

## Country Profile for POLAND

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# 1. Introduction

## 1.1 SETatWork Country Profiles

This report is one of a set of Country Profiles produced by **SETatWork**. The global society is faced with a huge challenge in order to meet the threat given by global warming. The project **SETatWork - Sustainable Energy Technologies at Work** aims to meet this challenge through the collaboration and partnerships between organisations in EU, Asia and South America, supported by the EU's Seventh Framework Programme (FP7). The activities take place over two years from 1 September 2008 to 31 August 2010.

The aim of this country profile, is to provide an overview of the carbon markets in Poland with a focus on Research and Technological Development (RTD) needs, implementation options and perspectives associated with energy efficiency (EE) and savings in the carbon market (short term and medium-long term).

The main target groups for this country profile are companies (financial investors, project developers, technology providers, ESCOs, consultants, etc.), organisations and administrations that are interested in a short overview of relevant information in the development of carbon projects and markets in India. This information is also relevant for readers from other countries that are interested in an overview of the country as well as for national readers that need to have information on the national developments.

SETatWork Country Profiles can be found online at: <http://www.setatwork.eu/countries.htm>

## 1.2 SETatWork Sustainable Energy Technology (SET) Priorities

In each country, companies and organisations were interviewed by SETatWork in order to identify indicative priority rankings for various Sustainable Energy Technologies (SET) and Industrial Sectors. The results of these interviews for each sector can be viewed on the following page: <http://www.setatwork.eu/maps/index.html>

The SETatWork Priorities for Poland are shown below. Where data is not yet available, the bar chart columns are left empty.



The biggest opportunities for SETatWORK can be seen in the heat and power companies, which are the most numerous in the EU ETS in Poland (around 600 companies), but there are also opportunities in other industries, such as food processing, paper/pulp, refineries.

Opportunities for Sustainable Energy Technology Providers in Poland are mainly created by heat and power companies. That is why the most important are biomass and bioenergy, combined heat and power (CHP), fuel switching and emission trading.

## 2. General Overview

Poland participates in international climate change mitigation efforts as a Member of the European Union and as a Party to the United Nations Framework Convention on Climate Change and the Kyoto Protocol. The target set for Poland by the Kyoto Protocol is to reduce the aggregated carbon dioxide emissions from 1988 level by 6% by 2012. Poland has fulfilled exceeded this commitment as a result of the economy transition in the 90s. This occurred before the UNFCCC and its Protocol had entered into force. Tough, but pertinent political decisions resulted in a significant change in the Polish economy. However, this transition required great efforts and high social costs. According to the Poland's *National Inventory Report 2009*<sup>1</sup>, total GHG emissions have decreased by 30% in the 1988-2007 period.

The excess CO<sub>2</sub> emission reductions can be sold to other countries via the international emission trading scheme established by the Kyoto Protocol. Poland is currently in the process of negotiations with potential buyers. As of now an initial agreement has been signed with Japan. The revenues from selling the Assigned Amount Units (AAUs) are intended to be used within the country for investments in renewable energy sources and CO<sub>2</sub> reduction projects. This could be done through Green Investment Scheme (GIS). However, detailed procedures still have to be determined.

Poland is also a host country for Joint Implementation projects. Several projects have already been or are still being developed. However, until now, none of JI projects have been registered by the UNFCCC. EU ETS covers most of the sectors with the highest reduction potential, which is a key obstacle for smooth development of JI projects in Poland. In addition, complicated procedures, lack of national reserve in the National Allocation Plan and other issues inhibit foreign investment in JI projects in Poland.

### 2.1 GHG emissions

Total national GHG emissions in 2007 were estimated as 398.88 Mt CO<sub>2</sub>eq<sup>2</sup>, which makes Poland the 6<sup>th</sup> largest emitter within EU-27 countries. Carbon dioxide has the major share in country's GHG emissions with approximately 82%, followed by methane (9%) and nitrous oxide (8%).

Over 10 years the total values of emissions of greenhouse gases dropped from around 530616 Gg CO<sub>2</sub>eq in 1988 to around 389994 Gg CO<sub>2</sub>eq by 1998. However, the rate of decrease then slowed over the next decade such that emissions in 2006 were around 359954 Gg CO<sub>2</sub>eq.

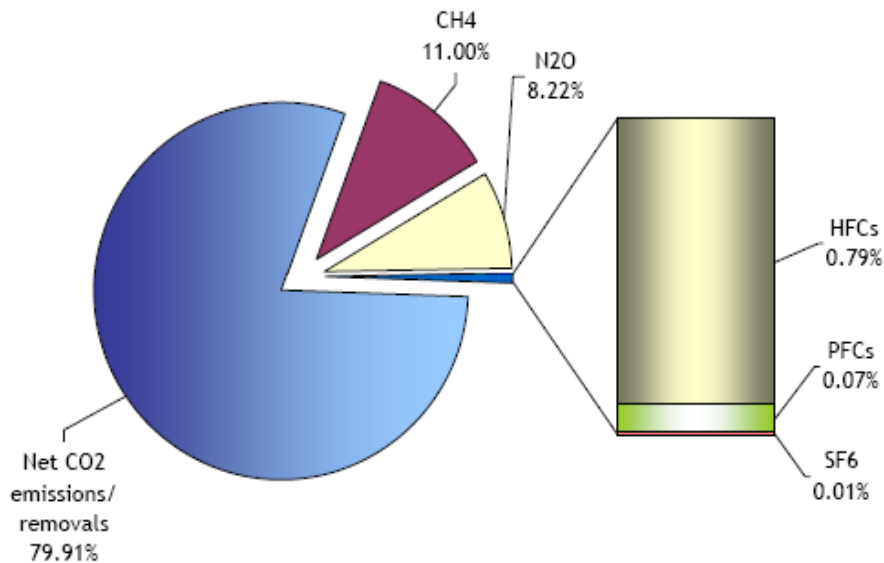
The majority of CO<sub>2</sub> emissions come from fuel combustion processes, especially—from the energy production industries. Since 1988 the following changes have occurred in Poland in the structure of fuel use:

- The share in of solid fuel consumption dropped from 87.7% in 1988 to 73.5% in 2006;

<sup>1</sup>[http://kashue.eu/serwis/materialy/Inwentaryzacje\\_krajowe/NIR\\_2009\\_Poland\\_05-09.pdf](http://kashue.eu/serwis/materialy/Inwentaryzacje_krajowe/NIR_2009_Poland_05-09.pdf)

<sup>2</sup> Eurostat, <http://ec.europa.eu/eurostat/> (website accessed on 31.08.2009)

- The share of liquid fuel consumption increased from 8.7% (1988) to 18.8% (2006);
- The share of gaseous fuel consumption increased from 3.6% (1988) to 7.7% (2006).



