

Ministry of Economy

# 2nd National Energy Efficiency Action Plan of Poland 2011

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Warsaw, February 2012

## INTRODUCTION

The Second National Action Plan for Energy Efficiency, hereinafter referred to as the *National Action Plan*, has been prepared following the obligation to provide the European Commission with reports based on Directive 2006/32/EC *on energy end-use efficiency and energy services* (OJ L 114 of 27.4.2006, p. 64) and Directive 2010/31/EC *on the energy performance of buildings* (OJ L 153 of 18.6.2010, p. 13) This document has been prepared also pursuant to Article 6(1) of the Act of 15 April 2011 *on energy efficiency* (Journal of Laws No 94, item 551), implementing the provisions of Directive 2006/32/EC.

The *National Action Plan* includes a description of measures intended to improve energy efficiency, focusing on energy end-use efficiency, and calculations concerning energy savings achieved in 2008-2009 and expected in 2016 as required by the abovementioned Directives.

This document has been prepared by the Ministry of Economy with the assistance of the Ministry of Transport, Construction and Maritime Economy, the Central Statistical Office of Poland (GUS), and the Polish National Energy Conservation Agency (KAPE S.A.).

The Minister of Transport, Construction and Maritime Economy is in charge of reporting as regards Directive 2010/31/EC *on the energy performance of buildings*.

Energy savings calculations were carried out by KAPE based on the data from the Central Statistical Office, Eurostat, as part of the ODYSSEE-MURE 2010 project under the *Intelligent Energy Europe Programme* (IEE).

Statistical information and data from the Central Statistical Office publication “Efektywność wykorzystania energii w latach 1999-2009” (“Energy efficiency in 1999-2009”), Warsaw 2011, was used herein to illustrate the trends of energy efficiency improvement based on the ODYSSEE indicators for the Polish economy and its sectors (chapter 2.2.1 and Annex 3).

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## 1. INTRODUCTION

### 1.1 Highlights of the NEEAP

The *National Action Plan* fulfils the provision of Article 14(2) of the 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* (OJ L 114 of 27.4.2006, p. 64)

This document includes in particular the description of projected energy efficiency improvement measures in all the sectors of economy, crucial for achieving the national target for efficient use of energy by 2016; the target is to be achieved within nine years starting in 2008, pursuant to Article 4 of the abovementioned Directive.

The national target for efficient energy use was defined in the First National Energy Efficiency Action Plan (EEAP) 2007, adopted by the European Committee of the Polish Council of Ministers on 31 July 2007 and forwarded to the European Commission in August 2007. According to the target, the overall amount of energy savings for 2016 is a minimum of 9% of the average annual consumption, where the average is drawn from 2001-2005. The first National Energy Efficiency Action Plan (EEAP) 2007 included also the intermediate national energy savings target for 2010, which is indicative and constitutes a path for achieving the target set for 2016, providing means for evaluating the achievements (calculations of the national target as regards efficient energy use are presented in chapter 2.1 herein and in Annex 2).

The following assumptions were taken into account for the *National Action Plan*:

- the suggested measures will be based on market mechanisms to the maximum possible extent, and budget funding will be limited to a minimum,
- the targets will be achieved following the minimum cost principle, that is by the maximum use of existing mechanisms and organisational infrastructure,
- all entities are expected to participate in order to use the entire national potential for energy effectiveness.

This *NEEAP* includes also the report required under Directive 2010/31/EC *on the energy performance of buildings*. The European Commission is presented with the information required under the Directive, which is the list of current and projected measures and support instruments, including financial ones, for energy savings in buildings (Article 10 of Directive 2010/31/EC). The information is included in chapter 3.4 and Annex 4.

The achieved (2009) and projected (2016) final energy savings under Directive 2006/32/EC have been presented in two ways. Based on national statistics and evaluation models, total final energy savings under the Directive were calculated for the national economy as a whole and by all the end-use sectors.

Furthermore, final energy savings will be determined, for selected measures, according to the bottom-up method. The method allows for demonstrating a direct relation between the implementation of the measures and the energy policy of the state. The measures monitored with the bottom-up method include a large portion of the total final energy savings, constituting more than 30% of the total energy savings which, according to Directive 2006/32/EC, should be calculated using the *bottom-up* method.

The results are given in chapter 1.3 and 2.1. Chapter 2.1 shows final energy savings by energy end-use sectors. The figures of energy savings achieved in 2009 (*top-down*) and expected in 2016 (*top-down* and *bottom-up*) are given.

## 1.2 National context of energy savings

Poland has been an active participant in creating the Community energy policy, and has implemented the relevant legislation, taking into account the national context, protection of consumer interests, its energy resources, and technological conditions of energy production and transmission.

Within the last 20 years Poland has made significant progress, among the best in Europe, as regards efficient energy use. The industry sector has had the greatest impact on the results, where trade indicators improved and advantageous structural changes took place. The majority of improvements resulted from independent decisions made by the entities driven by their calculation of costs. Undoubtedly, the Thermomodernisation and Repairs Fund remains an important support programme for efficient energy use. However, the programme is addressed to the housing and service sectors. The positive trends continued in 2009. The gap between Poland and the European average as regards the main energy efficiency indicators narrowed to around 12%, but the most efficient economies remain far in the future.<sup>1</sup> Programmes implemented by the National Fund for Environmental Protection and Water Management (Narodowy Fundusz Ochrony Środowiska i Gospodarki Wodnej), support from the funds of the Operational Programme for Infrastructure and Environment, and preference loans are also among the very important financial instruments supporting energy efficient investments. The programmes are described in detail in chapter 2.3.

Energy efficiency is a priority in energy policy, and progress in this area will be crucial for achieving all the objectives of the policy. Therefore, any and all possible measures improving energy efficiency will be taken.

Energy efficiency<sup>2</sup> is important, not only for ensuring sustainable growth and security of energy supply, but also for improving the competitiveness of Polish companies and ensuring social wealth. The government will therefore aim to reach the energy efficiency targets in a way that would be most economical, or cost effective. Energy efficiency is an economically attractive measure with a positive impact on CO<sub>2</sub> reduction.

In November 2009, the Council of Ministers adopted a resolution on the adoption of “Energy Policy of Poland until 2030”. The document, devised on the basis of the Energy Act, describes Poland's strategy to meet the most important challenges facing the Polish energy sector, both short-term and up to 2030.

The main objectives of the Polish energy policy as regards energy efficiency include:

- Aiming to maintain zero-energy economic growth, i.e. economic growth without growing demand for primary energy;
- Consistent lowering of energy consumption of the Polish economy to reach the EU-15 level.

Specific objectives in energy efficiency include:

- An increase of electricity production capabilities by building high-efficiency generation units;
- A doubling of electricity production using high-efficiency cogeneration by 2020 as compared to 2006;
- Reducing network losses in transmission and distribution, by means of e.g. modernising the existent networks and construction of new ones, exchanging low-efficiency transformers and development of distributed generation;
- Increase in energy end-use efficiency;

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<sup>1</sup> Based on statistical information and data from the Central Statistical Office publication “Efektywność wykorzystania energii w latach 1999-2009” (“Energy efficiency in 1999-2009”), Warsaw 2011.

<sup>2</sup> Energy efficiency – the ratio of the achieved amount of use effect obtained for an object, technical device or installation, under normal conditions of use or operation, to the amount of energy used by an object, technical device or installation necessary to achieve this effect.

- Increase in the ratio of annual energy demand to maximum demand in peak load times, which allows it to decrease the total cost of electric energy demands.

The following measures described in the “Energy Policy of Poland until 2030” were taken to improve energy efficiency:

- Defining the national objective for energy efficiency improvement;
- Introduction of a systemic support mechanism for measures serving to achieve the national objective for energy efficiency improvement;
- Stimulating the development of cogeneration through support mechanisms, taking into account cogeneration from sources up to 1 MW, and appropriate municipal policy;
- Using obligatory certificates of energy performance of buildings and flats when these are put on the market or leased;
- Determining energy consumption of appliances and products using energy, and introduction of minimum standards for energy-consuming products;
- Obliging the public sector to perform an exemplary role in efficient energy use;
- Supporting investments in energy savings using preferential loans and EU and national subsidies, including funds under the Act on the support for thermomodernisation and repairs, the Operational Programme for Infrastructure and Environment, regional operational programmes and funds from the National Fund for Environmental Protection and Water Management;
- Supporting research of new solutions and technologies decreasing energy consumption in all fields of energy production and use;
- Using Demand Side Management techniques, stimulated by e.g. different distribution rate schedules and electricity prices on the basis of reference prices resulting from the introduction of current day market, and transmitting price signals to consumers through two-way communication with electronic meters;
- Information and education campaigns, promoting rational energy use.

The implementation of the proposed measures has resulted in a substantial decrease of energy consumption of the Polish economy, at the same time increasing energy security. Stimulating investments in modern, energy-efficient technologies and products contributes to the innovativeness of the Polish economy. Measures in energy savings largely contribute to improving economic effectiveness of the Polish economy and its competitiveness.

The current energy effectiveness policy will be continued, and when necessary corrected, in order to contribute as best as possible to a favourable climate for investments in energy efficiency.

The *National Action Plan* includes a description of measures for improving energy efficiency taken and projected in Poland in relation to the 2010 and 2016 targets (see point 1.3). This plan and objectives in energy savings refer to the final energy use, excluding installations under the Community Emissions Trading Scheme (ETS).

### 1.3 National energy savings targets and achievements

Table 1 presents energy savings targets under Directive 2006/32/EC together with the projected results and achievements (energy savings).

**Table 1 Summary of targets and final energy savings achieved and evaluated under Directive 2006/32/EC**

	Energy savings targets (GWh)	Final energy savings achieved and evaluated (2016) (GWh)

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2010	11 878	35 320
2016	<b>53 452</b>	67 211

In the first National Energy Efficiency Action Plan 2007, the indicative energy savings targets for 2010 and 2016 were defined.

The target for 2010 was 2% of the average national final energy consumption, the average being based on the years 2001 to 2005. The indicative savings target for 2016 is 9% of this consumption. The targets are maintained in the second National Action Plan.

Due to the lack of official national statistical data on energy consumption in 2010, final energy savings achieved in 2009 were calculated.

Energy savings achieved in 2009 refer to the intermediate target, and they are also counted towards the projected energy savings for 2016.

## 2 ENERGY SAVINGS IN THE END-USE SECTORS

### 2.1 Review of national energy savings targets and achievements

Table 2 presents a review of the national energy savings targets (end-use), calculated under Directive 2006/32/EC, which were set out in the first National Energy Efficiency Action Plan 2007, and the achievements.

The table below shows that both the amount of achieved and projected final energy savings will exceed the estimated targets.

**Table 2 Review of the national energy savings targets and achievements (in end-use sectors)**

	Target in final energy savings		Final energy savings achieved and evaluated (2016)	
	Absolute values (GWh)	As a percentage of average consumption in 2001-2005 (%)	Absolute values (GWh)	As a percentage of average consumption in 2001-2005 (%)
2010	11 878	2	35 320	5.9
2016	<b>53 452</b>	9	67 211	11

Table 3 shows the final energy savings by end-use sectors.

**Table 3 Final energy savings by sectors (top-down)**

Sector	Savings achieved (GWh)
Housing (households)	13 816
Services	-
Industry	11 851
Transport	9 653
<b>Total:</b>	<b>35 320 GWh</b>



## 2.2 Energy savings calculation methodology

### 2.2.1 Energy savings calculations (top-down method)

Below we present the method for calculating final energy savings for the purposes of the second *National Action Plan*. Due to the lack of statistical data for 2010, 2009 was taken as the calculation year. Energy savings were calculated using the top-down method, according to the methodology published by the European Commission: “RECOMMENDATIONS ON MEASUREMENT AND VERIFICATION METHODS IN THE FRAMEWORK OF DIRECTIVE 2006/32/EC ON ENERGY END-USE EFFICIENCY AND ENERGY SERVICES”. 2007 is recommended by the European Commission as the base year.

Based on the analysis of available data, the following indicators may be used in reference to the given economy sectors.

	Sector	Indicator
1.	Housing	P1
2.	Services	M3, M4
3.	Transport	P9
4.	Industry	P14

The description of the indicators and the calculations can be found in Annex 2. Based on the indicators, final energy savings were calculated as their difference.

The calculations were carried out on the basis of data from the Central Statistical Office, Eurostat, as part of the ODYSSEE-MURE 2010 project under the Intelligent Energy Europe Programme (IEE).

### 2.2.2 Description of the formula used for bottom-up calculation of energy savings achieved within the Thermomodernisation and Repairs Fund

Energy savings achieved by entities using a thermomodernisation bonus as part of the support from the Thermomodernisation and Repairs Fund, were calculated based on the data from Bank Gospodarstwa Krajowego concerning the amount of thermomodernisation bonus awarded and paid from the fund by 30 September 2010 (see Table 1) and statistical analysis carried out based on a database of 1 455 energy audits verified by the Polish National Energy Conservation Agency (KAPE) in 2008. Energy audits are performed under the Regulation of the Minister of Infrastructure of 17 March 2009 on the *detailed scope and form of energy audit and a part of repairs audit, templates of audit sheets, and the algorithm for evaluating cost-effectiveness of thermomodernisation investments* (Journal of Laws No 43, item 346).

Table 1. Bonuses awarded from the Thermomodernisation and Repairs Fund (by 30 September 2010)

Description	Value (in PLN million)	Quantity (items)
Value of investments	7 040	
Amount of loans	5 073	
Value and number of awarded bonuses	1 076	19 288
Value and number of paid bonuses	835	15 601

Source: BGK

Using the database of audits verified by the Polish National Energy Conservation Agency (1 400 audits), the average annual energy savings per one awarded thermomodernisation bonus were calculated, equal to: 702.7 GJ/year or 16.77 toe/year.

Multiplying the number of awarded bonuses: 19 288 (see table 1) by annual energy savings per one awarded bonus (16.77 toe) results in 323 496 toe. Following an order by the Ministry of Economy, and based on energy audits of investments, Bank Gospodarstwa Krajowego (BGK) currently gathers information about savings achievements for which thermomodernisation bonuses were awarded. Therefore, the bottom-up method proposed for documenting energy savings achieved by entities using the thermomodernisation bonus within the support from the Thermomodernisation and Repairs Fund, will in the future (2011-2016) involve simply summing up all the savings in the BGK database containing all the audits performed in such investments.

The same procedure may be applied towards projects supported within priority programmes of the National Fund for Environmental Protection and Water Management.

### **2.2.3. Analysis and trends of energy efficiency improvement on the basis of the ODYSSEE indicators for the Polish economy and its sectors**

The Central Statistical Office and the Polish National Energy Conservation Agency (Krajowa Agencja Poszanowania Energii S.A.) have for several years participated in a number of projects aimed at improving energy efficiency and describing the measures implemented to improve energy efficiency. At present, they participate in a 2.5-year (2010 to 2012) project under the Intelligent Energy Europe Programme (IEE) programme called "Monitoring of European Union and national energy efficiency targets: ODYSSEE - MURE 2010". The main objective of the project is to use the developed energy efficiency indicators for EU economies to analyse, identify and evaluate the results of energy efficiency policy measures.

The project involves the establishment and development of the ODYSSEE database,<sup>3</sup> which includes the data and amounts of energy efficiency indicators, and the MURE database<sup>4</sup> with information concerning energy efficiency improvement measures.

Annex 3 to the second *National Action Plan* demonstrates energy efficiency indicators resulting from the efforts on the current project, as well as previous ones, concerning energy efficiency indicators of the “Intelligent Energy Europe Programme”, and they are based on the methodology developed within these projects. The data on energy consumption in 2009 were collected and grouped according to the Polish Classification of Activity of 2007.

### 2.3 Energy efficiency improvement measures by sectors

This chapter shows energy savings by each end-use sector, and describes the implemented and projected measures for improving energy efficiency by end-use sectors. Total energy savings are demonstrated by means of the top-down method (TD). Bottom-up method (BU) will be used for selected energy efficiency improvement measures.

The main obstacles in the development of energy efficiency improvement measures and implementation of the first National Energy Efficiency Action Plan (EEAP) 2007 included:

- insufficient interest in funds for energy savings on the part of energy companies,
- no tariff incentives favouring consumers using energy rationally,
- insufficient support for energy efficiency improvement measures taken by the society,
- financial barriers (e.g. no specific budget, limited aid measures),
- meagre results of energy-efficient measures taken by households,
- limited knowledge and low awareness of energy consumers (e.g. no knowledge about information sources on energy efficiency).

In order to remove the obstacles in achieving the national target in efficient energy use, the existing energy efficiency improvement measures had to be modified, and new measures for 2011-2016 had to be proposed.

So far in Poland, there had been no legal regulations which would ensure the implementation of energy efficiency improvement programmes and measures necessary to achieve the required energy savings. Also, market mechanisms motivating for energy-efficient measures were not strong enough. Therefore, a new legal regulation was introduced in the form of the Act of 15 April 2001 on energy efficiency (Journal of Laws No 94, item 551), with the aim to boost the development of mechanisms stimulating energy efficiency improvement. The Act introduces the obligation of acquiring an appropriate number of energy efficiency certificates, the so-called white certificates, by energy companies selling electricity, heat, or natural gas to end consumers connected to the network on the territory of the Republic of Poland.

The system will work just like the current green certificates for energy from renewable energy sources and red certificates for electricity produced in cogeneration. The certificates may be issued to e.g. businesses which cut down on their energy consumption by investing in modern technologies. The energy efficiency certificates are issued and redeemed by the President of the Energy Regulatory Office. Revenues from substitution fees and fines for non-compliance with the requirement to obtain energy efficiency certificates and submit them for redemption with the President of the Energy Regulatory Office, or for failing to pay substitution fees, and for failing to comply with other obligations under the Act on energy efficiency, will be gathered on the bank account of the National Fund for Environmental Protection and Water Management. The revenues

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<sup>3</sup> [www.odyssee-indicators.org](http://www.odyssee-indicators.org)

<sup>4</sup> [www.mure2.com](http://www.mure2.com)

will be used as a financing source for programmes supporting the improvement of energy efficiency, including high-efficiency cogeneration, or for supporting the development of renewable energy sources and the construction and redevelopment of networks used for connecting the sources.

Moreover the Act defines the rules of preparing energy efficiency audits and acquisition of a licence of an energy efficiency auditor. It also introduces the obligation for the public sector to perform an exemplary role in energy efficiency. The Act obliges government units and local authorities to perform their duties applying at least two energy efficiency improvement measures from the list of measures given in the Act. After analysing programmes and measures for energy efficiency improvement, both existing and projected within national policies, priority measures for the purposes of this *National Action Plan* were selected and additional, new measures were introduced to ensure the achievement of the national energy efficiency targets.

As a result, the following efficiency improvement measures were defined:

1. Measures in housing (households)
  - a. Thermomodernisation and Repairs Fund (continued).
2. Measures in the public sector
  - a. Green Investment Scheme (Part 1) – energy management in public utility facilities (**new**).
  - b. Green Investment Scheme (Part 5) – energy management in the facilities of selected public finance sector entities (**new**).
  - c. Operational Programme “Energy efficiency and the promotion of renewable energy sources” for the use of financial resources within the EEA Financial Mechanism and the Norwegian Financial Mechanism in 2012-2017 (**new programme under development**).
  - d. Operational Programme Infrastructure and Environment (OPIE) – Measure 9.3 Thermomodernisation of public utility facilities (continued).
3. Measures in industry and SMEs
  - a. Efficient energy use (Part 1) – Supplementary financing of energy and electrical energy audits in businesses (**new**).
  - b. Efficient energy use (Part 2) – Supplementary financing of investment measures aiming at energy savings or at increasing energy efficiency of businesses (**new**).
  - c. Priority Programme Smart Grids (**new, programme to be launched in 2012**).
  - d. Operational Programme Infrastructure and Environment (OPIE) – Measure 9.2 Efficient energy distribution (continued).
  - d. Operational Programme Infrastructure and Environment (OPIE) – Measure 9.1 Efficient energy distribution (continued).
4. Measures in transport
  - a. Traffic management systems and optimisation of the transport of goods (continued).
  - b. Exchange of fleet in municipal transit companies and the promotion of eco-friendly driving (**new, programme to be launched in 2012**).
5. Horizontal measures
  - a. Scheme of energy efficiency certificates – so-called white certificates (**new**).
  - b. Information campaigns, trainings and education in improving energy efficiency (continued).

### 2.3.1 Housing (households)

**Table 2.3.1.1 Overview of measures in the housing sector**

Title of the energy saving measure: <b>Thermomodernisation and Repairs Fund</b>		
Description	Category	7.3 Funds
	Timeframe	Start: 2009 End: this is a systemic measure – the Act does not provide for a definite time framework for the programme
	Aim (brief description)	<p>A support system for thermomodernisation and repair investments. To obtain a thermomodernisation bonus:</p> <ul style="list-style-type: none"> <li>• the investor carries out an energy audit to determine the work that needs to be done, what is the estimated cost and the expected savings,</li> <li>• the investor files a loan application in a commercial bank, together with an application for a thermomodernisation bonus,</li> <li>• after the bonus is awarded, the investor draws up a construction plan and carry out the investment accordingly</li> <li>• the crediting bank gives the loan,</li> <li>• the crediting bank notifies BGK that the investment is completed and that a loan was given,</li> <li>• BGK pays the thermomodernisation bonus.</li> </ul> <p>The amount of the thermomodernisation bonus constitutes 20% of the amount of loan for the investment, but no more than:</p> <ul style="list-style-type: none"> <li>• 16% of expenses incurred for the investment, and</li> <li>• twice the amount of expected annual energy savings.</li> </ul> <p>In the case of a repair investment, the investor is entitled to a bonus for paying back a part of the loan taken for the investment, which is called a repairs bonus; under the Act, awarding the bonus depends on achieving a specific energy savings effect (a decrease in annual demand for energy delivered to multi-dwelling units for heating and water heating by at least 10%, and if the cost indicator of the investment exceeds 0.3 – by at least 25%).</p>
	Objective at the final consumer	The primary objective of the Act of 21 November 2008 on supporting thermomodernisation and repairs is to offer financial aid for investors who want to improve the technical condition of an existing housing resource, and in particular of common areas of multi-dwelling units, and to reduce the consumption of energy for heating purposes.

