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The Republic of Poland
Ministry of the Environment

National Allocation Plan for CO_2 Emission Allowances

2005 – 2007 Trading Period

Warsaw, 2004

The Plan was approved by the European Committee of the Polish Council of Ministries at the session on 20th of August 2004 to be notified to the European Commission.

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- List of Installations included in the NAP (as for 29 July 2004)
- List of Installations proposed for exclusion from the NAP in the first trading period (2005-2007) (as for 29 July 2004)

1. Introduction

Poland has developed the *National Allocation Plan for CO_2 Emission Allowances*, as presented in this document, for the purpose of meeting the European Union's requirements laid down in *Directive 2003/87/EC*[1] *of the European Parliament and of the Council of 13 October 2003 establishing a scheme for greenhouse gas emission allowance trading within the Community and amending Council Directive 96/61/EC*[2]. The basic provisions which directly determine the form of the National Allocation Plan are set out in Article 2 of the Directive, which indicates the activities which must be covered by the emissions trading scheme, and in Article 9, which provides the substantive criteria for the preparation of the NAP.

The aim of the development and adoption of *Directive 2003/87/EC* by EU15 was to reduce the costs to be incurred in reducing carbon dioxide emissions to meet the targets set by the Kyoto Protocol. In accordance with the Preamble and Article 1, the aim of the Directive is to create the conditions for the more effective fulfilment of the reduction commitments of the Community and its Member States, through an efficient European market in greenhouse gas emission allowances, with the lowest possible diminution of economic development and employment. Just as a large number of other countries, Poland has taken an active part in the efforts of the international community to reduce greenhouse gas emissions, also before its accession to the European Union. As a result of these activities:

- since 13 December 2002 Poland has been a Party to the K*yoto Protocol to the United Nations Framework Convention on Climate Change*, making the commitment to reduce its greenhouse gas emissions by 6% with respect to the 1988 emissions;
- Poland took an active part in the discussion on climate change and the greenhouse effect which has accompanied the adoption of the Framework Convention and the Kyoto Protocol;
- since the beginning of the present decade it has taken substantial and effective efforts to reduce its greenhouse gas emissions, to reach in 2003 an almost 30% reduction with respect to the base year.

The process of political and economic transition which began in 1989 in Poland has also brought other significant effects in environmental protection. In 1990-2000, SO_2 emissions fell by 53%, NO_x emissions decreased by 35%, despite an increase in the number of vehicles, the emissions of Non-Methane Volatile Organic Compounds (NMVOCs) dropped by 28%, mercury containing compounds by 21% and lead emissions by 37%. In 1988-2000, the water withdrawals to meet the needs of the national economy were reduced by about 25%. The energy and waste intensities of the economy were diminished substantially. These effects were achieved as a result of structural change in the economy and the stronger enforcement of the amended legislation as well as due to substantial outlays of the order of 1.6% of GDP on environmental protection and modernisation of production technologies.

Therefore, it was without reservations that Poland adopted for implementation the targets, recommendations and requirements laid down in the Directive, despite the fact that our country had limited influence on the formulation of their contents and scope. However, in respect of the principles of the preparation of the National Allocation Plan, it should be indicated at the outset that the provisions of the Directive and of the related documents of the European Commission hardly take into account the consequences of the enlargement of the European Union, particularly the specific circumstances in Poland.

[1] Directive 2003/87EC of the European Parliament and of the Council of 13 October 2003 establishing a scheme for greenhouse gas emission allowance trading within the Community and amending Council Directive 96/61/EC.

[2] Council Directive 96/61/EC of 24 September 1996 concerning integrated pollution prevention and control.

Indeed, these documents were primarily developed for the purpose of the joint implementation of the so-called *Burden Sharing Agreement* by the EU15 countries. They focused on the need to design emission allowance allocation plans in such a manner as would allow for the achievement of the Community emission reduction target as laid down in the Kyoto Protocol.

In contrast, the Directive has practically failed to take note of the situation of the new Member States which, apart from Slovenia, now have emission reserves with respect to the emission targets of the Kyoto Protocol. This is confirmed by its Article 30 (2) which provides that "*Commission shall draw up a report on the application of this Directive, considering, inter alia, how to adapt the Community scheme to an enlarged European Union*". Until such a report is prepared, which is expected to take place by 30 June 2006, i.e. at the date that the Directive sets for the preparation of another allocation plan for 2008-2012, there are no specific principles for action in place for such a situation.

The European Community made a commitment to achieve a larger reduction in greenhouse gas emissions than that of Poland, specifically by 8%, over the entire EU15 territory. Pursuant to Council Decision 2002/358/EC, with consent of all the EU15 Member States, this commitment was unequally divided among the individual states. Following the principle of solidarity, the Community Member States agreed that the countries which have the largest economic gap to eliminate would be able to increase their emissions in 2008-212 with respect to 1990. They include Portugal (27%), Greece (25%), Spain (15%) and Ireland (13%). In contrast, other countries undertook to achieve greater reductions, including Luxembourg (28%), Germany and Denmark (21%), Austria (13%) and the UK (12.5%). There is no doubt that such an arrangement, which reflects the best traditions of the integrating Europe, will provide substantial assistance to the economic growth of these countries.

Point (30) of the Preamble to the Directive also cites the principle of subsidiarity, justifying the need to take measures at Community level to meet the commitments under the Kyoto Protocol. However, Poland assumed that the implications of the application of this principle in the formulation of the provisions of *Directive 2003/87/EC* extends solely to the previous group of the Member States (EU15) which had much earlier undertaken to jointly meet the commitments under the Kyoto Protocol and the majority of which must achieve significant CO_2 emission reductions. This means that, just as the other states which joined the European Union on 1 May 2004, Poland will have to individually fulfil the commitments which it made under the Kyoto Protocol; in particular, it must not exceed the maximum emission cap provided there for 2008-2012.

In approving the already mentioned aims of *Directive 2003/87/EC*, Poland's Government regards the solutions proposed in it as useful tools for the implementation – entailing the lowest costs – of the tasks agreed in Kyoto in respect of greenhouse gas emission reductions. Still, the establishment of the emission allowance trading scheme is not an end in itself. Therefore, in setting out to prepare the NAP, it was assumed that the measures introducing the allocation of allowances and the emission allowance trading scheme needed to ensure in a logical manner the implementation of the requirements of the Directive, in consideration of the specific national circumstances as well as the point of departure and the target to be achieved.

In particular, the process of allocation of allowances and their transfer between operators should not – and must not – be a factor which would, paradoxically, lead to the lower competitiveness of the Member States of the European Union, including especially its new countries. After all, they will have to take substantial efforts to align their levels of socio-economic development with those of the EU15 countries.

Therefore, the manner in which Poland interprets its commitments to reduce greenhouse gas emissions is significantly determined by its economic circumstances and the situation in the individual economic sectors which will be covered by the emission allowance trading

scheme. Given the development trends which emerged in Poland in 2002 and 2003 as well as the data and projections for 2004 and subsequent years, a substantial growth in production and consumption should be expected. These are exactly the goals of strategic documents setting out the conditions for the further socio-economic development of the country.

This means that the consumption of raw materials, water, electricity and other energy carriers, including fuels in the sectors of enterprises, transport and households may significantly grow in the coming years. However, whereas further emission reductions seem possible in the case of the emissions of specific pollutants, sulphur dioxide, nitrogen oxides, wastewater discharged into waters or waste, the growth of greenhouse gas emissions is inevitable in the coming years. This is the case with both its main source, i.e. the energy sector, and other industrial sectors as well as the transport and municipal sectors.

It is also necessary to consider the specific consumption structure of energy carriers. For Poland, whose energy sector is based for the most part on the use of hard coal and lignite, this is a key issue in terms of its long-term policy on the national energy security.

Therefore, in contrast to highly developed countries, Poland's fundamental goal in this respect is to ensure gradual stabilisation in a short term, to be followed by limitation of greenhouse gas emissions in a longer term.

Poland expects that the other Member States will demonstrate the same understanding that they did with respect to the less economically developed EU15 countries. At the same time, Poland treats very seriously the concerns of the European Commission about the possible overallocation of allowances to certain installations. Therefore, the legal measures adopted on the emission allowance trading scheme include restrictions which would curb unjustified growth in emissions and, particularly, prevent from placing on the market amounts of emission allowances in excess of the emission reductions really achieved as a result of enhancement of the efficiency in use of energy carriers.

Bearing the above in mind, in preparing the National Allocation Plan for Poland, efforts were taken to reconcile as far as possible the requirements of the Directive with:

- the situation of Poland which is different from EU15 as regards the targets of its reduction of CO_2 emissions,
- the present level of Poland's socio-economic development in relation to EU15 and EU25; and
- the optimum scenarios for further transition and development of the Polish economy.

In particular, the principles of equity and solidarity were adopted as the point of departure; which had already been applied in establishing the emission targets for the individual EU15 countries. These principles impose the need to apply the requirements of the Directive for the emission allowance trading scheme, particularly the *national allocation plans for emission allowances*, in such a way as would not hamper the development of the still weak economies of certain countries.

Recognising the overriding necessity of introducing systemic measures which would ensure the credible implementation of the target set for Poland in the Kyoto Protocol, it was assumed that the allocation of allowances, particularly for the first commitment period, must not be made at the expense of installations which are not entitled to a bonus for *early action* and *cogeneration*. In accordance with the philosophy and logic of the national allowance reserves, this group of installations will be entitled to such a number of allowances as would cover their justified emission needs.

Such an approach is based on the fact that Poland has now a substantial reserve of about 30% of the cap set in the Kyoto Protocol. This means that without detriment to the commitments laid down in the Protocol, it is now possible to allocate to each existing emission source such a number of allowances as will cover its current needs.

At the same time, it is envisaged that as soon as possible the allowance allocation will move from historical data to emission factors (from grandfathering to benchmarking method). This issue is discussed in detail in a further section of this Plan; however, even now it should be emphasised that Poland's Government regards it as the most important incentive to 0encourage operators to take measures to systematically reduce specific CO_2 emissions per unit of product (or raw material).

The factors adopted in the NAP should, therefore, be treated as "caps" rather than emission targets. Poland's Government will make all efforts to ensure that these "caps" will not be reached; however, when planning the allowance allocation on the basis of current knowledge of development trends it needs to consider the current data and projections. In addition to the system of allowance allocation, the following measures will contribute to stabilisation and subsequently gradual reduction of greenhouse gas emissions:

- the consistent treatment of energy efficiency issues as a priority in establishing the requirements of the best available techniques for integrated permits;
- the increasingly strong pressure on the enhancement of energy efficiency in the transport sector and in the household and municipal sectors;
- the promotion of the development of energy generation from renewable energy sources.

In particular, already as a Member States of EU25 Poland wants to make full use of the situation in which it found itself after 1 May 2004, by actively implementing the joint strategy for fulfilment of the commitments. Given the significant progress which it made earlier in the reduction of CO_2 emissions and its accelerating economy, Poland is vitally interested in its participation in the European emissions trading. The possible benefits from the participation of domestic operators in the emission allowance trading scheme will give impetus to further technical and technological modernisations and will thereby enhance the competitiveness of industry on the world markets.

The work on the preparation of the National Allocation Plan in Poland was innovative in nature. It was for the first time that such a comprehensive and specific document was developed – in consultation with all the interested sectors – to describe realistically the current situation and projected changes. The experiences in this respect will certainly be useful in the efficient expansion of the allowance allocation scheme to include the emissions of other pollutants, in the first instance those of SO_2, NO_x and particulates from large combustion plants. A solid basis is also in place for updating the Environmental Policy, the Climate Policy, the Energy Policy and the Strategy for the Development of Renewable Energy Sources. The consultations and negotiations which were for the first time conducted to such an extent in Poland with industrial sectors are a great achievement and experience; they should be of assistance in the partner-like co-operation on the implementation of the first plan and the development of the subsequent ones.

2. Key factors and structural elements of the National Allocation Plan

2.1. Objectives and requirements of Directive 2003/87/EC concerning the NAP

The basic provisions which directly determine the form of the National Allocation Plan are set out in Article 2 of the Directive, which indicates the activities which must be covered by the emissions trading scheme, and in Article 9, which provides the substantive criteria for the preparation of the NAP. 11 substantive criteria listed in Annex 3 to this Directive are of key significance for the preparation of the National Allocation Plan. These criteria provide as follows:

1. The total quality of allowances to be allocated for the relevant period shall be consistent with the Member State's obligation to limit its emissions pursuant to Decision 2002/358/EC and the Kyoto Protocol, taking into account, on the one hand, the proportion of overall emissions that these allowances represent in comparison with emissions from sources not covered by this Directive and, on the other hand, national energy policies, and should be consistent with the national climate change programme. The total quantity of allowances to be allocated shall not be more than is likely to be needed for the strict application of the criteria of this Annex. Prior to 2008, the quantity shall be consistent with a path towards achieving or over-achieving each Member State's target under Decision 2002/358/EC and the Kyoto Protocol.

Poland fully accepts these rules and, having a considerable reserve (of about 130 million tonnes) in comparison with the commitment made in 1997, it will certainly meet them. Even the most optimistic economic growth projections do not jeopardise Poland's fulfilment of its 6% emission reduction target for the period of 2008 – 2012. This must, however, be confirmed by Poland's Energy Policy (until 2025) being currently drafted as well as by other verified strategic documents such as the Climate Policy (until 2020) and the Strategy for the Development of Renewable Energy Sources.

2. The total quantity of allowances to be allocated shall be consistent with assessments of actual and projected progress towards fulfilling the Member States' contributions to the Community's commitments made pursuant to Decision 93/389/EEC.

Taking stock of its total emissions and comparing them with its commitments, Poland does not foresee any threats to the fulfilment of its obligations under the Kyoto Protocol.

3. Quantities of allowances to be allocated shall be consistent with the potential, including the technological potential of activities covered by this scheme to reduce emissions. Member States may base their distribution of allowances on average emissions of greenhouse gases by product in each activity and achievable progress in each activity.

Through the transposition of the requirements laid down in the IPPC Directive (96/61/EC) into the Environmental Protection Act, which entered into force on 1 October 2001, Poland commenced the gradual implementation of the best available techniques. The allocation of allowances for the first commitment period of 2005 – 2007 was based on the grandfathering method, whereas it is envisaged that the future allocation plans will apply to a wide extent the more effective benchmarking method.

4. The plan shall be consistent with other Community legislative and policy instruments. Account should be taken of unavoidable increases in emissions resulting from new legislative requirements.

The requirements of the EU legislation relating to energy activities (Directive 2001/80/EC) and the refinery sector (Directives on the quality of petrochemical products: 2003/17/EC, 1999/32/EC and 2003/30/EC) were applied for the first trading period.

5. The plan shall not discriminate between companies or sectors in such a way as to unduly favour certain undertakings or activities in accordance with the requirements of the Treaty, in particular Articles 87 and 88 thereof.

Following long discussions and consultations with the industries concerned, Poland reached an agreement on the proposed distribution of allowances among individual sectors. The distribution of sectoral allowance caps among individual undertakings was accepted and considered not to violate the principles of competition.

6. The plan shall contain information on the manner in which new entrants will be able to begin participating in the Community scheme in the Member State concerned.

This procedure is envisaged and the NAP guarantees a sufficient new entrants reserve, which is included in the national cap and does not pose the risk of exceeding the Kyoto commitments.

7. The plan may accommodate early action and shall contain information on the manner in which early action is taken into account. Benchmarks derived from reference documents concerning the best available techniques may be employed by Member States in developing their National Allocation Plans, and these benchmarks can incorporate an element of accommodating early action.

Poland recognises as early action any activities which were undertaken after 1988 directly in installations covered by the system and which contributed to stable reductions of CO_2 unit emissions.

8. The plan shall contain information on the manner in which clean technology, including energy efficient technologies, are taken into account.

In this scope, Poland has distinguished combined heat and power co-generation. The high potential of this system was taken into account in the allocation of allowances by granting a "co-generation bonus". No such analyses or assessments were performed for the first trading period with respect to any other technologies.

9. The plan shall include provisions for comments to be expressed by the public, and contain information on the arrangements by which due account will be taken of these comments before a decision on the allocation of allowances is taken.

Information on the consultation process, including via the Internet, was included in the NAP.

10. The plan shall contain a list of installations covered by this Directive with the quantities of allowances intended to be allocated to each.

The list of installations to be covered by the system as well as those proposed for temporary exclusion was attached as annexes to the NAP

11. The plan may contain information on the manner in which the existence of competition from countries or entities outside the Union will be taken into account.

Poland expects no threats of this kind in the first trading period.