**Figure 1:** Percentage share of greenhouse gases in national total emission total in 2007  
 Source: Poland's National Inventory Report 2007

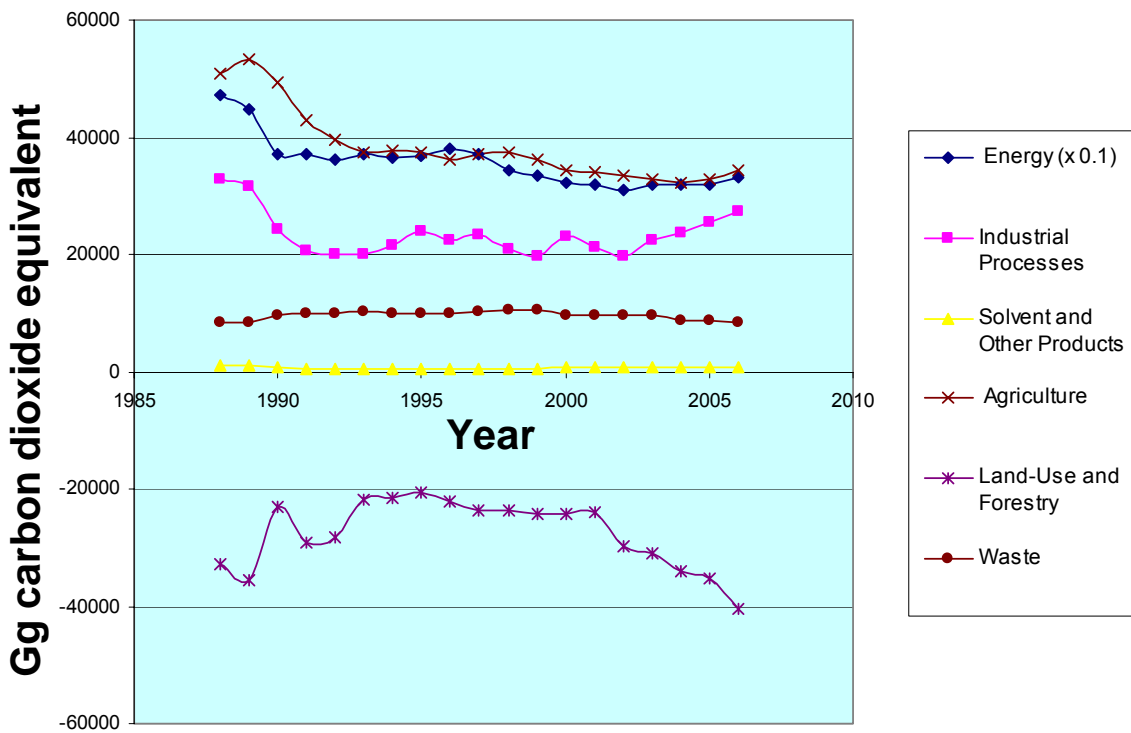
**Table 1:** National emissions of greenhouse gases for 1988–2007 according to IPCC categories

| IPCC sector                               | 1988              | 1989              | 1990              | 1991              | 1992              | 1993              | 1994              | 1995              | 1996              | 1997              |
|---|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|
|   | CO2 eq. [Gg]      | CO2 eq. [Gg]      | CO2 eq. [Gg]      | CO2 eq. [Gg]      | CO2 eq. [Gg]      | CO2 eq. [Gg]      | CO2 eq. [Gg]      | CO2 eq. [Gg]      | CO2 eq. [Gg]      | CO2 eq. [Gg]      |
| 1. Energy                                 | 469 594.85        | 446 200.03        | 369 705.50        | 372 071.63        | 363 119.13        | 371 315.17        | 365 532.75        | 368 852.18        | 379 519.24        | 372 107.68        |
| 2. Industrial Processes                   | 33 495.82         | 32 330.26         | 24 333.57         | 20 603.38         | 19 984.69         | 19 948.97         | 21 400.30         | 23 847.74         | 22 384.90         | 23 319.68         |
| 3. Solvent and Other Product Use          | 1 006.46          | 946.14            | 629.23            | 608.22            | 558.57            | 519.36            | 521.05            | 524.80            | 547.11            | 542.72            |
| 4. Agriculture                            | 51 225.04         | 53 631.68         | 50 043.01         | 43 572.64         | 40 100.35         | 37 771.46         | 37 907.66         | 37 817.46         | 36 512.20         | 37 312.81         |
| 5. Land-Use, Land-Use Change and Forestry | -32 926.48        | -35 487.83        | -23 024.65        | -29 253.10        | -28 219.24        | -21 686.94        | -21 522.61        | -20 723.44        | -22 117.93        | -23 652.08        |
| 6. Waste                                  | 14 188.25         | 14 440.59         | 14 762.46         | 15 153.16         | 15 269.91         | 15 413.60         | 15 427.11         | 15 388.93         | 15 499.51         | 15 776.94         |
| <b>TOTAL net emission (with LULUCF)</b>   | <b>536 583.96</b> | <b>512 060.87</b> | <b>436 449.12</b> | <b>422 755.94</b> | <b>410 813.42</b> | <b>423 281.62</b> | <b>419 266.26</b> | <b>425 707.68</b> | <b>432 345.03</b> | <b>425 407.75</b> |