	Target group	Owners of multi-dwelling units, owners and administrators of all other housing facilities, and local government units with the exception of local government budgetary enterprises.
	Regional application	N/A
Information on implementation	List and description of energy efficiency measures	<p>Thermomodernisation bonus applies when thermomodernisation investments are made, which aim at:</p> <ul style="list-style-type: none"> <li>• decreasing the consumption of energy for heating and water heating purposes in housing units, multi-dwelling units, and facilities owned by local government units and used by them for public tasks,</li> <li>• decreasing the cost of acquiring heat delivered to the buildings – as a result of building a technical connection for a centralised heating source due to the liquidation of a local heat source,</li> <li>• decreasing primary energy losses in local heating grids and local heat sources,</li> <li>• a complete or partial change of energy sources to renewable sources, or using high-efficiency cogeneration – with the obligation to achieve energy savings defined in the Act.</li> </ul> <p>Repairs bonus applies when thermomodernisation investments are made, which consist in:</p> <ul style="list-style-type: none"> <li>• repairing a multi-dwelling unit,</li> <li>• exchanging windows, or repairing balconies in multi-dwelling units, even if they are used exclusively by the dwelling's owners,</li> <li>• alterations of multi-dwelling units, resulting in improvements,</li> <li>• equipping multi-dwelling units with installations and devices required for buildings approved for housing according to technical and construction regulations.</li> </ul>
	Budget and financial source	approx. PLN 200 million per year, Public funds
	Implementing body	Bank Gospodarstwa Krajowego
	Monitoring authority	Minister of Transport, Construction and Maritime Economy
Energy savings	Method of monitoring/measuring energy savings	BU
	Energy savings achieved in 2010 <sup>5</sup>	3 765 GWh
	Energy savings expected in 2016 <sup>6</sup>	8 121 GWh

<sup>5</sup> KAPE's own calculations performed as part of the study: "Analyses and expert's opinions on the implementation and evaluation of the National Energy Efficiency Action Plan". Agreement No II/120/P/75001/10/D concluded on 18 October 2010 between the Ministry of Economy and KAPE.

<sup>6</sup> KAPE's own calculations, see above.

### 2.3.2 Measures in the service sector (incl. public sector)

**Table 2.3.2.1 Overview of measures in the public sector**

Title of the energy saving measure: <b>Green Investment Scheme (Part 1) – energy management in public utility facilities</b> <sup>7</sup>		
Description	Category	7.3 Funds
	Timeframe	Start: 2011 <sup>8</sup> End: 2014
	Aim (brief description)	Decrease in energy consumption in public utility facilities
	Objective at the final consumer	Decrease in energy consumption
	Target group	1) local government units and associations thereof; 2) entities which are not entrepreneurs and which provide public services as part of local government own tasks; 3) Voluntary Fire Services; 4) universities, within the meaning of the Act on university education, and research institutes; 5) independent public and non-public healthcare centres; 6) non-governmental organisations, churches, other religious associations, church legal persons which carry out activity in health protection and disease prevention, rehabilitation or social assistance; 7) an entity or a unit defined in points 1 to 6, which is a party to a loan agreement in a collective project.
	Regional application	N/A

<sup>7</sup> Priority programme adopted by the Supervisory Board of the National Fund for Environmental Protection and Water Management on 22 March 2011

<sup>8</sup> Programme implementation: 2010–2014. Budget allocation: January 2010 – 2013. Payments: by 31 December 2014. Minimum total cost of investment: exceeding PLN 2 million. In the case of collective projects, the total amount of the investment, resulting from the agreement on supplementary financing by means of subsidies and loan/s must exceed PLN 5 million.

Information on implementation	List and description of energy efficiency measures	Number of facilities under thermomodernisation – approx. 3 000 <sup>9</sup> 1. Supplementary financing may be granted for investments in public utility facilities. <sup>10</sup> 2. Thermomodernisation of public utility facilities, including equipping facilities with appliances of the highest, economically justified energy efficiency standards, directly related with the thermomodernisation of the facilities, in particular: a. insulation of a building, b. exchange of windows, c. exchange of external door, d. alterations of the heating system (including the change of the heat source), e. exchange of ventilation and air conditioning systems, f. preparation of technical documentation for the investment, g. energy management systems in buildings, h. the use of technologies of renewable energy sources. 3. Exchange of internal lighting for an energy-efficient one (as additional work performed together with facility thermomodernisation).
	Budget and financial source	PLN 555 million as a subsidy from funds from AAU trade transactions <sup>11</sup> or from the National Fund for Environmental Protection and Water Management, and PLN 1 010 million as a loan from the funds of the National Fund for Environmental Protection and Water Management.
	Implementing body	National Fund for Environmental Protection and Water Management
	Monitoring authority	Minister of the Environment
Energy savings	Method of monitoring/measuring energy savings	BU
	Energy savings achieved in 2010	Ongoing programme, the results are differently distributed over the years
	Expected energy savings in 2016	1 950 GWh

<sup>9</sup> Supplementary financing is not available to investments from the basic ranking list of the Operational Programme Infrastructure and Environment measure 9.3, or investments which obtained financing from the National Fund for Environmental Protection and Water Management under other projects.

<sup>10</sup> Public utility facilities shall be understood as facilities intended for the following functions: local and state administration, fire protection performed by Voluntary Fire Services, voluntary fire services, the system of justice, culture, religious practices, education, science, healthcare, social assistance and welfare, as well as collective dwellings intended for periodic stay of persons outside their permanent residence (in particular: boarding houses, university dormitories, military barracks, correction facilities and juvenile detention facilities), and facilities for permanent residence (in particular: retirement homes, orphanages, residential care homes, convents and monasteries);

<sup>11</sup> AAU (Assigned Amount Units) – a unit of assigned greenhouse gas emissions, equal to one metric tonne of carbon dioxide equivalent. The units were used in the Kyoto Protocol to define the amounts of emissions allowed to states-signatories over the 2008-2012 commitment period. Assigned Amount Units are subject to international trading, and the funds obtained by selling the Units by Poland are spent on the Green Investment Scheme.



**Table 2.3.2.2 Overview of measures in the public sector**

Title of the energy saving measure: <b>Green Investment Scheme (Part 5) – energy management in the facilities of selected public finance sector entities</b>		
Description	Category	7.3 Funds
	Timeframe	Start: 2010 End: 2015
	Aim (brief description)	Decrease in energy consumption in the facilities of selected public finance sector entities.
	Objective at the final consumer	Decrease in energy consumption
	Target group	The Polish Academy of Sciences and institutes established by the Academy, state cultural institutions, and budgetary institutions
	Regional application	N/A
Information on implementation	List and description of energy efficiency measures	Thermomodernisation of buildings, including equipping facilities with appliances of the highest, economically justified energy efficiency standards, directly related with the thermomodernisation of the facilities, in particular: a. insulation of a building, b. exchange of windows, c. exchange of external door, d. alterations of the heating system (including the change of the heat source), e. exchange of ventilation and air conditioning systems, f. preparation of technical documentation for the investment, g. the use of energy management systems in buildings, h. the use of technologies of renewable energy sources; 2) Exchange of internal lighting for an energy-efficient one (as additional work performed together with facility thermomodernisation).
	Budget and financial source	PLN 500 million from the National Fund for Environmental Protection and Water Management (100% subsidy) Minimum investment cost: PLN 2 million.
	Implementing body	National Fund for Environmental Protection and Water Management
	Monitoring authority	Minister of the Environment
Energy savings	Method of monitoring/measuring	BU
	Energy savings achieved in 2010	Ongoing programme, the results are differently distributed over the years
	Energy savings expected in 2016	No data

**Table 2.3.2.3 Overview of projected measures in the public sector**

Title of the energy saving measure: <b>Programme “Energy efficiency and the promotion of renewable energy sources” (within the EEA Financial Mechanism and the Norwegian Financial Mechanism in 2012-2017)</b>		
Description	Category	7.3 Funds
	Timeframe	Start: 2012 End: 2017
	Aim (brief description)	The programme is currently in the preparation stage. The scope of the financed investments includes: 1. Local projects which aim at improving energy efficiency in buildings, including thermomodernisation of public utility facilities intended for education, healthcare, social assistance and welfare, and state and local government administration; 2. Projects aimed at replacing obsolete heating sources with a capacity from 0.2 MW to 3 MW with modern, energy-efficient eco-friendly energy sources in public utility facilities. 3. Modernisation of district heating. 4. Promotion of RES (including solar collectors, photovoltaic systems, biogas, geothermal sources, etc.) Currently also non-investment projects are taken into account, aimed at education and raising social awareness about energy efficiency and RES.
	Objective at the final consumer	Decrease in energy consumption
	Target group	All public and private sector institutions and non-governmental organisations legally established in Poland and acting for public interest.
	Regional application	N/A
	Information on implementation	List and description of energy efficiency measures
	Budget and financial source	Resources within the EEA Financial Mechanism and the Norwegian Financial Mechanism in 2012-2017: EUR 75 million.
	Implementing body	Ministry of the Environment, National Fund for Environmental Protection and Water Management
	Monitoring authority	Minister of Regional Development
Energy savings	Method of monitoring/measuring	BU
	Energy savings achieved in 2010	None
	Energy savings expected in 2016	No data

**Table 2.3.2.4 Overview of projected measures in the public sector**

Title of the energy saving measure: <b>Operational Programme Infrastructure and Environment (OPIE) – Measure 9.3 Thermomodernisation of public utility facilities</b>		
Description	Category	7.3 Funds
	Timeframe	Start: 1 January 2007 End: 2015
	Aim (brief description)	Energy-saving efforts in the public sector will include the support for thermomodernisation of public utility facilities, including equipping facilities with appliances of the highest, economically justified energy efficiency standard, directly related to the thermomodernisation of the building.
	Objective at the final consumer	Decrease in energy consumption in the public sector
	Target group	1. Entities of the public finance sector: - local government units and groups, unions, associations and agreements thereof, - entities which are not entrepreneurs and which provide public services as part of local government own tasks; - official authority bodies, including government administration units, state inspection bodies, law enforcement, courts and tribunals, - police bodies, fire services (including Voluntary Fire Services), and municipal police bodies, - state universities, - independent public healthcare centres. 2. Non-governmental organisations, churches, church legal persons and associations thereof, and other religious associations.
	Regional application	N/A
Information on implementation	List and description of energy efficiency measures	Thermomodernisation of public utility facilities <sup>12</sup> together with the exchange of equipment of the facilities for energy-efficient ones, as regards expenses for: <sup>13</sup> - insulation of a building, - exchanging windows, external doors, and lighting for energy-efficient ones, - alterations of the heating system (including the change of the heat source), ventilation and air-conditioning systems, - preparation of technical documentation for the investment.  Projects carried out in public utility facilities where over 15% of the total space of the building is used for a business activity or housing purposes are not eligible for support.

<sup>12</sup> Public utility facilities shall be understood as facilities intended for the purposes of public administration, the justice system, culture, religious practices, education, university education, science, healthcare, social assistance and welfare, and sport, excluding facilities intended for housing purposes, such as: dormitories, boarding houses, convents, teachers' residential houses.

<sup>13</sup> Detailed scope of eligible expenditure is included in the terms and conditions of the competition.

	Budget and financial source	Resources within the measure, EU fund allocation (Cohesion Fund) – EUR 76.7 million.
	Implementing body	National Fund for Environmental Protection and Water Management
	Monitoring authority	Minister of Regional Development
Energy savings	Method of monitoring/measuring	BU
	Energy savings achieved in 2010	Ongoing programme, the results are differently distributed over the years
	Energy savings expected in 2016	320 GWh

### 2.3.3 Measures in industry and SMEs

**Table 2.3.3.1 Overview of measures in industry and SMEs**

Title of the energy saving measure: <b>Efficient energy use (Part 1) – Supplementary financing of energy and electrical energy audits in businesses</b>		
Description	Category	7.3 Funds
	Timeframe	Start: 2011 End: 2014
	Aim (brief description)	The aim of the programme is to launch investment actions which increase energy efficiency of the economy, include the support mechanism and lead to measurable energy savings.
	Objective at the final consumer	Decrease in energy consumption
	Target group	Industry sector, meaning entrepreneurs whose total energy consumption (electric, thermal, and gas energy) exceeds 50 GWh of energy.
	Regional application	N/A
Information on implementation	List and description of energy efficiency measures	Supplementary financing will be offered to energy audits of technological processes, electrical energy audits of buildings and internal industrial grids, energy audits of thermal energy, electricity and cooling, energy audits of external heating networks and buildings.
	Budget and financial source	PLN 40 million, from the National Fund for Environmental Protection and Water Management
	Implementing body	National Fund for Environmental Protection and Water Management
	Monitoring authority	Minister of the Environment
Energy savings	Method of monitoring/measuring energy savings	BU
	Energy savings achieved in 2010	None
	Energy savings expected in 2016	200 energy and electrical energy audits carried out in businesses

**Table 2.3.3.2 Overview of measures in industry and SMEs**

Title of the energy saving measure: <b>Efficient energy use (Part 2) – Supplementary financing of investment measures aiming at energy savings or at increasing energy efficiency of businesses</b>		
Description	Category	7.3 Funds
	Timeframe	Start: 1 July 2011 End: 2015
	Aim (brief description)	The aim of the programme is to increase energy efficiency of businesses, based on investment actions including the support mechanism and leading to efficient energy use or measurable energy savings.
	Objective at the final consumer	Decrease in energy consumption
	Target group	Industry sector, meaning entrepreneurs whose total energy consumption (electric, thermal, and gas energy) exceeds 50 GWh of energy.
	Regional application	N/A
Information on implementation	List and description of energy efficiency measures	<p>A company may participate in the programme on the condition that it carries out an energy or electrical energy audit before; it is not required however for the audit to be carried out within a priority programme of the National Fund for Environmental Protection and Water Management. In particular, the material scope of investments will include:</p> <ol style="list-style-type: none"> <li>1. implementation of energy management systems and energy quality management systems (installing grid parameter analysers), and implementation of Smart Grid systems for managing electrical energy grids in business facilities.</li> <li>2. efficient use of electricity by means of: <ul style="list-style-type: none"> <li>• energy efficient drive systems,</li> <li>• drive control systems e.g. by gentle start-up installations,</li> <li>• energy efficient engines,</li> <li>• inverters for pumps and fans,</li> <li>• energy-efficient compressors and compressor control systems,</li> <li>• internal energy transmission grids, including limiting passive power flows,</li> </ul> </li> </ol>

		<ul style="list-style-type: none"> <li>• energy efficient lighting systems,</li> <li>• network drive rectifiers,</li> <li>• low loss transformers in local electric energy systems and internal distribution networks.</li> </ul> <p>3. efficient use of thermal energy and gas by means of:</p> <ul style="list-style-type: none"> <li>• insulation and dewatering of steam systems,</li> <li>• geothermal systems, small wind turbines, solar collectors, heat pumps,</li> <li>• thermomodernisation of buildings,</li> <li>• recuperation and heat recovery from processes and devices,</li> <li>• decentralisation of extended heating networks,</li> <li>• using energy from waste,</li> <li>• construction/modernisation of internal energy sources.</li> </ul> <p>4. modernisation of industrial processes</p>
	Budget and financial source	PLN 780 million, from the National Fund for Environmental Protection and Water Management
	Implementing body	National Fund for Environmental Protection and Water Management
	Monitoring authority	Minister of the Environment
Energy savings	Method of monitoring/measuring energy savings	BU
	Energy savings achieved in 2010	None
	Energy savings expected in 2016	2 900 GWh

**Table 2.3.3.3 Overview of measures in industry and SMEs**

Title of the energy saving measure: Programme offering access to financial instruments for SMEs (PolSEFF)		
Description	Category	7.3 Funds
	Timeframe	Start: 2011 End: no data
	Aim (brief description)	PolSEFF stands for the Polish Sustainable Energy Financing Facility with a EUR 150 million credit line. PolSEFF tries to help small and medium sized businesses (SMEs) interested in investing in new, sustainable energy technologies and equipment which reduce energy consumption or produce energy from renewable resources.
	Objective at the final consumer	Energy savings
	Target group	SMEs
	Regional application	Only when applicable
Information on implementation	List and description of energy efficiency measures	Financing may be obtained as a loan or lease in the amount of up to EUR 1 million with the help of financial institutions participating in the Programme (banks and leasing institutions). 1. Investments allowing to achieve at least 20% savings in energy consumption; 2. Investments increasing efficient energy use in buildings, allowing for energy consumption cuts in commercial and administrative buildings of SMEs by 30%; 3. Investments in renewable energy sources; 4. Investments including selected technologies – investments in undertakings and equipment selected from a prepared technology list.
	Budget and financial source	EUR 150 million, from the funds of the European Bank for Reconstruction and Development (EBRD)
	Implementing body	EBRD
	Monitoring authority/institution	EBRD/Minister of Economy
Energy savings	Method of monitoring/measuring	BU or other
	Energy savings achieved in 2010	None
	Energy savings expected in 2016	No data



**Table 2.3.3.4 Overview of projected measures in industry and SMEs**

Title of the energy saving measure: Priority Programme: Smart Grids		
Description	Category	7.3 Funds
	Timeframe	Start: 2012 End: no data
	Aim (brief description)	It is intended that the National Fund for Environmental Protection and Water Management will provide financial support for: promotional and educational actions, the implementation (in pilot areas) of smart metering and information transmission networks, efforts in balancing and optimisation of electricity, heat, and gas consumption (measuring and feedback), the implementation (in pilot areas) of distributed renewable energy sources, energy storage facilities and smart lighting networks using energy-efficient lighting, development works, development of IT systems and specification of standards. The implementation of Smart Grids in pilot city areas will be conducive to sustainable development of cities.
	Objective at the final consumer	Decrease in energy consumption
	Target group	<ul style="list-style-type: none"> <li>• entrepreneurs – operators of electric/gas energy distribution and transmission systems who balance the system and cooperate with local government and/or housing cooperatives (associations),</li> <li>• local government units which in their area organise pilot Smart Grid areas and develop Smart Grid projects,</li> <li>• administrators of special economic zones<sup>14</sup></li> </ul>

<sup>14</sup> Capital companies pursuant to Art.6 of the Act of 20 October 1994 on special economic zones (Journal of Laws of 2007 No 42, item 274, as amended)

	Regional application	N/A
Information on implementation	List and description of energy efficiency measures	<ul style="list-style-type: none"> <li>• promotional and educational actions as regards Smart Grids, including smart metering,</li> <li>• implementation of smart measuring systems (AMI) in pilot areas, and optimisation of electric, gas and thermal energy use and service water use,</li> <li>• implementation of distributed renewable and/or alternative energy sources within smart grid projects (in pilot areas),</li> <li>• implementation of energy storage devices within smart grid projects (in pilot areas),</li> <li>• implementation of smart lighting networks using energy-efficient lighting in pilot areas,</li> <li>• preparing studies (including IT software) for energy transmission and distribution companies facilitating the development of peak load times management systems and for integrating energy measurement and distribution with telecommunication systems,</li> <li>• preparing technical feasibility studies for smart grid projects,</li> <li>• preparing studies concerning specifications and standards for measures related to smart grids.</li> </ul>
	Budget and financial source	PLN 542 million, National Fund for Environmental Protection and Water Management. It is intended that the priority programme Smart Grids will be adopted in October 2011 along with implementation in January 2012.
	Implementing body	National Fund for Environmental Protection and Water Management
	Monitoring authority	Minister of the Environment
Energy savings	Method of monitoring/measuring energy savings	BU
	Energy savings achieved in 2010	None
	Energy savings expected in 2016	No data

**Table 2.3.3.5 Overview of projected measures in industry and SMEs**

Title of the energy saving measure: <b>Operational Programme Infrastructure and Environment (OPIE) – Measure 9.2 Efficient energy distribution</b>		
Description	Category	7.3 Funds
	Timeframe	Start: 1 January 2007 End: 2015
	Aim (brief description)	The measure is aimed at decreasing energy losses in energy and heat distribution. Measures under this priority will significantly satisfy territorial demands for increasing energy efficiency. The intervention of public funds in electric energy distribution grids will be in particular allocated to areas in eastern Poland. Modernisation of heating grids will have a significant impact on increasing energy efficiency in large urban complexes.
	Objective	Decrease in energy consumption
	Target group	1. Entrepreneurs, 2. Local government units and groups, unions, associations and agreements thereof, 3. Entities which provide public services as part of local government own tasks.
	Regional application	N/A
Information on implementation	List and description of energy efficiency measures	The following projects are developed under the measure: comprehensive projects in construction (replacing the existing system) or alterations of high, medium and low voltage electric energy grids aimed at cutting down grid losses (exchange of low energy-efficiency transformers, shortening of very long distance lines, changing cross-sections of wires to adjust it to current grid temperatures, and other types of projects equivalent in terms of their results).

