Achieving by 2020 a 14% share of renewable energies in the energy balance required by the *Strategy for renewable energies* means additional costs to the Polish economy of ca. PLN 9.5 billion (this additional cost of the emission reduction will be borne throughout the whole period i.e. until 2020; it is expressed in the 1999 prices and adjusted for the base year with a 10% discount rate). This cost can be treated as the implementation cost of the *Strategy for renewable energies* – i.e. the costs of achieving a 14% share of renewable energies by 2020.

Moreover, the simulation of costs and benefits connected with the use of the Kyoto Protocol instruments by Poland indicates the advisability of their use. Due to the potential reduction surplus in GHG gas emission, actions taken by Poland should concentrate on ensuring its right to this surplus in EU negotiations and supporting international solutions which will help Poland benefit directly from their sale (most favourable for Poland is the implementation of the international GHG emission trading system).

The implementation of Poland's climate policy will certainly improve the competitiveness of its economy. No other changes are expected in the employment structure which would go beyond those envisaged by industry restructuring programmes for e.g. hard coal mining, the iron and steel industry, the petroleum industry, and the chemical industry. The implementation of the *Strategy for renewable energies* is expected to create new jobs.

Detailed costs will be defined in the GHG emission reduction programme which constitutes the executive programme for Poland's climate policy. It includes the allocation of responsibilities to individual ministries for specific tasks along with the time schedule as well as the strategy for the execution of Poland's Kyoto Protocol commitments, taking into account maximum benefits for Poland, and the creation of institutional capacities necessary for the efficient adaptation of the Kyoto Protocol mechanisms.

It should be emphasised here that benefits from the ratification of the Kyoto Protocol by Poland are multidimensional. In the political aspect, Poland has confirmed its readiness to participate in efforts

of the international community aimed at global sustainable development in accordance with Article 5 of the Constitution of the Republic of Poland. In the technical aspect, by improving energy efficiency of the production process and creating an access to the best technologies the modernisation of Polish companies has become easier. Involvement in JI (Joint Implementation) and CDM (Clean Development Mechanism) mechanisms may help the promotion of Polish technologies on less developed markets. In the social aspect, the ratification leads to an improved public awareness of energy savings and the change in existing consumption models. In the financial aspect, involvement in the Kyoto mechanisms may result in tangible financial gains of Polish companies and the state budget, mainly through the participation in international trade in GHG emission units, thus dramatically reducing considerable implementation costs.

8.1. Sources of finance

- Continued financing of GHG emission reduction projects from the National Fund for Environmental Protection and Water Management and EkoFund Foundation.

Resources of the National Fund for Environmental Protection and Water Management and voivodship, district and municipal funds for environmental protection and water management are earmarked exclusively for supporting activities specified in the Act of 27 April 2001 – Environmental Protection Law (OJ 62, item 627, as amended). The types of activities that may be of high significance for the performance of the climate policy include: supporting pollution prevention activities; supporting the use of local renewable energy sources; aid for the introduction of more environment friendly energy carriers; supporting ecological transport; ecological education; and promoting pro-environmental activities and principles of sustainable development.

Funds of EkoFund Foundation come from the reduction of the part of the Polish debt. The Foundation gives financial support to environmental protection projects which are not only significant for a given region or the country but also influence the achievement of environmental objectives considered a priority by the international community at the European or even world-wide level. One of the Foundation's priorities is the reduction in the emission of greenhouse gases contributing to climate changes. Hence, EkoFund supports projects connected with energy savings, improved energy efficiency, but mainly promotes the use of renewable energy sources.

- ❑ Financing from other international sources (e.g. World Bank, GEF³², EU structural funds, EU Cohesion Fund³³)
- ❑ Own resources of companies
- ❑ State budget.

The state budget covers the part of the administrative costs connected with Poland's co-financing agreed by the Conference of the Parties to the Convention or the Meeting of the Parties to the Protocol, the development of the system for monitoring, control, verification and reporting, the preparation of necessary documents, the performance of required expert studies etc..

9. CONCLUSION

The key guideline for all activities is the most favourable, for Poland, fulfilment of the Kyoto Protocol supplemented with decisions of the Conference of Parties to the Climate Convention and the implementation of solutions agreed in the EU negotiation process. Poland's membership in the European Union will require the better integration of its climate policy with the policy and the programme for climate change prevention in the EU.

The satisfaction of the requirements of the Kyoto Protocol and the EU integration process will mean a need for urgent adjustment measures creating conditions necessary for their effective and efficient implementation – both in production companies as well as in central government and self government structures. Moreover, the favourable use of the Kyoto Protocol mechanisms by Poland requires undertaking certain activities at a national level which should show results not later than 2005.