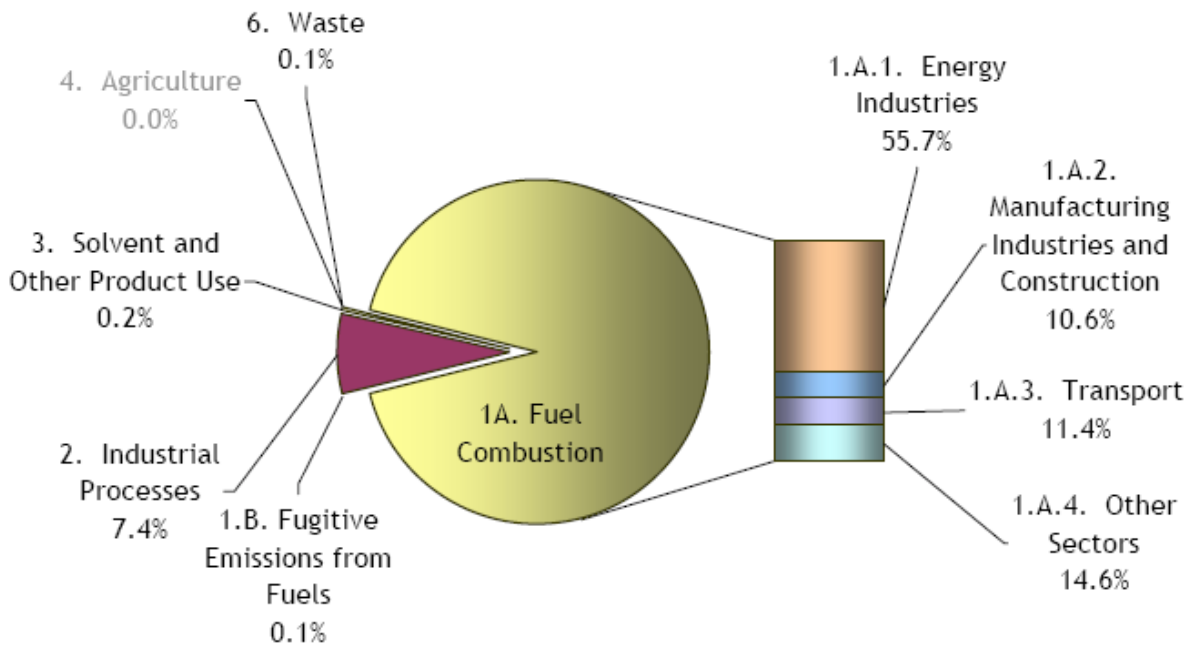
  

| IPCC sector                               | 1998              | 1999              | 2000              | 2001              | 2002              | 2003              | 2004              | 2005              | 2006              | 2007              |
|---|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|
|   | CO2 eq. [Gg]      | CO2 eq. [Gg]      | CO2 eq. [Gg]      | CO2 eq. [Gg]      | CO2 eq. [Gg]      | CO2 eq. [Gg]      | CO2 eq. [Gg]      | CO2 eq. [Gg]      | CO2 eq. [Gg]      | CO2 eq. [Gg]      |
| 1. Energy                                 | 344 825.52        | 334 014.47        | 322 186.46        | 320 594.50        | 309 212.02        | 319 324.67        | 319 252.94        | 315 453.29        | 324 617.45        | 321 704.33        |
| 2. Industrial Processes                   | 20 887.76         | 19 839.12         | 23 031.06         | 21 036.78         | 19 598.14         | 22 665.71         | 23 546.81         | 29 423.30         | 31 539.69         | 33 299.29         |
| 3. Solvent and Other Product Use          | 543.39            | 535.04            | 616.09            | 637.21            | 664.25            | 647.39            | 704.67            | 705.75            | 705.75            | 733.04            |
| 4. Agriculture                            | 37 726.43         | 36 416.35         | 34 595.44         | 34 227.47         | 33 710.48         | 32 978.42         | 32 376.32         | 32 947.60         | 34 504.18         | 35 039.64         |
| 5. Land-Use, Land-Use Change and Forestry | -23 592.39        | -24 418.28        | -24 236.89        | -23 908.15        | -29 777.64        | -30 847.42        | -34 101.15        | -35 373.61        | -40 504.79        | -40 497.08        |
| 6. Waste                                  | 9 570.71          | 9 685.91          | 8 582.37          | 8 323.50          | 8 307.67          | 8 187.11          | 8 111.10          | 8 078.10          | 7 924.90          | 8 105.11          |
| <b>TOTAL net emission (with LULUCF)</b>   | <b>389 961.41</b> | <b>376 072.61</b> | <b>364 774.53</b> | <b>360 911.31</b> | <b>341 714.91</b> | <b>352 955.88</b> | <b>349 890.69</b> | <b>351 234.43</b> | <b>358 787.18</b> | <b>358 384.32</b> |

Source: Poland's National Inventory Report 2007



**Figure 2:** National emissions of greenhouse gases for 1988–2006 according to IPCC categories Source: Poland's National Inventory Report 2006 (note the figure for the energy sector are divided by 10)