		<p>Under this measure it is also intended to support investments in alterations and construction (replacing existing systems) of heating grids and district heating with the largest potential for decreasing energy losses as a result of energy-efficient technologies and solutions.</p> <p>Only projects for electric energy grids which will demonstrate cuts in energy losses by at least 30% will be eligible for funding.</p>
	Budget and financial source	Resources within the measure, EU allocation – EUR 196.9 million.
	Implementing body	National Fund for Environmental Protection and Water Management
	Monitoring authority	Minister of Regional Development
Energy savings	Method of monitoring/measuring energy savings	BU
	Energy savings achieved in 2010	Ongoing programme, the results are differently distributed over the years
	Energy savings expected in 2016	498 GWh

**Table 2.3.3.6 Overview of projected measures in industry and SMEs**

Title of the energy saving measure: <b>Operational Programme Infrastructure and Environment (OPIE) – Measure 9.1 Efficient energy distribution</b>		
Description	Category	7.3 Funds
	Timeframe	Start: 1 January 2007 End: 2015
	Aim (brief description)	As regards increasing energy efficiency of the energy sector, funding will be awarded for increasing the efficiency of electricity generation, in particular combined heat and power generation. The priority in the strategy for reducing energy consumption of energy generation and transmission processes is distributed generation and construction of local, small energy sources producing both electricity and heat for local needs, which do not require long-distance transmission. Measures in this area should comply with the requirements under Directive 2004/8/EC.
	Objective	Decrease in energy consumption
	Target group	1. Entrepreneurs, 2. Local government units and groups, unions, associations and agreements thereof, 3. Entities which provide public services as part of local government own tasks.
	Regional application	N/A
Information on implementation	List and description of energy efficiency measures	<p>The following investments will be supported under the measure:</p> <ul style="list-style-type: none"> <li>– investments in alterations and construction of units for combined heat and electricity generation which meet the requirements of high-efficiency cogeneration;</li> <li>– promotion of cogeneration based on a useful heat demand;</li> <li>– projects in combined heat and power generation from renewable and non-renewable energy sources;</li> <li>– construction or alteration of heat generation units, as a result of which the units will be replaced with combined heat and power generation units that meet the requirements of high-efficiency cogeneration set forth in Directive 2004/8/EC.</li> </ul> <p>Within the projects, support may also be awarded to construction of connections for high-efficiency combined heat and power generation units to the nearest existing grid which meets the technical and economic conditions for connection. In this</p>

		context, the connection, understood as a section of the grid between energy generation unit/units with the point where ownership of the grid is delimited between the owner of the generation unit and the grid operator, may constitute an integral part of a project related to an energy generation unit, necessary to achieve the project objective. <sup>15</sup>
	Budget and financial source	Resources within the measure, EU allocation – EUR 58 million.
	Implementing body	National Fund for Environmental Protection and Water Management
	Monitoring authority	Minister of Regional Development
Energy savings	Method of monitoring/measuring energy savings	BU
	Energy savings achieved in 2010	Ongoing programme, the results are differently distributed over the years
	Energy savings expected in 2016	3 100 GWh

<sup>15</sup> Ownership delimitation defined in the connection agreement between the entrepreneur producing energy and the grid operator

### 2.3.4 Measures in transport

**Table 2.3.4.1 Overview of measures in transport**

Title of the energy saving measure: <b>Traffic management systems and optimisation of the transport of goods</b>		
Description	Category	7.3 Funds
	Timeframe	Start: 2008 End: no data
	Aim (brief description)	The aim of the project supported with EU funds is to install traffic management systems in cities and to facilitate the purchase of systems optimising the transfer of goods by companies
	Objective at the final consumer	Reduction of energy consumption for transport
	Target group	Cities and transport companies
	Regional application	N/A
Information on implementation	List and description of energy efficiency measures	Modernisation of transport means within goods transport systems. Promotion of intermodal transport. Reduction of excessive transport demand. Actions aimed at increasing the use of rail transport. Establishment of zones with limited or regulated access for transport users.
	Budget and financial source	Own resources of municipalities and cities, EU budget funds
	Implementing body	Ministry of Transport, Construction and Maritime Economy
	Monitoring authority	Minister of Regional Development
Energy savings	Method of monitoring/measuring energy savings	TD
	Energy savings achieved in 2010	9 653 GWh
	Energy savings expected in 2016	13 360 GWh

**Table 2.3.4.2 Overview of projected measures in transport**

Title of the energy saving measure: <b>Exchange of fleet in municipal transit companies and the promotion of eco-friendly driving</b>		
Description	Category	7.3 Funds
	Timeframe	Start: 2012 End: 2016
	Aim (brief description)	The aim of the programme is the purchase of new vehicles, mainly municipal transit buses, and the promotion of eco-friendly driving among passenger vehicle users.
	Objective at the final consumer	Reduction of energy consumption for transport
	Target group	Transport companies and passenger vehicle users
	Regional application	N/A
Information on implementation	List and description of energy efficiency measures	Modernisation of road transportation vehicles (purchase of more fuel-efficient vehicles by transport companies). Introduction of eco-friendly driving to drivers' habits.
	Budget and financial source	Funds from relevant European Union programmes between 2014 and 2020
	Implementing body	Ministry of Transport, Construction and Maritime Economy
	Monitoring authority	Minister of Regional Development
Energy savings	Method of monitoring/measuring energy savings	TD
	Energy savings achieved in 2010	None
	Energy savings expected in 2016	2 500 GWh



### 2.3.5 Horizontal measures

**Table 2.3.5.1 Overview of projected horizontal measures**

Title of the energy saving measure: <b>White certificate scheme</b>		
Description	Category	7.1 Obligation imposed on entities required to either obtain certificates of energy efficiency (white certificates) and submit them for redemption with the President of the Energy Regulatory Office, or pay a substitution fee
	Timeframe	Start: 2013 End: 2016
	Aim (brief description)	Support mechanism for measures aimed at improving energy efficiency of the economy
	Objective at the final consumer	Increase of energy savings by final consumers
	Target group	Energy companies selling electricity, heat, or natural gas to final consumers connected to the grid on the territory of the Republic of Poland; Final consumers connected to the grid on the territory of the Republic of Poland, who are members of the commodity exchange market, <sup>16</sup> in relation to transactions concluded on their own behalf on the commodity exchange market; Commodity brokerage houses or brokerage houses <sup>17</sup>
	Regional application	Only when applicable
Information on implementation	List and description of energy efficiency measures	The white certificate scheme supports energy-efficient investments, such as modernisation of local heating grids and heat sources, buildings, lighting, household appliances, as well as energy recovery and modernisation of industrial devices and installations. President of the Energy Regulatory Office is entitled to issue and redeem white certificates.

<sup>16</sup> within the meaning of Article 2(5) of the Act of 26 October 2000 on commodity exchange markets (Journal of Laws of 2010 No 48, item 284, No 81, item 530 and No 182, item 1228)

<sup>17</sup> Referred to in Article 2(8) and (9) of the Act of 26 October 2000 on commodity exchange markets

		Property rights resulting from the certificates will be subject to trading, and they will be considered a commodity subject to trading on the commodity exchange market or on the regulated market. A detailed list of investments which may participate in the tender procedure will be prepared by means of an announcement by the Minister of Economy. The Minister of Economy will have an additional task related to system monitoring: to calculate the achieved energy savings, as well as to prepare reports and submit them to the European Commission.
	Budget and financial source	It is expected that administrative expenses due to actions in the white certificate scheme will amount to approx. PLN 3 million per year.
	Implementing body	Energy Regulatory Office
	Monitoring authority	Minister of Economy
Energy savings	Method of monitoring/measuring energy savings	BU or other
	Energy savings achieved in 2010	None
	Energy savings expected in 2016	25 586 GWh <sup>18</sup>

<sup>18</sup> According to the regulatory impact assessment, the final energy savings by 2016 are expected to reach the level of approx. 2.2 Mtoe, i.e. 2.2 Mtoe x 11 630 GWh = 25 586 GWh

**Table 2.3.5.2 Overview of horizontal measures**

Title of the energy saving measure: <b>National information and educational campaigns</b>		
Description	Category	2.1 Targeted information and educational campaigns organised and coordinated by the Ministry of Economy and the Ministry of Transport, Construction and Maritime Economy
	Timeframe	Start: 2012 End: 2016
	Aim (brief description)	The aim is to modify social behaviours to more saving-oriented ones by means of information and educational campaigns.
	Objective at the final consumer	Increase in social awareness regarding energy efficiency, funding (and in particular ESCO formula and White Certificates), nearly zero-energy buildings and environmental risks related to energy use.
	Target group	Final consumers of energy Public sector Policy makers
	Regional application	N/A
Information on implementation	List and description of energy efficiency measures	National campaigns promoting energy efficiency actions, including implementation of innovative technologies by public sector units, promotion of nearly zero-energy buildings and passive construction, promotion of ESCO financing. Other actions include information and educational actions and trainings, publication of handbooks and guidebooks about the available measures improving energy efficiency and on the rules of using the measures on the websites of relevant Ministries and programme participants. Efforts will be made to introduce issues related to energy efficiency to the curriculum of B.Sc. studies.

		<p>The campaign is organised by the Ministry of Economy and the Ministry of Transport, Construction and Maritime Economy, and other institutions involved in the programme, including local governments and non-governmental organisations, and energy producers and distributors. It will be implemented by professional companies involved in information campaigns supported with the knowledge of consulting firms.</p> <p>The topics focus on energy use.</p> <p>As far as monitoring of the system is concerned, the Minister of Economy will be in charge of calculating the energy savings achieved in 2016, preparing reports and submitting them to the European Commission.</p>
	Budget and financial source	<p>approx. PLN 2 million from the state budget;</p> <p>The programme is being implemented and funds allocated for campaigns by other (non-budget) institutions differ in individual years and are currently difficult to evaluate.</p>
	Implementing body	Ministry of Economy, and Ministry of Transport, Construction and Maritime Economy
	Monitoring authority	Minister of Economy
Energy savings	Method of monitoring	BU, TD, or other
	Energy savings achieved in 2010	None
	Energy savings expected in 2016	12 793 GWh (approx. 1.1 Mtoe)

### 3 ENERGY SAVINGS – DETAILED ISSUES REQUIRED IN THE REPORT FOR THE EUROPEAN COMMISSION

#### 3.1 Exemplary role of public sector

Public administration plays an exemplary role by implementing the provisions of the Act on energy efficiency, which defines the tasks of the public sector units as regards energy efficiency. In the light of Article 10(1) and (2) of the Act, a public sector unit performs its duties applying at least two of the five specified energy efficiency improvement measures; one of them includes preparing an energy audit according to the provisions of the Act of 21 November 2008 on supporting thermomodernisation and repairs. The energy audit includes a recommendation to carry out the investments indicated in the audit, depending on their cost-effectiveness. The investments may be financed with resources from the National Fund for Environmental Protection and Water Management.

Pursuant to Article 13 of Directive 2010/31/EC of the European Parliament and of the Council of 19 May 2010 *on the energy performance of buildings*, in all government buildings where a total useful floor area exceeds 500 m<sup>2</sup>, the energy performance certificate will be displayed in a prominent place clearly visible to the public. In 2015, this threshold shall be lowered to 250 m<sup>2</sup>.

The minister competent for construction, spatial development and housing holds an open register of persons authorised to prepare energy performance certificates for buildings. Entry in the register may be granted to persons who have completed the training and passed the examination, or who completed at least one-year postgraduate studies in energy audit for thermomodernisation purposes organised by a department of architecture, construction, environment engineering, energy, or related, and who at the same time meet the requirements specified in Article 5(8)(1), (2), and (3) of the Act – *Construction Law*. As at 31 December 2010, the register of persons who had been awarded the right to prepare energy performance certificates for buildings after having passed the examination or after completing relevant postgraduate studies included 7 699 names.

In the Polish decentralised system of public procurement, every procuring party has the right to select goods and services which meet high standards of environment protection. So far the environmental criteria are quite rarely applied by Polish procuring parties (in approx. 10.5% of all procurements). Environment protection issues usually include technical, operational or functional parameters, e.g. the device's water consumption criterion. However, in every sector of procurements (supplies, services, construction works) the object of procurement may be defined in a way which ensures that the procurement results in an optimised environmental effect. In order to change that, the "National Action Plan for Green Public Procurement 2007-2009" has been adopted. The Action Plan included specific tools and indicators for monitoring changes in making the public procurements "greener".

The main objectives of actions to be implemented included:

- increase in the level of attention paid to environmental issues in public procurement,
- development of the market of eco-friendly products and broadening of the market of technologies for the environment protection industry and environment protection-related services,
- promotion of sustainable production and consumption models.

Due to the closing of the above mentioned "National Action Plan for Green Public Procurement 2007-2009", in 2010 the Council of Ministers adopted a new 3-year planning concept aimed at the promotion of green public procurements in Poland. The "National Action Plan for Sustainable Public Procurements 2010-2012" prepared by the Public Procurement Office includes an analysis of

EU and national legislation, both directly concerning green public procurements and indirectly related to the procurements. It also includes information on the actions performed so far, and a schedule for actions planned for the next years.

Due to public interest and the need to improve the quality of life and the condition of the environment, it is desirable and justified that public procurement take into account, as much as possible, the environmental aspects. Actions undertaken in this respect should involve in particular the support for energy-, water-, and resource-efficient solutions, which to a large extent are also cost effective. Hence, due to their short- and long-term economic benefits, they may be attractive for the procuring parties. Together with the Public Procurement Office, the Ministry of Economy has created and updates the [www.zielonezamowienia.gov.pl](http://www.zielonezamowienia.gov.pl) website where one may find environmental criteria for selected product groups.

It is intended that the implementation of public tasks in the ESCO formula will be facilitated by changes to the provisions concerning the detailed manner of classification of debt instruments considered as public debt. The changes will apply to agreements related to financing services, supplies and construction works in the scope in which the repayment is made from financially guaranteed energy savings. The provision will constitute an additional incentive for local government units to carry out investments reducing current expenditure.

Public administration will play an exemplary role also by implementing and promoting nearly zero-energy buildings. EU funding for public utility facilities – construction of schools, hospitals etc., should be awarded primarily (and after 2015 exclusively) to buildings with increased energy efficiency, including in particular nearly-zero energy buildings. It is also intended that support will be offered for the promotion of demonstration and pilot projects in the construction of nearly-zero energy public utility facilities. Taking into account the fact that these are pilot actions, the subsidy component should be higher than in the case of conventional actions related to thermomodernisation of public utility facilities. Therefore, exemplary designs of nearly-zero energy buildings should be prepared to inspire anyone who undertakes such actions.

### **3.2 Ensuring availability of advice and information**

Information on energy efficiency measures and financial mechanisms is available to relevant market participants, including final consumers, through:

The Polish National Energy Conservation Agency (Krajowa Agencja Poszanowania Energii S.A., KAPE S.A) operates a National Contact Point within the Competitiveness and Innovation Framework Programme 2007-2013 (CIP) for the beneficiaries of the “Intelligent Energy Europe Programme” (IEE II). The following actions are taken within the National Contact Point of the IEE Programme:

- offering information concerning the IEE Programme to potential beneficiaries;
- organisation of National Information Days related to the calls for proposals published by the European Commission;
- organisation of trainings for institutions interested in participation in the programme;
- participation in trainings, conferences and workshops organised by other institutions;
- translation of working documents;

- preparation and dissemination of materials about the IEE Programme;
- preparation and updating of the [www.cip.gov.pl](http://www.cip.gov.pl) website;
- preparation of reports from the participation of Polish entities in calls for proposals, and reports from entities implementing programmes within the IEE Programme;
- assistance in preparing applications.

Polish-Japan Energy Conservation Technology Centre (PJCEE) began its operations on 20 June 2005. The aim of the Centre is to improve energy management in the Polish industry, mainly by training energy auditors and managers in industry, and by performing industrial energy audits. PJCEE is equipped with a modern training laboratory, and has a qualified staff of Polish experts in energy efficiency. The trainings provide specialist theoretical and practical knowledge and show opportunities offered by efficient energy management in industrial plants. The laboratory, founded through an initiative of the Japanese party, is unique in Poland in terms of the training equipment. It is equipped with typical devices used in industry: pump station, compressor station, fan station, boiler station, dewatering station, burner station, lighting control station.

PJCEE tasks:

- professional improvement in energy efficiency of the managerial staff of the Polish industry,
- providing energy audit services for the industry,
- promoting energy efficiency aspects,
- conducting research and development work in energy efficiency in the industry,
- participation in national and international programmes and initiatives on energy efficiency in the industry.

Moreover, there are many other organisations, associations and institutions which provide information and advice related to the promotion of energy conservation; they are, among others: the National Energy Conservation Agency (NAPE), the Polish Foundation for Energy Efficiency (FEWE), regional energy agencies (e.g. Baltic Energy Conservation Agency (BAPE), Regional Energy Conservation Agency in Toruń (RAPE), Mazovian Energy Agency (MAE), Podkarpacka Energy Agency (PAE), Institute for Sustainable Development, and other trade organisations).

Due to the planned actions related to the promotion of energy-efficient construction, an advisory group will be appointed. The group members will include representatives of the public administration, local governments, construction companies and non-governmental organisations. The tasks of the group will include preparing a diagnosis of energy efficiency of buildings, taking into account the developers and thermomodernisation process. The diagnosis will be based on information on the current energy standard of buildings. The diagnosis will be prepared in order to adjust the existing energy efficiency support measures in accordance with the volatile market and economic situation.

Furthermore, it is intended for a national ESCO contact point to be established. The activity of the contact point should include e.g. assistance for the public sector units, and local government units, which intend to save energy under the ESCO formula.

### 3.3 Market for energy services

With the aim to stimulate the market for companies providing energy services, such as ESCO energy saving companies, the Act of 15 April 2011 on energy efficiency introduced a regulation under which such entities may enter tenders to obtain energy performance certificates (white certificates). ESCO energy saving companies will be the beneficiaries of the white certificates due to the possibility provided by the Act to aggregate energy savings and enter tenders on behalf of other entities which have carried out an energy efficiency improving investment, in total achieving energy savings of at least 10 toe.<sup>19</sup>

Moreover, public sector units, obliged to use energy efficiency improvement measures under the Act on energy efficiency, will be allowed to conclude agreements on the implementation and financing of investments for improving energy efficiency with such entities as ESCO energy saving companies. This will contribute to the growth of the market for services of entities which offer various non-budgetary financing types, such as e.g. third party financing, or agreement on the improvement of energy efficiency, on the basis of which an investment is financed from the funds obtained in relation to the energy saving defined in the agreement.

Other measures for developing the market for energy services will also be taken in 2012. The measures will be primarily focused on facilitating the conclusion of agreements by companies operating in the ESCO formula. The main facilitation when concluding agreements on improving energy efficiency and non-budgetary financing by ESCO companies would lie in allowing for the acquired financing to be considered own resources in applying for and carrying out projects in energy efficiency, co-funded or credited from EU funds in the new financial perspective, and from the funds of the National Fund for Environmental Protection and Water Management and the Norwegian Mechanism. Appropriate changes in the relevant rules of procedure for acquiring the funds will be prepared by the Ministry of Regional Development and Ministry of the Environment in cooperation with other ministries. Examples of Terms of Reference and agreement templates for different categories of services ensuring energy efficiency improvement will be published on the website of the Ministry of Economy.

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<sup>19</sup> tonne of oil equivalent (toe) - the equivalent of one tonne of crude oil with heating value equal to 41 868 kJ/kg



### 3.4 Current and projected measures and support instruments for energy savings in buildings

A list of current and projected measures and support instruments for energy savings in buildings pursuant to Article 10 of Directive 2010/31/EC is presented in Annex 4.

#### 4 COMPETENT ORGANISATIONS

Task	Institution responsible
Monitoring of Directive 2006/32/EC objective	Ministry of Economy
Exemplary role of public sector	Ministry of Economy

Prepared in the Energy Department  
of the Ministry of Economy

**Approved**

## 5 BIBLIOGRAPHY

Directive 2006/32/EC *on energy end-use efficiency and energy services* (OJ L 114 of 27.4.2006, p. 64)

Directive 2010/31/EC *on the energy performance of buildings* (OJ L 153 of 18.6.2010, p. 13)

*“Recommendations on Measurement and Verification Methods in the Framework of Directive 2006/32/EC on Energy End-Use Efficiency and Energy Services”*, European Commission Document

*“Guide and template for the preparation of the second national energy efficiency action plans”*, final version, document prepared by the European Commission and Joint Research Center, 2010

*“The Power Policy of Poland until 2030”*, document adopted by the Council of Ministers on 10 November 2009

*“Information on the implementation of the Power Policy of Poland until 2030”*, document adopted by the Council of Ministers on 14 November 2011

The Act of 15 April 2011 on energy efficiency (Journal of Laws of 2011 No 94, item 551).

*“Analyses and expert’s opinions on the implementation and evaluation of the National Energy Efficiency Action Plan”*, a study by the Polish National Energy Conservation Agency under contract for specific work No II/120/P/75001/10/D of 18 October 2010 concluded with the Ministry of Economy.

*“Energy efficiency in 1999-2009”* publication of the Central Statistical Office, Warsaw 2011.

*“National Fund for Environmental Protection and Water Management for energy efficiency”*, publication of the National Fund for Environmental Protection and Water Management, Warsaw, July 2010.

**Annex 1: Categories and examples of end-use energy efficiency measures.**

The list is not exhaustive.