³² Small Grants Programme [SGP/GEF] is directed to formally registered (associations, foundations) non-governmental organisations (not just environmental). Financing is also available to local authorities subject to their close, well documented cooperation with non-governmental organisations. The Programme provides financing for investment contributing to the improvement of natural environment in one or more focal areas: the protection of biodiversity, the protection of water resources, the prevention of climate changes. Apart from the Small Grants Programme GEF also supports medium and large projects in the area of climate protection which are successfully implemented also by Poland.

³³ Within the current EU integration process more and more significant source of financing of energy project are dedicated programmes of the European Commission such as: ALTENER II, SYNERGY, the Framework Technological Cooperation and Presentation Programme. 802 million euro have been allocated to renewable energies in the budget of the 6th EU Framework Programme for 2002-2006. At present, Poland can also take advantage of pre-accession funds available within the ISPA and SAPARD Programmes.

Prepared by the Environmental Policy Department of the Ministry of the Environment

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ANNEX 1. GREENHOUSE GAS EMISSION

1. Emission of greenhouse gases

In the period between the base year (1988) and 2001 the emission of greenhouse gases in Poland changed significantly (see Table 1). The changes in the level of GHG emission were accompanied by lower energy consumption in the national economy and the change in the fuel consumption structure. The fuel consumption structure has been changing gradually. Although hard coal still dominates, its share has gone down in favour of hydrocarbon fuels and renewable energies³⁴.

Table 1. Changes in the emission of carbon dioxide, methane and nitrous oxide (CH₄ and N₂O expressed in CO₂ equivalent) in the period 1988-2001 [Gg]

Years	1988	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
CO ₂	477584	381482	367689	372311	363980	372293	348926	373202	362300	338095	329739	314812	317844
CH ₄	65961	58821	54369	51954	51072	51807	51597	47292	47838	49035	47250	45852	38820
N ₂ O	21700	19530	16120	15500	15500	15500	16740	16740	16740	16120	23250	23896	23946

Source: Ministry of the Environment

Emission of CO₂, CH₄, N₂O

Table 2 Emission of key greenhouse gases in 2001 [Gg]

	CO ₂	CH ₄	N ₂ O
TOTAL	264 205	1 848.59	77.24
1. ENERGY	307 325	837.20	7.47
2. INDUSTRIAL PROCESSES	10 513	8.09	14.37
3. USE OF SOLVENTS AND OTHER PRODUCTS			
4. AGRICULTURE		450.71	52.82
5. CHANGES IN THE USE OF LAND AND FORESTRY	-53 639	0.19	0.00
6. WASTE	6	552.40	2.59

The net emission of carbon dioxide is calculated by deducting the absorption observed in category 5. *Changes in the use of land and forestry* from the total emission from all categories. In accordance with the IPCC methodology, the CO₂ emission is presented taking into account the value of category 5 (264 205 Gg) and without it (317 844 Gg). The 2001 inventory did not take into account the CO₂ emission from the biomass of 16 623.13 Gg because in accordance with the IPCC methodology this emission is not included in the national balance. The data for industrial gases show the real emission i.e. calculated on the basis of the detailed methods referred to in the IPCC methodology as Tier 2 and 3.

³⁴ In the recent years new renewable energies include wind and biogas, both used in the production of electrical power.

Other greenhouse gases (industrial gases)

Table 3. Emission of industrial gases in 2001

	HFCs [Mg]	PFCs [Mg]	SF₆ [Mg]
TOTAL	845.85	130.25	0.73
2. INDUSTRIAL PROCESSES	845.85	130.25	0.73
C. Metal manufacturing		120.13	
F. Use of HFCs, PFCs and SF ₆	845.85	10.12	0.73

Precursors of greenhouse gases

Table 4. Emission of precursors of greenhouse gases NO_x, CO, NMVOC, SO₂ in 2001

	NO _x	CO	NMVOC	SO ₂
TOTAL	805.38	3 527.90	873.39	1 564.30
1. ENERGY	790.55	2 634.15	338.70	1 534.50
2. INDUSTRIAL PROCESSES	14.84	21.15	36.60	29.80
3. USE OF SOLVENTS AND OTHER PRODUCTS			164.67	
4. AGRICULTURE			33.99	
5. CHANGES IN THE USE OF LAND AND FORESTRY				
6. WASTE		872.60	2.57	
7. OTHER			296.86	

2. Trends in the emission of greenhouse gases

Trends in the emission of CO₂

Exhibit 1 shows the emission of carbon dioxide in Poland between 1988-2001. The figures refer to the net emission i.e. taking into account (deducting) the absorption observed in category 5 *Changes in the use of land and forestry*.