Due to the general phrasing of the above criteria, the European Commission discussed them in greater detail in its guidance of 7 January 2004.[3]

[3] Commission of the European Communities: Communication from the Commission on guidance to assist Member States in the implementation of the criteria listed in Annex III to Directive 2003/87/EC establishing a scheme for greenhouse gas emission allowance trading within Community and amending Council Directive 96/61/EC, and on the circumstances under which force majeure is demonstrated.

2.2. Poland's situation in comparison with other EU countries

Being already a member of the new Community of EU25, Poland faces a long and difficult process of reaching the economic potential and the standard of living of society to be seen particularly in the EU15 countries. Our place in the Community is illustrated by the comparison of the Gross Domestic Product (GDP) measured in purchasing power parity units (Figure 1). Compared with the other EU25 countries, in 2003 the Polish GDP per capita took the 24th place and amounted to 46% of the Community average. The figure below also shows the places of the other, new EU25 Member States.

Due to the process of economic transition which started in the late 1980s as well as enormous environmental investments, Poland now has a substantial emission reserve when compared with its emission target for 2008–2012 under the Kyoto Protocol. This evident success was, however, achieved at tremendous social costs, including the unemployment rate of almost 20%.

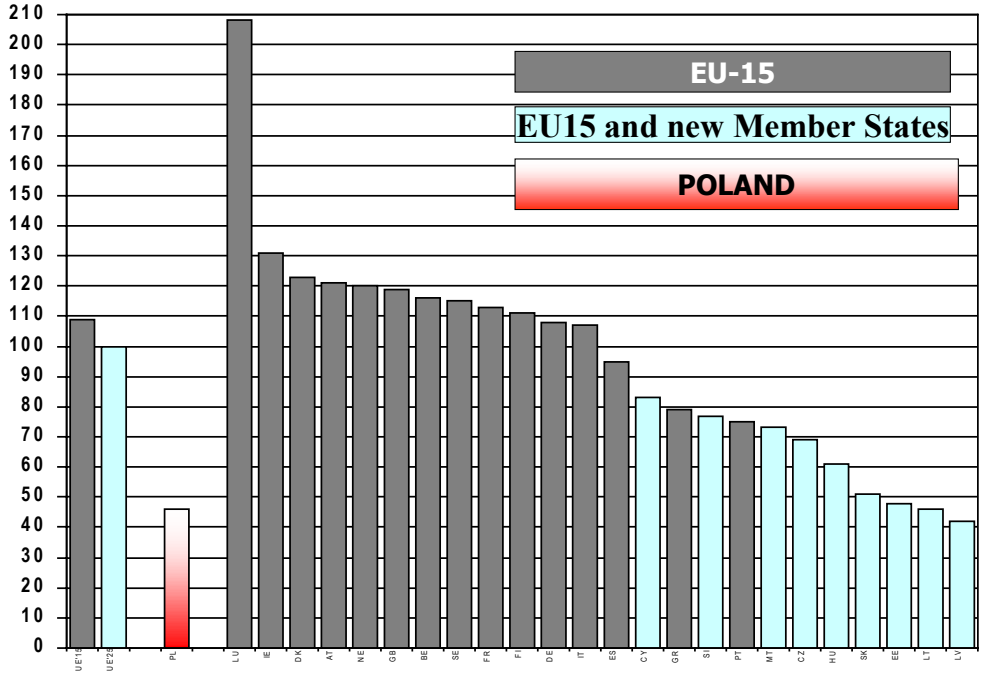

Figure 1. Comparison of GDP in 2003 expressed in purchasing power parity units; EU25=100 %

The combustion processes in the electricity and heat production sectors are of the highest importance for CO_2 emissions in Poland. The fuel consumption structure in the Polish energy sector is specific in nature, due to such a high scale of consumption of the domestic hard coal and lignite, compared with the other EU countries. Efforts aimed at modernizing the production potential and reducing the energy intensity of our economy may result in further reductions of emissions into the atmosphere, including greenhouse gas emissions. Figures 2 and 3, based on *IEA-OECD* statistics, show the shares of individual states in electricity production and the fuel mix in the electricity production in EU25 in 1999, distinguishing the fuels responsible for CO_2 emissions.

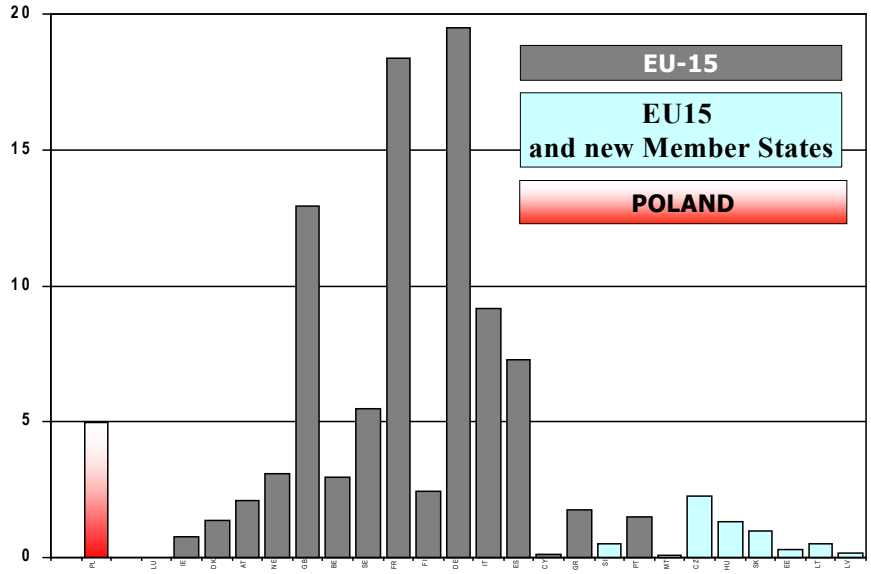

Figure 2. The shares of individual states in electricity production; EU25= 100%

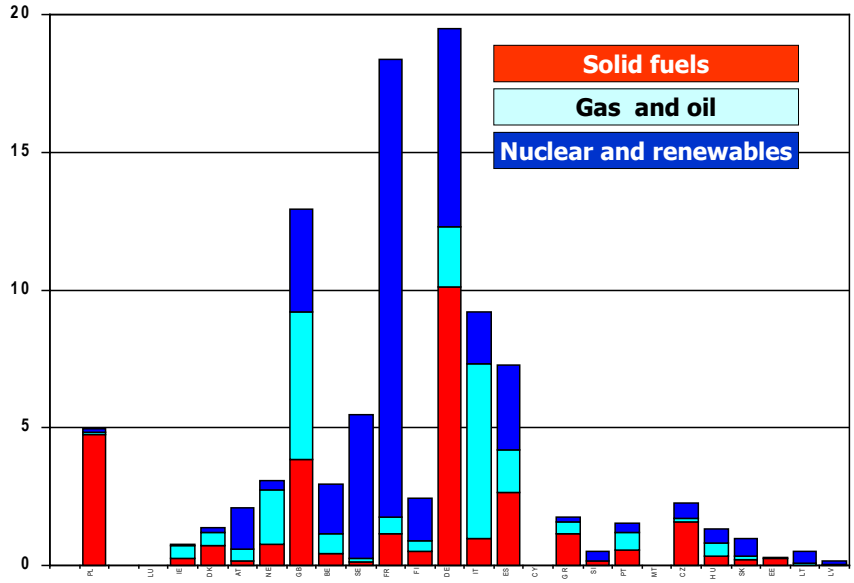

Figure 3. The fuel mix in electricity production; EU25=100%

3. The Allocation Plan at macro level – the "top-down" approach

3.1. Introduction

The National Allocation Plan for 2005-2007 covers one greenhouse gas (CO_2) and only a certain part of the national emissions. Therefore, it is impossible to adopt the targets under Kyoto Protocol directly as the emission caps for the NAP.

This section of the document, devoted to analysis of the macroeconomic dependencies, presents the manner of identification of the total quantity of allowances intended to be allocated. The calculation included the following activities:

a) the national assigned amount set by the Kyoto Protocol for the period of 2008 - 2012 was divided between CO_2 and the other greenhouse gases;

b) the national emission targets were established for the period of 2005-2007, separately for CO_2 and the other greenhouse gases;

c) the CO_2 emission cap was set for the period of 2005-2007 for installations covered by the emission allowance trading scheme.

Annex III to Directive 2003/87/EC requires the total quantity of allowances allocated within the NAP prior to 2008 to be consistent with a path towards the achievement of the targets under the Kyoto Protocol. Therefore, first , the share of emissions from installations covered by the NAP was established on the basis of historical data. Subsequently, the baseline scenario for Poland's economic development and the corresponding projections of CO_2 emissions were developed. As part of the preparation of the scenario, the development potential of the sectors covered by the emission allowance trading scheme was analysed, along with change in CO_2 emissions resulting from the development of their activities. Moreover, analysis was performed of the projected CO_2 emissions from sectors not covered by the emission allowance trading scheme, i.e. transport, commercial, services and households sectors.

As a result of these macro analyses, the baseline scenario was developed for CO_2 emissions until 2015, which were divided into the emissions from installations covered by the emission allowance trading scheme and the emissions from the other sources.

3.2. Change in greenhouse gas emissions in 1988-2001 and projections for Poland until 2012

3.2.1. Greenhouse gas emissions

By ratifying the United Nations Framework Convention on Climate Change in July 1994, Poland committed itself to preparing and publishing periodical national inventory reports showing the effects of measures taken to reduce greenhouse gas emissions. The data presented below come from the national inventory reports covering the period of 1988–1999[4] as well as the report on the national inventory of greenhouse gas (GHG) emissions for 2001[5].

Table 1 presents the total emission of all the greenhouse gases covered by the national inventory. In 2001, CO_2 emissions decreased by about 32% compared with the emissions in the base year (1988). Even a greater decrease was observed for methane emissions, as a result of its management and increasingly lower levels of hard coal mining as well as a decline in the numbers of livestock in agriculture and decreased emissions from solid waste landfills. A significant, 25% increase in N_2O emissions identified in the inventory results from the change, as from 1999, of the calculation methodology. A rapid, almost threefold increase in the emissions of fluorinated gases (HFCs, PFCs, SF_6) is mainly caused by a higher number of air-conditioning devices (stationary and mobile) and increased production of aluminium. Due to a limited share of industrial gases in the total GHG emission balance (about 0.6% in 2001), the growing emissions of these gases do not jeopardise Poland's fulfilment of its commitments under the Kyoto Protocol.

[4] The Third National Communication to the Conference of the Parties to the United Nations Framework Convention on Climate Change, Council of Ministers, Warsaw, 2001.

[5] The inventory of GHG emissions and their precursors for 2001, Ministry of the Environment – Institute for Environmental Protection, Warsaw – June 2003.

Table 1. Greenhouse gas emissions in Poland in 1988-2001 [million tonnes of CO_{2eq}/year]

Specification of GHG emissions(CO_{2eq})	**1988**	1990	1996	1998	2000	2001	**2001/1988**
CO_2	**476.6**	380.7	372.5	337.4	314.8	317.8	66.7%
CH_4	**66.0**	58.8	47.3	49.0	45.9	38.8	58.8%
N_2O	**21.8**	19.4	16.7	16.0	23.9	23.9	109.6%
Fluorinated gases (HFCs, PFCs, SF_6)	**0.8**[1)]	----	0.8	1.0	1.6	2.2	275.0%
Total GHG emissions (gross)	**565.2**	**458.9**	**437.3**	**403.4**	**386.2**	**382.7**	**67.7%**
CO_2 emissions (net)[2)]	**441.9**	**336.0**	**329.9**	**294.8**	**271.7**	**264.2**	**59.8%**

[1)] estimates for 1995

[2)] considering CO_2 removals by sinks in agriculture and forestry

Source: The Third National Communication to the Conference of the Parties to the United Nations Framework Convention on Climate Change, Warsaw, 2001 and the GHG inventory report for 2001, IOŚ, Warsaw, 2003.

In 1988 – 2001, considering CO_2 removals by sinks in agriculture and forestry, the net emissions of this gas fell, exceeding its gross emission reduction by almost 7%. This was an effect of the consistent implementation of the long-term national forestry policy, including the *National Programme for the Augmentation of Forest Cover*.

The changes in the emissions of the main greenhouse gases over the period of 1988-2001 are shown in Figure 4.

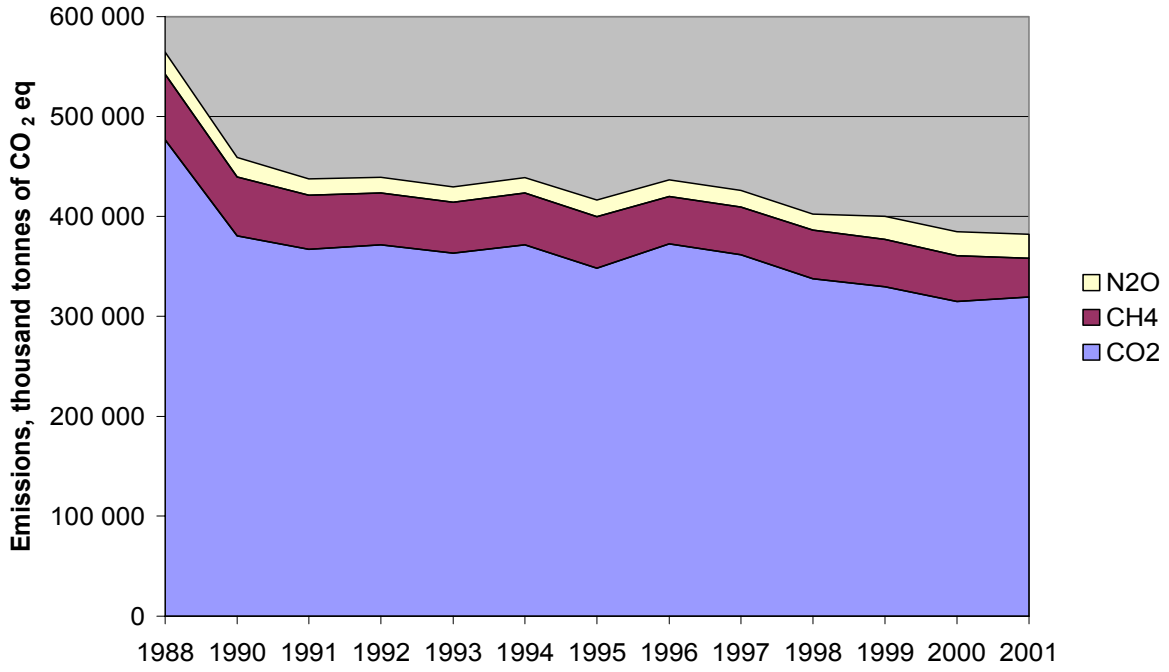

Figure 4. The changes in the emissions of the main greenhouse gases in Poland from 1988 to 2001.

3.2.2. Carbon dioxide emissions

The data on CO_2 emissions are of key importance for the preparation of the NAP as it is the main greenhouse gas and the only substance covered by the first trading period of 2005-2007 (see Table 2).

Table 2. CO_2 emissions in Poland in the distinguished sectors of the economy over the period of 1988-2001 [million tonnes of CO_{2eq}/year]

Specification of categories of CO_2 emissions	1988	1990	1996	1998	2000	2001	2001/1988 [%]
Total national CO_2 emissions (gross), including:	**476.6**	**380.7**	**372.5**	**337.4**	**314.8**	**317.8**	**66.7 %**
Combustion installations in the energy sector:	252.9	234.6	182.0	168.7	164.7	166.9	66.0%
Emission in the processing industry, of which:	82.0	63.3	90.0	83.4	71.7	64.3	78.4%
refineries and coking plants	5.4	4.1	6.4	9.7	7.2	6.6	122.2%
process emissions (from raw materials)	13.6	9.2	8.9	10.5	12.3	10.5	77.2%
Transport	28.2	29.1	28.1	28.1	28.2	30.1	106.7%
Commerce, services, households, agriculture	111.2	55.7	64.1	50.1	45.4	50.1	45.0%
CO_2 removals by sinks (agriculture and forestry)[1)]	**-34.7**	**-44.7**	**-42.6**	**-42.6**	**-43.1**	**-53.6**	**154.5%**
Total national CO_2 emissions (net)	**441.9**	**336.0**	**329.9**	**294.8**	**271.7**	**264.2**	**59.8%**

[1)] The analyses of CO_2 removals by sinks which were performed in 1988-2001 used a different methodology. This change is not reflected here.

Source: The analysis by EnergSys based on the GHG inventory report for 2001, IOŚ, Warsaw, 2003 and Third National Communication to the Conference of the Parties to the United Nations Framework Convention on Climate Change, Warsaw, 2001.