Category	Examples
1. Regulations	Norms and standards 1.1. Building Codes and Enforcement 1.2. Minimum Equipment Energy Performance Standards
2. Information and mandatory information measures (e.g. mandatory labelling)	2.1. Focused information campaigns 2.2. Energy labelling schemes 2.3. Information centres 2.4. Energy audits 2.5. Education and training 2.6. Demonstration projects 2.7. Exemplary role of public sector 2.8. Metering and informative billing
3. Financial instruments	3.1. Subsidies (Grants) 3.2. Tax rebates and other taxes (also tax increase) that stimulate reduction of energy end-use consumption 3.3. Loans (soft and/or subsidised)
4. Voluntary agreements and co-operative instruments	4.1. Industrial Companies voluntary agreements 4.2. Commercial or Institutional Organisations voluntary agreements 4.3. Energy efficient public procurement 4.4. Technology procurement
5. Energy services for energy savings	5.1. Guarantee of energy savings contracts 5.2. Third party financing 5.3. Energy performance contracting 5.4. Energy outsourcing
6. Transport-specific measures	6.1. Modal shift 6.2. Pricing (e.g. parking fees or congestion charges)
7. Energy saving mechanisms and other combinations of previous (sub)categories	7.1. Public service obligation for energy companies on energy savings including "White certificates" 7.2. Voluntary agreements with energy production, transmission and distribution companies 7.3. Energy efficiency funds

## Annex 2. Documentation of the calculations of final energy savings according to the top-down method

### HOUSING SECTOR

#### P1 Indicator

P1 indicator represents the unit energy consumption of households for space heating per floor area in m<sup>2</sup> adjusted for climatic conditions.

P1 Indicator is described by the following relation:

$$P1 = \frac{E^{H_{SH}}}{F} \cdot \frac{MDD_{25}^{heating}}{ADD^{heating}}$$

Energy savings achieved in year  $t$  in relation to the recommended base year 2007 are calculated according to the formula:

$$\left[ \left( \frac{E_{2007}^{H_{SH}}}{F_{2007}} \cdot \frac{MDD_{25}^{heating}}{ADD_{2007}^{heating}} \right) - \left( \frac{E_t^{H_{SH}}}{F_t} \cdot \frac{MDD_{25}^{heating}}{ADD_t^{heating}} \right) \right] \cdot F_t$$

where:

$E_{2007}^{H_{SH}}$ ,  $E_t^{H_{SH}}$  – consumption of energy for heating in the housing sector, in 2007 and in year  $t$ , respectively;

$MDD_{25}^{heating}$  – average multi-annual size of degree-days (for the previous 25 years);

$ADD_{2007}^{heating}$ ,  $ADD_t^{heating}$  – sizes of degree-days in 2007 and in the calculation year  $t$ ;

$F_{2007}$ ,  $F_t$  – surface area of flats in 2007 and in the calculation year  $t$ .

Figure 1 shows the developments of P1 indicator from 1990 to 2009.

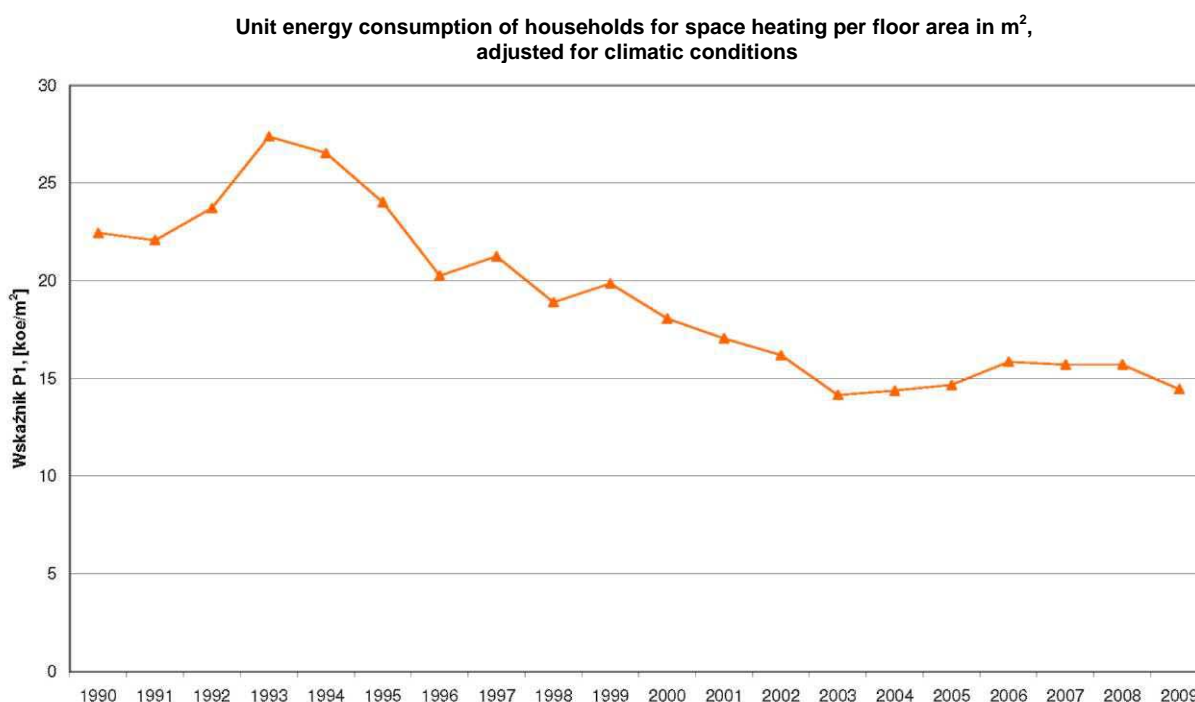


Fig. 1. Developments of the *P1* indicator from 1990 to 2008.

Below are the calculations of energy savings in 2009 in relation to base year 2007. The data and results of the energy savings calculations based on the *P1* indicator are shown in the table below.

Amount	Unit	2007	2009
Energy consumption for heating	ktoe	12 701	12 894
Surface area of flats	1 000 m <sup>2</sup>	907 225	938 475
Size of degree-days (base temperature 18°C)		3 222.06	3 439.10
Average multi-annual size of degree-days (base temperature 18°C)		3 615.77	3 615.77
<i>P1</i>	koe/m <sup>2</sup>	15.71	14.45
Energy savings	ktoe		1 188

The value of *P1* indicator for 2009 is lower than *P1* indicator value for base year 2007, which signifies that energy savings were achieved. That did not happen in 2008. The value of *P1* indicator is significantly influenced by the size of degree-days in a year.

## SERVICE SECTOR

### M3 Indicator

M3 indicator defines the unit energy consumption, excluding electric energy, per employee.

The M3 indicator is defined as follows:

$$M3 = \frac{E^{S_{NON-EL}}}{em^{S_{fe}}} \cdot \frac{MDD_{25}^{heating}}{ADD^{heating}},$$

and savings are calculated according to the following formula:

$$\left[ \left( \frac{E_{2007}^{S_{NON-EL}}}{em_{2007}^{S_{fe}}} \cdot \frac{MDD_{25}^{heating}}{ADD_{2007}^{heating}} \right) - \left( \frac{E_t^{S_{NON-EL}}}{em_t^{S_{fe}}} \cdot \frac{MDD_{25}^{heating}}{ADD_t^{heating}} \right) \right] \cdot em_t^{S_{fe}}$$

where:

$E_{2007}^{S_{NON-EL}}$ ,  $E_t^{S_{NON-EL}}$  – energy consumption in the service sector, excluding electricity consumption, in 2007 and in the calculation year  $t$ , respectively;

$em_{2007}^{S_{fe}}$ ,  $em_t^{S_{fe}}$  – the number of employees (in full time equivalents) in 2007 and in the calculation year  $t$ , respectively.

### M4 Indicator

M4 indicator defines the unit electricity consumption per employee.

M4 indicator is calculated from the following relation:

$$M4 = \frac{E^{S_{EL}}}{em^{S_{fe}}},$$

and energy savings in calculation year  $t$  are calculated in relation to base year 2007, from the following formula:

$$\left( \frac{E_{2007}^{S_{EL}}}{em_{2007}^{S_{fe}}} - \frac{E_t^{S_{EL}}}{em_t^{S_{fe}}} \right) \cdot em_t^{S_{fe}}$$

where:

$E_{2007}^{S_{EL}}$ ,  $E_t^{S_{EL}}$  - electricity consumption in the service sector in 2007 and in calculation year  $t$ , respectively.

Calculations of savings based on M3 and M4 indicators for 2009, in relation to base year 2007, proved no savings were achieved.

			2007	2008	2009
M3	Unit energy consumption, excluding electricity, per one employee in the service sector	toe/emp	0.52	0.54	0.53
M4	Unit electricity consumption per one employee in the service sector	kWh/emp	4 829	5 165	5 144

## TRANSPORT

### P9 Indicator

P9 indicator is defined as the unit energy consumption in road transfer of goods, expressed in ktoe/tkm (tonne-kilometres)

The value of P9 is drawn from the following formula:

$$P9 = \frac{E_t^{TLV}}{T_t^{TLV}},$$

and energy savings from the following formula:

$$\left( \frac{E_{2007}^{TLV}}{T_{2007}^{TLV}} - \frac{E_t^{TLV}}{T_t^{TLV}} \right) \cdot T_t^{TLV}$$

where:

$E_{2007}^{TLV}$ ,  $E_t^{TLV}$  – energy consumption by trucks (or trucks and light-weight vehicles) in 2007 and in calculation year  $t$ , respectively.

$T_{2007}^{TLV}$ ,  $T_t^{TLV}$  – total transfer of goods by trucks in tonne-kilometres in 2007 and in calculation year  $t$ , respectively.

In 2009 the amount of energy savings in relation to base year 2007 reached 830 ktoe.

			2007	2008	2009
P9	Unit energy consumption by trucks (or trucks and light-weight vehicles) per tonne-kilometres	goe/tkm	41	39	36

## INDUSTRY SECTOR

### *P14* Indicator

*P14* indicator is the unit consumption of the industry per volume of production. To calculate the indicator, in accordance with the recommendations of the European Commission, it is necessary to know the ETS share in energy consumption in the given industry sub-sector.

*P14* indicators recommended by the Commission include 13 industry sub-sectors (below are the sections of the Polish Classification of Activity (PKD), according to the 2004 classification):

- “non-energy” mining (PKD 13-14)
- food industry (PKD 15-16)
- textiles (PKD 17-19)
- wood and wood products (PKD 20)
- paper production (PKD 21-22)
- chemicals (PKD 24)
- non-metallic minerals (PKD 26), of which cement (PKD 26.51)
- steel (PKD 27.1)
- non-ferrous metals (PKD 27.2)
- machinery (PKD 28-32)
- transport equipment (PKD 34-35)
- other (PKD 25, 33, 36-37)
- construction (PKD 45)

The *P14* indicator defines the energy consumption in the industry sub-sector in relation to the production index, calculated from the following formula:

$$P14 = \frac{E^{I^x}}{IPI^{I^x}},$$

whereas the achieved energy savings are calculated from the following formula:

$$\left( \frac{E_{2007}^{I^x}}{IPI_{2007}^{I^x}} - \frac{E_t^{I^x}}{IPI_t^{I^x}} \right) \cdot IPI^{I^x} \cdot K_{2007}^{I^x},$$

where:

$E_{2007}^{I^x}$ ,  $E_t^{I^x}$  - energy consumption in the industry sub-sector in 2007 and in calculation year  $t$ , respectively;

$IPI_{2007}^{I^x}$ ,  $IPI_t^{I^x}$  - industry sub-sector production index in 2007 and in calculation year  $t$ , respectively;

$K_{2007}^{I^x}$  - share of energy consumption in the industry sub-sector, according to directive 2006/32/EC.



On the basis of data from the National Administrator of the Emissions Trading Scheme, the following values  $K_{2007}^{I^x}$  were assumed:

Industry sub-sector	$K_{2007}^{I^x}$
Chemicals (PKD 24)	0.61
Iron and steel (PKD 27)	0.80
Non-metallic minerals (PKD 26)	0.30
Wood and wood products (PKD 20)	0.53
Paper production (PKD 21-22)	0.41
Food industry (PKD 15-16)	0.61
Textiles (PKD 17-19)	0.89
Machinery (PKD 28-32)	0.89
Transport equipment (PKD 34-35)	0.93
Other (PKD 25, 33, 36-37)	0.78
Construction (PKD 45)	1.00

Savings in the industry sub-sectors in 2009 in relation to base year 2007, based on the *P14* indicator, [ktoe].

The data for calculating the *P14* index value are shown below.

	Unit	2007	2008	2009
Final consumption in chemical industry	ktoe	3 685	3 478	3 487
Final consumption in iron and steel	ktoe	3 205	2 804	2 042
Final consumption in steel	ktoe	2 515	2 170	1 488
Final consumption in non-ferrous metals	ktoe	690	634	554
Final consumption in non-metallic minerals	ktoe	2 844	2 592	2 502
Final consumption in cement production	ktoe	1 387	1 232	1 124
Final consumption in wood and wood products	ktoe	613	690	657

Final consumption in paper production	ktoe	1 487	1 167	1 207
Final consumption in food industry	ktoe	1 962	1 925	1 785
Final consumption in textiles	ktoe	206	171	132
Final consumption in machinery	ktoe	769	737	636
Final consumption in transport equipment production	ktoe	441	452	337
Final consumption in construction	ktoe	219	217	264
Final consumption in other industries	ktoe	573	548	450
Production index in chemicals	2 000=100	170	169	172
Production index in iron and steel	2 000=100	117	113	84
Production index in non-metallic minerals	2 000=100	169	170	160
Production index in wood and wood products	2 000=100	148	142	141
Production index in paper production	2 000=100	161	154	163
Production index in food industry	2 000=100	130	123	128
Production index in textiles	2 000=100	101	94	85
Production index in machinery	2 000=100	239	258	256
Production index in production of manufacturing equipment	2 000=100	204	218	193
Production index in construction	2 000=100	107	118	123
Production index in other industries	2000=100	219	228	225

#### P14 indicator values

	Industry sub-sector	Unit	2007	2008	2009
P14	Chemicals (PKD 24)	toe/indicator	2.17	2.06	2.03
P14	Iron and steel (PKD 27)	toe/indicator	2.73	2.49	2.42
P14	Non-metallic minerals (PKD 26)	toe/indicator	1.69	1.52	1.56
P14	Wood and wood products (PKD 20)	toe/indicator	0.41	0.48	0.46
P14	Paper production (PKD 21-22)	toe/indicator	0.92	0.76	0.74

P14	Food industry (PKD 15-16)	toe/indicator	1.51	1.57	1.39
P14	Textiles (PKD 17-19)	toe/indicator	0.20	0.18	0.16
P14	Machinery (PKD 28-32)	toe/indicator	0.32	0.29	0.25
P14	Transport equipment (PKD 34-35)	toe/indicator	0.22	0.21	0.17
P14	Other (PKD 25, 33, 36-37)	toe/indicator	0.26	0.24	0.20
P14	Construction (PKD 45)	toe/indicator	0.20	0.18	0.21

Energy savings calculated for 2009

Industry sub-sector	Energy savings in 2009 in relation to base year 2007 [ktoe]
Chemicals (PKD 24)	146
Iron and steel (PKD 27)	211
Non-metallic minerals (PKD 26)	58
Wood and wood products (PKD 20)	-38
Paper production (PKD 21-22)	121
Food industry (PKD 15-16)	94
Textiles (PKD 17-19)	36
Machinery (PKD 28-32)	168
Transport equipment (PKD 34-35)	75
Other (PKD 25, 33, 36-37)	109
Construction (PKD 45)	-9
<b>Total</b>	<b>1 019</b>

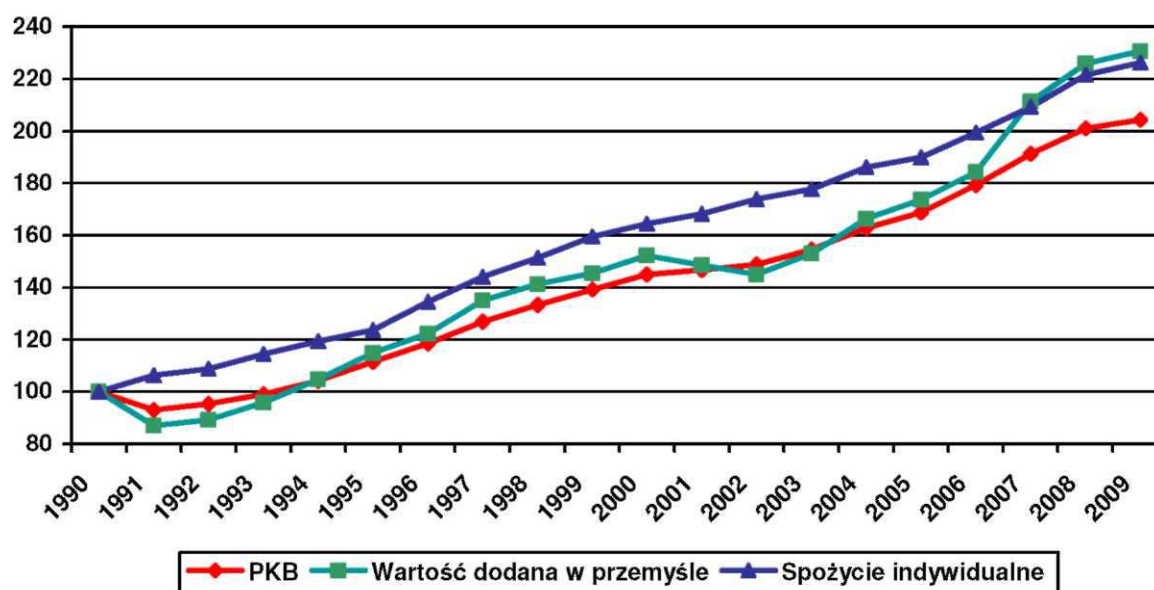
**Energy savings in 2009, in relation to 2007, are the total energy savings achieved in housing, transport and industry, which amount to 1 188, 830, and 1 019 ktoe, respectively, and 3 037 ktoe in total.**

### Annex 3. ODYSSEE indicators for the Polish economy and its sectors

#### 1. Dynamics of economic growth

Since 1992, after the drop at the beginning of the 1990s, the main economic indicators for Poland have been improving (Figure 1). In this period, the fastest growth rate in the added value in constant prices was noted by the industry sector, although the growth was also the most unsteady, with two drop years (2001 and 2002). Per capita consumption went up every year, and the growth rate exceeded GDP growth, in particular from 1990 to 1992 (Table 1). The lowest growth rate was observed in the agriculture sector (Figure 2).

Fig. 1. Dynamics of the main macroeconomic indices (1990=100)

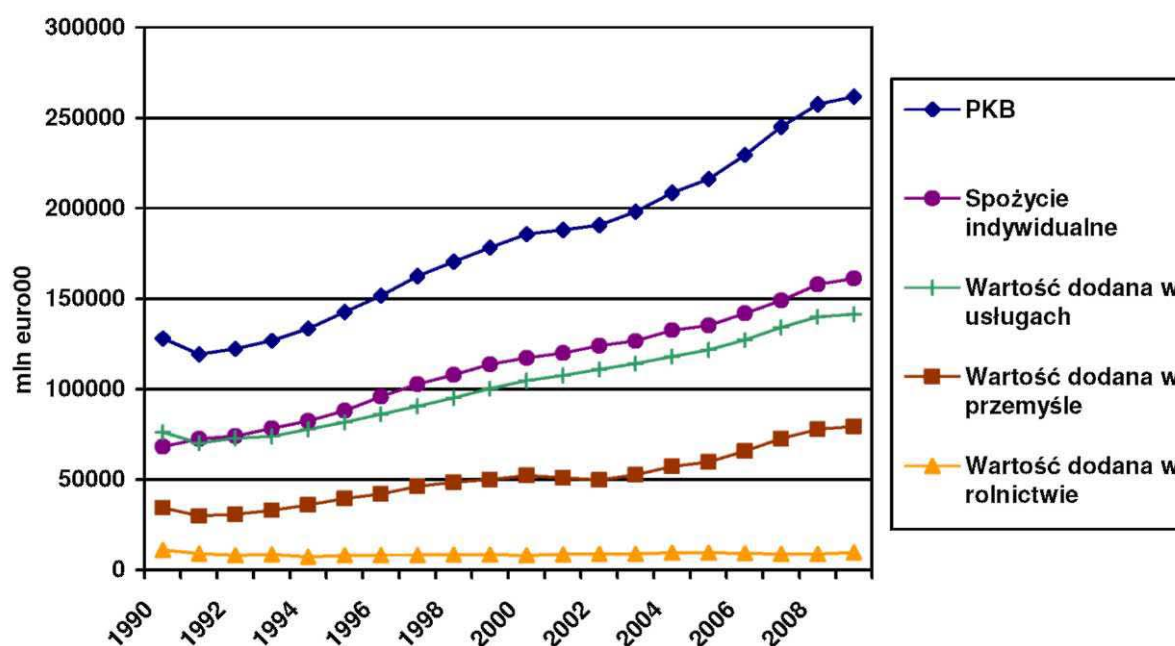


GDP	
Added value in industry	
Per capita consumption	

Table 1. Growth rate of the basic macroeconomic indices of the economic development of Poland from 1990 to 2009 [in %/year]

Description	1991-2001	2001-2009	1990-2009
GDP	4.66	4.23	3.83
Added value in industry	5.50	5.65	4.50
Per capita consumption	4.70	3.77	4.39

Fig. 2. Developments in GDP, added value in the main sectors of the national economy, and per capita consumption



GDP	
Per capita consumption	
Added value in services	
Added value in industry	
Added value in agriculture	
Euro million	

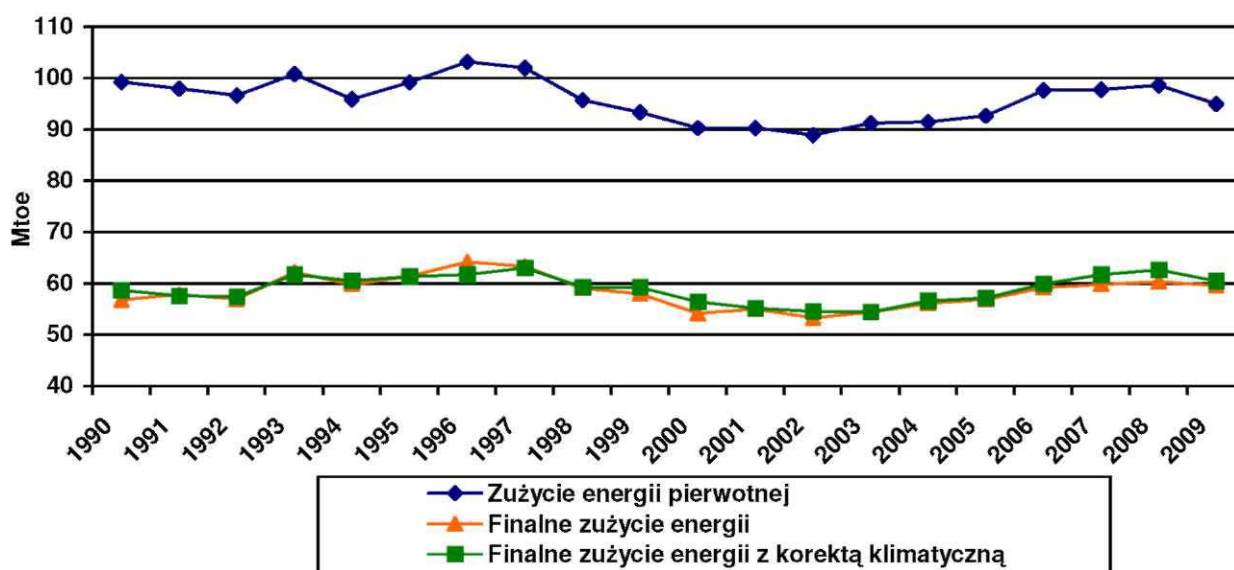
## 2. Energy consumption and prices

After the initial growth in the first half of the 1990s and reaching the highest value in 1996, primary energy consumption and final energy consumption<sup>20</sup> from 1996 to 2002 showed a clear downward trend (Fig. 3). Next, there was a slow increase in consumption, which lasted until 2008. In 2009, both primary and final energy consumption dropped.