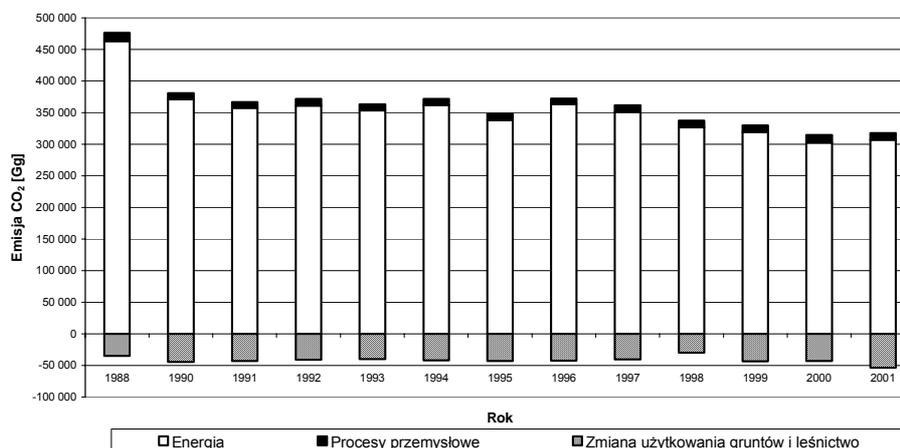


Exhibit 1. Emission of CO₂ in 1988, 1990-2001 broken down for the main sectors

In general, since 1988 the CO₂ emission has been going down. The largest change took place between 1988-1990 which corresponds to the industrial activity slowdown. In subsequent years the downward trend results from, *inter alia*, the change in the fuel consumption profile (a decrease in the share of coal fuels and an increase

in the use of liquid and gas fuels) as well as on-going modernisation and restructuring of industry influencing the energy-intensiveness of production.

Trends in the emission of CH₄

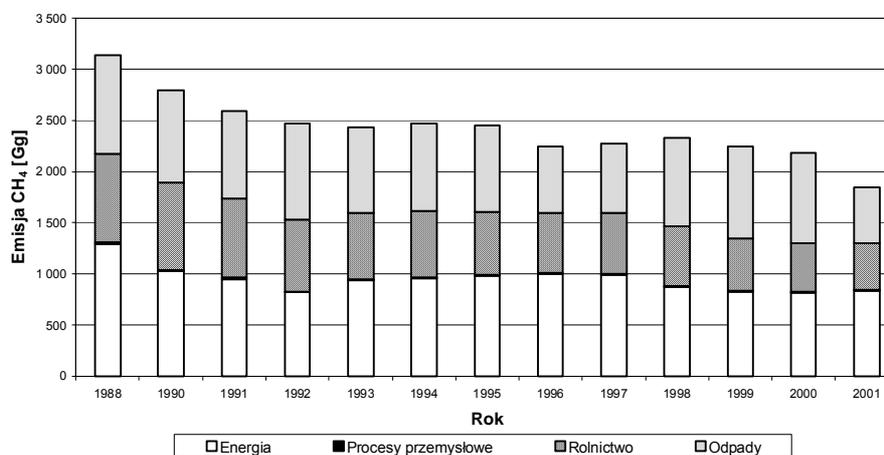


Exhibit 2. Emission of CH₄ in the period 1988-2001 broken down for the main sectors

The emission of methane has been following a continuously downward trend which results from decreasing emissions from categories 4. *Agriculture* and 1. *Energy*. Last year the CH₄ emission dropped due to a lower emission from category 6. *Waste*. The decrease in the emission of methane from agriculture results from a continuous drop in the number of farm animals, thus also intestine fermentation. With respect to volatile emissions from the energy sector the following three phases of the trend can be observed:

- a considerable decrease in the early 1990s. caused by the economic crisis;
- growth and stabilisation of the economy in mid 1990s.;
- a gradual decrease in the late 1990s. caused by the restructuring process of the mining sector and the reduced coal excavation.

With respect to the methane emission from category 6. *Waste*, the decrease has been caused by the change in the methodology.