**Figure 3:** Carbon dioxide emission in 2007 by sector Source: Poland's National Inventory Report 2007

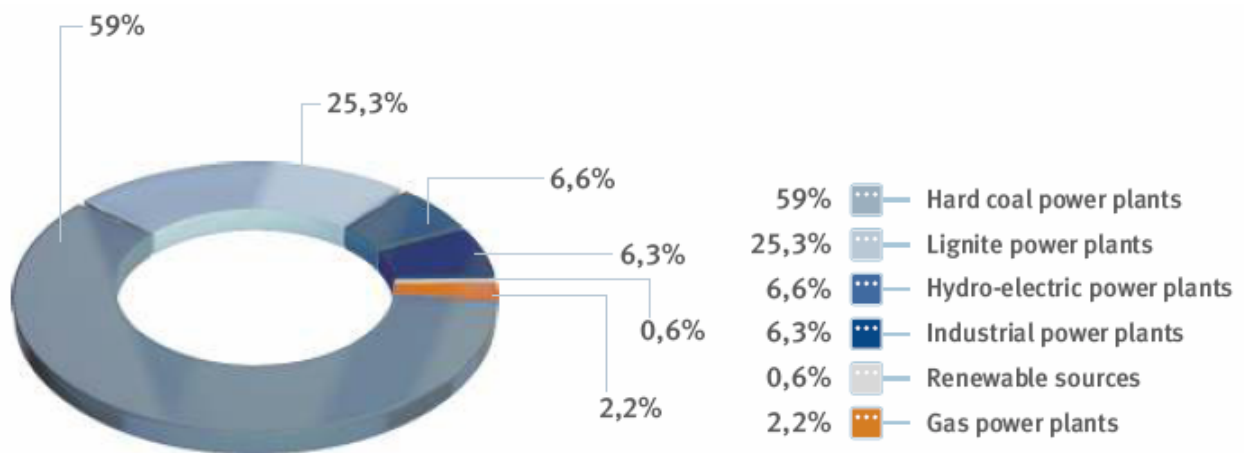
## 2.2 Energy sector

**Power production** The Polish power system is based on 23 major power producers. Independent power transmission grid operators, distribution and sales companies as well as the regulator are key power market actors. The national power transmission system is operated by the state-owned company PSE-Operator S.A.<sup>3</sup> There are seven main power-producing energy groups that have been established recently: PGE, Tauron, ZE PAK, ENEA, ENERGA, Vattenfall and Dalkia. These groups also own power plants and include distribution companies within their assets. Electricity is delivered to the end-user by 20 distribution companies, among which ENEA, ENERGA and RWE Polska are the largest. The Polish power market is not yet fully liberalised.

**Heat production** The Polish heating sector is quite broad in terms of type and scope of business carried out by various companies. The heating sector is regulated by regional branches of the Energy Regulatory Office. Usually companies that produce heat also operate as heat distributors and suppliers. Approximately 20% of the country's heat production is used within generating companies for their own purposes; the remaining 80% meets the demands of customers. Presently approximately 60% of heat companies are owned by the public sector. The rest are in private hands with over 20% having a share of foreign capital.

**Efficiency of conversion** The average efficiency of combined heat and power plant was estimated as 47.5%, according to Central Statistics Office [1].

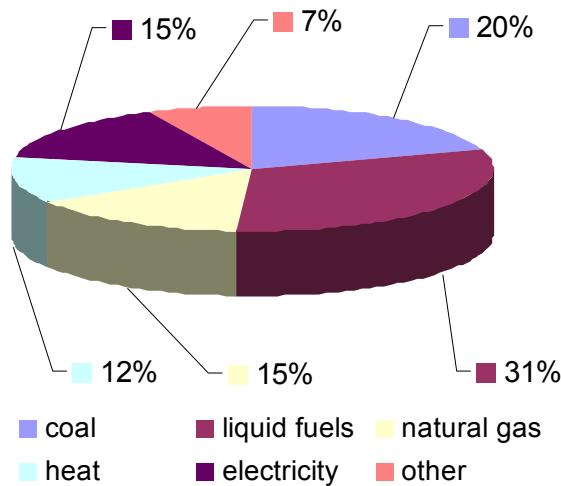
**Fuels** The Polish power sector is dominated by fossil fuels. Coal (hard and lignite) plays a very significant role in the country's energy mix, with a very large share in electricity generation (approximately 90% - the highest among the EU Member States) and also in primary energy supply, resulting in high and concentrated CO<sub>2</sub>emissions.



**Figure 4:** Percentage structure of the capacity available in the Polish Power System in 2007  
 Source: Annual Report 2007, PSE-Operator SA<sup>4</sup>

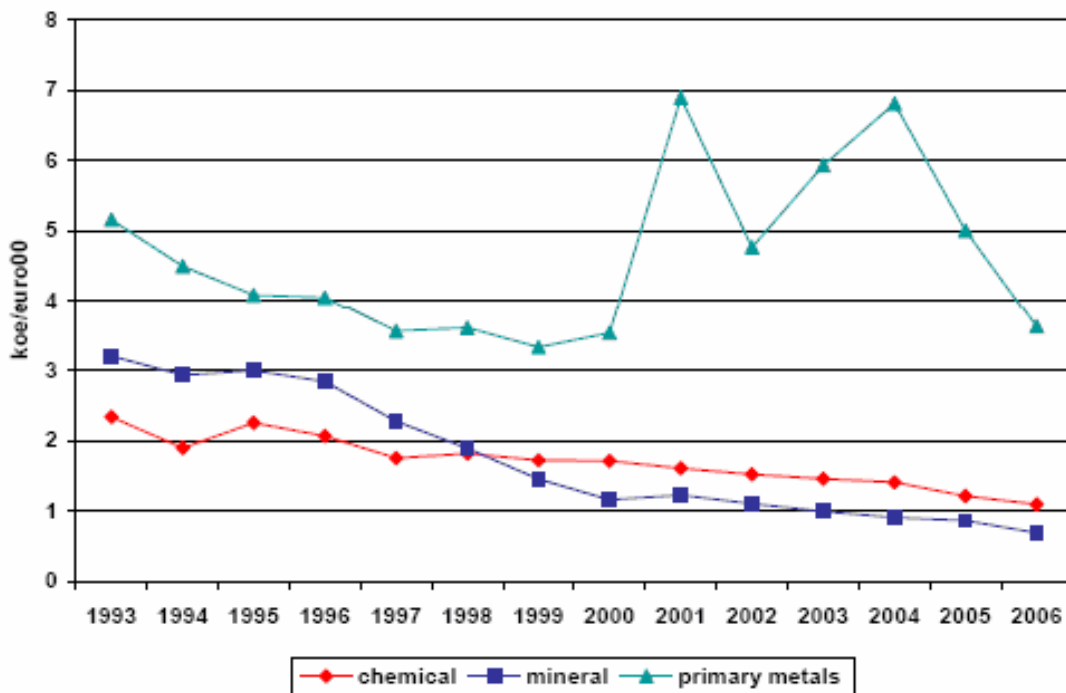
<sup>3</sup> PSE-Operator S.A. is a Polish Transmission System Operator which has been established within the structures of the PSE holding as a legally unbundled company, according to requirements of the Directive 2003/54/EC.