A drop in energy consumption (between 1996 and 2002) was caused by modernisation programmes, economy restructuring and also by a periodic decrease in economic activity. The implemented energy efficiency improvement programmes and market transformation of energy prices also contributed to the decline in consumption.

<sup>20</sup> The term final energy consumption means final energy consumption for energy purposes, calculated according to the Eurostat/IEA methodology.

Fig. 3. Primary and final energy consumption



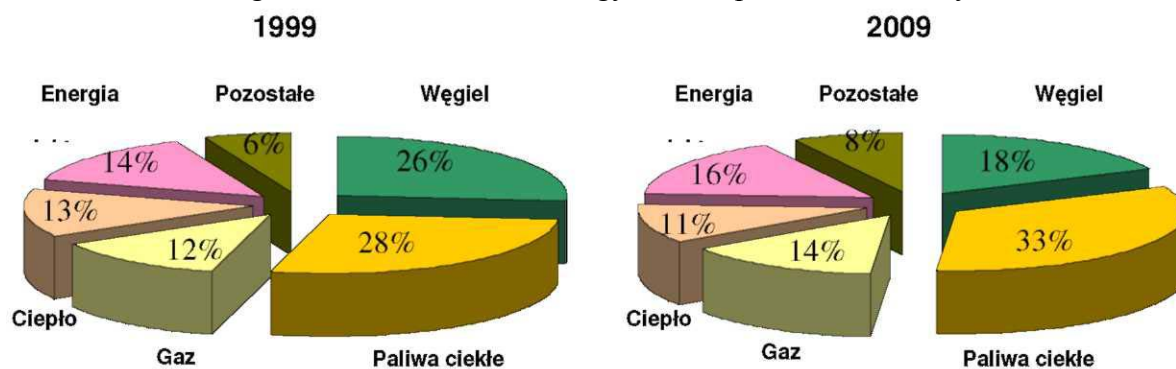
Mtoe	
Primary energy consumption	
Final energy consumption	
Final energy consumption, climate adjusted	

The developments in the function of final energy consumption are slightly modified by the climate adjustment, which increases its value for winters with lower number of degree-days (milder). Climate adjustment includes the sector of households and services. Energy consumption with climate adjustment defines the theoretical consumption for a given year if it was characterised by weather conditions represented by the average multiannual number of degree-days.

Final energy use with climate adjustment is calculated by subtracting energy consumption in the housing and service sector from the total final energy consumption (across all sectors), and adding energy consumption in the housing and service sector with climate adjustment.

The Polish energy system was traditionally oriented towards using Polish natural resources. Hard coal and lignite were the main sources of energy. Since the beginning of the 1990s the importance of petroleum fuels kept growing, and in 1999 the final consumption of these carriers for the first time exceeded final consumption of coal, as its share reached 28% (Figure 4.). In 2009, the share was 33%. At the same time, the share of coal fuels in the final energy consumption continued to decrease considerably, from 26% in 1999 to 18% in 2009. As compared to 1999, a slight increase in natural gas consumption was observed in 2009, as it represented 14% of energy consumption. Electric energy consumption also slightly increased between 1999 and 2009, and the share of this carrier in 2009 reached 16%.

Fig. 4. Structure of final energy consumption in Poland by carriers

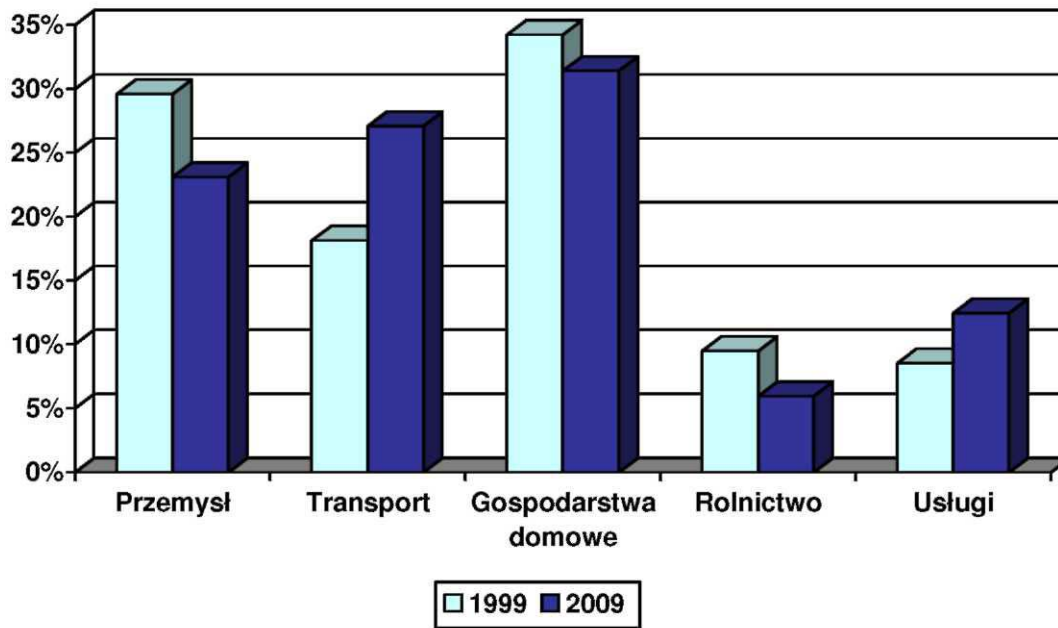


Energy	
Other	
Coal	
Heat	
Gas	
Liquid fuels	

Changes in the final energy consumption in the main sectors of the economy (Figure 5) reflect the directions of economy development. Industry restructuring and actions taken by businesses, aimed at reducing energy consumption, led to a decrease of energy use in this sector. Continuous development of road transportation and of the service sector results in the growing share of these sectors in the national energy consumption. From 1999 to 2009, due to the implementation of the insulation scheme and the improvement and increase of heating system efficiency, energy consumption in the household sector went down by 6%.

Developments in agriculture, consisting of liquidation and privatisation of former state-owned farms and creating modern, large-scale farms, did not contribute to reducing energy consumption. Energy consumption in agriculture did start to decrease in 2000.

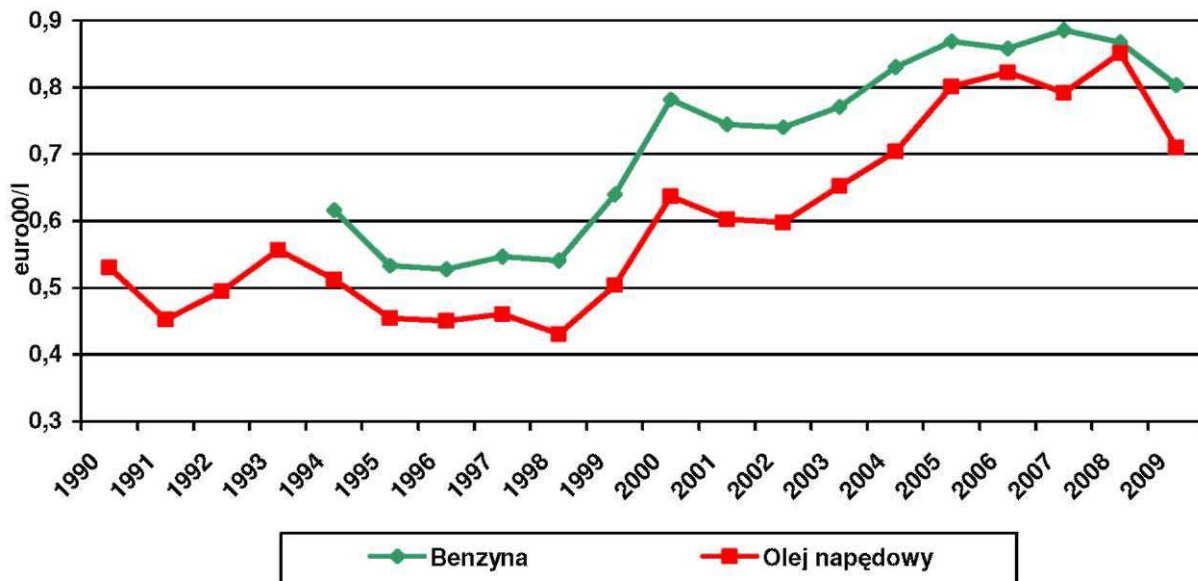
Fig. 5. Structure of final energy consumption in Poland by sectors



Industry	
Transport	
Households	
Agriculture	
Services	

Petrol and diesel fuel prices expressed in constant prices of 2000 saw a dynamic growth since 1998, with periodic adjustments (Figure 6). What affected the prices the most was the amount of taxes included in them (significant excise duty increases took place at the end of the 1990s), and commodity prices on global markets. In 2009, after a substantial drop, the price of petrol prices reached 0.8 euro/l, and the price of diesel fuel – 0.71 euro00/l.

Fig. 6. Diesel fuel and petrol price developments

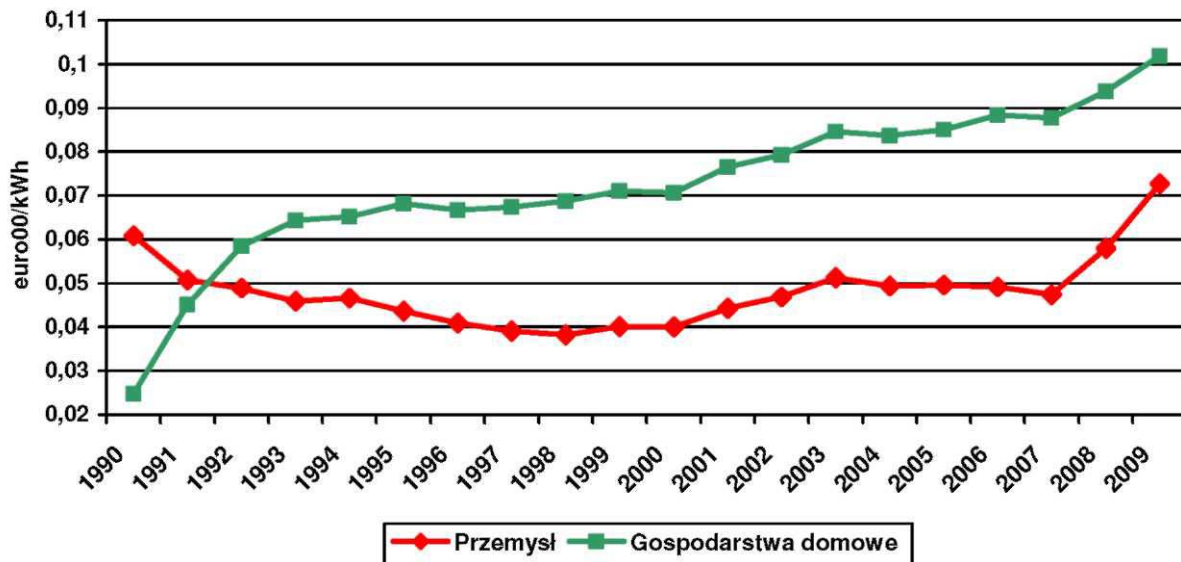


Petrol	
Diesel fuel	
Euro00/l	



At the beginning of the 1990s, subsidies for electric energy were liquidated. This was effected by increasing household tariffs from 0.0248 for 1 kWh in 1990 to 0.0644 in 1993 (increase by 160%) expressed in euro in constant prices of 2000. Since that time energy prices for this customer group have been slowly rising. In 2009, the price was 0.102 euro00/kWh. The price of electric energy for the industry decreased between 1990 and 2000 (by about 4.1% a year) – Fig.7. However, in 2001-2003 the prices went up by 28%. Then they started to slowly fall only to suddenly rebound in 2008, reaching the level of 0.073 euro00/l in 2009.

Fig. 7. Changes of electric energy prices for households and industry

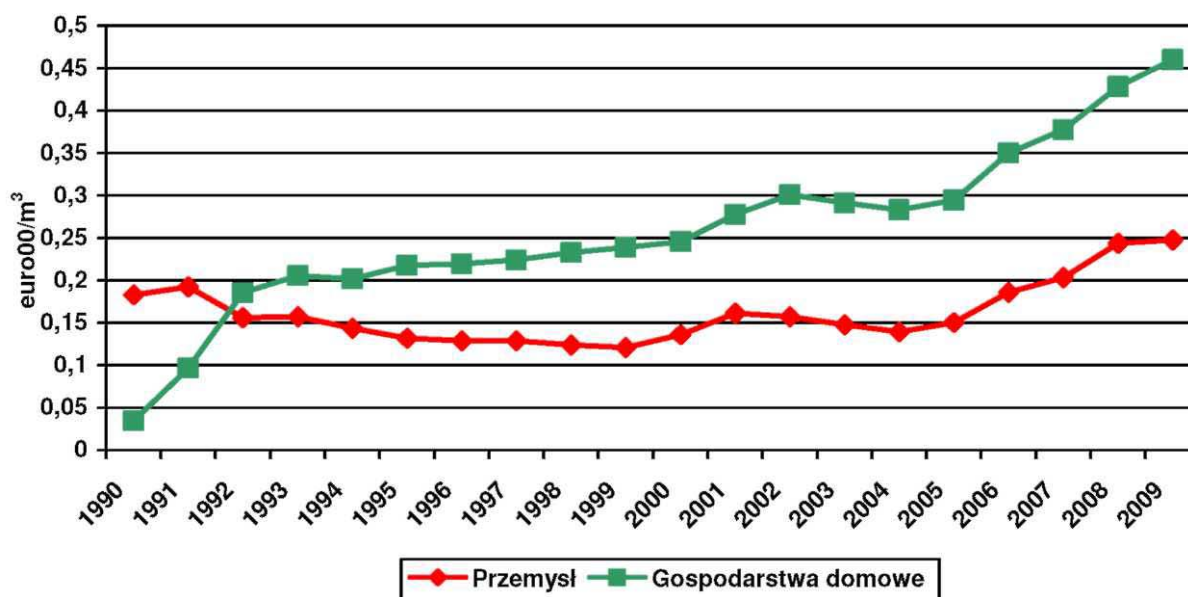


Industry	
Households	
euro00/kWh	

The trends in natural gas prices are similar to the trends observed in electric energy prices. Natural gas prices for households expressed in euro in constant prices of 2000 considerably increased, from 0.0349 in 1990 to 0.2058 in 1993 (a 490% growth in constant prices – Fig. 8), and a slow increase was noted until 2000. 2001 and 2002 saw further substantial rises in natural gas prices, and in the following years there were minor price fluctuations. In 2004, the prices went back on the upward path, with a rapid climb in 2006, and continued increases in the following years. In 2009, natural gas prices for households went up by 7.4% and reached the level of 0.46 euro00/m<sup>3</sup>.

Between 1990 and 1999, natural gas prices for the industry systematically decreased, and then rapidly increased from 2000 to 2001. After a minor drop, which lasted until 2004, they went up again. In 2009, after a slight increase by 1.6%, the price of natural gas for the industry reached 0.25 euro00/m<sup>3</sup>.

Fig. 8. Changes of natural gas prices for households and industry



Industry	
Households	
euro00/m <sup>3</sup>	

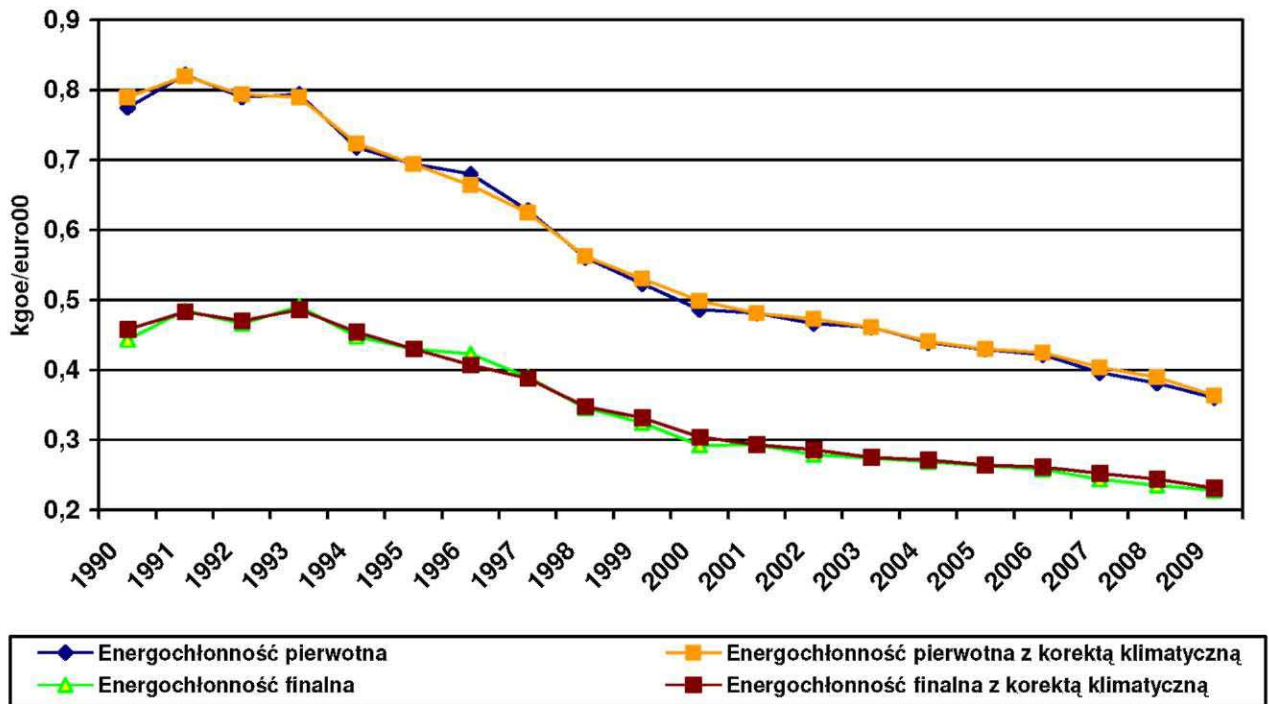
### 3. Macroeconomic indices

Rather stable energy consumption and growing value of the gross domestic product results in the decreasing primary and final energy consumption of GDP (Figure 9 to 11, Table 2). After the initial growth of GDP energy consumption (until 1993), there was a period of dynamic improvement which lasted until 2000. Since then there was a gradual improvement of energy efficiency at a rate of over 2% per year, which again gained speed in 2007. In 2009, the positive trend continued, and the decrease of GDP energy consumption reached 3% for final energy consumption, and 5% for primary energy consumption.