Trends in the emission of N₂O

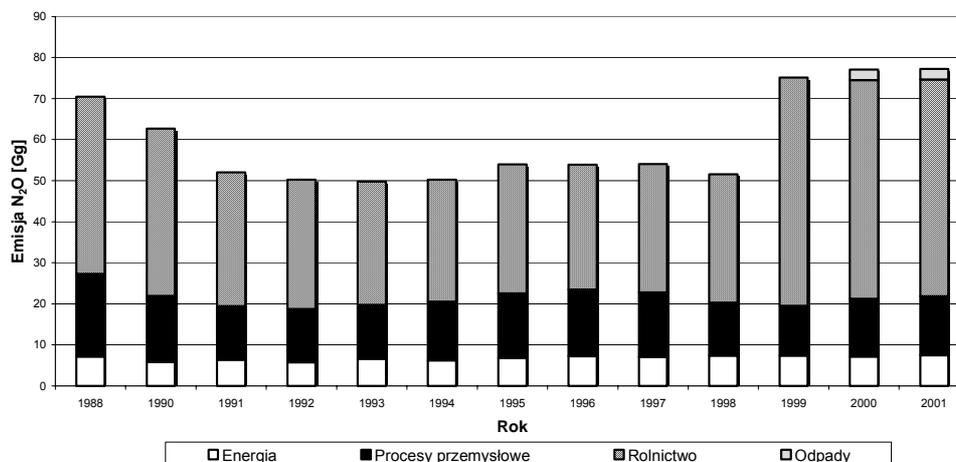


Exhibit 3. Emission of N₂O in the period 1988-2001 broken down for the main sectors

After a considerable decrease in the early 1990s, the emission of nitrous oxide has stabilised at the level of 50-54 Gg per year. An increase to the level of 75-77 Gg observed in 1999-2001 results from taking into account the emission from animal waste (18-20 Gg) and the emission from waste management (2.6 Gg). The emission from these two sources existed before but was not monitored.

The share of the energy sector has been changing slightly (6-7 Gg). After an initial decrease in the early 1990s, and an increase in mid 1990s, the emission from industrial processes has stabilised at the level of 12-14 Gg.

Other greenhouse gases (industrial gases)

Exhibit 4 shows the emission of industrious gases, expressed in CO₂ equivalent, in the period 1995-2001. It reflects a very distinct upward trend in the emission of HFCs from 22.46 Gg in 1995 to 1282.56 Gg in 2001. A further increase in the emission of HFCs is envisaged in the future due to an increasing number of cooling and air-conditioning devices, including stationary and mobile air-conditioning units (air-conditioning in personal and commercial vehicles, and buses). In the period 1995-2000 the emission of PFCs changed slightly from 820 Gg in 1995 to 881.16 Gg in 2001, following the trend in the production of aluminium – the main source of the emission. The emission of SF₆ has been continuously increasing, from 2.39 Gg in 1995 to 17.56 Gg in 2001.

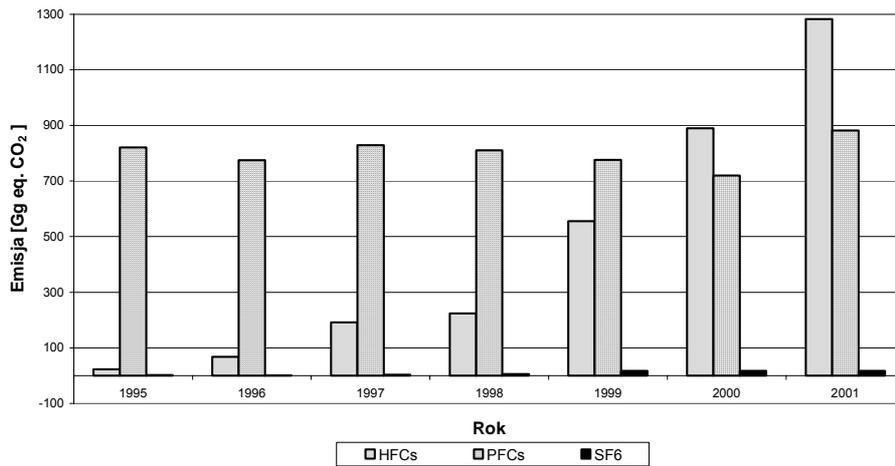


Exhibit 4. Emission of HFC, PFC and SF₆ in the period 1995-2001

Precursors of greenhouse gases

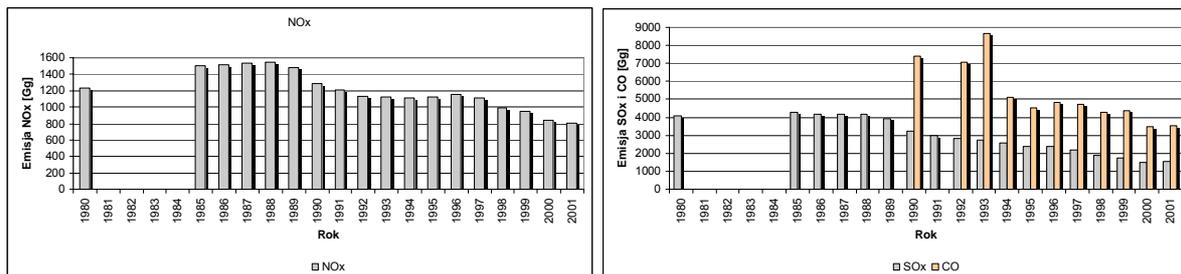


Exhibit 5. Emissions of nitrous oxide, sulphur oxide and carbon oxide in the period 1995-2001