The most significant trends in the changes of CO_2 emissions over the period of 1988 – 2001 included:

1) a more than 30% reduction in the total national CO_2 emissions and those from combustion installations (producing electricity and heat);
2) a 55% reduction in CO_2 emissions from the commercial and service sectors, agriculture and households; in this case, the investments in thermal modernisation measures and changes in the mix of fuels used for heating purposes were of vital importance;
3) growing emissions from the sectors of refineries and coking plants; the main reason for them was a higher transport activity and a substantial increase in the extent of crude oil processing.

3.2.3. Changes in CO_2 emissivity factor

Changes in CO_2 emissions also lead to significant changes in the factors which synthetically reflect the changes which took place in Poland in the period of political and economic transition. This is illustrated by the numerical data in Table 3.

Table 3. Changes in CO_2 emissivity factor in Poland over the period of 1988-2001

Specification	Unit	1988	2001	2001/1988
1. CO_2 emissions per capita	t CO_2/ Ma	12.6	8.2	65.1 %
2. CO_2 emissions per unit GDP	t CO_2/ thous. PLN'99	0.9	0.5	55.6 %
3. CO_2 emissions per primary energy unit	kg CO_2/ GJ	88.8	82.8	93.2 %
4. Consumption of primary energy per capita	GJ/ Ma	139.3	99.4	71.4 %

Source: Analysis by EnergSys based on the national GUS statistics and the national emission inventory

3.3. National emission caps for 2008-2012 and 2005-2007

Emission caps for 2008-2012 under the Kyoto Protocol

Under the Kyoto Protocol, Poland committed itself to reducing the greenhouse gas emissions in 2008-2012 by 6% against the 1988 level[6]. This commitment applies to the basket of six main greenhouse gases. The national emission inventory showed that the total emissions of CO_2, CH_4, and N_2O were at a level of 564.4 million tonnes of CO_2 equivalent in 1988 and that the total emissions of PFCs, HFCs and SF_6 were at a level of 0.8 million tonnes of CO_2 equivalent in 1995. These data were used for setting the emission cap for the six greenhouse gases.

The national emission cap for six greenhouse gases (GHGs) in 2008-2012 amounts to **531.3 million tonnes of CO_2 equivalent** a year on average.

In the first trading period, the emission allowance trading scheme only covers carbon dioxide. The results of the inventory (Table 1) show an increase in the emissions of three industrial gases (PFCs, HFCs, and SF_6) in recent years. However, the share of these gases in the emissions of all the six greenhouse gases is low, as in 2001 it amounted to about 0.6%. On the other hand, a further decrease in CH_4 emissions is expected in the time-frame until 2012, as a result of, *inter alia*, the implementation of *Directive 99/31/EC on the landfill of waste*. Assuming that these two will offset each other, ultimately the share of CO_2 in the emissions of six greenhouse gases over the period of 2008-2012 was adopted in accordance with the emission structure in the base year of the Kyoto Protocol, i.e. at the level of - 6%. This reduction level was adopted as Poland's commitment under the Kyoto Protocol applicable to carbon dioxide only.

The national CO_2 emission cap for the period of 2008-2012 amounts to **448 million tonnes** a year on average.

[6] In the Kyoto Protocol the basis for Poland's commitments concerning CO_2, CH_4, and N_2O emissions is the emission levels in 1988, whereas for PFCs, HFCs, and SF6 – the emission levels in 1995.

3.4. Hypothetical emission caps for 2005-2007 in accordance with the Kyoto Protocol

The first National Allocation Plan covers the years 2005-2007 when the emission targets set under the Kyoto Protocol do not apply directly. The caps for this period were calculated on the basis of the linear trajectory of emission reductions from the base year level to the required level over the period of 2008-2012.

The national emission cap for six greenhouse gases (GHGs) in 2005-2007 amounts to **537.5 million tonnes of CO_2 equivalent** a year on average.

The CO_2 emission cap for the period of 2005-2007 was calculated by assuming, just as above, a constant share of carbon dioxide in the basket of greenhouse gas emissions.

The national CO_2 emission cap in 2005-2007 amounts to **453.2 million tonnes** a year on average.

The cap defined above reflects the requirements of the Kyoto Protocol transposed over 2005-2007 and limited to carbon dioxide only. Taken together, the emission allowances allocated within the NAP and the CO_2 emissions projected over the period of 2005-2007 from installations not covered by the emission allowance trading scheme must not exceed this cap.

The cap calculated in this way for 2005-2007 is higher than CO_2 emissions in the last year covered by an inventory (in 2001, they amounted to 318 million tonnes). The years 2000-2002 brought, however, a slowdown in the rate of Poland's economic development. Whereas CO_2 emissions had fallen before 2000, since 2001 they have been gradually increasing, even despite a low economic growth rate. This shows that low-cost, simple CO_2 reducing measures have been exhausted and indicates the need for the NAP to provide for allowances to cover increased emissions resulting from Poland's economic development.[7]

3.5. Projected national CO_2 emissions in accordance with the baseline scenario (BLN)

The levels of emissions in 2008-2012 as well as in 2005-2007 are based on projections and a scenario-based analysis of economic development by means of a set of models. The analysis produced the baseline scenario (BLN), which presents the probable path of Poland's economic development, along with corresponding CO_2 emissions. The most significant results of this scenario, which were directly used in the preparation of the NAP, include:

a) a projection of national CO_2 emissions, which is consistent with the adopted assumptions;

b) the expected future share of CO_2 emissions covered by the emission allowance trading scheme in the total national emissions;

c) coefficients of the growth of emission needs for all the sectors covered by the emission allowance trading scheme.

[7] GUS data for the 1st quarter of 2004 indicate the achievement of 6.9% GDP growth rate while the Government's estimates show the possibility that 6% GDP growth may be achieved in the 2nd quarter of 2004.

The main macro-economic assumptions and projections of the national CO_2 emissions are presented below.

Apart from the BLN scenario, the BAU'88 comparative scenario was developed. It adopted the same activity levels and the emission factors as in 1988. The emissions set in this scenario serve as a point of reference for establishing the magnitude of sustained reduction effects achieved as a result of the measures taken to date on the national scale.

3.6. Main macro-economic assumptions

The BLN scenario is based on the assumption that the GDP will grow by 4.5% on average until 2015. A slightly faster growth rate was assumed for the period before 2005 (see Table 4).

Table 4. The assumed rates of GDP growth and the pace of change in added values in individual sectors of the national economy, under the BLN scenario

Specification	2002		2005	2010	2015	
	Bn PLN	structure	Growth rate 2002 = 100%			Structure
Agriculture and fishery	21	3.2 %	103.3	119.2	131.9	2.5 %
Industry and construction	205	30.4 %	112.6	129.2	142.5	25.5 %
Transport and communications	53	7.9 %	103.4	131.1	165.2	7.7 %
Services	394	58.5 %	117.0	147.2	187.4	64.4 %
Total added value	674	100.0 %	114.1	139.6	170.2	100.0 %
Gross GDP	771		114.8	140.7	172.1	
Mean annual GDP growth over the period:			**2002- 2005**	**2006 - 2010**	**2011 – 2015**	
			4.7 %	**4.1 %**	**4.1 %**	

Source: GUS data and calculations made by EnergSys

The data on the GDP growth rates in the last quarters of 2003 and the first quarters of 2004 indicate a potentially faster economic development may occur in Poland compared with the assumptions adopted in the BLN scenario.

The above macro-economic proportions create the basic structure of the scenario. They were supplemented by the assumptions on the expected future production levels of energy-intensive goods and services, including, too, the types of activities covered by the emission allowance trading scheme. Moreover, these assumptions also reflect the most recent data on the situation in individual sectors, which were acquired from sectoral organisations and the largest enterprises.

3.7. Baseline path for national CO2 emissions

The part of the BLN scenario which is of key importance for the preparation of the NAP is the baseline path for CO_2 emissions until 2015. It provides for the following levels of national CO_2 emissions:

2001	2005	2010	2015
317.8 Mt	363.4 Mt	394.4 Mt	417.0 Mt

The results achieved for the BLN and BAU'88 scenarios are presented in Figure 5. The figure also shows historical emissions and the national CO_2 emission cap reflecting Poland's commitment under the Kyoto Protocol.

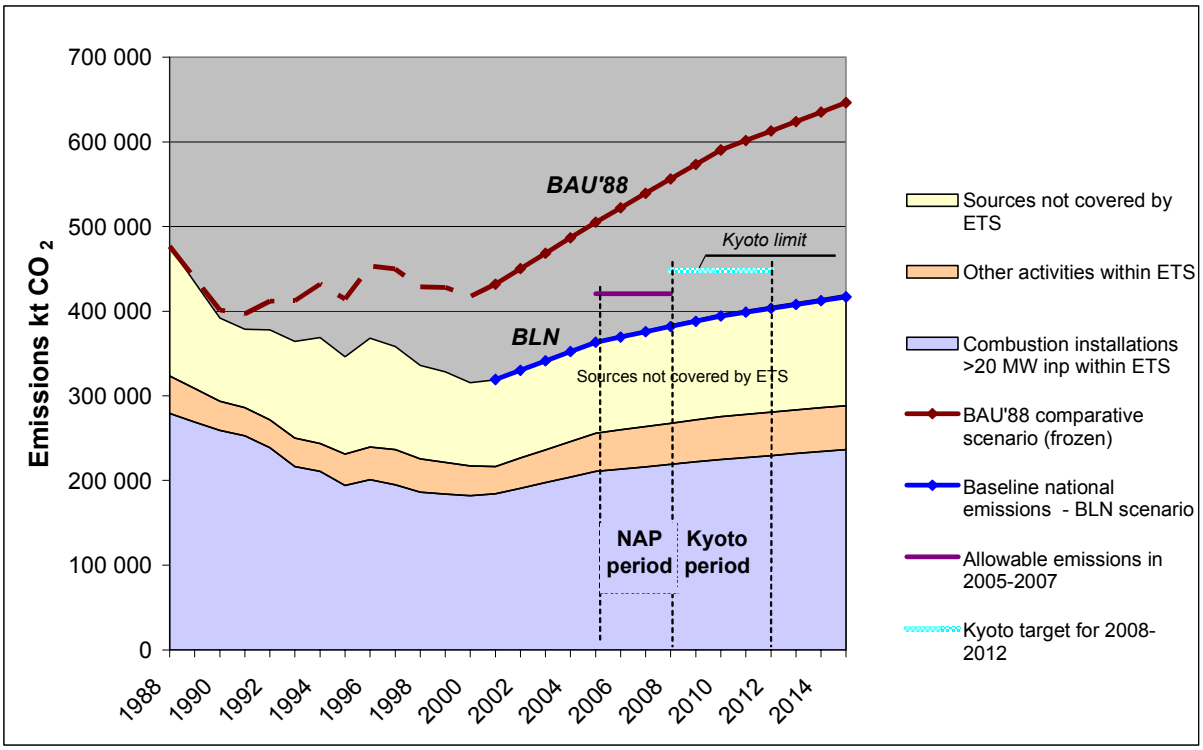

Figure 5. Projections of CO_2 emissions until 2015 under the BLN scenario and the comparative values under the BAU'88 scenario (emission factors fixed at the levels of 1988).

In the years 2008-2012, CO_2 emissions under the BLN scenario are lower than Poland's emission cap under the Kyoto Protocol. The scale of reduction effects is reflected in the differences between the results achieved in the BLN and BAU'88 scenarios which amount to:

- in 2005 - 141.6 million tonnes,
- in 2010 - 195.9 million tonnes,
- in 2015 - 229.3 million tonnes.

3.8. Principles applied in establishing the total pool of emission allowances

The total quantity of allowances to be allocated was calculated on the basis of the share of the emissions from installations covered by Directive 2003/87/EC and the mean levels of CO_2 emissions over the period of 2005-2007 in accordance with the path towards the achievement of Poland's targets under the Kyoto Protocol. On the basis of the inventory data and the national statistics concerning fuel and energy consumption, the share of the emissions from installations covered by the NAP was determined at the level of 68% of the national CO_2 emissions. The level of 420.9 million tonnes a year on average was adopted as the basis for setting the quantity of allowances. This level resulted from the selected emission path following the same general trends as the line of the BLN scenario and reaching emissions equal to the Kyoto cap in 2008-2012. Therefore, the total pool of allowances to be allocated under the NAP for 2005-2007 amounts to 286.2 million tonnes a year on average. A detailed description of the methodology applied in the calculation of the total pool of emission allowances is presented in the annex.

4. Emission needs by sectors in 2005-2007

4.1. Sectoral aggregation

In preparing the NAP, adopted was the principle that installations covered by the emission allowance trading scheme would be grouped into sectors on the basis of their main market activities. Combustion installations which produced energy to meet the needs of a production installation in a given sector were included within the sector for which they operated (e.g. heat and power co-generation plants supplying chemical plants were assigned to the chemical sector).

In the work on the NAP, three energy production-related subsectors were distinguished:

- power plants,
- combined heat and power plants,
- heat plants.

Subsequently, the sectors related to the activities listed in Annex I to the Directive were distinguished:

- mineral oil refineries,
- coking plants,
- iron and steel industry,
- cement plants,
- lime production plants,
- glass industry,
- ceramic industry,

including within them heat auto-producers as well as combined heat and power auto-producers, too.

The third group distinguished consisted of sectors which are not listed in Annex I to the Directive, but which used combustion or other installations listed in the Annex:

- chemical industry,
- sugar production industry,
- other industries.

4.2. Indicators of the growth of emission needs - comparison

The indicators of the growth of justified emission needs were determined on the basis of the projected rate of development of a given sector and the possible reduction in the CO_2 emission factor per product. Taking into account the reduction measures taken earlier and the short time remaining until the beginning of the first commitment period, it was assumed for most sectors that the CO_2 emission factors per product unit would slightly improve or stabilise at the levels of 2001.

It was assumed that the emission factors would fall within an interval of 0.3 to 0.5% in all the installations producing electricity or heat and for the installations for the production of paper. It should be emphasised that these improvements are expected to come despite the growing energy demand, as a result of the need to build desulphurisation installations within the framework of the implementation in Poland of *Directive 2001/80/EC on the limitation of emissions of certain pollutants into the air from large combustion plants*.

Constant values of CO_2 emission factors were assumed for the other installations covered by emissions trading. The projections of justified emission needs for 2005-2007, as presented in Table 5, were derived from the projected growth rate of a given sector and change in emission factors.

The values determined for individual sectors are different from one another as a result of their varied situation and specific nature. The lowest growth of emissions is projected for heat plants (108.7%) with the highest growth expected to occur in the sugar production industry (139.3%) as well as in the cement and lime production sectors (137.8%). The latter installations belong to the group of industries the development of which is mostly driven by the implementation of investment projects. In 1999-2000, Poland saw a particularly severe decline in investment projects. This is confirmed by the values of the production in the cement and lime production sectors, which dropped by more than 20% with respect to their values in 1999. Therefore, in analysing the cited growth rates, one should take into account the very low baseline to which they are referred. In the case of the sugar production sector, the extremely adverse weather conditions recorded in 2001 also had significant impact.

The overall comparison given above was derived from analyses carried in individual sectors and sub-sectors as well as from consultations and negotiations with employers' organisations.

Historical data on production and projected change are provided below. In addition, in order to explain the scarce reserves set aside for new entrants, the percentage extent of the use of production capacities was determined for individual sectors, compared with the maximum use of the capacity (taking 8,760 working hours per year as the reference). This information indicates how large production capacities are still frozen in the Polish economy and wait to be set in operation with an upturn of the economy.

Table 5. Indicators of the growth of justified CO_2 emission needs according to the BLN scenario

No	Sector	Change in sectoral quantities in 2005-2007 with respect to 2001 (2001=100%)		
		Indicator of activity change	Indicator of change in CO_2 emissivity factor	Indicator of change in CO_2 emissions
1.	Power plants	118.5%	99.7%	118.1%
2.	Combined heat and power plants	112.1%	99.7%	111.8%
3.	Heat plants	109.0%	99.7%	108.7%
4.	Mineral oil refineries	129.0%	101.6%[1]	131.1%
5.	Coking plants	133.7%	100.0%	133.7%
6.	Iron and steel industry			132.0%
	Sinter	*150.7%*	*100.0%*	*150.7%*
	Pig iron	*129.4%*	*100.0%*	*129.4%*
	Steel	*140.8%*	*101.1%*[2]	*142.3%*
7.	Cement plants	137.8%	100.0%	137.8%
8.	Lime production plants	130.8%	105.4%[3]	137.8%
9.	Glass industry	135.0%	100.0%	135.0%
10.	Ceramic industry	124.4%	100.0%	124.4%
11.	Paper industry			122.7%
	Pulp	*115.5%*	*100.0%*	*115.5%*
	Paper	*132.3%*	*100.0%*	*132.3%*
12.	Sugar production industry	139.3%	100.0%	139.3%
13.	Chemical industry	126.7%	99.5%	127.3%
14.	Other industries	117.9%	99.5%	117.3%

[1] This growth is caused by higher transport intensity and a greater extent of mineral oil processing

[2] This growth is caused by change of technology and product lines

[3] This growth is caused by higher workloads on existing installations which are set in operation periodically with higher demand for products

4.3. Sectoral assumptions

4.3.1. Power plants

In 1999-2001, the electricity production in power plants remained at similar levels (see Table 6). Slightly lower production levels came in 2002, but as early as 2002 the production levels grew significantly – by more than 5.5% compared with 2002. This growth was affected by electricity exports, mostly to the EU15 countries. However, it can be assumed that the growth will be constant but should not exceed 10 TWh a year.