Table 2. Annual average rate of change of GDP energy consumption index (%/year)

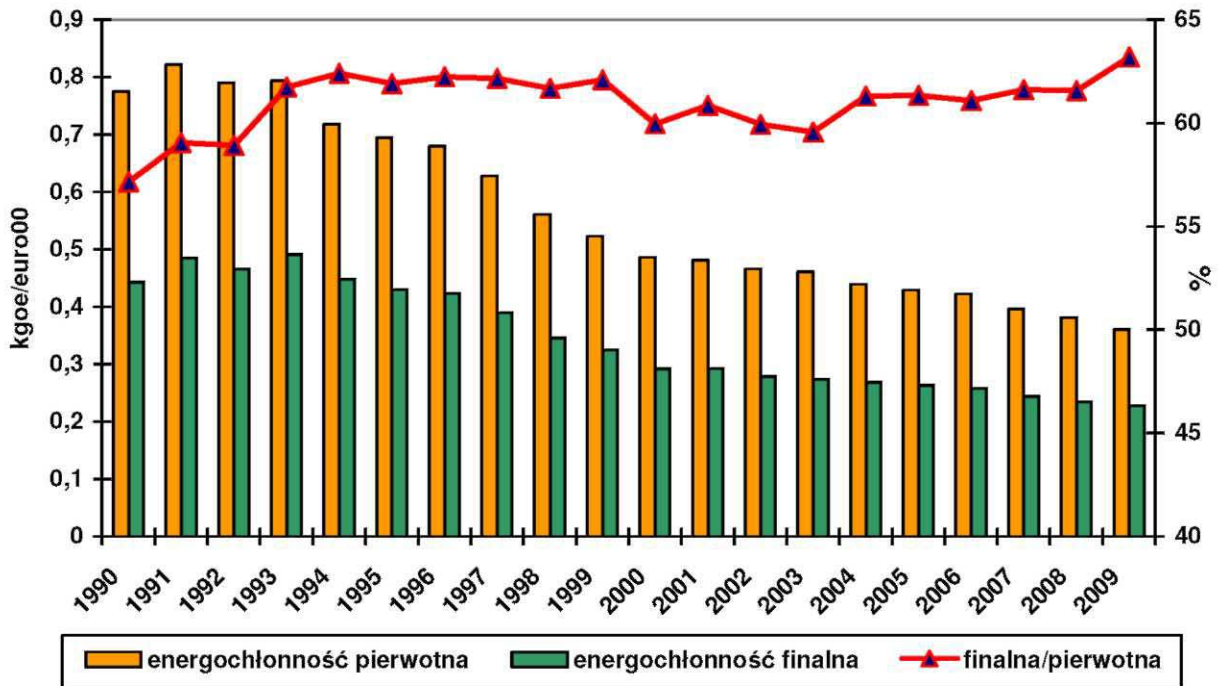
Rate of change	1990-1993	1993-2000	2000-2009	1993-2009	1990-2009
GDP final energy consumption	3.46	-7.16	-2.71	-4.68	-3.44
GDP primary energy consumption	0.84	-6.77	-3.21	-4.78	-3.92

Fig. 9. Developments of the GDP energy consumption index



Primary energy consumption	
Final energy consumption	
Primary energy consumption, climate adjusted	
Final energy consumption, climate adjusted	
kgoe/euro00	

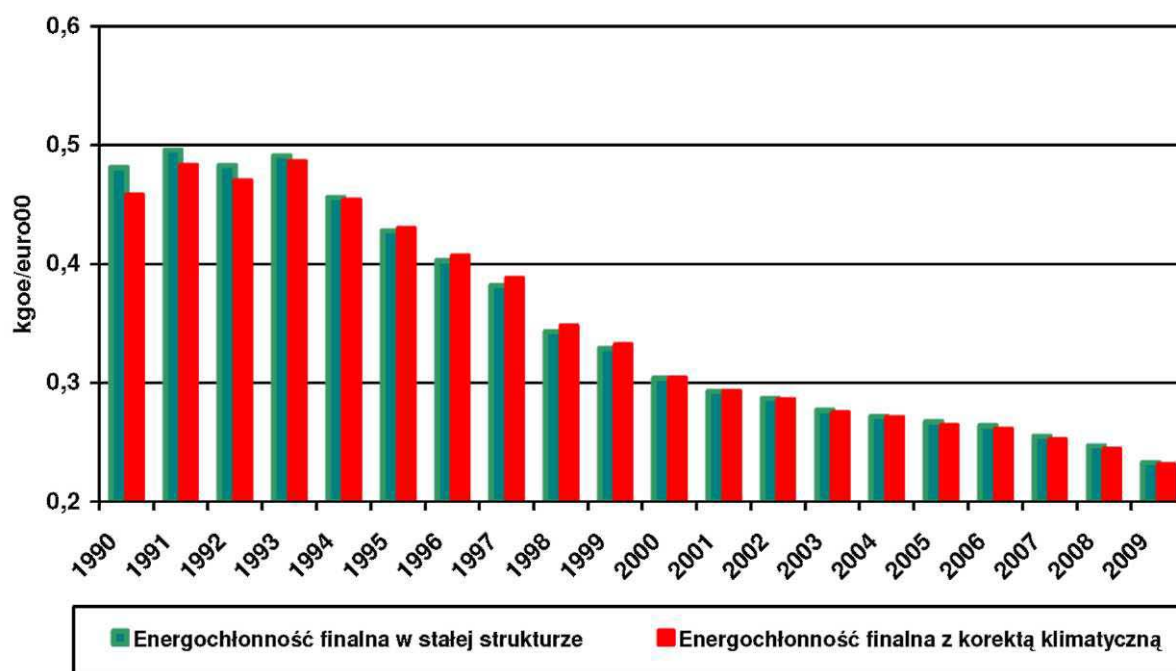
Figure 10. GDP final to primary energy consumption ratio



primary energy consumption	
final energy consumption	
final/primary	
kgoe/euro00	

The rate of improvement of the primary energy consumption index at the beginning of the 1990s was greater than the rate of improvement of the final energy consumption, and as a result the relation between the two energy consumptions slightly improved. Since that time the index was on more or less the same level, with a small downward trend which was halted in 2006. In 2009, the index reached the highest value since 1990, that is 63.2%. It is affected mainly by the effectiveness of energy transformations (the higher the effectiveness, the greater value of the index), and by the growth rate of electric energy consumption (the higher the growth rate, the lower the index value).

Figure 11. Changes in the GDP final energy consumption index



Final energy consumption in the constant structure	
Final energy consumption, climate adjusted	
kgoe/euro00	

The greatest structural changes<sup>21</sup> took place at the beginning of the 1990s. Positive tendencies have continued since 1995, but their influence is very insignificant.

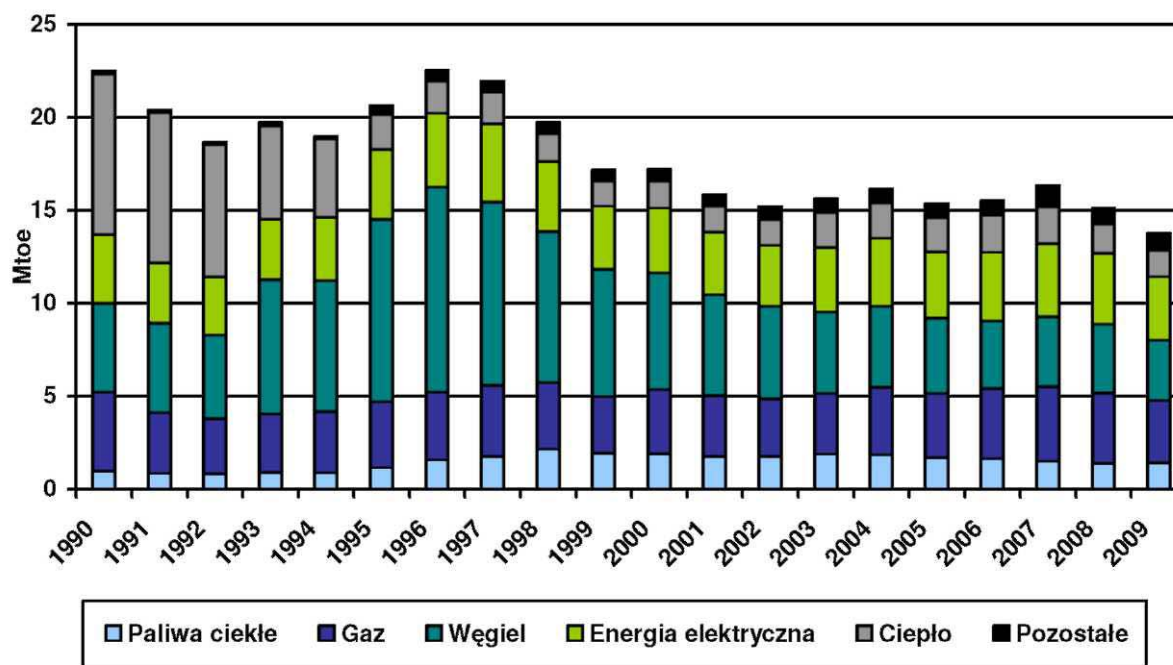
When analysing energy consumption changes since 1990, one should not forget about the special situation of countries of Central and Eastern Europe, including Poland, before 1990. Energy prices were very low in economies based on central planning, causing huge energy waste, reaching up to 60-70% of the total consumption. That in turn led to a disadvantageous habit of inefficient energy use, difficult to eradicate, which at the same time offered plenty opportunities for savings. To some extent, the reduction in energy consumption was achieved by using these simple reserves.

#### 4. Industry

<sup>21</sup> final energy, climate adjusted in constant structure (of 2000) is calculated in a given year as weighted average of current sectoral energy consumptions with a final adjustment, where the weights are the shares of the sectors in creating added value in 2000. For energy consumption in households, the level of per capita consumption was taken as reference level. For transport the reference level was GDP.

Final energy consumption in the industry was subject to similar fluctuations as the consumption in general. A decrease in energy consumption began in the second half of the 1990s, reaching the level of 15 Mtoe in 2002. Energy consumption was then at a steady level until 2007, when the decline began, reaching less than 14 Mtoe in 2009.

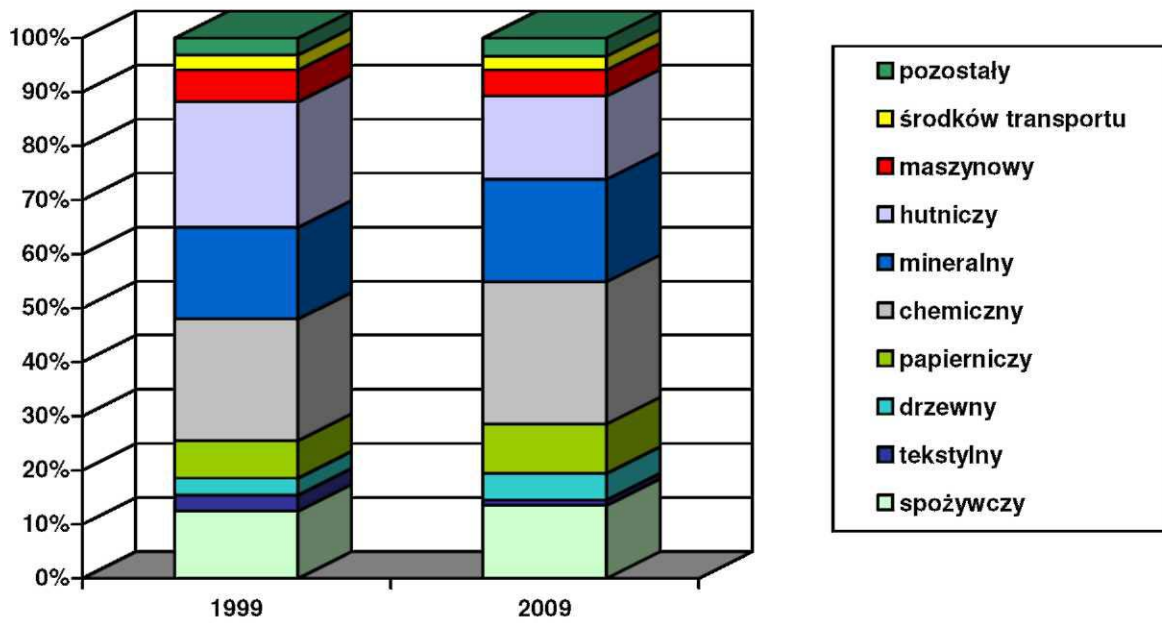
Figure 12. Final energy consumption in industry by carriers



Liquid fuels	
Gas	
Coal	
Electricity	
Heat	
Other	
Mtoe	

Changes in the shares of industry sub-sectors in the total energy consumption in the processing industry are shown in Figure 13. Approx. 60% of energy is used by the following industries: iron and steel, chemicals and non-metallic mineral; the share has not changed much in the last 10 years. The following industries have increased their share in the consumption structure: food industry, wood and wood products, paper production, chemicals, non-metallic minerals, and other. A decrease in the share can be seen for textiles, steel and iron, machinery and transport equipment. A substantial drop in energy consumption was observed in the steel and iron industry. The drops were partially caused by cuts in production. Structural changes are however insignificant, within a few percentage points.

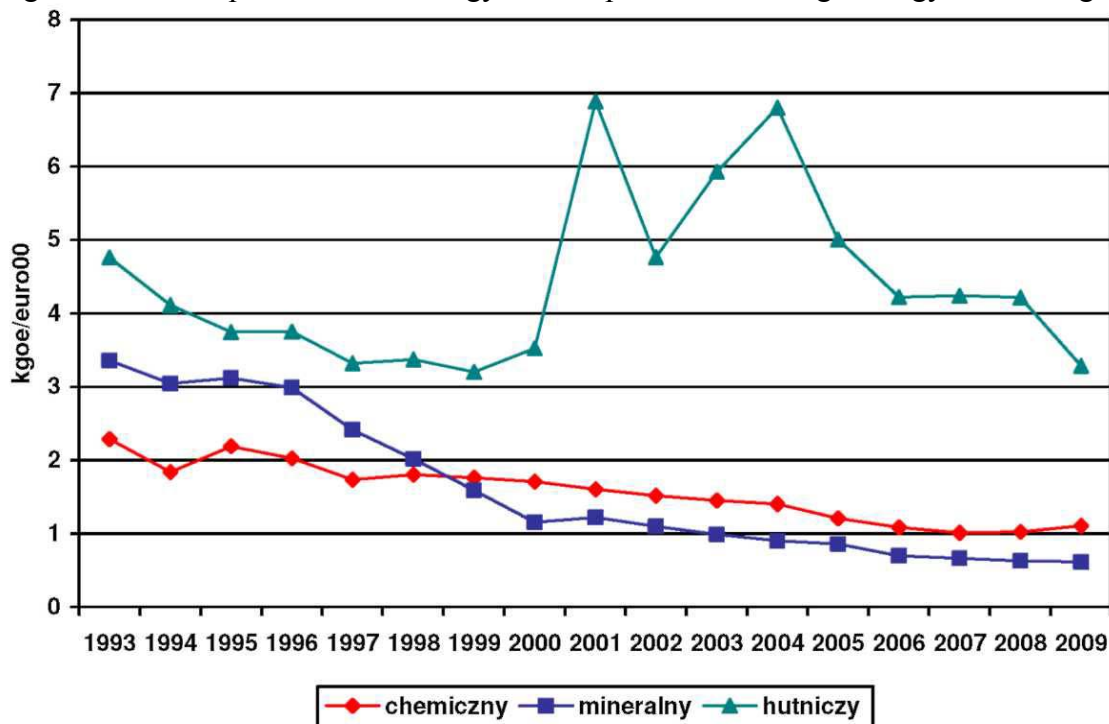
Figure 13. Structure of final energy consumption in Poland in the processing industry



other	
transport equipment	
machinery	
iron and steel	
non-metallic minerals	
chemicals	
paper production	
wood and wood products	
textiles	
food industry	

Figures 14 and 15 demonstrate the chart of changes in the energy consumption indices (final energy consumption/added value) for selected industry sub-sectors from 1993 to 2009.

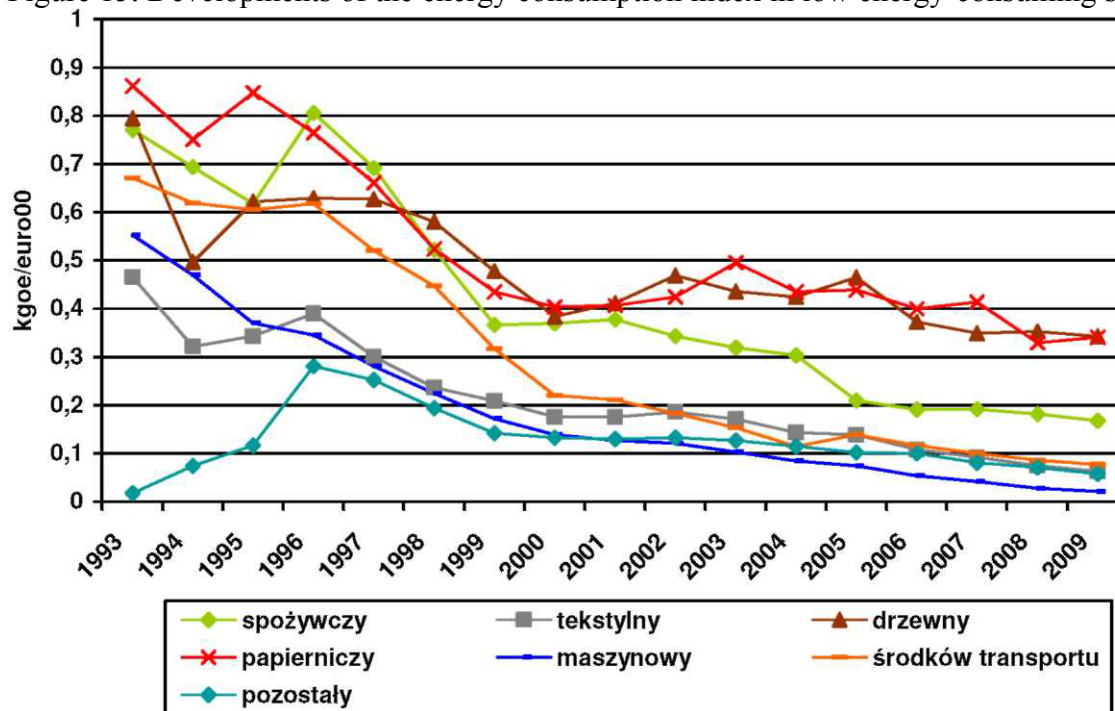
Figure 14. Developments of the energy consumption index in high energy-consuming sub-sectors



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chemicals	
non-metallic minerals	
iron and steel	
kgoe/euro00	

Figure 15. Developments of the energy consumption index in low energy-consuming sub-sectors



food industry	
paper production	
other	
textiles	
machinery	
wood and wood products	
transport equipment	
kgoe/euro00	

The greatest energy efficiency improvement dynamics were noted in the machinery industry and transport equipment, as well as in food production and textiles. The slowest improvements are observed in the iron and steel industry, paper production, wood and wood products and chemicals. The fastest reductions in energy consumption were noted by all sub-sectors between 1996 and 2000. In 2009, in all sub-sectors except for paper production and chemicals, a decline in energy consumption was achieved.

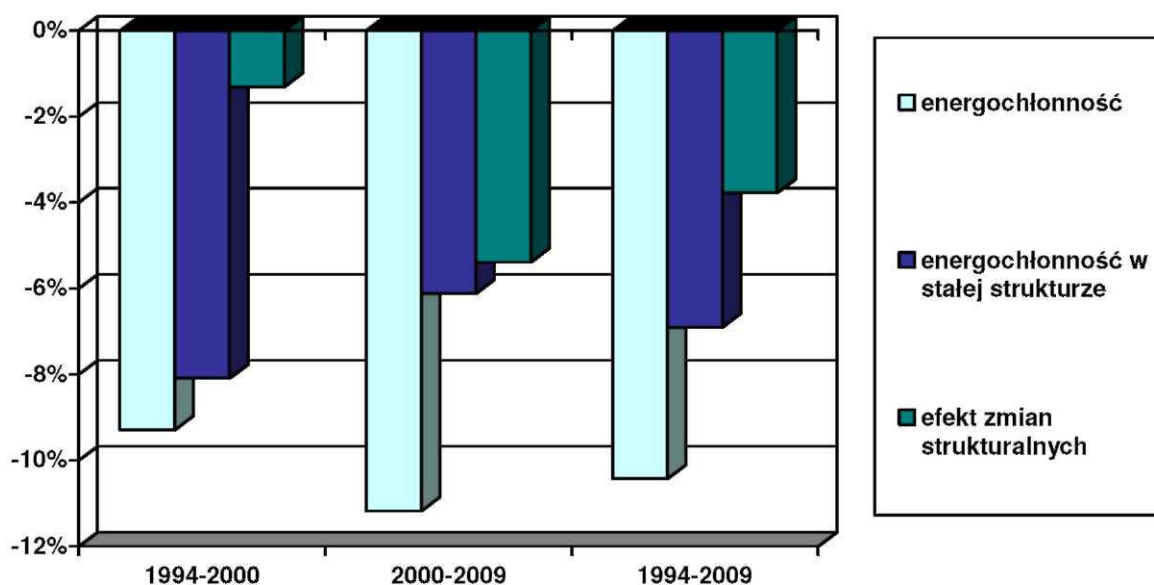
The level of energy consumption of the processing industry is influenced by structure changes: changing shares of the sub-sectors in the final energy consumption and in the created added value in the section. The results below, which assess the impact of structural changes in the processing industry on the level of energy consumption, in some cases resulted from using the Divisia method.<sup>22</sup>

In long periods the rate of energy consumption improvement in the processing industry was high and steady (exceeding 9% per year). However, after 2000 the impact of structural changes was over 3-times stronger. Efficiency improvement rates in the constant structure, which reflect the real improvement on the industry level, declined from -8.1% per year in 1994-2000 to -6.1% in 2000-2009. From 1994 through 2009 the structural changes led to a drop of the energy consumption index by an average of 3.8% a year.