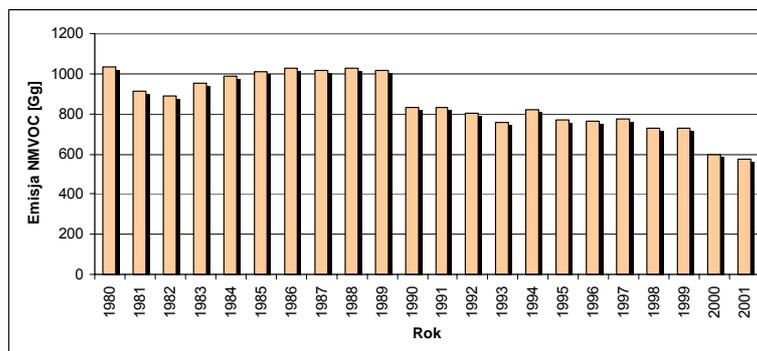


Exhibit 6. Trends in the emission of NMVOC from anthropogenic sources in the period 1988-2001

3. Emission in CO₂ equivalent in the period 1988-2001

Exhibit 7 shows the national emission of greenhouse gases in the period 1988-2001, expressed in CO₂ equivalent.

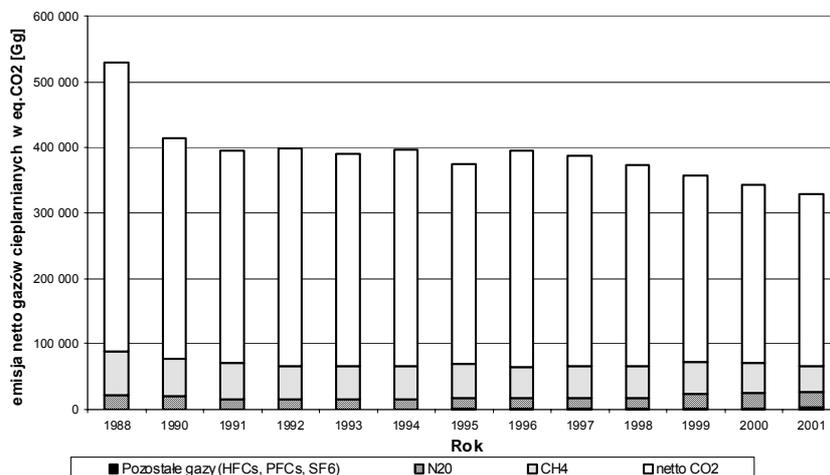


Exhibit 7. Emission of individual greenhouse gases in the period 1988-2001 taking into account the emission and absorption from Category 5

Of critical importance for the national GHG emission is the emission of carbon dioxide whose share over years amounted to 83% - 79%. In the analysed period, the emission of methane has been continuously going down – in 2001 its share in the national emission amounted to ca. 12%. The emission of nitrous oxide was decreasing until 1999 due to the decreasing consumption of nitrogen fertilizers. However, in the period 1999 - 2001 its general percentage share increased (in 2001 – more than 7%) due to the consideration of new emission sources in the inventory.

ANNEX 2 LIST OF EU DIRECTIVES

The list of EU directives (and proposals) with respect to the climate policy:

1. Council Directive 1996/62/EC of 27 September 1996 on ambient air assessment and management
2. Decision of the Council 1999/296/EC of 26 April 1999 amending the Decision 93/389/EEC on a monitoring mechanism of Community CO₂ and other greenhouse emissions. A proposal for a new decision of the European Parliament and the European Council on a monitoring mechanism of Community greenhouse emissions and the implementation of the Kyoto Protocol
3. Directive of the European Union relating to tradable allowances for the emission of greenhouse gases within the Community and the amended Directive 96/61/EC – approved by the European Council on 22 July 2003.
4. Council Directive 1999/30/EC of 22 April 1999 relating to limit values of sulphur dioxide, nitrogen dioxide and nitrogen oxides, dust and lead emissions in the air and the Commission Decision (2001/744/EC) of 17 October 2001 changing Annex V to this directive
5. Council Directive 2000/69 of 16 November 2000 relating to limit values for benzene and carbon monoxide in ambient air
6. Directive of the European Parliament and the Council 2002/3/EC of 12 February 2002 relating to ozone in ambient air.
7. Council Directive 96/61/EC concerning integrated pollution prevention and control (IPPC)
8. Council Directive 84/360/EEC of 28 June 1984 on the combating air pollution from industrial plants
9. Council Directive 88/609/EEC on the limitation of emissions of certain pollutants into the air from large combustion plants, amended by Directive 94/66/EEC of 15 December 1994
10. Directive of the European Parliament and the Council 2001/80/EC of 23 October 2001 on the limitation of emissions of certain pollutants into the ambient air from large combustion plants
11. Directive of the European Parliament and the Council 2001/81/EC of 23 October 2001 on national emission ceilings for certain atmospheric pollutants
12. Directive 70/220/EEC on standards for motor vehicles together with all amendments
13. Council Directive 89/369/EEC on the prevention of air pollution from new municipal waste incineration plants
14. Council Directive 89/429/EEC on the prevention of air pollution from existing municipal waste incineration plants
15. Directive 94/67/EEC on the incineration of hazardous waste
16. Directive 2000/76/EC on the incineration of waste.