The growth of electricity production assumed for 2005-2007 and for 2010 is consistent with the document *The Assumptions of Poland's Energy Policy until 2020* of February 2000. Even this year, these data will be verified in *The Energy Policy until 2025* being now drafted.

These assumptions are reasonable, given the urgent need to modernise the production in Poland and in the light of the very low electricity consumption per capita, which is twice as low as in the EU15 countries.

Table 6. Electricity production, the coefficient of capacity utilisation in 1999-2003 in the sector of power plants and the production growth rates projected for 2005-2010

Item	Unit	Production in the year					Production growth rate (2001 = 100)	
		1999	2000	2001	2002	2003	2005-2007	2010
Electricity	GWh	112 649	114 411	113 020	111 090	117 442	118.51	132.7
Coefficient of utilisation of production capacity*)	%	52	53	52	51	54		

*) the relation between the actual output and the product of the available capacity operated over 8,760 hours/year (survey data)

4.3.2. Combined heat and power plants

The heat production in the sector of combined heat and power plants in 1999-2002 (see Table 7) remained at similar levels, with the differences between particular years having seasonal nature, depending on the temperature conditions (measured by the number of so-called "degree-days"). In contrast, a steady growing tendency could be seen for the share of electricity production in combined heat and power (CHP) systems. In 1999-2002, the mean co-generation factor in the CHP sector grew by 8 percentage points. The present legal and economic conditions are favourable for co-generation; therefore, a further increase in CHP-based electricity production can be expected.

As the NAP was developed several combined heat and power plants submitted data which indicated that they planned to enhance their production and CO_2 emission levels due to the planned investment projects (large modernisations) exceeding the mean production growth rate as assumed for this sector, including an increase in the co-generation factor. In this sector, the share of production from such producers in the total energy production of the sector amounts to about 3.5%.These installations should be considered individually according to their individual development paths.

The mean CO_2 emission factor in the sector of combined heat and power plants, as calculated per unit of the total energy production (both electricity and heat), may grow in the future as a result of a growing share of electricity production. In contrast, the CO_2 emission factor per unit of the chemical energy of the fuel burned will fall.

Table 7. Energy production, the coefficient of capacity utilisation in the sector of combined heat and power plants and the projected production growth rate in 2005-2010

Item	Unit	Production in the year					Production growth rate (2001 = 100)	
		1999	2000	2001	2002	2003	2005-2007	2010
Electricity and heat	PJ	282.5	276.6	293.0	281.4		112.11.8	
Coefficient of production capacity utilisation*)	%	30	30	32	31			

*) the relation between the actual output (survey data) and the maximum reference output (the available capacity operated over 8,760 hours/year)

4.3.3. Heat plants

In 1999-2002 the heat production levels in the sector of heat plants showed only relatively slight annual variations, mainly depending on the outdoor temperatures (see Table 8).

The projected slight growth of demand for district heat is caused mainly by lower direct consumption of hard coal for housing heating purposes and an increase in the number of housing units.

The share of energy production in the sector of heat plants related to the projected cases of extraordinary production growth is slight, amounting to about 1.5%.

The coefficient of utilisation of the achievable capacity is extremely low in this sector, indicating a number of real problems of economic and cost-related nature, for both heat suppliers and users.

Table 8. Heat production and the coefficient of capacity utilisation in the sector of heat plants and the projected production growth rate for 2005-2007

Item	Unit	Production in the year					Production growth rate (2001 = 100)	
		1999	2000	2001	2002	2003	2005-2007	2010
Heat	PJ	103.7	95.3	103.4	97.7		109.08.7	
Coefficient of production capacity utilisation*)	%	19	17	19	19			

*) the relation between the actual output (survey data) and the maximum reference output (the available capacity operated over 8,760 hours/year)

4.3.4. Other than heat plants

This sector consists of energy installations – the electricity and heat producers in all the other sectors of the economy, excluding those mentioned directly below. Combustion installations which operate in the chemical industry and the sugar production industry are important in this group. In general, this sector mainly consists of installations operating to meet the needs of industries, supplying technological and heating steam and heat as well as smaller amounts of electricity.

Given the specific development circumstances of the sugar production sector, it is briefly characterised separately.

Table 9. Heat production, the coefficient of capacity utilisation in the sector of other than public heat and/or electricity producers and the projected production growth rate for 2005-2007

Item	Unit	Production in the year					Production growth rate (2001 = 100)	
		1999	2000	2001	2002	2003	2005-2007	2010
Energy activities in other industries	PJ	85.5	81.2	85.7	85.8		123.3	
Coefficient of production capacity utilisation*)	%	25	24	25	25			

*) the relation between the actual output (survey data) and the maximum reference output (the available capacity operated over 8,760 hours/year)

In 1999-2002, the heat production levels in the sector of other than heat plants showed slight annual variations, mainly depending on the technological needs (see Table 9). Therefore, lesser consumption variations can be seen compared with the sectors of public heat and power co-generation plans and heat plants.

To a very large extent, the projection of the future activity of this sector depends on the projection of the future production of the chemical sector, which in the last two years (2003 and 2004) began to significantly increase its production, including the production of nitrogen fertilisers.

The energy installations operated by sugar production plants are primarily installations with high capacities which are only used in the sugar production season (about three months long). The levels of the demand for heat from the sugar production plants in this season significantly depend on the climate conditions in a given year:

- The amount of raw material to be processed depends on the weather conditions in the plant vegetation period (contracts cover yields from a specific area cultivated).
- The amount of heat needed for sugar production significantly depends on the physico-chemical characteristics of the sugar beet processed.
- The amount of heat needed for sugar production significantly depends on the weather conditions in the sugar production season.

Table 10. The assumptions adopted in the BLN scenario for sugar production levels

Item	Unit	Production in the year					Production growth rate (2001 = 100)	
		1999	2000	2001	2002	2003	2005-2007	2010
Sugar	kt	1 821	2 009	1 543	2 030	1 948	139.3	139.3

Table 10 illustrates the assumptions for sugar production as adopted in the BLN scenario. In order to protect the plants of the sugar production industry which participate in the emission allowance trading scheme against the need to buy additional emission allowances in case of unfavourable weather conditions in 2005-2007, the amount of a “safety margin” was set out at the level of the relation between the highest and lowest emission factors of the sugar production in 1992-2002, i.e. at the level of 13.6% of the basic allocation.

The growth of the production levels projected for 2005- 2007 by 12.4% with respect to the “normal” sugar production levels in 1999-2002 is justified by the higher demand for sugar on the markets outside of the European Union (e.g. the CIS countries) in recent years and the enhanced product diversification in sugar factories.

4.3.5. Refinery products

The development trends of the domestic sector of mineral oil refineries are determined by two national refineries: those in Płock and Gdańsk. The other installations are hardly important on the domestic market of petrochemical products. In recent years, a number of development and modernisation investment projects were carried out at the two refineries, with the side effect of inevitably higher greenhouse gas emissions, mainly CO_2.

The data in Table 11 show that in 1999-2002 there was a gradual increase in mineral oil processing levels. In addition, the values of the coefficient of capacity utilisation demonstrate that in 2001 there was a very high increase in processing capacity.

Table 11. Mineral oil processing levels, the coefficient of capacity utilisation in the sector of mineral oil refineries and the production growth rate projected for 2005-2007

Item	Unit	Production in the year					Production growth rate (2001 = 100)	
		1999	2000	2001	2002	2003	2005-2007	2010
Mineral oil processing	kt	16 217	17 674	17378	17258		129.0	
Coefficient of production capacity utilisation*)	%	84	76	75	74			

*) the relation between the actual output (survey data) and the maximum reference output (the available capacity operated over 8,760 hours/year)

The relatively high growth rate projected for 2005-2007 indicates the need for further modernisation and higher mineral oil processing levels. It is envisaged that in this period a large expansion of the processing capacity by as much as about 30% will take place in the Gdańsk refinery.

The existing projections of the development of the transport infrastructure in Poland and the very substantial increase in the number of second-hand passenger cars imported from the EU15 countries also suggest that a significant increase in the demand for engine fuels is likely.

At the same time, in connection with the increasingly stringent quality requirements for engine fuels and heating oils (including heavy oils) under the provisions of EU legislation, a slight increase in the emission factor of the production in this sector was assumed. The analytical studies published in EU15 indicate that the growth of unit emission factors may vary between about 1 and 3% with respect to the factors in 2001-2002.

4.3.6. Coking plants

In the NAP, the following circumstances were assumed for the allocation of allowances to coking plants:

1. In the macro scenario, the coke production growth by 3.7% with respect to the production level in 2001 results, inter alia, from the growth rate of pig iron production.
2. Even in 2003, the coke production level was higher by almost 20% than the output in 2001. The calculations of the coefficient of production capacity utilisation did not take into account the coke ovens which were modernised in a given year.
3. In the National Allocation Plan, it was assumed that the amounts of coke-oven gas sold would remain at the mean level from 1999-2002. Coking plants received

additional allowances for "unsold coke-oven gas" under the higher coke production levels. The provisions of legislation being drafted envisage the mandatory transfer of these additional allowances with the gas sold if additional demand for coke-oven gas emerges.

Table 12 illustrates the assumptions for coke production levels adopted in the BLN scenario.

Table 12. The assumptions adopted in the BLN scenario for coke production levels

Item	Unit	Production in the year					Production growth rate (2001 = 100)	
		1999	2000	2001	2002	2003	2005-2007	2010
Coke	kt	8 500	9 069	8 954	8 788		133.7	150.1
Coefficient of production capacity utilisation*)	%	72.9	82.8	81.4	80.5			

*) the relation between the actual output (survey data) and the maximum reference output (the available capacity operated over 8,760 hours/year)

4.3.7. Iron and steel industry

The assumptions for iron and steel production in the BLN scenario were derived, on the basis of the macro development scenario, from the assumptions of the Climate Policy. The assumptions for the production levels were adjusted by considering the current demand for the products of the Polish iron and steel industry on the world market. Table 13 illustrates the assumptions for the iron and steel production as adopted in the BLN scenario.

Table 13. The assumptions adopted in the BLN scenario for iron and steel production levels

Item	Unit	Production in the year					Production growth rate (2001 = 100)	
		1999	2000	2001	2002	2003	2005-2007	2010
Crude steel	kt	8 759	10 498	8 809	8 367	9 107	140.8	158.9
Iron ore sinter	kt	6 476		6 770			150.7	168.4
Pig iron	kt	5 233	6 492	5 440	5 296	5 632	129.4	176.5
Coefficient of production capacity utilisation*)	%	73.0	87.5	73.4	69.7	75.9		

*) for crude steel

4.3.8. Cement clinker production

Table 14 shows the quantities which characterise cement clinker production levels and the coefficient of production capacity utilisation in 1991-2002. The last two columns give the production growth rates for 2005-2007 and 2010.

The projected data are consistent with the development assumptions made for the baseline scenario (BLN). The assumptions for production levels in the period covered by the NAP (2005-2007) were adjusted as a result of consultations with representatives of the cement sector and the government administration (the Minister of the Environment and the Minister of Economy).

The values indicate that the production capacity has until now been used to a very slight extent – particularly in 2001 and 2002. This was caused directly by the substantial slowdown

of Poland's economic growth rate, particularly by a severe decline in the investment rate. These data show that even such a substantial clinker production growth rate until 2010 will not make it necessary to build new production capacity, as surplus capacity of about 20% will still remain in existing installations.

Table 14. Production levels and the coefficient of capacity utilisation for cement clinker producers in 1999-2002 and projections for 2005-2010.

Item	Unit	Production in the year					Production growth rate (2001 = 100)	
		1999	2000	2001	2002	2003	2005-2007	2010
Clinker production	kt	11 364	11 393	9 307	8 776		137.8	146.7
Coefficient of production capacity utilisation*)	%	72	63	56	53		77	82

*) the relation between the actual output (survey data) and the maximum reference output (the available capacity operated over 8,760 hours/year)

A constant emission factor of a tonne of clinker produced, equal to that in 2001, was assumed for the entire period. This was possible given the fact that the Polish cement industry is among the most modern ones in Europe.

Since the beginning of the 1990s the cement sector has implemented numerous investment projects to modernise the industry. Over this period the ownership of individual plants changed, causing the transfer of production between plants belonging to different capital groups. At the same time, within the capital groups production has been moved from inefficient plants using the wet method to advanced, modernised plants which applied the dry method. These measures still take place; therefore, they were not covered by the inventory for the purposes of the NAP which did not extend beyond 2002.

4.3.9. Lime production

Table 15 lists the quantities which characterise the developments in lime production and the coefficient of production capacity utilisation in 1999-2002, along with the production growth rates estimated for 2005-2007 and 2010.

The projected data are consistent with the development assumptions of the BLN scenario.

The values in the table show a very slight extent of utilisation of the production capacity, particularly in 2001 and 2002, representing barely 40% of the production capacity available. This was caused directly by the substantial slowdown of Poland's economic growth rate, particularly by a severe decline in the investment rate. This was a result of the partial loss of the market to substitutes of synthetic origin. The data indicate that the high lime production growth rate until 2010 will not make it necessary to build new production capacity, since surplus capacity will still remain in existing installations. The sector envisages a further increase in lime production to meet the domestic demand and for exports to the Scandinavian countries (for lake liming and paper production purposes).

A constant emission factor of a tonne of lime produced, higher by about 5.4% than that in 2001, was assumed for the entire period. This was necessary due to the very high growth of demand for lime projected for such fields of the economy as: environmental protection (reclamation of landfills, sludge management, liming of acid waters and soils, desulphurisation installations at power plants), and also due to the distinctly growing

importance of lime applications related to the construction of road infrastructure (site drainage), metallurgy and construction. Such a substantial short-term demand for lime will require the setting in operation of installations producing with slightly higher emission intensity, which were closed on a temporary basis in 2002. This is also caused by the projected change in the structure of demand for lime, towards products of better quality, but, unfortunately, at the cost of higher unit emission factors.

Table 15. Production and the coefficient of capacity utilisation for lime producers in 1999-2002 and the projection for 2005-2010

Item	Unit	Production in the year					Production growth rate (2001 = 100)	
		1999	2000	2001	2002	2003	2005-2007	2010
Lime production	kt	1 743	1 765	1 508	1 458		130.8	133.6
Coefficient of production capacity utilisation*)	%	49	49	40	39		55	56

*) the relation between the actual output (survey data) and the maximum reference output (the available capacity operated over 8,760 hours/year)

4.3.10. Production of glass including glass fibre

Table 16 lists the quantities which characterise the developments in the production of glass including glass fibre and the coefficient of production capacity utilisation in 1999-2002, along with the production growth rates estimated for 2005-2007 and 2010 under the BLN scenario.

It should be stressed that a dynamic growth of the glass production sector can be seen in Poland. This is e.g. an effect of the presence in Poland of very large investors from the EU15 countries which have developed the very advanced production of glass, to a substantial extent destined for foreign markets. Over the last 3 years (2000-2003 and the 1st quarter of 2004), the production growth has already reached almost 30%.

The values in the table indicate the very high extent of production capacity utilisation, particularly in 2001 and 2002, representing about 80% of the production capacity available. The strong growth rate assumed for 2005-2010 is caused, inter alia, by the setting in operation of very advanced production capacity. In 2004-2005, the growth rate of these capacities will reach a level of 25% of the total installed production capacity. In the course of consultations with representatives of the glass production sector, it turned out that a number of installations have capacity reserves of about 10 to 15%, which can be set in operation in a very short time, at the expense of relatively low capital outlays.

In such a situation, the values of the coefficient of capacity utilisation exceeding 100% as shown for 2005-2010 should not cause any greater concern. Indeed, after the new growth and modernisation have been added to the capacity existing in 2001, it turns out that in 2005-2007 this coefficient will come to a value of about 0.88, to reach a value of about 0.95 in 2010.

A constant emission factor of a tonne of glass produced, equal to the value of the factor in 2001, was assumed for the entire time-frame of the projection, since the leading producers apply very advanced, low-emission production technologies.