<sup>4</sup> Annual Report 2006, PSE-Operator SA  
[http://www.pse-operator.pl/uploads/kontener/Raport\\_Roczny\\_2007\\_EN.pdf](http://www.pse-operator.pl/uploads/kontener/Raport_Roczny_2007_EN.pdf) (website accessed on 08.09.2009)

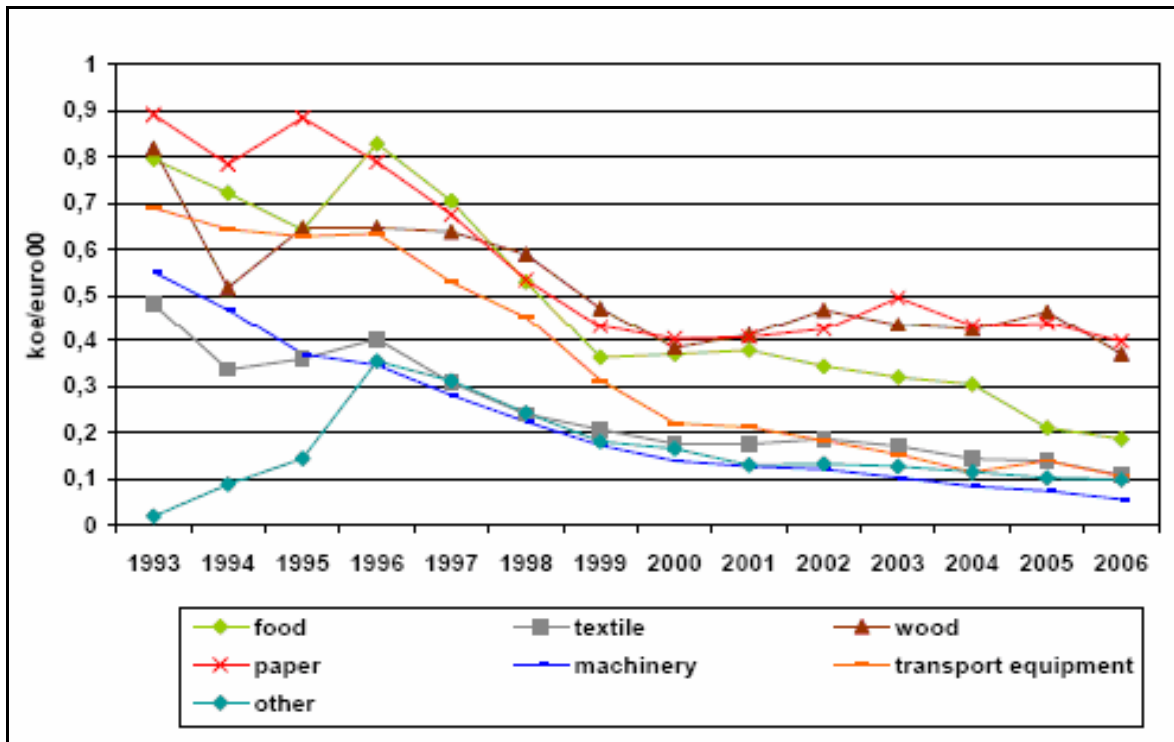


**Figure 5:** Final energy consumption by energy carrier in 2006  
 Source: Energy efficiency in Poland in 1996-2006, Central Statistic Office [3]

**Energy efficiency** The improvement in the energy efficiency index for Polish industry is better than that for the EU as a whole due to extensive adoption energy-saving technologies. The following energy sectors have the highest levels of energy consumption: primary metals, mineral and chemical production.



**Figure 6:** Changes of energy intensity indicators in energy intensive industry branches



**Figure 7:** Changes of energy intensity indicators in low energy intensive industry branches  
 Source: Energy efficiency in Poland in 1996-2006, Central Statistic Office

**Renewable energy and cogeneration** In 2006, the share of renewable energy in gross electricity consumption amounted to 2.8%<sup>5</sup>. To increase this share, Poland introduced a system of energy certificates - a mechanism of promotion of renewable energy and combined heat and power production. According to the Polish Energy Law, each power supplier is obliged to provide a quota obligation certificate for renewable energy production and for energy produced in cogeneration. As for 2009, the share of renewable energy in total energy sold to end-users is set as at least 8,9%, while for cogeneration the share is at least 20,6%. The compensation penalty for not fulfilling the quota is set on an annual basis by the Energy Regulatory Office and in 2009 equals 259.89 PLN/MWh<sup>6</sup> (63.44 €/MWh) for renewable- and 148,12 PLN/MWh<sup>7</sup> (36.16 €/MWh) for cogeneration electricity.

<sup>5</sup> Report on realisation of targets and reached goals in the scope of renewable energy sources, Ministry of Economy, 2008, <http://www.lex.com.pl/serwis/mp/2008/0457.htm> (only in Polish, website accessed on 03.11.2008)

<sup>6</sup> <http://www.ure.gov.pl/portal.php?serwis=pdb&dzial=271&id=2861&search=1404>; € exchange rate on 08.09.2009 1€ = 4,0969PLN (source: NBP)

<sup>7</sup> <http://www.ure.gov.pl/portal.php?serwis=pdb&dzial=497&id=3046&search=1410>; € exchange rate on 08.09.2009 1€ = 4,0969PLN (source: NBP)

### 3. Legislation

Poland is an active player in the development of a new EU climate package and future EU ETS to establish fair and satisfactory rules for all Member States.

#### 3.1 Poland's policies

**The National Energy Efficiency Action Plan** (NEEAP) had to be developed to fulfill provisions of Directive 2006/32/EC.

For sectors and installations outside EU ETS there are five measures established:

- Promotion of high efficiency cogeneration (CHP);
- System of voluntary undertakings in industry resulting in increased energy efficiency;
- Development of an energy management system and an energy audit system in industry;
- Financial support for actions related to high efficiency electricity generation and the reduction of losses in electricity distribution;
- Support for enterprises for the introduction of best available technologies (BAT).

Horizontal energy efficiency improvements measures are established:

- Support mechanism in the form of so-called *white certificates* to stimulate energy saving actions together with an obligation placed on suppliers of electricity, heat or gas fuels to end users;
- Organising and running information campaigns and educational projects on energy efficiency and financial support for actions relating to the promotion of energy efficiency.