<sup>22</sup> Divisia index is a weighted sum of the growth rates of individual components, where the weights are the component's shares in total value. In the method used in this document, growth rates are defined as the natural logarithm of the change in the added value in a sub-sector of industry against the total, where the weights are a share of the sub-sector's average energy consumption in the total consumption.



Figure 16. Changes in the energy consumption of the processing industry – the impact of structural changes



energy consumption	
energy consumption in constant structure	
impact of structural changes	

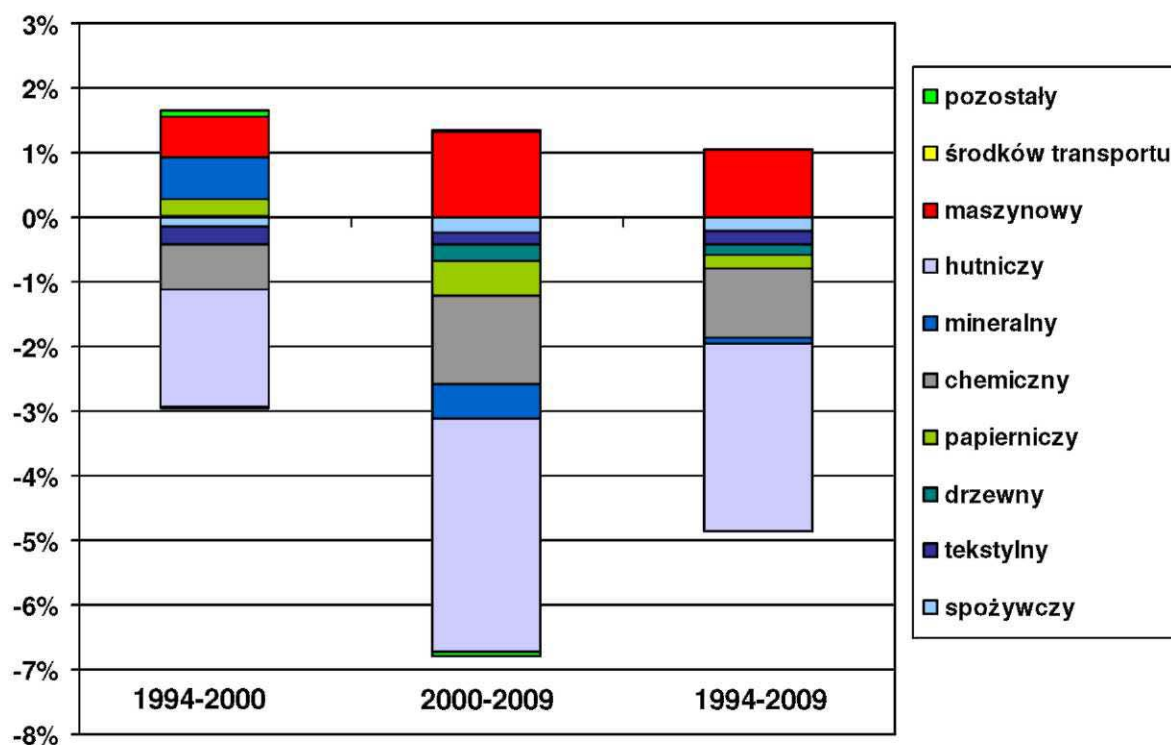
Table 3. Change dynamics in the energy consumption of the processing sector and of the impact of structural changes [%/year]

Description	1994-2000	2000-2009	1994-2009
Energy consumption	-9.29	-11.18	-10.43
Energy consumption at constant structure	-8.09	-6.12	-6.91
Impact of structural changes	-1.31	-5.39	-3.78

The steel and iron industry had the greatest influence on the impact of structural changes. It was caused by the declining importance of the sector which had a large share in energy consumption and at the same time showed very little improvement of energy efficiency. On the other hand, continuous development of the machinery industry and growing importance of this sub-sector in industrial processing had an opposite influence on the impact of structural changes.

When broken down by individual periods, it becomes evident that the steel and iron industry influenced structural changes the most after 2000 (Figure 17).

Figure 17. The impact of structural changes – influence of the sub-sectors in different periods



other	
transport equipment	
machinery	
iron and steel	
non-metallic minerals	
chemicals	
paper production	
wood and wood products	
textiles	
food industry	

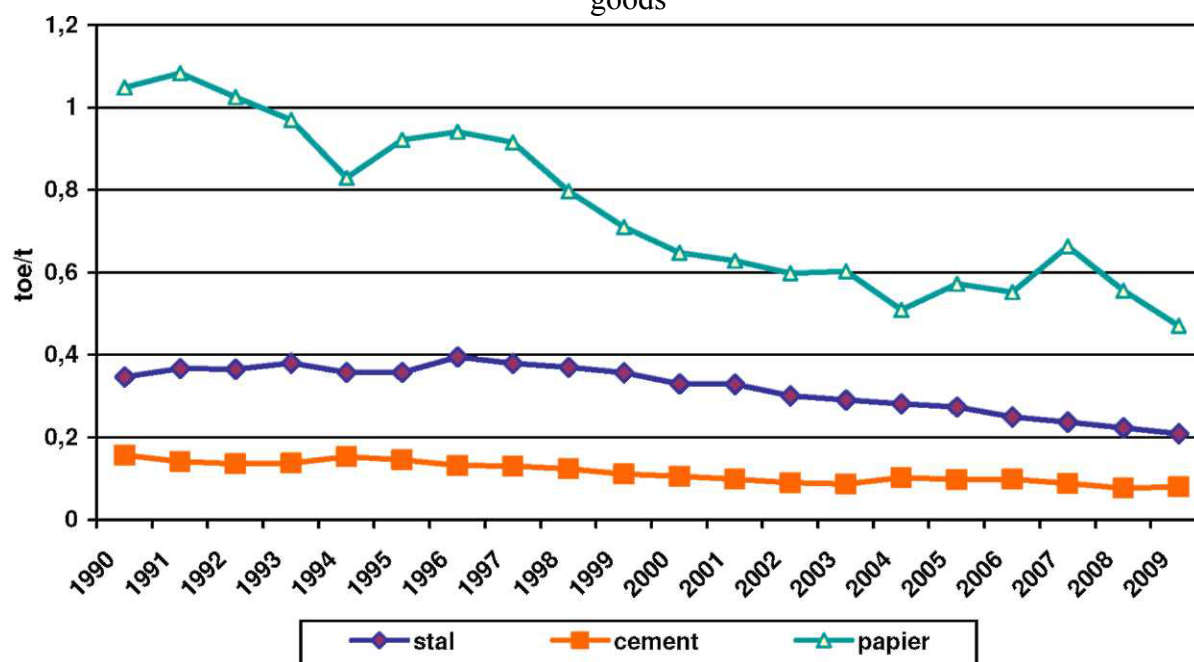
Figure 18 shows changes in energy consumption indices in the production of steel<sup>23</sup>, cement<sup>24</sup>, and paper<sup>25</sup> from 1990 to 2009. Energy consumption for the production of these goods constituted 29% of the consumption in the processing industry in 2009. Energy consumption in the production of cement has been going down systematically. In this sub-sector of industry, the outdated and highly energy-consuming wet process technology for cement production has been practically eliminated, which cut down energy-consumption to less than 0.1 toe/t, close to the European average. The slightly lower decline of energy consumption in steel production results from substantial delays in privatisation processes and in the implementation of modern technologies. The paper production industry, after privatisation, went through a thorough modernisation of technology, which led to a reduction in energy consumption to 0.51 toe/t in 2004. Since then the level of energy consumption fluctuated, to reach 0.47 toe/t in 2009. Between 1990 and 2009 the energy consumption in the production of raw steel dropped by 39.8%, of paper – by 55.1% (4.1%/year), and of cement – by 49.3% (3.5%/year).

<sup>23</sup> Calculated as energy consumption in the iron industry (since 2009 in groups 24.1, 24.2, 24.3, and classes 24.51 and 24.52 according to the Polish Classification of Activity 2007) divided by the production of steel

<sup>24</sup> Calculated as energy consumption in the cement industry (since 2009 in group 23.5 according to the Polish Classification of Activity 2007) divided by the production of cement

<sup>25</sup> Calculated as energy consumption in the paper production industry (since 2009 in group 17 according to the Polish Classification of Activity 2007) divided by the production of paper

Figure 18. Developments in energy consumption indices in the production of selected industrial goods

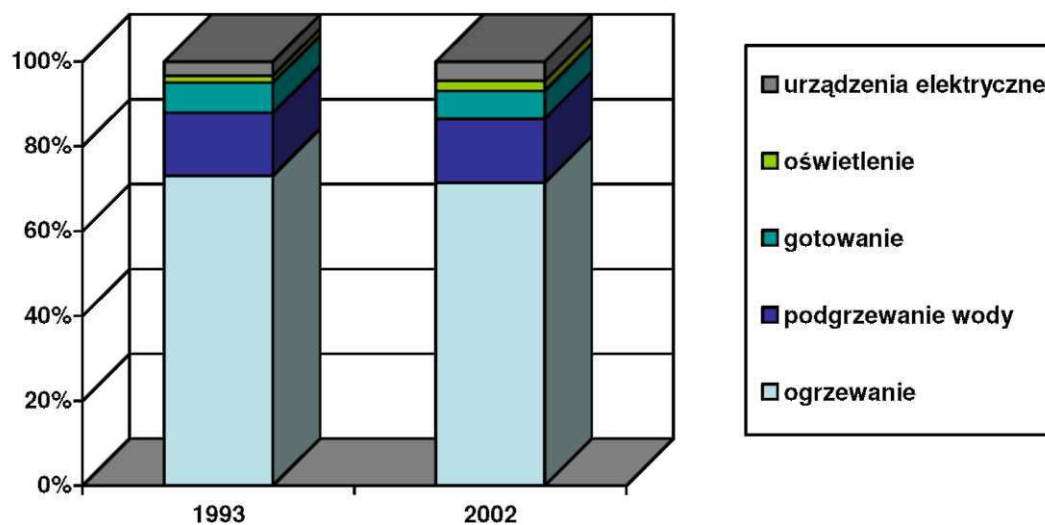


Ttoe/t	
steel	
cement	
paper	

## 5. Households

The share of energy consumption in households in final energy consumption reached 31% in 2009. Figure 19 and table 4 present the structure of consumption by use, according to the surveys carried out by the Central Statistical Office in 1993 and 2002. The declining share of energy consumption for heating and meal preparation is related to the replacement of low-efficient coal burning stoves with modern gas and electric appliances. Growing consumption of electricity used for powering appliances and for lighting is related to increasingly wealthy electric equipment of dwellings and to changes in the users' behavioural patterns (e.g. changes in the frequency of use of appliances such as washing machines, dishwashers, TV sets, computers).

Figure 19. Structure of energy consumption in households by use



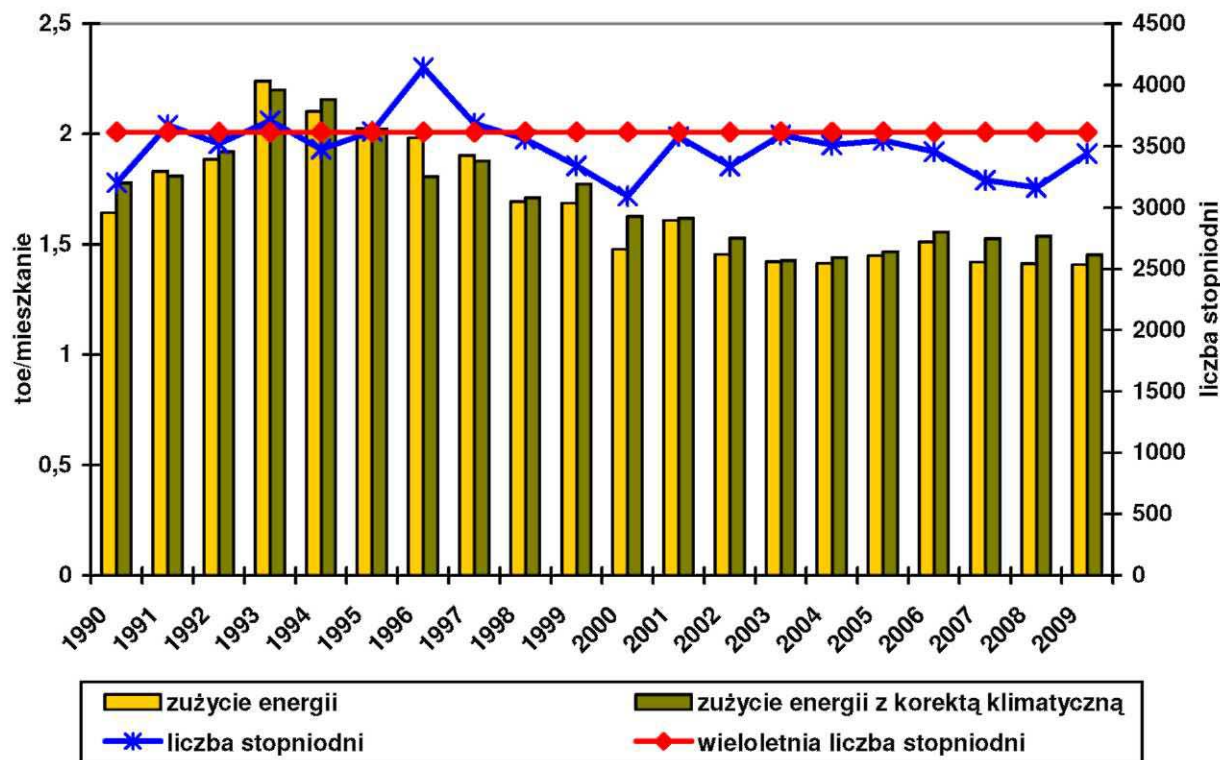
electric appliances	
lighting	
cooking	
water heating	
heating	

Table 4. Changes in the structure of energy consumption in households by use

Description	1993	2002
Total	100.0	100.0
Heating	73.1	71.2
Water heating	14.9	15.1
Cooking meals	7.1	6.6
Lighting	1.6	2.3
Electric equipment	3.3	4.5

Figure 20 shows the changes in energy consumption indices per 1 dwelling. The index, climate adjusted, shows a downward trend with an annual average decline of 2.0% since 1999. The decline in unit energy consumption in dwellings is caused by the implementation of the thermomodernisation programme for buildings, reduction of losses in heating grids and improved efficiency of new appliances. Growth in consumption can be seen since 2002, which may be due to changes in users' behavioural patterns (increase in comfort).

Figure 20. Changes of the energy consumption index in households per 1 dwelling



source: Eurostat and Joint Research Center, Central Statistical Office

toe/dwelling	
number of degree-days	
energy consumption	
number of degree-days	
energy consumption, climate adjusted	
multi-annual number of degree-days	

The methodology for climate adjustment, adopted for the study, is based on the relation between energy consumption and external temperature. A direct ratio between energy consumption for heating and the number of degree-days (Sd) is assumed. Based on these assumptions, it can be deduced that climate adjusted final energy consumption ( $ZEF^{kk}$ ) may be calculated with the following formula:

$$ZEF^{kk} = \frac{ZEF}{1 - 0,9 \cdot \alpha \cdot \left( 1 - \frac{\text{liczba Sd w roku obliczeniowym}}{\text{srednia wieloletnia liczba Sd}} \right)}$$

number of degree-days in the calculation year	
average multi-annual number of degree-days	

where: ZEF – final energy consumption, Sd – number of degree-days,  $\alpha$  – the share of energy consumption for heating in the total energy consumption in the households sector.

The number of degree-days is introduced to provide means to control and compare energy consumption for heating. It is the product of the number of heating days and the difference between the average temperature of the heated space and average external temperature. According to Eurostat methodology, the number of degree-days in a year is calculated as follows:

$$Sd = \sum_{n=1}^N \begin{cases} 18^{\circ}\text{C} - t_{sr}(n) & \text{dla } t_{sr}(n) \leq 15^{\circ}\text{C} \\ 0 & \text{dla } t_{sr}(n) > 15^{\circ}\text{C} \end{cases}, [\text{dzień} \cdot \text{deg/rok}]$$

dla	for
dzień	day
rok	year

$$t_{sr}(n) = \frac{t_{\min}(n) + t_{\max}(n)}{2}$$

where:  $t_{sr}(n)$  – average external air temperature on day n of the year, [°C];  $t_{\min}(n)$ ,  $t_{\max}(n)$  – minimum and maximum air temperature on day n of the year, [°C]; N – number of days in the year. According to the formula, and following the assumption adopted by Eurostat, heating days are those days when the average daily external temperature is below 15°C.

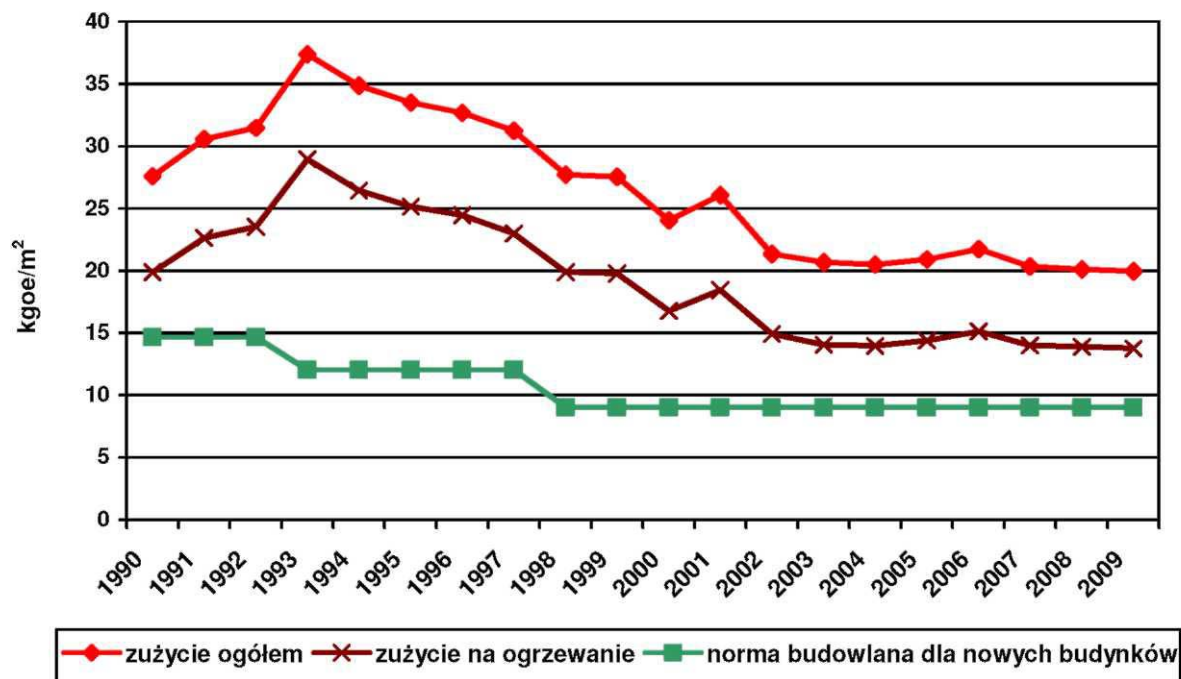
The amount of degree-days from 1995 to 2009 is presented in the table below (average multi-annual calculated for 1980-2004 is 3 615.77):

Table 5. The amount of degree-days from 1995 to 2009

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Sd – annual	3 622	4 144	3 686	3 559	3 341	3 092	3 581	3 337	3 594	3 510	3 547	3 454	3 222	3 164	3 439

source: Eurostat and Joint Research Center

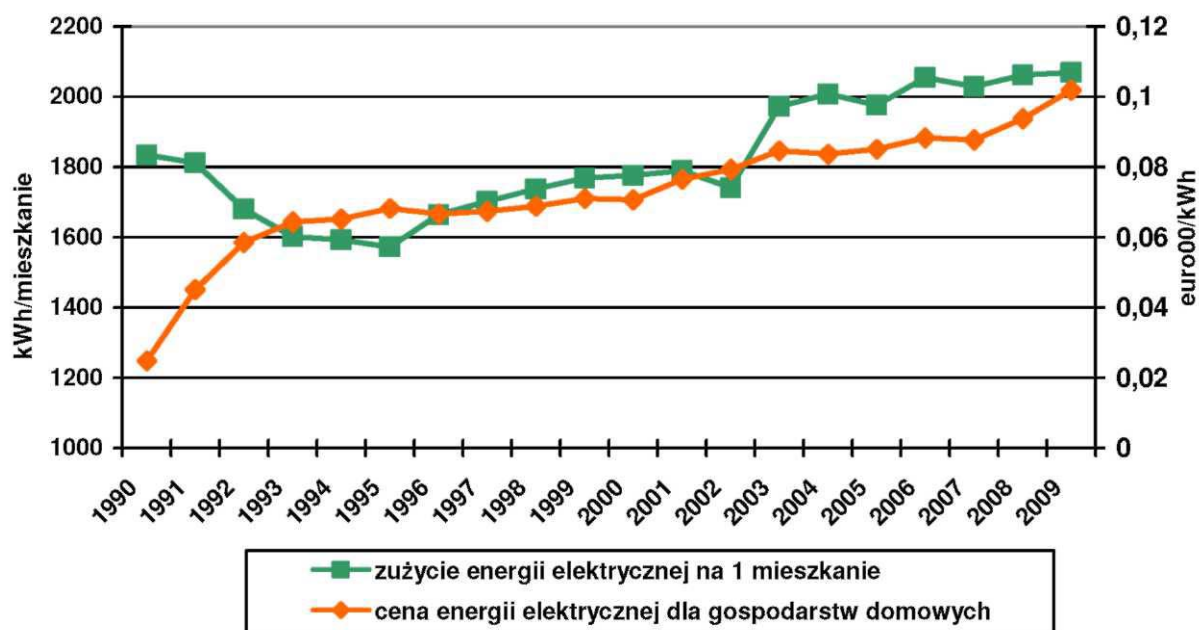
The trend of energy consumption per square metre shows a similar pattern, but its improvement is higher by approx. 1 percentage point due to a gradual increase of the average dwelling size. Although the norms for newly developed buildings are more than 2-times lower than the average consumption, this index has a minor influence on the improvement of energy efficiency in buildings in general. The graph below shows changes in energy consumption in household buildings per square metres.