Table 16. Production of glass including glass fibre, the coefficient of installation capacity utilisation in 1999-2002 and the projection for 2005-2010

Item	Unit	Production in the year					Production growth rate (2001 = 100)	
		1999	2000	2001	2002	2003	2005-2007	2010
Glass production	kt	1 899	2 017	2 000	1 984		135.0	156.0
Coefficient of production capacity utilisation*)	%	76	79	81	80		88	95

*) the relation between the actual output (survey data) and the maximum reference output (the available capacity operated over 8,760 hours/year)

4.3.11. Production of ceramic products

Table 17 shows the quantities which characterise the developments in the production of ceramic goods and the coefficient of production capacity utilisation in 1999-2001, along with the production growth rates estimated for 2005-2010 and 2010. The projected data are consistent with the development assumptions under the BLN scenario.

The values in the table indicate the utilisation of production capacity at a level of about 70%. It should be emphasised that this coefficient was relatively stable in 1999-2002, even despite the substantial growth, of as much as 35%, in the production of ceramic goods, which occurred in that period. The production of ceramic tiles and sanitary goods showed particularly high growth rates. As indicated by information from the branch associations of producers of the ceramic sector, 2003 and the first months of 2004 also brought a substantial growth of the production of construction materials.

Given the very large organisational dispersal in the sector of ceramic goods producers in Poland, it was only possible to adjust the model-based projections of the development of this sector through consultations with representatives of its professional associations. Still, the most important basis for the projections consisted of statistical data from the Main Statistical Office and the reference made to the growth projections for the cement and lime sectors based on the demand projection for the construction sector.

Table 17. Production of ceramic goods, the coefficient of installation capacity utilisation in 1999-2002 and the projection for 2005-2010

Item	Unit	Production in the year					Production growth rate (2001 = 100)	
		1999	2000	2001	2002	2003	2005-2007	2010
Production of ceramic goods	kt	3 262	3 942	4 051	4 392		124.4	134.0
Coefficient of production capacity utilisation*)	%	72	75	68	66		85	91

*) the relation between the actual output (survey data) and the maximum reference output (the available capacity operated over 8,760 hours/year)

4.3.12. Pulp and paper production

Table 18 shows the total output of the products of the pulp and paper sector, i.e. pulp and paper (including cardboard), the coefficient of production capacity utilisation in 1999-2002 and the production growth rates for 2005-2007 and 2010. These data are consistent with the development assumptions made for the macroeconomic BLN scenario.

Table 18. Pulp and paper production and the coefficient of installation capacity utilisation in 1999-2002 and the projections for 2005-2010

Item	Unit	Production in the year					Production growth rate (2001 = 100)	
		1999	2000	2001	2002	2003	2005-2007	2010
Pulp and paper production	kt	1 388	1 492	1 531	1 687		132.3	139.0
Coefficient of production capacity utilisation*)	%	84	88	83	90			

*) the relation between the actual output (survey data) and the maximum reference output (the available capacity operated over 8,760 hours/year)

The data in the table indicate a stable growing trend for pulp and paper production, which translates into increasingly high coefficients of utilisation of the production capacity available. In recent years, the domestic pulp and paper sector was substantially modernised, mostly by private sectoral investors which operate on many European and world markets. Such a situation ensures large development stability, while, at the same time, effectively reducing air pollutant emissions. For this reason, for 7 installations of this sector it proved necessary to apply an individual approach to setting the production and emissions trajectories for the period covered by the NAP. The growth along the individual trajectories should balance the increased need for new production capacity, which is even now utilised at a level of about 90%.

5. Rules of NAP preparation and allowance allocation

5.1. Sectoral allocation

The allocation of allowances in the Polish National Allocation Plan (NAP) consisted of two phases:

a. Allocation at sectoral level - defining the amount of allowances for each sector to be allocated further to companies in this sector,

b. Allocation at installation level - allocating allowances on the basis of the chosen allocation method and within the amount of allowances for the given sector.

The same procedure was used for all the sectors; however, with various allocation parameters, depending of the specific situation in each sector.

For all sectors, the procedure consisted of:

1. Defining the baseline emissions for installations of a given sector, as the average amount of emissions from three years in the period of 1999-2002, excluding the year with lowest emissions;
2. Defining the forecast emissions for each sector, considering baseline emissions and assuming emission growth factors for each sector;
3. Defining the amount of allowances for new entrants in each sector and defining the base allocation for each sector by deducting the new entrant part from all the forecast emissions;
4. Calculating the early action - and cogeneration effects, individually for each installation and their total amounts for sectors;
5. Agreeing the base amount allocation method for installations and defining factors for early action and cogeneration bonuses.

6. Calculating the quantity of allowances to be allocated for each installation in a given sector (base allocation, early action bonus, cogeneration bonus).

5.2. Emission forecasts for sectors

Emissions forecasts for sectors were defined on the basis of verified emission data for installations within the emission trading scheme (ETS) as well as emission growth factors. Market fluctuations resulting from demand-supply changes, competition activities and weather conditions cause significant variations in production in installations. Calculating emission forecasts on the basis of one-year emissions is not a good solution. It is possible that unusual situations taking place in one year would affect the future allowance allocation.

The total baseline emissions from the ETS assigned installations of a given sector and the emission growth factors taken from the BLN scenario (see Table 19) were the basis for calculating the sectoral needs for emission allowances. Table 19: Anticipated needs for emission allowances of distinguished sectors.

Table 19. Anticipated needs for emission allowances of distinguished period

Sector	Baseline CO_2 emission	CO_2 emission growth factor (according to the BLN scenario)	CO_2 emission forecasts (according to the BLN scenario)
	1999-2002	2005-2007 (baseline)	2005-2007
	Thousand tonnes/year	%	Thousand tonnes/year
Power plants	116 552	18.1	137 648
Combined heat and power plants	37 327	11.8	41 731
Heat plants	12 690	8.7	13 794
Mineral oil refineries	6 834	31.1	8 959
Coking plants	3 548	33.7	4 744
Iron and steel industry	13 670	32.0	18 045
Cement plants	9 406	37.8	12 962
Lime production plants	1 939	37.8	2 673
Glass industry	1 400	35.0	1 890
Ceramic industry	1 253	24.4	1 559
Paper industry	2 284	22.7	2 803
Sugar production industry	2 176	39.3	3 031
Chemical industry	6 086	27.3	7 749
Other industries	4 605	17.3	5 403
Total	**219 769**	**19.7**	**262 991**

Comment: Possible inaccuracy of the presented totals results from the rounding up of the component numbers

Source: Calculations by EnergSys

5.3. Principles of allocation at installation level

The basic relations between different categories of allowances are presented in Figure 6. It shows the elements of the total amount of allowances granted according to the NAP before the system starts as well as the elements of the allowance reserve, which will be used afterwards.

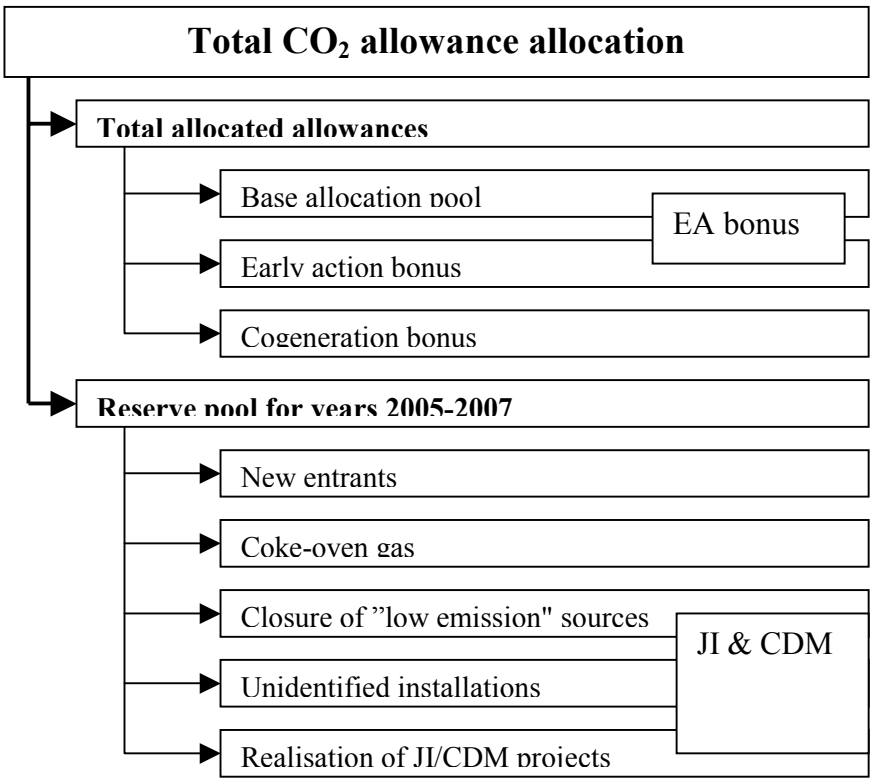

Figure 6: Main categories of allowances within the Polish NAP

Each of the existing installations, listed in the NAP, is allocated allowances from the base allocation pool and, if it is justified, extra allowances as early action- and cogeneration bonuses. It should be stressed that the early action bonus may be either a separate allocation element or a part of the base allocation. The latter takes place in the case of power plants and cement manufacturers.

As a result of the survey among the ETS installations, the total CO_2 emissions were calculated on the level of 212.8 million tonnes (Mt) in 2001. It is 4.3 Mt less than evaluated on the basis of statistical data. The difference may be a result of underestimation of the baseline emission by lowering data in surveys or due to the lack of some installations on the NAP list of installations. Therefore, some allowances have been saved for "unidentified" installations.

The first ETS period covers years 2005-2007 and allowances will be allocated for three years. Allowances allocated to installations will be divided in three equal parts. The decision on allocating allowances for a given year will be taken by 28th February.

It will be possible to bank and borrow any quantity of allowances between years within the same ETS period.

5.3.1. Grandfathering

Grandfathering was used as the main method of allocating the base pool of emission allowances among installations of a given sector. It was used for nine sectors and implemented as a two-phase procedure:

a) first, allowances were allocated to installations planning higher emission growth than the sectoral average due to development processes (the so-called individual allocation based on the presented and verified development plans),

b) in the second phase, the remaining allowances were allocated to the remaining installations, in proportion to their share in the total baseline emissions from these installations (standard allocation).

The individual allocation for installations dynamically developing their production detracts from the amount of allowances for the remaining installations in a given sector.

5.3.2. Other allocation methods

As a result of agreements, for four sectors other allocation methods were used. In the cement and sugar industry allowances were allocated on the basis of the level of production in the chosen period.

In the case of power plants three criteria were used for allocation: historical emissions in years 2001-2003, the maximum capacity of the installation and the maximum capacity used in years 1999-2002. For this method, gathering data for 2003 was necessary.

For coking plants the agreed allocation method considered production capacity in each plant according to forecasts for years 2005-2007 and their emissions, resulting from the amount of coke-oven gas produced during coke production.

5.3.3. Early action bonus

Early action and cogeneration bonuses were calculated for each installation on the basis of the firm and stable CO_2 reductions achieved in those installations. After the sectoral discussion, it was decided that only part of the whole saved emission amount will be considered: 75% in the case of the early action bonus and 50% in the case of the cogeneration bonus. It was furthermore agreed that these allowances constituted bonuses and would be granted over and above the base allocation. This agreement refers only to the first ETS period and it will not be harmful for any of the ETS participants.

Stable reduction effects had to be presented in surveys for each installation, along with a description of the reduction measures implemented. According to the survey guidelines, only reduction measures resulting from a decrease in the production emission factor could be considered for the early action bonus. The size of the reduction effects presented by operators was verified on the basis of changes in production emission factors. Detailed definitions and formulae for calculating the reduction effects are presented in the annex.

Cogeneration effects were calculated on the basis of the formula, in which fuel savings were calculated, according to Directive 2004/8/EC, and then so was the amount of saved CO_2 emissions. The cogeneration bonus could be granted only to installations which produced heat and power with the gross energy efficiency above 65%. The size of bonus will depend on the CO_2 reduction effect achieved by producing heat and power in cogeneration.

The cogeneration bonus was allocated regardless of other bonuses and allocations, both for the existing and for new installations.

Comparison of CO_2 reduction amounts reported in surveys and calculated on the basis of emission factors shows that the effects presented in the surveys were lower than those calculated on the basis of the emission factors. Part of the reduction was reached by activities not requiring any investments and these were not presented in the surveys. This is because the survey guidelines required presenting only CO_2 reductions resulting from investments in reduction measures.

5.3.4. Allowance reserve

The allowance reserve is the reserve for new entrants and for other purposes, such as coverage of unidentified installations, coke-oven gas emissions, closure of “low emission" sources (which are now not covered by the ETS) as well as allowances generated by JI and CDM projects. If the allowances foreseen for covering coke-oven gas emissions are not used, they will be cancelled. The remaining unused allowances will become part of the reserve for JI, CDM and other similar projects resulting in greenhouse gas emission reductions.

Allowances from the new entrant reserve, if not used by 30.09.2006, can be auctioned.

The volume of the coke-oven reserve reflects emissions from combustion of the average amount of coke-oven gas sold from coke ovens in the years 1999-2002.

The reserve for closure of “low emission" sources will cover emission increases in heat only boiler stations and combined heat and power plants due to liquidation of small emission sources, remaining outside the ETS.

The realization of JI and CDM projects may cause the situation where operators whose installations do not participate in ETS at the moment will have to be granted allowances.

5.4. Allocation at sectoral level

On the basis of the above data, the following allocations were calculated for each sector:

- base allocation,
- sectoral new entrant reserve,
- early action bonus,
- cogeneration bonus,
- the reserve for remaining purposes.

Table 20: Sectoral allocation (average for years 2005-2007 [kt CO_2/year])

Sectors	Total alloca-tion	Including				Reserve for remaining purposes
		Base allocation	Early action bonus	Cogenera-tion bonus	New entrants reserve	
Power plants	143 627	142 736	0	16	874	
Combined heat and power plants	47 935	40 985	3 141	3 063	747	
Heat plants	14 345	13 540	549	2	254	
Mineral oil refineries	10 204	8 822	735	511	137	
Coking plants	5 255	4 602	483	28	142	
Iron and steel industry	18 967	17 772	917	4	273	
Cement plants	13 704	13 422	0	0	282	
Lime production plants	2 789	2 615	116	0	58	
Glass industry	2 165	1 848	276	0	42	
Ceramic industry	1 683	1 521	125	0	38	
Paper industry	3 072	2 757	144	126	46	
Sugar production industry	3 142	2 988	92	19	44	
Chemical industry	8 070	7 567	78	242	183	
Other industries	5 713	5 265	310	0	138	
Total	**280 672**	**266 439**	**6 965**	**4 012**	**3 256**	**5 513**
Total allocation	**286 185**					

Comment: Possible inaccuracy of the presented totals results from the rounding up of the component numbers.
Source: Calculations by EnergSys

The numbers presented in Table 20 are the result of using the assumed formulae and bonus factors. The total allocation for all sectors is equal to the foreseen emissions plus early action and cogeneration bonuses. The size of the base allocation is enlarged by the new entrants reserve and reflects the forecast emissions in sectors.

The base allocation to power plants and the cement sector contains early action bonuses, which is caused by the specific situation in these sectors.

Power plants

Considering the voluntary agreement on environmentally sound modernizations (Jaworzno 1996) undertaken by the public power sector in the first half of the 1990s, it was decided that the calculated base allocation was the effect of technical and financial activities taken by the whole sector and, therefore, the whole sector should benefit from the reduction effects. In a way, such a decision levelled out to a certain extent the uneven burden of long-term contracts (KTD) between power plants and the transmission system operator (Polskie Sieci Elektroenergetyczne SA). All the power plants agreed on that solution.

Cement industry

This sector of the Polish economy is one of the most modern in Europe. In the last 10 years, significant modernization took place, also minimizing the use of wet technology in clinker production. Due to consolidation and privatization activities, new concerns were created and they took over state owned cement plants.

The cement sector reduced CO_2 emissions significantly. During the negotiation process, it was agreed with the industry that early action bonuses will be allocated according to the installation's share in the total production of the sector to avoid distortion of competition. This solution was also chosen because the definition of early action does not cover all the investments in the cement sector, including part of these investments which had contributed to CO_2 emission reduction.

5.5. Rules for special allocation

5.5.1. Temporary exclusion from the scheme (Opt-out)

Temporary exclusion of installations from the ETS scheme is allowed in Article 27 of Directive 2003/87/EC. This Article provides that a Member State may apply to the European Commission for temporary exclusion of an installation, submitting the proper rationale and enclosing with the application a full list of installations.