ANNEX 3. POTENTIAL FOR THE REDUCTION OF GREENHOUSE GAS EMISSION

An unutilised potential for the reduction of GHG emission can be mainly observed in energy and heat generation, manufacturing, transport, and the household sector.

Energy and heat generation

The options for the reduction of the emission of greenhouse gases in this sector include: (i) renovation and modernisation of certain existing coal-fired installations; (ii) investment in small sources of combined production of power and heat; (iii) the use of waste biomass (forests; wood industry); (iv) improved efficiency of heating networks; (v) decentralising and optimising the energy transfer system.

The reduction projects that are potentially feasible include those that are mainly connected with the implementation of technologies based on natural gas (steam-gas units for the production of energy).

Other potential reduction products for power-heat plants and heat plants also include the replacement of hard coal with natural gas. The major role is played by small and medium efficiency systems for the combined production of power and heat. Such systems also dominate the potential connected with dispersed energy sources. In this case, of high importance are also power-heat plants using biomass from energy plantations and waste biomass from forestry and wood industry.

As a result of the modernisation projects, realised and planned, a majority of the existing power and heat generating plants can be still used for 15-20 years. It means a rigid technological structure hindering any changes resulting in the reduction of the CO₂ emission. The replacement of properly functioning facilities for new ones is not economically viable as it requires significant investment resulting in an increase in the system-related power generation cost. The replacement of old coal-fired technologies with new ones of higher efficiency would reduce the CO₂ emission by about 20%. Yet, due to the cost involved, the CO₂ reduction is quite expensive. The reduction could be also achieved at a lower cost by using new steam-gas power plants instead coal-fired ones. While the cost of power generation is similar in all three technologies (hard coal, brown coal, natural gas), higher reduction in the CO₂ emission for gas technology is achieved at a much lower unit reduction cost.

With a moderate growth rate in the demand for electrical energy and a substantial surplus in generation capacities in Poland, the construction of new power plants will be required only after 2010. Considering the Polish conditions, out of the available power technologies most likely is the application of coal-based

(hard coal or brown coal) or gas technologies. For the optimal allocation of coal fuel from Polish mines to various user groups it would be advisable to concentrate its use in large energy facilities. Such facilities have technically and economically adequate conditions for the use of effective technologies for the protection of atmosphere against pollution from coal combustion. On the other hand, the construction of new coal-fired power plants means the maintenance of relatively high CO₂ emissions from coal combustion for many years to come. From the point of view of the carbon dioxide reduction strategy it would be more advisable to use high-efficiency natural gas combustion technologies in the gas-steam cycle.

The use of renewable energy resources – The use of technologies based on renewable energy resources and energy respecting projects are the most important activities allowing for the effective reduction of GHG emission. The rational use of renewable energy i.e. river energy, wind energy, solar energy, geothermal energy or biomass energy is one of the vital elements in sustainable development leading to tangible environmental and energy effects.

Technologies with the highest potential in Poland include:

- ❑ Power and heat plants using biomass;
- ❑ Wind power plants;
- ❑ Water power plants.

Manufacturing sectors

In the industrial sector some reduction reserves are mainly seen in simple and cheap, economically viable, projects rationalising the use of energy, in particular projects aimed at (i) the improvement in lighting systems; (ii) the improvement in the efficiency of electric drives; (iii) the elimination of heat loss in plant's transfer networks.

Transport

In the transport sector, some reduction reserves exist in the broadly understood improvement in organisation of the passenger and cargo transport and related infrastructural projects, as well as in the use of bio-fuels produced from the biomass conversion. As regards the organisational projects, an important role is played by the adoption of models, sometimes not the best ones, from the developed economies (e.g. proportions between individual and public passenger transport). Yet, there are also low capital-consuming projects (e.g. development of telematics, improvement in the organisation of the forwarding process) whose development is mainly blocked by the lack of sufficient knowledge and adequate research programmes. It is estimated that the reduction potential connected with the implementation of broadly understood organisational solutions in transport is several times higher than the total potential of technical fuel-based options and amounts to about 40% of the current emission from transport. The realisation of

this potential has been envisaged within a number of technical organisational projects. Considering that not all activities planned within the currently prepared long term development strategy for transport may succeed, it is estimated that organisational measures may result in 20-30% reduction in the emission of greenhouse gases from the transport section.