**Poland's Climate Policy** is the most important document regarding climate change strategies prepared according to UNFCCC provisions. The document deals with general problems and conditions in terms of climate policy, it describes Poland's international commitments in the field of climate change and sets concrete goals for particular industry sectors.

The overall aim of Poland's climate policy is consistent with EU goals. The document indicates that the strategic goal of Poland is active participation in global efforts against climate change through implementation of concepts of sustainable development, especially in the field of energy efficiency, increasing forest and soil resources, rationalisation in usage of resources and proper waste management.

Tasks for years 2007-2020 refer, among others, to:

- promotion and development of renewable energy sources;
- promotion and development of carbon capture and storage technologies;
- reduction of energy consumption per GDP by 25% till 2010 and further reduction by 50% till year 2025 comparing to the level from year 2000;
- dissemination of Best Available Techniques in the scope of energy efficiency and renewable energy sources;
- transformation of production and energy consumption mode to reduce GHG emissions by basic emission sources;
- supporting GHG reducing activities, with the priority given to energy sector, energy-consuming industry, transport and waste management.

**Energy Policy of Poland up to 2025** is defined in a separate chapter focused on energy efficiency within industry. The document defines energy efficiency increase in terms of a decrease of primary energy consumption per unit of GDP.

Several activities regarding energy efficiency are included within the policy:

- decrease of products' energy consumption during its design, production and utilisation phases through implementation of high energy efficiency standard devices together with awareness campaign;
- increase of energy production efficiency through an incentive system including introduction of advanced high-efficient technologies in power plants, condensation power plants, residential houses and public utility buildings and increase of share of CHP plants;
- decrease of energy consumption in industrial processes through improvement of production processes and adjusting them to BAT and restructure of Polish economy towards limitation of energy consuming industries;
- decrease of energy losses in transmission and distribution through improvement of throughput of transmission lines, energy distribution and limitation of a long distances energy transmission via 110 kV lines;
- implementation of energy demand management systems to increase energy use efficiency through organisational solutions, incentives system and informational campaigns.

In terms of renewable energy promotion, the document outlines a number of assumptions:

- maintenance of stable supporting mechanisms for use of renewable energy sources;
- application of biomass for electricity and heat production;
- enhancement of small hydro energy application;
- increase of wind energy usage;
- enlargement of share of bio-components in fuels;
- industry development towards renewable energy.

Poland's new energy policy covering the period to 2030 is currently being prepared by the Ministry of Economy. The main targets of the policy projects are:

- energy efficiency improvement
- safety of energy and fuel supply
- implementation of nuclear energy
- renewables development
- limitation of power industry impact on the environment

**Strategy for renewable energy development** sets a goal of increasing the share of renewable energy in the energy-fuel mix to 7.5% in 2010 and up to 14% by 2020. In addition to these strategic targets, the document provides a series of tasks that include:

- introduction of national standards for devices generating energy from renewable sources and for bio-fuels;
- carrying on an inventory of renewable sources in Poland;
- creation of the national data base regarding available renewable technologies;
- facilitation of granting of permission for electricity generation from renewable sources;
- establishment of a supporting system such as certificates, contests or tenders;

- supporting of research and demonstration programmes focused on development of renewable technologies;
- promotion of renewable energy sources on all levels of education.

### 3.2 EU Legislation

The following directives cover this area of activity:

**Directive 2003/87/EC** 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.

**Directive 2004/101/EC** of the European Parliament and of the Council of 27 October 2004 amending Directive 2003/87/EC establishing a scheme for greenhouse gas emission allowance trading within the Community, in respect of the Kyoto Protocol's project mechanisms.

**Directive 2006/32/EC** of the European Parliament and of the Council of 5 April 2006 on energy end-use efficiency and energy services and repealing Council Directive 93/76/EEC. The indicative target for energy savings in Poland is 9% in 2016 and an intermediate target is 2% in 2010.

### 3.3 Polish legislation

The following key laws regulate the energy and climate markets in Poland:

**Energy Law** in the area of climate policy, stipulates principles related to energy management and energy savings and supports the use of renewable energy sources. The basic mechanism that stimulate energy generation from renewable sources and through cogeneration is described in the *Regulation of the Minister of Economy on obligation of energy purchasing originated from renewable sources and from cogeneration*. This regulation requires that power sold to the end-user has to consist of an appropriate share of energy from renewable sources (share in 2008  $\geq 7\%$ ) and from cogeneration (share in 2008  $\geq 19\%$ ). Penalties are provisioned in the regulations for not fulfilling these conditions as outlined above.

**Environment Protection Law** is a superior Polish document covering various aspects of the environment including:

- preparation of an updated national climate policy every 4 years;
- preparation of local policies including activities related to climate change;
- obtaining allowance for introduction of gases and ashes to the air;
- establishment of air protection programmes;
- holding of an integrated allowance for installations that may significantly pollute or affect environment;
- granting resources from environment protection and water management funds to support activities related to pollution prevention, use of local renewable energy sources and help in introduction of more environmentally-friendly fuels or transportation;
- establishment and observance of air quality standards and emission standards in energy sector;
- environmental fees.

**Act on emission trading system [7]** contains regulations stipulated by the Directive 2003/87/EC and the Directive 2004/101/EC.

**Act on emission management system** contains regulations stipulated by i.a. the Directive 2004/101/EC, the Directive 2008/50/EC and Decision 2006/780/EC. The act regulates rules of an emission units dispose. It implements a system of air- and climate protection and a system of emission balance and prognoses.

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## 4. National Allocation Plans (NAP)

**The National Allocation Plan for 2005-2007** was prepared according to the requirements described in Annex III to Directive 2003/87/EC. The total allowances for Poland was 717.3 million tons CO<sub>2</sub>eq. for the period 2005-2007 . The reserve for new participants was set at 2.5 mln tons CO<sub>2</sub>eq. All allowances were distributed free of charge.

The sectors included in the NAP-I complied with Annex I of the Directive 2003/87/EC. The plan included 945 installations within the following sectors and sub-sectors:

- Utility power plants
- Combined heat and power plants
- Utility heat plants
- Refining industry
- Coking industry
- Iron and steel industry
- Cement industry
- Lime industry
- Glass industry
- Ceramic industry
- Paper industry
- Sugar industry
- Chemical industry
- Other industries

220 installations opted out of the first ETS phase. These were mainly brick factories that work periodically.