Poland proposes for temporal exclusion ca. 220 installations with annual emissions below 5 thousand tones of CO_2 each. The full list of installations proposed for temporary exclusion is enclosed with this NAP document. The following reasons support the request:

1. the list of the companies to be temporarily excluded consists of ca. 220 companies, mostly brickyards, often seasonal brickyards employing not more than several employees;
2. the costs of their operation within the ETS, even assuming that they will participate in the costs in proportion to their share in total emissions, would be significant for these companies;
3. the share of their emissions in the total Polish ETS emissions is ca. 0.1%. In the years 2005-2007 they will have time to prepare for participation in the ETS system in the years 2008-2012.

5.5.2. Pooling

The Polish national allocation plan allows pooling, according to the rules defined in Directive 2003/87/EC. Companies interested in creating pools should apply to the administrator before the start of a given ETS period. Pooling may be interesting for installations belonging to one owner and for small companies. Creating a pool allows more flexibility in adjusting to environmental requirements in the most economically effective way and may facilitate the management of the allowances held.

5.5.3. New entrants

New entrants are companies which are neither on the list of installation covered by the NAP nor on the list of installations proposed to exclusion from ETS.

The identified emission needs of sectors cover both the existing and new installations. Calculating emissions for new entrants as a percentage share of the total sectoral emissions is the next step. These allowances will constitute the new entrants reserve. The remaining allowances will create the base allocation pool for installations in the sector.

New installations will be allocated enough allowances to cover their emissions needs, defined on the basis of verifiable production plans, provided BAT standards are fulfilled. Allowances will be allocated from the new entrant reserve on the first-come-first-served basis.

The allowance allocation covers the period from the issue of the allocation decision to the end of the first ETS period. In the case of a new installation, built from the scratch, the allowance allocation covers all the emissions from the installation. In the case of an extension of the installation or a change in its character, allowances are allocated to cover the emission increase caused by the action taken.

The allowances from the new entrant reserve which are not allocated by 30 September 2006 may be auctioned. The system administrator may use the remaining allowances to cover the growth of emissions in the non-ETS sectors in order to meet the national emission cap, if the emission balance requires it.

In case there are not enough allowances in the new entrant reserve, the system Administrator:

- may use the non-ETS emissions reserve to allocate emissions to new installations if such a reserve exists in non-ETS sectors,
- will buy allowances on the market to cover emissions of all the new entrants which should be allocated allowances.

5.5.4. Existing developing installations

Installations already existing, which in years 1999-2002 were in the start-up phase, in the phase of increasing their production capacity or for any other documented reason face increase their production faster than the average rate in a given sector, may apply for individual allowance allocations within the NAP.

The individual allocation will be based on a description of the activities resulting in the production increase and a verifiable production plan.

5.5.5. Unidentified installations

Unidentified installations are installations which fulfill all the requirements for participation in the ETS system, have not been temporarily excluded and are not listed in the NAP.

It is foreseen that such installations may be added to the ETS scheme by 30 June 2005. Allowances for such installations will be allocated from the allowances reserve on the basis of historical data, according to the allocation method used in a given sector.

5.5.6. Enlarging and limiting the emission trading system

The evaluation of the emissions and related needs for allowances of each sector in the years 2005-2007 is made on the basis of production and demand growth forecasts for a given group of installations with an assumption that the ETS and non-ETS shares will remain the same. This means, e.g., that growth of production in heat-only-boiler stations and CHPs in

the forecast is the result of changes in the demand, with a constant share of these installations in the market. It does not include, however, their takeover of the production from smaller heating stations, remaining outside the ETS scheme and therefore holding no allowances. The liquidation of small boilers and takeover of their production by large heat stations or CHPs cause a decrease in national emissions and the shift of emissions from non-ETS to ETS sectors. This creates the problem of covering this extra production with emission allowances.

A similar situation takes place in the case of coke ovens. Coke-oven gas, which is a by-product of the coking of coal, is sold and used outside coking plants. If current coke-oven gas users give up the coke-oven gas and the gas will have to be burnt in coke-ovens, the emissions from burning it will fall under the ETS scheme. This will mean extra emissions from coking plants, not foreseen in the forecasts and, therefore, not covered by allocated allowances.

In both cases a special reserve is created to cover emissions resulting from the "migration" of emissions into the ETS scheme from outside of the scheme.

It is possible that a reverse situation takes place: with emissions moving to a non-ETS sector. The creation of a separate external company from a part of the installation within the ETS scheme, in such a way that the new installation does not fulfill the Annex 1 requirements (e.g. thermal capacity lower than 20 MW), is an example here.

5.5.7. Limited verification ex post

The allocation verification ex post on the basis of actual production levels applies only to new installations. The correction of allocations will be made by 30 April 2007 on the basis of 2005-2006 data and it will refer to the whole ETS period 2005-2007.

5.5.8. Banking from the first to the second ETS period

Limited banking between the first and the second ETS periods is an incentive to encourage emission reduction investments in installations. Its limitation is based on two requirements:

1) the operator may bank only those allowances which were not used to cover actual emissions,
2) the banked allowances reflect firm and stable reduction effects achieved by emissions reduction investments.

This limitation will block the inflow of cheap allowances from other countries and reduce the possibility that banking allowances are not used by the company due to its lower growth or drop in production.

The implementation of the above rules will be an incentive for companies to realize emission reduction investments already in the first, "test-drive" ETS-period in the years 2005-2007.

To be able to bank allowances from the first to the second ETS periods, operators will have to prove firm emission reductions from investments in the years 2005-2007 corresponding to the amount of the banked allowances.

5.6. Allowance transfer

In a situation where the production in a closed installation will be replaced by the production in a new installation, allowances will be allocated as for the old installation for the part corresponding to the transferred production. Allowances for the emissions from the production exceeding the production in the old plant will be allocated according to the new entrant allocation rules. The operator of a new installation replacing the old one has a right to be allocated allowances according to the historical emissions from the old installation.

Similar rules of inheriting allowances will apply to new installations taking over the production of an old installation.

6. Basic balance of allowances

The basic breakdown of the total quantity of allowances in the Polish segment of the Community emission allowance trading scheme is presented in Table 21.

Table 21. The balance of the total quantity of the allowances (i) to be distributed among emitters and (ii) kept as a reserve - for installations covered by the emission allowance trading scheme in the first trading period (2005-2007)

Basic categories of emission allowances in the Polish NAP	Yearly average quantity of the CO_2 emission allowances [Mt/a]	The allowances allocated for the 2005-2007 period
Total quantity of allowances	**286,2**	**858,6**
in which:		
allowances to be allocated to the defined recipients:		
base allowances	**266.4**	**799.2**
"early action" bonuses	**7.0**	**21.0**
"cogeneration" bonuses	**4.0**	**12.0**
reserve pool of allowances:		
for new entrants	**3.3**	**9.9**
for other purposes	**5.5**	**16.5**
of which:		
reserve for emissions from coke-oven gas	***1.6***	***4.8***
reserve for phasing-out low-stack emissions	***0.6***	***1.8***
reserve for unidentified other sources	***3.3***	***9.9***
reserve for JI / CDM projects		

7. Public consultation process

According to the provisions of Directive 2003/87/EC, the National Allocation Plan has been developed with participation of the public. Since a very early stage of the work on the Plan, the issue was widely published among the potential participants in the CO_2 emission allowances trading scheme. Their sectoral organisations were involved in the process and the Internet was used as a medium. The leader of the consortium that was established for development of the NAP project, developed and made accessible a web site dedicated to the NAP, which was a source of current information on the Plan under development and also served as a discussion forum, where Frequently Asked Questions (FAQ) and the answers,- including governmental interpretations, were published. In total, 40 FAQs were answered there. Moreover, many questions were individually answered in written form, by letters and e-mails. The web site was used for publishing all subsequent versions of NAP, including the lists of installations and the quantities of allowances allocated to them.

In the framework of the public discussion on the NAP under development several branch meetings took place (2-3 meetings per branch, over 20 meetings in total), attended by scores of participants. The industries, under the co-ordination of their branch organisations of employers, were involved in this activity. The Minister of the Environment also met with the head of All-Poland Alliance of Trade Unions (OPZZ); there were meetings with the Environmental Protection Group of the Confederation of Polish Employers, as well as with the trade unions and employers of the glass industry.

Apart from the consultations with the sectors concerned, a special meeting with environmental NGOs was organised. Representatives of the main Polish organisations, associated in an informal Climate Coalition Forum participated in the meeting. The participating organisations presented their position on the NAP in written form. Their position was carefully analysed. In consultation concerning the Polish NAP also took part National Emission Centre.

From January till July 2004 several seminars, conferences and training courses were organised with the aim of increasing awareness of the assumptions and objectives of the emission allowance trading scheme being developed.

Information on the work underway and the system being developed were discussed by the European Committee of the Council of Ministers and the Senate Commission on the Environmental Protection.

All remarks and comments regarding the NAP were carefully analysed.

In spite of the fact that this phase of the work on the NAP had been completed and closed, the eventual version of the document notified to the European Commission was posted at the web site of the Ministry of the Environment. Possible comments will be analysed and taken into consideration while developing the first NAP or the subsequent plans.

METHODOLOGICAL ANNEX

I. Methodology applied to prepare the NAP for Poland

1. Introduction

In accordance with the philosophy and arguments presented in the basic text of this document, the substantive requirements of the Directive were met in the NAP. They reflect the need to ensure that the NAP is consistent with the macro- and micro-economic conditions. From the macro-economic perspective, the NAP must not be detrimental to the targets related to CO_2 emission levels as defined by the Kyoto Protocol for the country as a whole. From the micro-economic perspective, the NAP must ensure consistency between the proposed allowance allocations and the future or projected situation of the individual installations covered by the scheme. Therefore, the methodology comprises both scenario-based analyses of the present and future macro-economic factors ("top-down") as well as analyses of the situation and development prospects of individual companies and sectors ("bottom-up"). The NAP integrates the results of both scenarios of Poland's economic growth.

1.1. Installations covered by the scheme and their classification

Pursuant to the provisions of Directive 2003/87/EC, in the first trading period of 2005-2007, the CO_2 emission allowance trading scheme is addressed only to the operators of the installations[8] qualified for participation in this scheme[9]. A strictly defined quantity of tradeable CO_2 emission allowances will be allocated to all these installations.

1.2. Basic rules of allowance allocation

Tradeable allowances will be allocated to installations which conducted activities in a period including 1999-2002, or certain years of that period, on the basis of verified, annual historical emissions or on the basis of another agreed and approved method.

Emission allowances will also be allocated to installations which started their operation in 2003-2004, including those at the stage of technological commissioning (to reach the design production capacity), and those substantially modernised or expanding their production capacity. The allocation will be made in accordance with the emissions projected for the period of 2005-2007.

It is envisaged that special rules of allocation will apply to certain installations in order to provide them with a bonus for well-documented early reduction measures (early action) and highly efficient combined heat and power production (co-generation).

[8] As defined in Article 3(31) of the Environmental Protection Act of 27 April 2001.
[9] In accordance with the rules laid down in Annex I to Directive 2003/87/EC, it covers activities with capacities exceeding threshold values.

1.3. Process of collecting and verifying data on installations covered by Directive 2003/87/EC

The aim of the process of collecting and verifying data on installations was to make a complete list of installations which met the criteria qualifying them for participation in the emission allowance trading scheme and to gather the data indispensable for the allocation of allowances among installations. Installations were qualified for emission allowance trading pursuant to the provisions of Directive 2003/87/EC, particularly those of its Annex I, which set out the criteria for inclusion of installations in the scheme.

The data collection work followed the provisions of Article 14 of the Directive, which provided the basis for the adoption of the Commission Decision[10] on the monitoring and reporting of greenhouse gas emissions.

2. Process of data collection, verification and management

The information on installations, which was collected for the purposes of the NAP, consisted of the following main types of data:

- data identifying the installation and its operator,
- data on the characteristics of the installation (its production capacity, output, fuel consumption and CO_2 emissions in 1998 as well as in 1999-2002),
- data on early actions to reduce emissions (a description of projects in 1989-2002 and the effects of the reduction).

In order to collect and verify these data, it was necessary to design and launch a special process and instruments had to be developed to support its implementation. The most significant elements of this process covered the following issues:

2.1. Address list of installations

In Poland, there is not a complete register of installations and emissions yet in place for the purposes of environmental protection. The development of such a database is still underway. Therefore, for the purposes of the NAP, it was necessary to launch a process designed to create a new, dedicated register.

The data collection process began with an inventory of potential participants in the emission trading scheme, which featured on the different address lists of selected authorities of the government administration. For this purpose, the following lists and partial surveys were analysed:

- the list of about 32,000 enterprises on the address database of the Central Statistical Office (GUS), from which about 1,500 enterprises were selected,
- the list of energy installations subject to licensing, in the resources of the President of the Energy Regulatory Authority,
- the list of plants which were obliged to obtain an integrated permit, as prepared by Ministry of the Environment,
- the lists at the Voivodship (Provincial) Inspectorates for Environmental Protection,
- the lists of plants which paid fees for the economic use of the environment, held at Marshal Offices (self governing bodies at provincial level).

[10] Commission Decision of 29 January 2004 establishing guidelines for the monitoring and reporting of greenhouse gas emissions pursuant to Directive 2003/87/EC of the European Parliament and of the Council.

In addition, this information was verified on a preliminary basis and complemented with lists of plants which were prepared by the interested employers' associations.

On the basis of all these documents, a list of plants which might be covered by the emission allowance trading scheme was developed; originally, the list included 2,360 installations, including 1,433 installations producing electricity and/or heat.

Letters were sent by Ministry of the Environment to all operators which might participate in the emission allowance trading scheme to inform them of the emission allowance trading scheme being established and of the need to collect the data indispensable for the preparation of the NAP. Each operator was obliged to submit relevant data or information in writing to the effect that it was not subject to the provisions of the Directive. In addition, the address list of the potential participants in the scheme was published on a dedicated website of the project.

This phase initiated the principal, about 4 months long process of co-operation with installation operators, consisting of the collection, consultation and verification of the data indispensable for the preparation of the NAP.

One of the effects of this process was the gradual elimination from the list of those installations which did not meet the requirements of the Directive or enterprises which transformed into completely different organisational and legal entities in recent years (through closures, mergers or acquisitions).

As a result, about 1,200-1,300 installations remained on the list. In the second phase, they were subjected to a process of thorough data verification. These installations are managed by about 700-800 operators. The detraction of installations with negligible emissions on the national scale (with 221 installations proposed for temporary exclusion) produced a group of 945 installations qualified for the NAP. Before 1 January 2005 this list may be slightly adjusted.

2.2. Data forms and the national database

The construction of the form for data collection complied with the formal and substantive requirements set by the provisions of EU legislation, i.e. Directive 2003/87/EC and the Commission Decision of 29 January 2004, issued pursuant to Article 14(1) of the Directive.

The data form had a universal format, in the light of the need to survey all the installations conducting the production activities indicated in Annex I to the Directive.

The structure of the data form comprised the following data sheets:

a) Sheets A and B – covering the identification data of the operator and the installation emitting greenhouse gases, in line with the specification of Annex I to the Directive,

b) Sheets C and D, describing:

- the production and capacity of an installation,
- the consumption of fuels as well as raw and other materials (e.g. intermediates),
- CO_2 emissions, distinguishing process emissions and those from fuel combustion (so-called emissions from oven/furnace fuels),

c) Sheet E, presenting:

- the projects implemented to reduce CO_2 emissions in 1989-2002.

In accordance with the guidelines of the European Commission, a special sheet was developed for coking plants, the iron and steel industry and refineries, which was adapted to assess the total CO_2 emissions from all the technological process on the basis of the mass balance of carbon.

The contents of all the data sheets were fed into the central database (KPRU-DATA) accessible through the Internet. Access to the accounts of particular enterprises was controlled by means of an individual code and an access password, which were known to the installation operator and the administrator of the KPRU-DATA base.

2.3. Accommodation of early action

Given the significant scale of CO_2 emission reductions achieved at many enterprises, measures were taken to gain reliable information on this type of early action. In accordance with criterion (7) of Annex III to the Directive and in line with the recommendations of the EC document of 7 January 2004, a form was developed to collect the key information on this type of projects.

The guide which was attached with the form contained lists and factors of CO_2 emissions from fuels, raw and other materials used in production processes as well as strictly defined basic products of particular installations. This information was mainly based on the guidelines published in the Commission Decision of 29 January 2004.

2.4. Check of consistency and verification of survey data

The data were checked for consistency and verified in substantive terms by a group of experts – verifiers responsible for particular sectors. The substantive verification was aided by a software application (FAST CHECKER) serving for automatic generation of reports on errors contained in the sheets filled in. This process included more than 50 different validation procedures.