Household sector (housing and household appliances)

The two categories of measures that dominate the household sector are: (i) fuel substitution and improvement in the energy efficiency of heating system; (ii) increased pace of the replacement of lighting and household appliances for those more modern and energy-saving.

Yet, the key option of the emission reduction is thermal modernisation of buildings, particularly by improved insulation of external walls and the exchange of construction wood elements (windows, doors).

The reduction potential of individual activities mainly depends on the following factors:

- ◆ a possible scale of the implementation of a given activity (power and production level relating to a given technology);
- ◆ a degree of the emission reduction achieved as a result of a given technological option.

The highest level of the emission reduction is achieved by applying biomass-based technologies for which nil CO₂ emission is assumed.

Examples of major limitations to the use of emission reduction measures and increased absorption of greenhouse gases include:

- ◆ bottom value – the required by the Development Strategy for Renewable Energy Sources share of renewable energies in the national consumption of energy used for the production of electrical power;
- ◆ top value – natural resources (e.g. wind, water flows, land for the cultivation of energy plants, geothermal water resources), the available amount of precipitation and wastewater, the adopted maximum speed of technology dissemination, the demand for combined heat.

The estimation of the possible reduction of the CO₂ emission (reduction potential) resulting from individual activities is difficult as to a great extent it depends on the replaced technology and, hard to estimate, technical restrictions. The production of electrical power with such technologies as wind power plants and small and large water power plants leads to the reduction in CO₂ emission from fuel combustion in conventional power plants. The scale of this reduction depends on the type of the technology replaced.

With the development of renewable energies, the best results in the reduction in CO₂ emission are achieved by replacing the production from coal-fired power plants. The replacement of gas power plants with renewable energies means less than half the effect and more than doubles the reduction costs.

Hence, the highest reduction potential is connected with (i) the power plant sector. Other significant areas include measures in (ii) the household sector; (iii) heat and power plants and industrial heating plants as well as connected with the development of (iv) dispersed production sources of electrical power and heat. The scale of the realistic reduction of emission of greenhouse gases and the increased CO₂ absorption results from resource, technical and economic conditions. It means that the reduction of emission must be technically feasible (it is determined by the technical reduction potential). It must also be profitable in the broad system sense and may not endanger the competitiveness of individual enterprises as well as the level of life of poor groups of population.

ANNEX 4. PROJECTED EMISSION OF GREENHOUSE GASES IN POLAND BY 2020

CO₂ and CH₄

In order to project the emission of CO₂ and CH₄ – the two most significant greenhouse gases in Poland (see Annex 1) two macro-economic reference scenarios have been defined differing in the adopted rate of the economic growth. The scenario with a relatively high (4.0% p.a.) GDP growth has been based on the existing documents outlining the economic policy of the Polish government and legislative acts relevant for future emissions. The scenario with a lower (2.3% p.a.) GDP growth has been based on the assumption that political plans of the government will not be fully realised.

In both scenarios the net emission of greenhouse gases (taking into account the emission of CO₂, methane and the absorption of CO₂ by forests), expressed in CO₂ equivalent, amounts to a similar level of 357-365 million ton of CO_{2e} in 2010 (in comparison with the most recent emissions – see Annex 1.). This makes up ca. 30% of the emission reduction since the base year (1988). It exceeds significantly the 6% reduction commitment under the Kyoto Protocol. In 2020 the net emission of greenhouse gases reaches 368-370 million ton of CO_{2e}. This corresponds 28-27% of the emission reduction since 1988. When individual gases are considered separately, the reduction of CO₂ emission is lower and amounts to 20% of the 1988 emission in 2020. At the same time the reduction of methane emission is higher and reaches ca. 40% in the reference scenarios. The following three scenarios of the emission reduction of greenhouse gases have reflected various "variants" of the climate policy:

- REDUCTION REFERENCE SCENARIO: reducing the emission of greenhouse gases in accordance with the currently binding assumptions of the State policy (of highest importance is the maintenance of the activity of the coal sector at the level fixed on the basis of the Governmental programme for the reform of hard coal mining – the production of 100-65 million tonnes and the maintenance of the current level of power production based on brown coal until 2020) but without enforcement of the 14% share of renewable energies in the 2020 energy balance required by the Strategy for renewable energies;
- REDUCTION MARKET SCENARIO: the policy carried out under the liberated energy market – the elimination of structural limitations; also non-enforcement of the 14% share of renewable energies in the 2020 energy balance;
- REDUCTION ECOLOGICAL SCENARIO: the policy carried out under the elimination of structural limitations; enforcement of the 14% share of renewable energies in the 2020 energy balance required by the Strategy for renewable energies.