Grandfathering formed the basic method of allocation used in the NAP-I. This method was applied in 10 out of 14 sectors. In cement and sugar sectors a benchmark methodology was applied. For power plants emissions from years 2001-2003, power capacity and maximum output capacity in the period 1999 to 2003 were used to set the amount of allowances. For coke ovens, the allowances were allocated based on forecasts and production needs for years 2005 to 2007. In addition to these methods some companies received surplus allowance for the so-called 'early action' (e.g. technology improvements in previous years) and for energy produced in cogeneration.

NAP-I was sent for approval to the European Commission in September 2004. However, the EC found the plan inconsistent with all their requirements. The EC pointed out, among others, that reserve for the existing installations and for growing emissions and ex-post allocations are not allowed. Therefore, in the final version of NAP-I Poland had to decrease the total amount of allowance by 16.5% comparing to the first plan.

**The National Allocation Plan for 2008-2012** was prepared, in accordance to the Act on emissions trading system, by the *National Administrator of Emission Trading Scheme* and the government. The final version of the plan was released on 1 July 2008 as the *Regulation of the Council of Ministries*. The total allowances for the period 2008-2012 amounts to 1,042.6 million tons CO<sub>2</sub>eq. The plan includes 838 installations from 16 sectors and sub-sectors. The decrease in the number of installation as compared to NAP-I is a result of more precise definition of qualifying combustion installations, exclusion of small installations and changes in ownership structure within companies. In addition reserves for new participants (37 million tons CO<sub>2</sub>eq) and for JI projects (750 ktons CO<sub>2</sub>eq) are established in the plan.

**Table 1.** Sectoral allocation of allowances in NAP-II. Source: Own study based on the Regulation of the Council of Ministries on acceptance of the NAP for the period 2008-2012.

| Sector                         | <i>Average annual allowances [tons CO<sub>2</sub>eq]</i> |
|--------------------------------|--|
| Utility power plants           | 110 791 200  |
| Combined heat and power plants | 25 391 008   |
| Utility heat plants            | 9 586 386  |
| Refining industry              | 8 058 808  |
| Coking industry                | 2 909 000  |
| Iron and steel industry        | 11 007 651   |
| Lime industry                  | 1 809 981  |
| Cement industry                | 10 849 456   |
| Glass industry                 | 1 854 935  |
| Ceramic industry               | 713 064  |
| Paper industry                 | 1 492 088  |
| Sugar industry                 | 1 349 992  |
| Chemical industry              | 4 913 857  |
| Wood industry                  | 1 071 555  |
| Industrial power plants        | 6 004 445  |
| Other sectors                  | 3 161 814  |
| Allocated allowances           | 200 965 240  |
| Reserve for new participants   | 7 400 054  |
| JI reserve                     | 150 101  |
| <b>Total</b>                   | <b>208 515 395</b>                                       |

The methodologies used for allocation were based on historic emissions, production data and benchmarking as well as production and emissions forecasts. In most sectors, the allocation was based on combined forecasts and benchmark methodologies. Historic data (emissions and/or production data) was applied for utility power plants, combined heat and power plants and the cement sector. Sugar producers received their allowances based on the Commission Regulation on national sugar production quotas [8]. In the chemical sector historic data, benchmarking and forecasts were used to allocate allowances. For wood industry forecasts historic production data were used while benchmarking and historic emission data were applied to industrial power plants. The allocation methodology also included 'early action' and cogeneration bonuses for particular installations.

The first version of NAP-II was sent to the European Commission for final approval in June 2006. Unfortunately for Poland, the EC found certain aspects of the document incompatible with the requirements. The EC decided to decrease total amount of allowances and to set a 10% limit for JI/CDM credits used by ETS companies. In response, Poland challenged the EC decision claiming that this decision would seriously harm the Polish economy. The decision, however, was sustained and as a consequence the Polish government had to allocate lower amount of allowances within ETS companies. This situation resulted in long-lasting disputes between all industry sectors and the government. Eventually, on 1 July 2008 the new allocation plan was launched. The European Commission have not questioned the improved NAP-II and therefore the Polish Prime Minister signed the document in the beginning of November 2008.

#### **4.1 SET opportunities**

There are a number of opportunities for SET as result of the legislation and allocations:

- Modest allocation and high CO<sub>2</sub> prices should stimulate carbon management activities in companies, as well as enhance faster uptake of cleaner technologies and renewable energy sources,
- in the short term (2008-2012) technological changes should be observed in mainly in smaller installations, mostly in the heating sector;
- the Polish power sector is a potentially target client for SETG activities, however, taking into account the capital requirements for investment and the time schedule of such investments it is expected that international carbon credit trade would be of greater interest than technology switch,
- In addition carbon asset management awareness actions may be of interest for ETS companies. In NAPI carbon restraints were not an issue due to the significant over allocation and low carbon price. However, the situation changes slowly now,
- some production sectors, especially the cement industry, have recently made significant progress in terms of reducing CO<sub>2</sub> emission per unit of production.

#### **4.2 ETS companies**

Table 2 below lists the key companies, which have the largest quantity of allowances (above 2 million tons CO<sub>2</sub>eq) from a complete over 800 of the ETS companies).