In the data verification and management process, use was made of purpose-developed information technology tools for processing and reporting data on installations, a device for an automatic dispatch of collective e-mails and a system of registers for controlling the entire process.

In most installations, the emissions were estimated by using the reference values of the emission, oxidation and conversion factors as well as calorific values of fuels, in accordance with the 1999 IPPC Revised methodological guidelines. Such an approach is allowed by the guidelines of Annex I to the Commission Decision of 29 January 2004. The other installations applied the emission factors used until now in reporting for the purposes of national statistics or for the calculation of emission fees.

3. Results of the data collection and verification process

As a result of the process of collecting and verifying data on installations, 945 installations were placed on the list of participants in the emission allowance trading, with the total mean annual CO_2 emissions of about 220 million tonnes of CO_2 (calculated as a mean from 3 years of the period of 1999-2002 – the so-called base emission).

In addition to the number of installations cited above, an inventory was made of 221 installations proposed for temporary exclusion from the emission allowance trading scheme (pursuant to the provisions of Article 27 of the Directive). The total base emissions of these installations amounted to about 240,000 tonnes of CO_2/year (i.e. slightly more than 1,000 tonnes of CO_2/installation on average).

The essential, tangible effects of the data collection and verification process were numerical data providing complete characteristics of all the aforementioned installations. In evaluating these data, it should be emphasised that:

a) each installation has a current and complete set of identification data, consisting, inter alia, of: addresses, localisations, ownership titles, contact persons and identification numbers (REGON and NIP),

b) the data collected are consistent and have been verified in formal and substantive terms; numerical data characterise each installation by the time series of data for 1999-2002, through: capacity, production activities, consumption of raw and other materials, calorific values, emission, oxidation and conversion factors, process emissions and those from fuel combustion;

c) data on early action were collected, providing its quantitative and qualitative characteristics;

d) in most cases, the factors of CO_2 emissions from fossil fuels and carbonate raw materials correspond to the reference values, in line with the 1999 IPCC Revised methodological guidelines;

d) the calorific values of fuels correspond to the averaged values in invoices paid to suppliers by individual installations.

The resource of information, which is stored at the KPRU-DATA base on the installations qualified for participation in the emission allowance trading scheme is, complete, consistent, understandable, cost-effective and sufficiently precise and reliable. The resource of information on installations meets the requirements laid down in the Commission Decision, particularly its Annex I.

4. Macro-economic "top-down" analysis

As the first step of the macro-economic analysis, a detailed balance of greenhouse gas (GHG) emissions was developed for the whole country, with a well defined structure of emissions by gases and economic sectors. Subsequently, in a sectoral arrangement, CO_2 emissions from the installations covered by the emission allowance trading scheme were distinguished. In building the GHG emission balance, use was made of the results of the national emission inventories, prepared every year by the National Emission Centre (KCIE), and official statistical publications.

As the second step, the assumptions of the scenario of the macro-economic growth of the country were developed, taking into account the relevant internal and external factors, which are likely to strongly affect the future pace and structure of value added generation in the sectors of the national economy. Subsequently, model simulations were made, using for this purpose a set of models devised by EnergSys Company, which had earlier been applied for a number of development analyses of the national energy sector and the alternatives of Poland's Climate Policy.

This set consists of three basic models and serves to map:

- the key macro-economic relations (the general equilibrium model CGE-PL),
- the range of end users of fuels and energy (the model PROSK-E), and
- the future balances of supply and demand for fuels and energy, with consideration of mechanisms which mitigate the adverse impact on the environment (the model EFOM-ENV).

As a result of these analyses, the baseline (BLN) scenario was developed. The scenario presents the basic, consistent path of economic, energy and emission changes in Poland in the time-frame until 2015.

5. Micro-economic, "bottom-up" analysis

In order to prepare the NAP, it was necessary to collect complete and reliable information on particular installations which, under the provisions of the Directive, are required to participate in the emission allowance trading scheme.

The main goal of these micro-economic analyses and evaluations was to correctly map the individual features and predictable behaviour of particular installations or sectors as well as to forecast short-term growth paths.

The final effect of the micro-economic analysis is a complete, reliable and verified set of information, stored in the structure of the database (KPRU-DATA), which is consistent with the guidelines laid down in the Commission Decision of 29 January 2004 for the monitoring and reporting of greenhouse gas emissions.

6. Integration of the macro and micro approaches

The integration of the macro- and micro-economic approaches was particularly important for addressing two issues:

a) the balance of CO_2 emissions for the installations covered by the emission allowance trading scheme as listed in Annex I to the Directive, and

b) the short-term growth projections for particular sectors.

As a result of the analyses conducted, consistency was achieved between the balances compiled on the basis of surveys and those based on national statistical data. In addition, through iterative series, the growth projections for particular sectors were verified on the basis of macro-economic analyses and data collected directly from enterprises.

7. Basic assumptions for allowance allocation

Given the CO_2 emission reductions achieved earlier and the surplus which it has over the target set in Kyoto Protocol, Poland intends to allocate to its installations the quantity of allowances which:

a) will cover the justified emission needs of all the installations covered by the scheme, taking into account the projected production growth in a given sector and the possible variations in weather or market conditions;

b) will include a bonus for early action and the use of clean technology, mainly combined heat and power production (co-generation).

When the quantity of allowances is defined on the basis of the baseline path it is impossible to make an allocation which would meet both of the above conditions.

8. Uncertainty involved in the baseline path projections

The emission baseline path under the BLN scenario represents projections for the country as a whole or for sectors. The margin of uncertainty involved in the emission projection for a large population is larger than for the sum total of projections made separately for each installation. When the justified margin of uncertainty for each installation is considered in the process of allowance allocation, the total sum of the individual projections of emission needs, including the margins of uncertainty, will be higher than the projections made for the entire population.

Apart from these factors, in general, the emission projection for the future years entails a substantial margin of uncertainty. More advanced projections are made on the basis of conditional development scenarios which respond to the "what if" question. The statistical data on the last months of 2003 and the first months of 2004 indicate a faster GDP growth rate than the one assumed in the BLN scenario. This increases the probability of a higher growth of production levels and the related CO_2 emissions, and, thereby, it adds to the uncertainty involved in the results of the BLN scenario.

The uncertainty of the emission projections is not greatly significant for the preparation of the NAP, since the main factor which limits the size of the allocation is the cap under the Kyoto Protocol, just as in the majority of the previous EU15 countries. In the case of countries where, as in Poland, the emission paths which they adopt will determine the size of the allowance allocation, the issues in question enormously affect the preparation of the NAP. Indeed, the baseline path reflects just one of the possible future scenarios. It does not reflect the sum total of the probable justified needs of the individual installations covered by the NAP.

9. Possibility of granting a bonus for early action

With the cap set on the basis of the emission levels under the BLN scenario, when a bonus for early action is granted to some installations it will be necessary to allocate to other installations quantities of allowances which will be insufficient to cover their emission needs. This would be detrimental to the situation of the installations which cannot demonstrate the effects of early action. Such an approach is not justified by Poland's situation in terms of its emission levels. The absence of a bonus for early action would discourage efforts to reduce emissions and could be seen to reward those installations which have not been interested to date in taking action to reduce their impact on the environment.

For these reasons, the Polish NAP proposes that a bonus for early action should be granted without diminishing the quantity of allowances for the installations which have not taken such action.

II. Total emission allowance allocation for the installations covered by the emission allowance trading scheme

1. Preliminary remarks

In conformity with the recommendations of the European Commission[11], the total pool of allowances intended to be allocated was calculated on the basis of the share of the emissions from the installations covered by Directive 2003/87/EC and the mean CO_2 emission levels in 2005-2007, in accordance with the path towards achieving the emission target under the Kyoto Protocol.

The manner of the calculation is described by the following formula:

$$\mathbf{TOTAL\_NUM_{AA} = SHARE_{ETS} \times PATH\_EMI_{05\text{-}07}} \quad (1)$$

where:

- $TOTAL\_NUM_{AA}$ – the total quantity of allowances allocated in the country as a whole,
- $SHARE_{ETS}$ – the share of the emissions from the installations covered by the Directive in the total national CO_2 emissions,
- $PATH\_EMI_{05\text{-}07}$ – the national CO_2 emissions in 2005 – 2007, in accordance with a path which would at least ensure that the requirements of the Kyoto Protocol are fulfilled.

1.1. Share of the emissions from the installations covered by the NAP in the national emissions

On the basis of data from the National Emission Centre and the statistical data on the consumption of fuels and energy in different sectors, the share of the emissions from the installations covered by Directive 2003/87/EC in the national emissions was determined as 68% for 2001.

The relevant non-paper[12] allows for the use a prognostic method to determine the total quantity of allowances. The projections which have been prepared indicate that the share of the emissions from the installations covered by the emission allowance trading scheme in 2005-2007 will be 70.3% on average.

In seeking to reduce the emissions from the sectors covered by the emission allowance trading, Poland adopted the former of the two values cited above to determine the emission caps:

$$\mathbf{SHARE_{ETS} = 68.0\%}$$

[11] Commission of the European Communities: Communication from the Commission on guidance to assist Member States in the implementation of the criteria listed in Annex III to the Directive 2003/87/EC establishing a scheme for greenhouse gas emission allowance trading within Community and amending council Directive 96/61/EC, and on the circumstances under which force majeure is demonstrated.

[12] European Commission: The EU Emissions Trading Scheme: How to develop a National Allocation Plan. Non paper 2nd meeting of Working 3 Monitoring Mechanism Committee. April 1, 2003.

1.2. National CO_2 emissions in accordance with the path towards fulfilling the commitments under the Kyoto Protocol

In accordance with Annex III to the Directive, total emissions must be consistent with the emission path which at least fulfils the emission target set for a given country by the Kyoto Protocol. For Poland, this path, which corresponds to the baseline development trend, runs significantly below the cap under the Kyoto Protocol. The choice of the emission path for determining the pool of allowances according to formula (1) was the subject of multifaceted analyses and discussions in the course of the preparation of the NAP. These analyses also considered the fact that Directive 2003/87/EC and the recommendations issued by the European Commission failed to take into account the situation of such countries as Poland.

Therefore, it was decided that, as the emission allowance trading scheme is an ancillary mechanism, it must not impose more stringent emission requirements on Polish enterprises than those in place, in the situation where Poland fulfils on its own the requirements of the Protocol.

Against the background of the measures, including analyses, taken for the sources covered by the emission allowance trading scheme, the changes which may occur in the other sectors and activities should be considered. In Poland, consideration should primarily be given to transport, agriculture and the municipal and household sector where about 10 million tonnes of hard coal is burned annually. When the work is conducted on the second NAP for 2008-2012 new energy and environmental projections will be known and the Climate Policy will be verified.

With respect to the period of 2005-2007, the information on emission projections for these sectors seem to be sufficient.

1.3. Choice of the path towards achieving the target set for Poland by the Kyoto Protocol

For the reasons described above, Poland adopts the following value as the basis for setting the quantity of allowances intended to be allocated to all the installations covered by the emission allowance trading scheme:

$PATH\_EMI_{05\text{-}07}$	= **420. 9 million tonnes** a year on average

This value corresponds to the emission path which will reach in 2008-2012 the emission level equal to the cap set in line with the requirements of the Kyoto Protocol for Poland, while keeping the same general trends as the trajectory in the BLN scenario (see trajectory (2) in Figure 7).

This value is lower by 32.3 million tonnes than the CO_2 emission cap set in line with the requirements of the Kyoto Protocol; it is also significantly lower than the trajectory representing CO_2 emissions in the BAU'88 scenario where the emission factors are fixed.

The value given above was determined by using the following formula:

$$PATH\_EMI_{05-07} = 0{,}94 \times EMI\_CO2_{88} \frac{\overline{EMI\_CO2_{BLN_{05-07}}}}{\overline{EMI\_CO2_{BLN_{08-12}}}} \qquad (2)$$

where:

EMI_CO2_{88} - national CO_2 emissions in 1988, according to the last inventory report,

$\overline{EMI\_CO2_{BLN_{05-07}}}$ - mean annual CO_2 emissions in 2005-2007, according to the BLN scenario,

$\overline{EMI\_CO2_{BLN_{08-12}}}$ - mean annual CO_2 emissions in 2008-212, according to the BLN scenario,

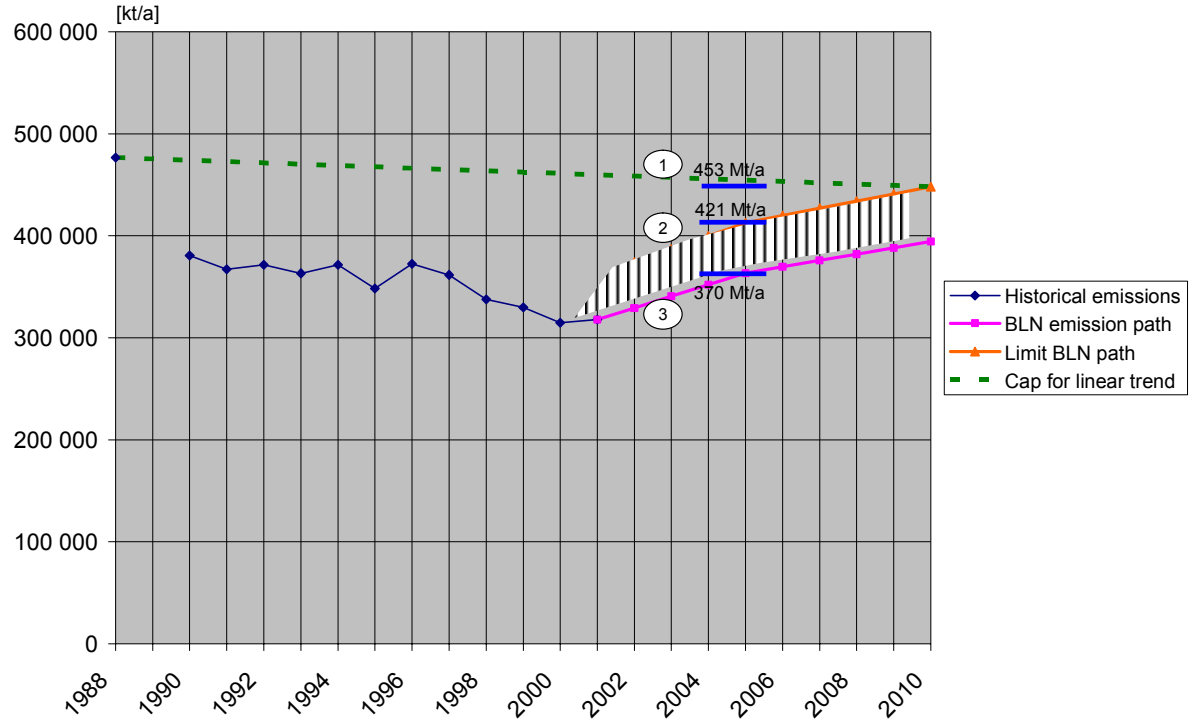

Figure 7.Possible paths towards achieving the targets under the Kyoto Protocol.

1.4. Total quantity of CO2 emission allowances intended to be allocated

On the basis of the 68% share of the installations covered by the NAP in the national emissions and the final national CO2 cap adopted for 2005-2007, the quantity of allowances to be allocated was determined as:

$TOTAL\_NUM_{AA}$ = 0,68 * 420,9 Mt/year

i.e.

the total quantity of allowances to be allocated under the National Allocation Plan in 2005-2007 will amount to 286.2 million tonnes a year on average

This quantity of allowances ensures the allocation for installations which will meet their basic emission needs and bonuses for early action or co-generation effects.

III. Formulae applied for the calculation

1. The dependences between the allowance pools

The basic dependences between the sizes of the allowance pools distinguished in the allocation process are given below. The equations containing pools marked by the sectoral subscript indices describe relations which apply to each sector distinguished. The formulae containing pools marked by the ETS subscript index describe the relations applicable to the whole scheme, covering all the participating installations.

(1) $\mathbf{EMI\_PROGN_S = P\_BAZA_S + P\_NOWE_S}$

(2) $\mathbf{P\_ALOK_S = P\_BAZA_S + P\_EA_S + P\_KOG_S}$

(3) $\mathbf{P\_ALOK_{ETS} = SUMA\ (P\_ALOK_S)}$

(4) $\mathbf{REZ\_UPR_{ETS} = P\_NOWE_{ETS} + P\_NIEZID_{ETS} + P\_ROZSZ_{ETS}}$

(5) $\mathbf{P\_BAZA_{ETS} + P\_EA_{ETS} + P\_KOG_{ETS} + P\_NOWE_{ETS} + P\_NIEZID_{ETS} \leq TOTAL\_NUM_{AA}}$

Equation (1) represents the breakdown of the sectoral projection of emission needs into the base pool and the pool which provides a reserve for new entrants.