Of key significance for the achievement of the enhanced reduction in GHG emission is liberating economic structures from the political impact. It mainly concerns solutions within the energy sector. Both, forcing the coal production at the level similar to that observed now as well as forcing the share of renewable energies in the consumption of the primary energy at the level proposed by the Strategy for renewable energies leads to a significant increase in GHG reduction costs. In the economy free from the above-named political impact a 40% GHG reduction can be achieved at low additional direct costs (yet, there may be additional social costs connected with e.g. the loss of jobs).

There is a need for the earliest possible introduction of the system of GHG emission trading for large emitters. This market instrument may cover more than 50% of the national emission of greenhouse gases. Dispersed sources of emission must be stimulated with financial and fiscal instruments in a manner adjusted to individual scenarios. A common element for all the situations is also the use of the climate policy supporting instruments.

The rigid structures may occur in the following two variants:

1. the maintenance of the high activity of the coal sector (keeping the production at the level higher than 65 million tonnes until 2020)
2. the requirement to increase the share of renewable energies to 14% consumption of the primary energy by 2020.

Coal variant

A 30% reduction target seems realistic. It seems acceptable to include large emitters (>20MWth) in the emission trading system with a 30% reduction ceiling (in comparison with the 1988 emission).

Renewable energies variant

Achieving the required development of the renewable sources of energy means almost a 40% reduction in GHG emission. Therefore, it is proposed to combine the trading system for tradable GHG emission allowances with the trading system for commitments to use renewable sources of energy in the production of power and heat. Enforcement of an increased use of renewable energies on dispersed energy users may be affected by introducing a moderate coal tax and earmarking the tax income for subsidising investors in the field of renewable energy sources, particularly to encourage the development of energy plantations and the biomass production. Here also, supporting mechanisms should be used to eliminate market barriers to the introduction of cost-effective reduction measures. Moreover, renewable sources of energy should be widely promoted and covered by a wide educational campaign.

N₂O

After a considerable decrease in the early 1990s, the emission of nitrous oxide has stabilised at the level of 50-54 Gg per annum. An increase to the level of 75-77 Gg observed in 1999-2001 results from taking into account the emission from animal waste (18-20 Gg) and the emission from waste management (2.6 Gg). The emission from these two sources existed before but was not monitored in the earlier inventories (in the near future the historical values of NO₂ emissions will be re-calculated taking into account the above-named sources).

The share of the energy sector has changed slightly (6-7 Gg). After an initial decrease in the early 1990s, and an increase in mid 1990s, the emission from industrial processes has stabilised at the level of 12-14 Gg. After some insignificant fluctuations in the first half of 1990s, the emission from transport has been continuously going up since 1997. The share of N₂O emission from transport in the total national emission of nitrous oxide did not exceed 3% in 2001 (despite an increase), hence its impact on the emission trend is insignificant.

In the future, following Poland's EU accession, N₂O emission will depend greatly on the EU agricultural policy as in Poland the main source of this emission is the category *Agriculture* (almost 70% of the total national emission). Yet, a further increase in N₂O emission is not envisaged.

Due to the above, by 2020 N₂O emission is not expected to increase by more than ten-odd percent in comparison with 2001.

Industrial gases: HFCs, PFCs and SF₆

A percentage change in the emission of greenhouse gases in 2001 in comparison with the base year (1995) is significant (almost 48-fold increase in the emission of HFCs, more than 6-fold increase in the emission of SF₆ and approximately a 7% increase in the emission of PFCs). Yet, the emission of industrial gases in comparison with the emission of key greenhouse gases is still very low (ca. 0.5% of the national total).

A further increase in the emission of HFCs is envisaged in the future due to an increasing number of cooling and air-conditioning devices, including stationary and mobile air-conditioning units (air-conditioning in personal and commercial vehicles, and buses). Assuming the rate of growth in HFCs emission does not change, it is expected that in 2010 GHG emission from this group will exceed 1.8 Gg and in 2020 – 3.2 Gg.

In the period 1995-2001 PFCs emission changed slightly from 820 Gg CO₂eq in 1995 to 881.16 Gg CO₂eq in 2001, following the trend in the production of aluminium – the main source of the emission. In future a significant increase in this emission is not expected.

The main source of SF₆ emission are releases of this gas from Gas Insulating Systems (GIS) used in switches and transformers for outdoor energy stations with voltage exceeding 110 kV. In the period 1995-2001 the emission of SF₆ increased from 2.39 Gg CO₂eq in 1995 to 17.56 Gg CO₂eq in 2001. In the last three years it has been following a very insignificant upward trend (a change of few percent e.g. 2001/2000 – ca. 3%) and no considerable change in the rate of growth for this emission is expected in future.