**Table 2:** Key companies included in the Polish National Allocation Plan for 2008-2012  
Source: Own study based on the Regulation of the Council of Ministries on acceptance of the NAP for the period 2008-2012.

| Company   | Sector       | Number of installations | Average annual allowances [mln tons CO <sub>2</sub> eq] |      |
|---|--------------|-------------------------|---|------|
| PGE S.A.  | Energy       | 14                      | 51.68   |      |
| Turon Polska Energia S.A.                       | Energy       | 12                      | 19.08   |      |
| ZE PAK S.A.                                     | Energy       | 4                       | 14.44   |      |
| EDF Polska                                      | Energy       | 9                       | 13.60   |      |
| ArcelorMittal Poland S.A.                       | Energy       | 6                       | 3.30  | 9.78 |
|   | Coking       | 1                       | 0.21  |      |
|   | Iron & steel | 4                       | 6.10  |      |
|   | Lime         | 1                       | 0.17  |      |
| Elektrownia Kozienice S.A. (ENEA Group)         | Energy       | 1                       | 9.64  |      |
| PKN Orlen S.A.                                  | Energy       | 2                       | 4.42  | 6.58 |
|   | Refining     | 1                       | 2.16  |      |
| Vattenfall Heat Poland S.A.                     | Energy       | 5                       | 6.07  |      |
| Elektrownia Połaniec S.A. (Electrabel Group)    | Energy       | 1                       | 4.97  |      |
| Zespół Elektrowni Ostrołęka S.A. (ENERGA Group) | Energy       | 2                       | 2.71  |      |
| Dalkia Łódź S.A.                                | Energy       | 3                       | 2.50  |      |
| Elektrownia Skawina S.A.                        | Energy       | 1                       | 2.33  |      |
| Góraźdze Cement S.A.                            | Cement       | 1                       | 2.27  |      |
| Lafarge Cement S.A.                             | Cement       | 2                       | 2.20  |      |
| <b>Total Poland</b>                             |              |                         | <b>200.97</b>   |      |

## 5. R&D Priorities

The situation in Poland as a result of EU accession linked to technology advances made it necessary to re-engineer the financing mechanisms and priorities set for the Polish R&D system. The Ministry of Science and Information Society Technologies (MSIST) therefore issued "A concept of the scientific, technological and innovation policy till 2020". According to Eurostat, the total expenditures on research and development within EU-27 countries amounted approximately to 1.84% of GDP in 2005. Currently, a negative trend is observed within funding of R&D.

Analysis suggests that this trend will continue and by 2010 it will reach a level similar to that of the mid-1990s of less than 1.80%. In Poland, expenditure on R&D are among the lowest of any of the EU Member States.

For business enterprises and the higher education sector such investment was only 0.18% of GDP in 2005. The government sector spent slightly more, at 0.21% of GDP. The underlying reason for the low level of R&D investment is that companies do not regard this as a priority but give higher priority to their existing or recent situation. Moreover, the high associated investment cost reduces the feasibility of R&D projects. At the same time companies do not cooperate closely with R&D institutions or higher education centres.

The two most important issues relating to research and development (R&D) in Poland are:

- incomplete use of innovative ideas with high potential in this sector,
- Inconsistent cooperation between a significant number of enterprises with the relevant parts or units of R&D which in turn translates into ignorance of their actual needs for innovation.

The situation is constantly improving, but there are still barriers to the development of several major areas of R&D. The most important are:

- insufficient capital resources within both the science sector and the economy in general,
- poor awareness of the importance of innovation in improving the competitiveness of enterprises
- inadequate flow of information concerning the facilities and support offered by research units and scientist to companies and their ability to meet the needs of businesses in this area,
- mismatch between existing institutions that offer R&D services in relation to the real needs of businesses.

However, some companies, especially those supported by foreign owners, are more focused on implementing new advanced technologies. At the same time some investments to broaden the scope of R&D have been observed in the past.

Several topics should be highlighted to enhance the role of R&D, for example:

- New technologies that may be implemented in particular industry, including measures for energy efficiency and use of renewable energy sources
- Financing opportunities
- Enhanced cooperation between industry and R&D organizations

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## 6. Links to Relevant and Related Websites

| <b>Web address</b>   | <b>Description</b>                                    |
|--|---|
| <a href="http://www.mos.gov.pl">www.mos.gov.pl</a>                       | The Ministry of Environment                           |
| <a href="http://www.mg.gov.pl">www.mg.gov.pl</a>                         | The Ministry of Economy                               |
| <a href="http://www.ure.gov.pl">www.ure.gov.pl</a>                       | The Energy Regulatory Office                          |
| <a href="http://www.pse-operator.pl">www.pse-operator.pl</a>             | PSE-Operator S.A. – grid operator                     |
| <a href="http://epp.eurostat.ec.europa.eu">epp.eurostat.ec.europa.eu</a> | Eurostat  |
| <a href="http://www.stat.gov.pl">www.stat.gov.pl</a>                     | Central Statistic Office                              |
| <a href="http://www.kashue.pl">www.kashue.pl</a>                         | The National Administrator of Emission Trading Scheme |
| <a href="http://emissions.ios.edu.pl">emissions.ios.edu.pl</a>           | National Emission Centre                              |

## 7. References

1. *Energy efficiency in Poland in 1996-2006*, Central Statistic Office, Warsaw 2008, p 28  
[http://www.stat.gov.pl/cps/rde/xbcr/gus/PUBL\\_energy\\_efficiency\\_in\\_Poland\\_in\\_1996-2006.pdf](http://www.stat.gov.pl/cps/rde/xbcr/gus/PUBL_energy_efficiency_in_Poland_in_1996-2006.pdf) (website accessed on 23.10.2008)
2. *Annual Report 2006*, PSE-Operator SA  
[http://www.pse-operator.pl/uploads/kontener/raport\\_roczny\\_2006\\_ANG.pdf](http://www.pse-operator.pl/uploads/kontener/raport_roczny_2006_ANG.pdf) (website accessed on 22.10.2008)
3. *Energy efficiency in Poland in 1996-2006*, Central Statistic Office, Warsaw 2008, p10
4. *Report on realisation of targets and reached goals in the scope of renewable energy sources*, Ministry of Economy, 2008, <http://www.lex.com.pl/serwis/mp/2008/0457.htm> (only in Polish, website accessed on 03.11.2008)
5. <http://www.ure.gov.pl/portal/pl/15/2551/>, exchange rate on 21.11.2008 1€ = 3.7984 PLN (source: NBP)
6. <http://ure.gov.pl/portal/pl/15/2359/> € exchange rate on 21.11.2008 1€ = 3.7984 PLN (source: NBP)
7. [http://www.mos.gov.pl/she/polskie\\_akt\\_y\\_prawne/ustawa\\_SHE\\_2004.281.2784.pdf](http://www.mos.gov.pl/she/polskie_akt_y_prawne/ustawa_SHE_2004.281.2784.pdf)
8. [eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2007:069:0003:0004:EN:PDF](http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2007:069:0003:0004:EN:PDF)