Equation (2) demonstrates that the quantity of allowances to be allocated in a given sector under the NAP is the sum total of the base pool, the early action bonus and the co-generation bonus.

Equation (3) shows that the quantity of allowances to be allocated under the NAP is the sum total of the allowances to be allocated within individual sectors.

Equation (4) presents three components of the allowance reserve. The reserve and its distinguished parts are only defined at the level of the entire scheme and they are not divided among sectors.

Equation (5) shows the manner in which all the allowances to be allocated under the NAP or those assigned to the allowance reserve are balanced with the total quantity of allowances to be allocated. It is only the pool which is to be allocated for an expansion of the range of emissions in the scheme that may exceed the cap established for all the installations covered by the scheme.

Meaning of symbols:

EMI_PROGN_S	mean annual emissions from sector S as projected for 2005-2007,
P_BAZA_S	mean annual base allowance pool to be allocated in sector S under the NAP,
P_EA_S	mean annual early action bonus, comprising all the allowances in a given sector S which are intended to be granted under the NAP as a bonus for early action,
P_KOG_S	mean annual co-generation bonus, comprising all the allowances in a given sector S which are intended to be granted under the NAP as a bonus for the emission reduction effects of combined heat and power production.,
P_NOWE_S	mean annual allowance pool representing the contribution of a given sector S to the allowance reserve which is established to meet the emission needs of new entrants; it detracts from the base pool of a given sector,
P_ALOK_S	total mean annual quantity of allowances to be allocated under the NAP to installations assigned to a given sector S,

P_ALOK_{ETS} total mean annual quantity of allowances to be allocated under the NAP to all the installations covered by the emissions trading scheme,

REZ_UPR_{ETS} total mean annual quantity of allowances assigned to the allowance reserve and intended to be issued in the course of operation of the scheme (2005-2007),

P_NOWE_{ETS} mean annual allowance pool (part of the reserve) intended to cover the emissions needs of all the new entrants to the scheme,

P_NIEZID_{ETS} mean annual allowance pool (part of the reserve) intended to cover additional emissions of existing installations, including installations which have not been identified to date,

P_ROZSZ_{ETS} mean annual allowance pool (part of the reserve) intended to cover the growth of emission needs which will emerge on the market as the result of an expansion of the range of emissions covered by the scheme; the components of the pool are shown in Table 21,

P_BAZA_{ETS} mean annual base allowance pool for the entire scheme, representing the sum total of the sectoral pools,

P_EA_{ETS} mean annual early action bonus for the entire scheme, representing the sum total of the sectoral pools,

P_KOG_{ETS} mean annual co-generation bonus for the entire scheme, representing the sum total of the sectoral pools.

2. Estimation of the effects of early action

Equations (6) and (7) represent the manner of calculating the effects of early action taken at each installation on the basis of a change in the production emission factors. They can be applied where one main product can be distinguished for the installation, or where the proportions between a larger number of products remain the same.

(6) $$\mathbf{E\_EA_{INST,t} = (e_{INST,p} - e_{INST,t}) * PROD_{INST,t}}$$

(7) $$\mathbf{E\_EA_{INST} = [SUMA\ (E\_EA_{INST,t}) - MIN\ (E\_EA_{INST,t})] / 3}$$

Equation (6) defines the size of the emission reduction at installation INST in year t, which is based on the difference between the emission factor in the initial year p and year t and the output of a given installation in year t.

Equation (7) shows the manner of calculating the averaged reduction for a given installation by neglecting the year with the lowest reduction and calculating the mean from the other three years.

The values which were calculated from these equations were regarded as the maximum ones and served to verify the correctness of the data provided by operators in the surveys. In conformity with the guidance provided with the surveys, only the effects of investment projects were to be indicated in the surveys – see equation (8). Therefore, the survey data are either lower or equal to those calculated from equation (9).

(8) $$\mathbf{E\_EA'_{INST} = W\_INV_{INST} * E\_EA_{INST}}$$

(9) $$\mathbf{E\_EA'_{INST} \leq E\_EA_{INST}}$$

Meaning of symbols:

$E\_EA_{INST,t}$ reduction achieved by early action as calculated for a given installation *INST* in a given year *t*,

$e_{INST,p}$ production emission factor of installation *INST* in 1988 or the first full year of its production when it is later than 1988,

$e_{INST,t}$ production emission factor of installation *INST* in year *t*,

$PROD_{INST,t}$ output of installation *INST* in year *t*,

E_EA_{INST} reduction averaged over 1999-2002, neglecting the year with the lowest reduction,

$E\_EA'_{INST}$ reduction as calculated by the operator of installation *INST* (operators were to include only the reductions achieved as a result of realization of investment projects),

W_INV_{INST} coefficient representing the share of emission reductions achieved by investment projects at a given installation *INST* in the reductions generated by all early actions,

t index of the year, t = {1999, 2000, 2001, 2002}.

In case of combined heat & power production (cogeneration) more sophisticated formulas have been applied including additional variability of cogeneration factor.

3. Determination of the reduction for co-generation (co-generation effect)

The calculation of a positive effect for an installation is the condition for granting the co-generation bonus to it. The co-generation effect is calculated for installations which produce electricity and heat in a combined system and which demonstrate energy efficiency of at least 65%. The calculation is made in line with the rules laid down in Directive 2004/8/EC on the promotion of cogeneration, using the following formulae:

(10) $$E\_KOG_{INST,t} = [(U\_EL_{INST} / EFF\_EL_R + U\_CP_{INST,t} / EFF\_CP_R) - 1] * FUEL_{INST,t} * EMI\_CO2_R$$

(11) $$U\_EL_{INST,t} = 3.6 * PR\_EL_{INST,t} / FUEL_{INST,t}$$

(12) $$U\_CP_{INST,t} = PR\_CP_{INST,t} / FUEL_{INST,t}$$

Meaning of symbols:

$E\_KOG_{INST,t}$ reduction achieved by co-generation as calculated for a given installation *INST* in a given year *t,*

$U\_EL_{INST,t}$ share of electricity produced at installation *INST* in year *t* in relation to fuel consumption,

$U\_CP_{INST,t}$ share of heat produced at installation *INST* in year *t* in relation to fuel consumption,

$PR\_EL_{INST,t}$ electricity produced by installation *INST* in year *t* in [GWh],

$PR\_CP_{INST,t}$ heat produced by installation *INST* in year *t* in [TJ],

$FUEL_{INST,t}$ fuel consumption at installation *INST* in year *t* in [TJ],

EFF_EL_R mean energy efficiency of other than CHP-based electricity production in Poland,

EFF_CP_R mean energy efficiency of other than CHP-based heat production in Poland,

EMI_CO2_R unit CO2 emissions per unit of production in a comparative system.

The following values were adopted for the parameters of the equation:

$EFF\_EL_R = 39.1\ \%$

$EFF\_CP_R = 89.9\%$

$EMI\_CO2_R = 0.0946$ t CO_2/TJ

The mean gross efficiencies of electricity and heat production were determined for the group of power plants, combined heat and power plants and heat plants on the basis of statistical data for 2002. The value of 94.6 kg/GJ was adopted for EMI_CO2, since additional electricity production by co-generation causes the closedown of its production by marginal public producers, which are hard-coal fired power plants in Poland.

4. Allowance allocation to existing installations on the basis of historical CO_2 emissions (grandfathering)

The allowance allocation to installations by this method depends on the size of the base pool, the quantities of allowances which have been allocated to existing developing installations and the baseline emissions from a given installation. The first two quantities take different values, depending on the sector. In their basis, it is possible to define the standard distribution coefficient WSP_STD_S, which defines for a given sector the change in the quantity of allowances allocated for 2005-2007 with respect to the baseline emissions. Formula (14) shows the manner of its calculation. The value of this coefficient depends on the sectoral coefficient of the growth of emission needs and on the quantities of allowances allocated on a case-by-case basis to developing installations. The sum total of individual allocations is detracted from the base pool and reduces the quantity of allowances to be allocated to installations which are subject to standard analysis. The quantity of allowances to be allocated to installations which are subject to standard analysis is the result of multiplication of this coefficient by the baseline emission levels, according to formula (13).

(13) $$\mathbf{A\_BAZA_{INST\_ST} = WSP\_STD_S * EMI\_CO2_{INST\_ST,baza} * T_P}$$

(14) $$\mathbf{WSP\_STD_S = [P\_BAZA_S - SUMA\ (A\_BAZA_{INST\_R})]/SUMA\ (EMI\_CO2_{INST\_ST,baza})}$$

The quantities present in formulae (13) and (14) refer to installations in one sector S. In order to simplify the notation, the sector indices were not indicated with the parameters and variables relevant for these installations.

Meaning of symbols:

$A\_BAZA_{INST\_ST}$	base allowance allocation for installation *INST_ST*, which is subject to standard analysis, for the period of 2005-2007,
WSP_STD_S	standard distribution coefficient defined for a given sector *S*,
$EMI\_CO2_{INST\_ST,baza}$	baseline CO_2 emissions from installation *INST_ST*,
T_P	number of years in period *P* for which allowances are allocated,
P_BAZA_S	size of the base pool defined for a given sector *S*,
$A\_BAZA_{INST\_R}$	base allowance pool for developing installation *INST_R*, which has been assigned to the group for which allowances are allocated on a case-by-case basis,
INST_ST	installation in the group for which allowances are allocated in the standard procedure,
INST_R	installation in the group for which allowances are allocated in the case-by-case procedure (so-called developing installations).

5. Distribution of allowances among existing installations on the basis of other criteria

A different method from the one described above was applied for four sectors. The mathematical formulae which were applied to calculate the allowances for the individual sectors are presented below. The symbols are explained after the equations for all the sectors concerned.

Sugar production industry

The base pool of the sugar production industry is distributed on the basis of the share of each installation in the total output in 2003.

(15) $$\mathbf{A\_BAZA_{INST} = P\_BAZA_{CUKR} * PROD_{INST,2003} / SUMA\ (PROD_{INST,2003}) * T_P}$$

The early action and co-generation bonuses are granted on the general principles.

Cement plants

The base pool and the early action bonus are distributed among cement plants according to the scheme based on the share of a given installation in the total output projections for 2005-2007. These projections comprise e.g. anticipated measures to consolidate the production in this sector. The distribution of the early action pool on the same principles as for the base pool was designed to prevent the distortion of competition which would occur if the early action bonus were to be granted on the principles applied to all the other sectors.

(16) $$\mathbf{A\_BAZA_{INST} = (P\_BAZA_{CEM} + P\_EA_{CEM}) * PROD_{INST,05-07} / SUMA\ (PROD_{INST,05-07}) * T_P}$$

(17) $$\mathbf{A\_EA_{INST} = 0}$$

The co-generation bonus is granted on the general principles.

Coking plants

The base pool was distributed among coking plants on the basis of data on the production capacities of the installations for 2005-2007. These data reflect the time-table of modernisation works planned at individual installations.

(18) $\mathbf{A\_BAZA_{INST} = P\_BAZA_{KOKS} * CAPA_{INST,05\text{-}07} / SUMA\ (CAPA_{INST,05\text{-}07}) * T_P}$

The early action and co-generation bonuses are granted on the general principles.

Power plants

In the light of the very different coefficients of capacity utilisation, the outcome of the attempts to grandfather allowances was that some power plants were allocated allowances in excess of their actual production capacities, whereas the allocation of allowances to others corresponded to very low levels of utilisation of their capacities.
In order to avoid such distortions, a distribution method was used which considered three types of factors: (i) baseline emissions, (ii) production capacities and (iii) the maximum coefficient of capacity utilisation which was achieved in the period of 1999-2002. The respective weights of 0.50, 0.25 and 0.25 were given to the particular criteria. The first factor reflects the actual emissions over a period of several years; the other represents the technical potential, whereas the third factor shows the maximum real competitiveness potential. The group of power plants includes one installation which is allocated allowances on a case-by-case basis in consideration of its production plans. The allowances for the others are allocated according to the following equations:

(19) $\mathbf{A\_BAZA_{INST\_ST} =}$

$$\mathbf{0.5 * (P\_BAZA'_{ELZ} + P\_EA_{ELZ}) * EMI\_CO2_{INST\_ST,baza} / SUMA\ (EMI\_CO2_{INST\_ST,baza}) * T_P +}$$

$$\mathbf{0.25 * (P\_BAZA'_{ELZ} + P\_EA_{ELZ}) * CAPA_{INST\_ST,03} / SUMA\ (CAPA_{INST\_ST,03}) * T_P +}$$

$$\mathbf{0.25 * (P\_BAZA'_{ELZ} + P\_EA_{ELZ}) * MAX\_UTIL_{INST\_ST,99\text{-}02} / SUMA\ (MAX\_UTIL_{INST\_ST,99\text{-}02}) * T_P}$$

(20) $\mathbf{A\_EA_{INST} = 0}$

The co-generation bonus is granted on the general principles.

Meaning of symbols:

A_BAZA_{INST}	base allowance allocation for installation *INST* for the period of 2005-2007,
$A\_BAZA_{INST\_ST}$	base allowance allocation for installation *INST_ST*, which is subject to the standard distribution, for the period of 2005-2007,
P_BAZA_{CUKR}	size of the base pool as determined for the sugar production sector (different subscript indices denote other sectors),
$P\_BAZA'_{ELZ}$	size of the base pool determined for the sector of power plants after detraction of the allowances to be allocated to installations granted allowances on a case-by case basis,
P_EA_{CEM}	size of the early action bonus, consisting of the total bonuses for early reduction measures, as determined for the sector of cement plants (a different subscript index denotes the sector of public power plants),
$PROD_{INST,2003}$	output of installation *INST* in 2003,
$PROD_{INST,05\text{-}07}$	projected output of installation *INST* as a mean from 2005-2007,
$CAPA_{INST,05\text{-}07}$	production capacity or achievable capacity of installation *INST*, based on the projected mean from 2005-2007,

$EMI\_CO_{2INST\_ST,baza}$	baseline CO2 emissions from installation *INST_ST*,
$CAPA_{INST\_ST,03}$	achievable capacity of installation *INST_ST* in year 2003,
$MAX\_UTIL_{INST\_ST,99-02}$	maximum coefficient of achievable capacity utilisation in installation *INST_ST* in the period of 1999-2002, measured in [MW] of the capacity utilised,
T_P	number of years in period P for which allowances are allocated.

6. Allocation for new entrants and existing developing installations

Allowances are allocated to new entrants on the basis of their justified production plans and specific emission factors, on the condition that they conform to the BAT (best available technology) standards.

(21) $\mathbf{A\_BAZA_{INST\_N} = PROD_{INST\_N,05-07} * EMI\_PROD_{INST\_N,\ 05-07}}$

(22) $\mathbf{A\_EA_{INST\_N} = 0}$

The co-generation bonus is granted on the general principles.

Analogous formulae apply to existing developing installations (INST_R). In both cases, it is proposed that the allowance allocation should be verified ex-post on the basis of actual production data.

Meaning of the symbols:

$A\_BAZA_{INST\_N}$	base allowance allocation for new entrant *INST_N* for the period of 2005-2007,
$PROD_{INST\_N,05-07}$	output of installation *INST_N* as projected for 2005-2007,
$EMI\_PROD_{INST\_N,\ 05-07}$	unit CO_2 emissions per unit of output of installation *INST_N* as projected for 2005-2007,
INST_N	new entrant.

7. Co-generation and early action bonuses

The bonuses for the emission reductions achieved as a result of the implementation of early reduction measures (early action) or combined heat and power production (co-generation) depend on the size of their effects and the bonus coefficient adopted for them, according to the following formulae.

(23) $\mathbf{A\_EA_{INST} = k_{EA} * E\_EA_{INST} * T_P}$

(24) $\mathbf{A\_KOG_{INST} = k_{KOG} * E\_KOG_{INST} * T_P}$

Meaning of symbols:

A_EA_{INST}	allowances allocated for the period of 2005-2007 as a bonus for early action,
k_{EA}	coefficient adopted for the calculation of the bonus for the effects of early action, k_{EA}=0.75,

E_EA_{INST} stable effects of CO_2 emission reductions, measured in annual values, which were achieved by early action at installation *INST*,

A_KOG_{INST} allowances allocated for the period of 2005-2007 as a bonus for co-generation,

k_{KOG} coefficient adopted for the calculation of the bonus for the reductions achieved by co-generation, $k_{KOG} = 0{,}50$,

E_KOG_{INST} stable effects of CO_2 emission reductions, measured in annual values, which were achieved by co-generation at installation *INST*,

T_P number of years in period *P* for which allowances are allocated.