Figure 21. Total energy consumption in households per m<sup>2</sup>

total consumption	
consumption for heating	
construction standard for new buildings	
kgoe/m <sup>2</sup>	

Electric energy consumption by households is shaped by a number of factors. The most important factors include the level of prices and economic situation of households, which translates into so-called changes in behavioural patterns demonstrated e.g. by different intensities of using household appliances. The growth of prices at the beginning of the 1990s resulted in a sudden drop in electric energy consumption, which was only compensated with growing incomes in the population at the beginning of the next decade. However, further rises in prices contributed to yet another reduction of electric energy consumption. The 2003 increase reflects a methodological change (including electric energy consumption by households whose main source of income consisted of revenues from an individual farm).

Figure 22. Price developments and changes of electric energy consumption index in households per 1 dwelling



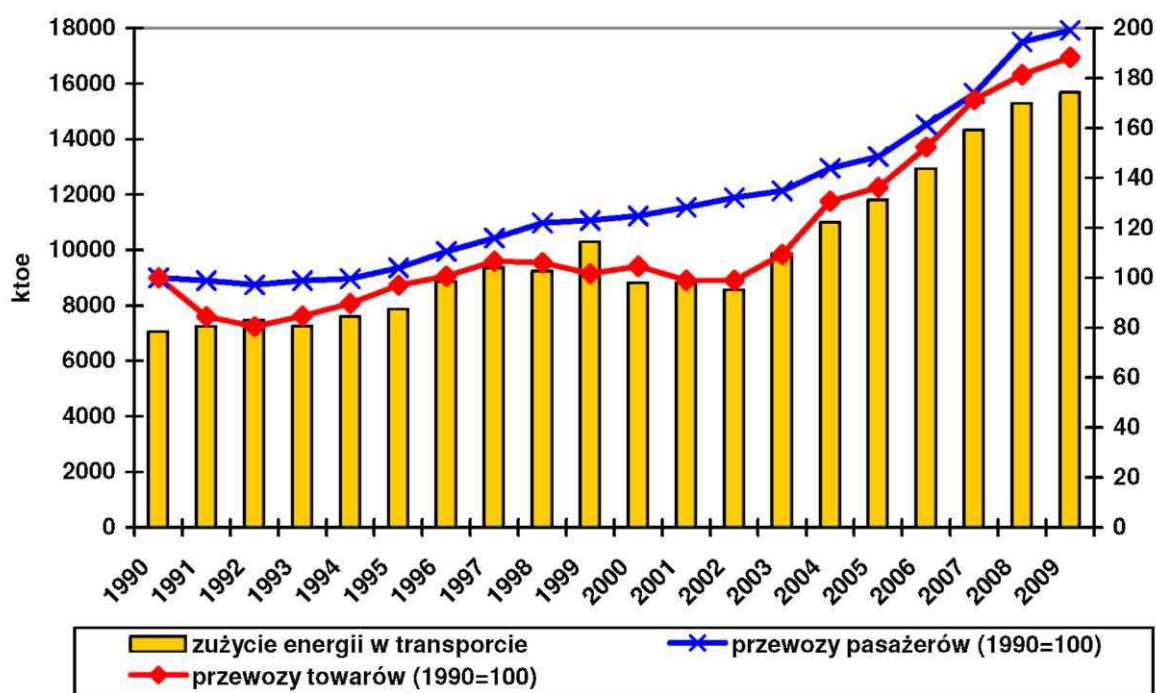
electricity consumption per 1 dwelling	
electricity price for households	
euro00/kWh	
kWh/dwelling	

## 6. Transport

Almost 95% of energy used by transport in Poland is used in road transport, and over 2% is used in rail transport. Moreover, 3% of energy is used in air transport, and minor amounts are used by inland and cabotage shipping.



Figure 23. Transfer of goods and energy consumption in transport\*



\*

\*excluding air transport, source: Eurostat, Polish Central Statistical Office

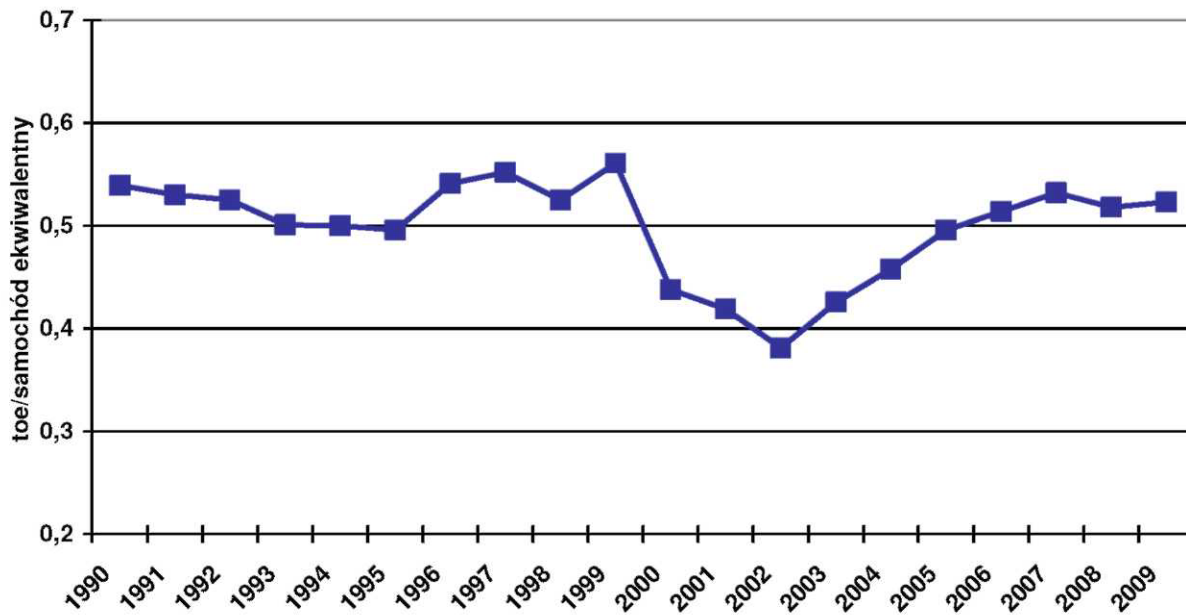
energy consumption in transport	
transfer of goods (1990=100)	
passenger transport (1990=100)	
ktOE	

From 1990 through 2009 we can see a continuous increase in the consumption of fuels in road transport (at the rate of approx. 5.1% per year), with a simultaneous clear decline of energy consumption in rail transport. It is caused by the change of the transport equipment used for the transfer of goods and transport of passengers. In the case of road transport, a three-fold increase was noted since 1990. As regards rail transport, a decline in transfers was noted: passenger transfers dropped by 63% and transfers of goods went down by 48%. In total since 1990 there has been a 90% increase in the transfer of goods (from 124.9 billion tonne-kilometres in 1990), a two-fold increase of passenger transport (from 164.8 billion passenger-kilometres in 1990), which more than doubled the increase on consumption of energy. The greatest discrepancies between the trends of consumption and transfers were observed at the beginning of the 1990s. Later on, the rates of growth of fuel consumption and transfers were similar.

Figure 24 shows changes in the index of unit fuel consumption per one vehicle equivalent.<sup>26</sup> The index value is mainly influenced by the economic situation of the country and by the growing efficiency of new vehicles.

<sup>26</sup> vehicle equivalent is a conventional measure used in the calculations of energy efficiency indices. The number of vehicles equivalents is calculated as follows:  $Se = 0.15 * M + So + 4 * Sc + 15 * A$ , where Se is the number of equivalent vehicles, M – the number of motorcycles, So – the number of passenger cars, Sc – the number of trucks and A – the number of buses and coaches. The coefficients are an estimated annual fuel consumption by a given type of vehicle in relation to fuel consumption by a passenger car.

Figure 24. Fuel consumption by vehicle equivalent



toe/vehicle equivalent

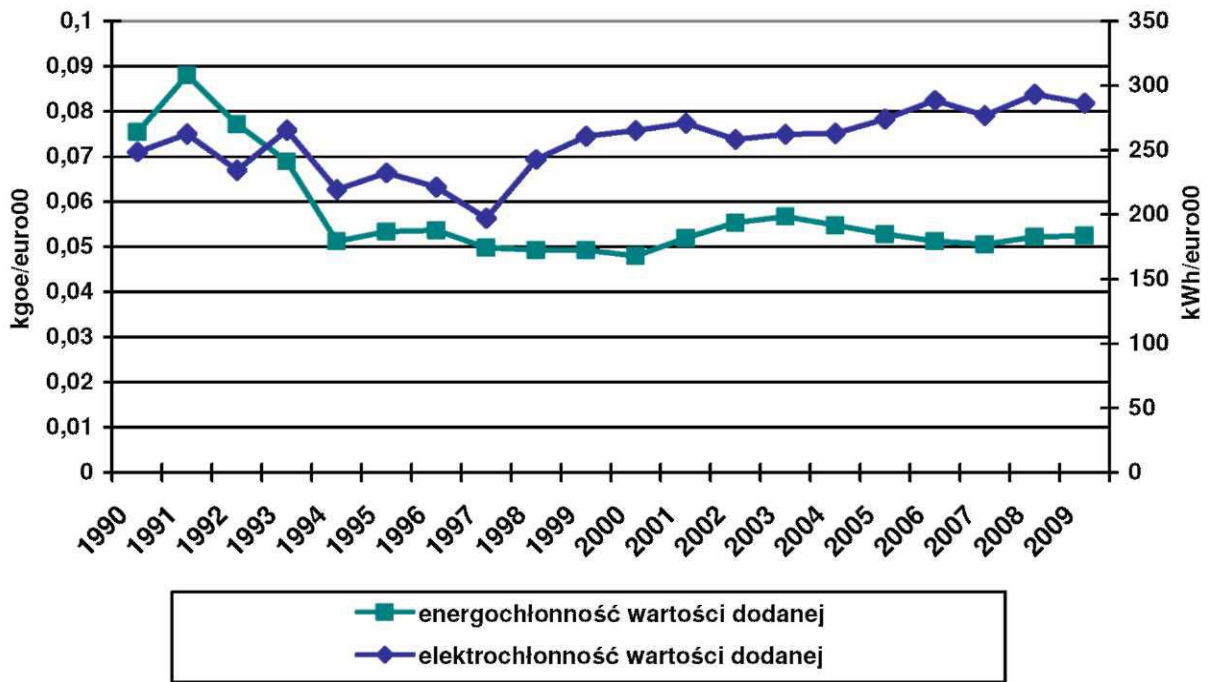
## 7. Service sector

The service sector shows the steadiest indices of efficient energy use. After a decline at the beginning of the 1990s, the energy consumption of added value<sup>27</sup> shows slight fluctuations and in 2009 assumes the value similar to the one in 1994. The rate of improvement is lower than the global value and it is significantly lower than the improvement e.g. in the industry; at the same time, it is the most energy efficient sector creating national income. The energy consumption index shows greater variations, and is on a fluctuating upward trend since the second half of the 1990s (Figure 25).

A fluctuating downward trend can be observed in the case of energy and electric energy consumption per 1 employee; the trend ended in mid-1990s (figure 26). Then energy and electric energy consumption started to grow. Since 1994, the growth rate of energy consumption was higher by 1 percentage point as a result of increasing the amount of electric devices being provided as equipment to companies.

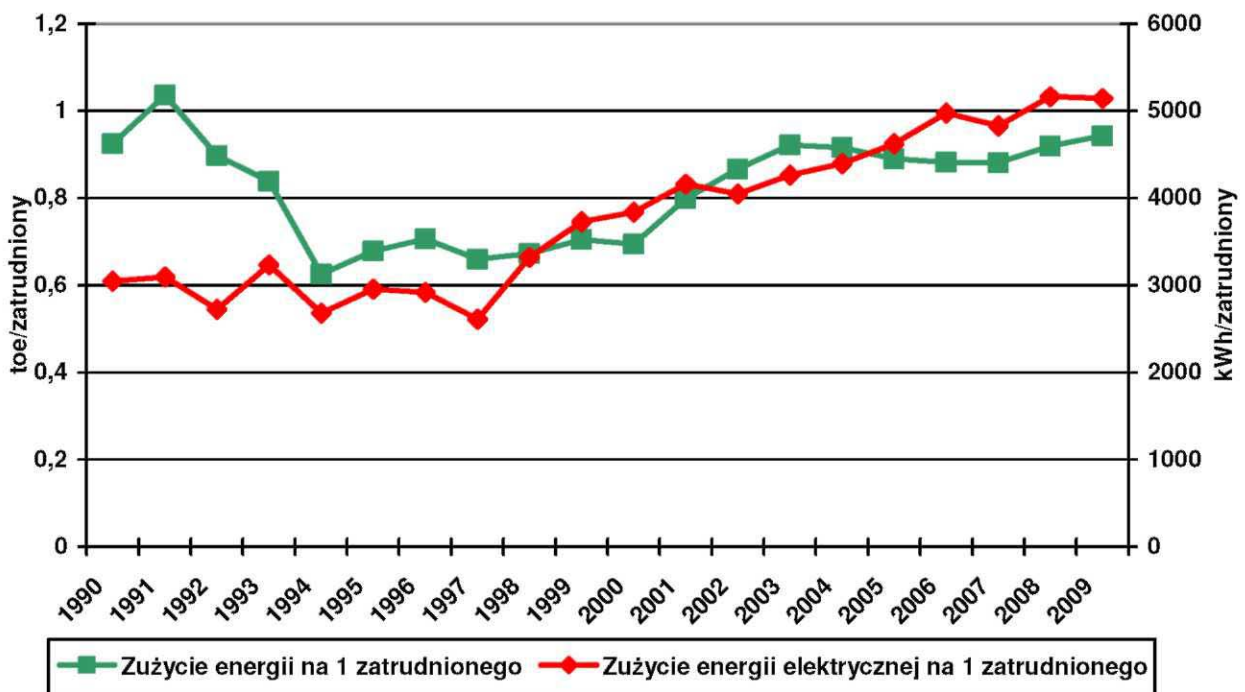
<sup>27</sup>The energy consumption of transport is not taken into account for calculating this index, but the transport added value is included. A similar procedure applies to the energy consumption index.

Figure 25. Changes in the index of energy consumption and electric energy consumption of added value in the service sector



kgoe/euro00	
kWh/euro00	
added value energy consumption	
added value electric energy consumption	

Figure 26. Changes of the index of energy and electric energy consumption per 1 employee in the service sector



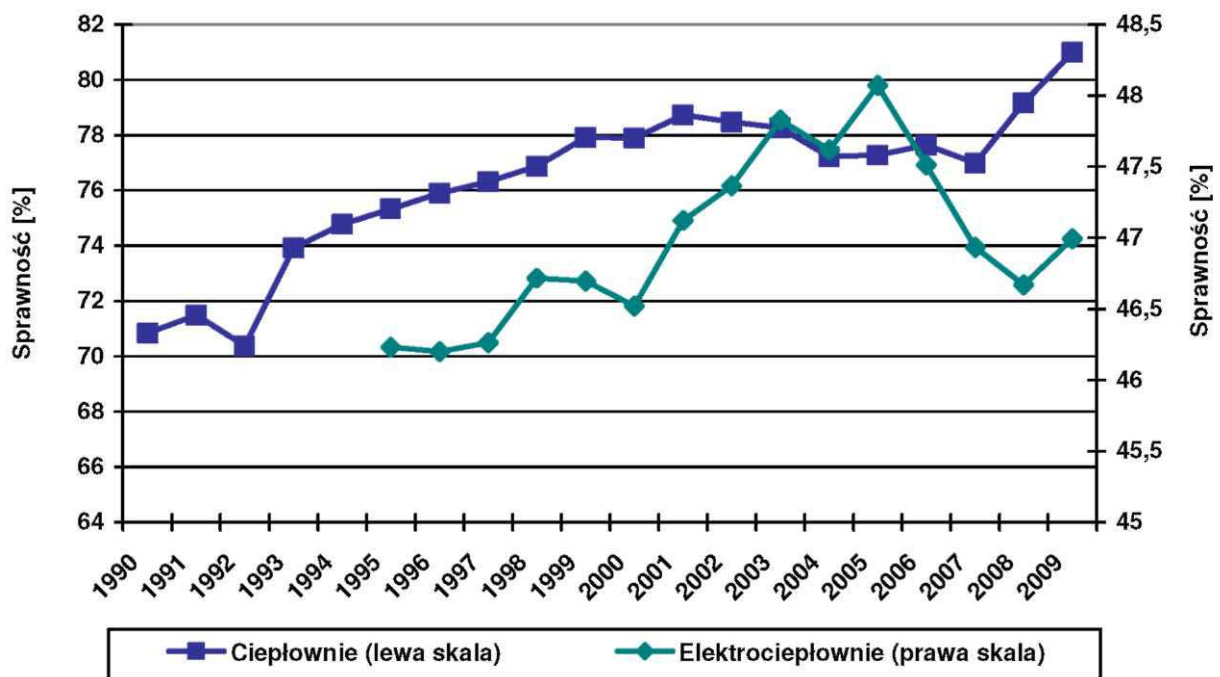
toe/employee	
kWh/employee	
Energy consumption per 1 employee	
Electric energy consumption per 1 employee	

### 8. Heating plants and combined heat and power plants

Figure 27 demonstrates changes in the efficiency of heating plants producing network heat and plants producing heat and power in co-generation (CHP).

Energy efficiency of heating plants increased significantly from 2008 through 2009, exceeding 80%. Previously, since 2001, the energy efficiency of heating plants was on a decline. In CHP plants, after a 3-year decline, the efficiency started to grow in 2009. Earlier on, efficiency of CHP plants had been increasing – with a few exceptions.

Figure 27. Changes in the efficiency of heating plants and CHP plants



Efficiency [in %]	
Heating plants (left scale)	
CHP plants (right scale)	
Efficiency [in %]	

#### **Annex 4. Current and projected measures and support instruments for energy savings in buildings (Article 10 of Directive 2010/31/EC)**

Polish state aid scheme supporting thermomodernisation efforts for building owners was introduced with the Act of 18 December 1998 on the support for thermomodernisation investments (Journal of Laws No 162, item 1121, as amended). The introduced scheme was based on a concept that allowed for financing comprehensive thermomodernisation of buildings, leading to energy consumption reductions and thus to decreasing expenses for space heating, water heating, ventilation, air-conditioning and cooling.

A new act of law entered into force on 19 March 2009 – the Act of 21 November 2008 on the support for thermomodernisation and repairs (Journal of Laws No 223, item 1459, as amended), replacing the previous provisions of the above mentioned Act, which since 2009 had been the basis for investments for thermomodernisation of buildings with state support. The new Act introduced new rules for awarding financial support for thermomodernisation purposes, and a support scheme for a certain group of repair investments. The main objective of the amendment was to define the rules for financing some parts of thermomodernisation and repairs investments from the Thermomodernisation and Repairs Fund.

The principle of obtaining funds requires preparing an energy audit for a building, local heat source or a local heating grid, including the methodology for detailed calculations which provide the means to choose the best possible option generating the largest reductions of expenses, as compared to annual energy savings and financial expenses necessary to complete the intended work. The key factor for choosing the best possible option is the shortest period for the repayment of the loan, taking into account minimum requirements for the given dimensions such as external walls, roofs, ceilings over basements, windows and doors included in the secondary legislation.

At the same time, a scheme was introduced which provided the means for multi-dwelling units which were in use before 14 August 1961 to apply for a bonus to finance investments decreasing energy consumption and making small repairs, such as: balcony repairs, exchange of equipment and installations for new ones, which are now made in the newly constructed buildings.

Additionally, apart from the repairs bonus, it is possible to obtain also a compensation bonus. The premium may be awarded to buildings with council flats, which belonged to a housing unit in a given time. Summing up, within the above mentioned Act it is in fact possible to obtain 3 different types of bonuses: thermomodernisation, repair, and compensation bonus.

It should also be added that every audit is subject to verification or checking whether the assumptions of the audit comply with the law, standards, etc., and whether the formal part and the content of the audit meet the required criteria. The verification of the audits, performed to award the thermomodernisation, repair, or compensation bonus, is made by authorised entities (verifiers), who have signed an agreement with Bank Gospodarstwa Krajowego under the regulation of the Minister of Infrastructure of 17 March 2009 *on detailed manners of verification of energy audits and a part of repairs audits, and on detailed requirements to be met by entities contracted by Bank Gospodarstwa Krajowego to perform the verification of audits* (Journal of Laws No 43, item 347).

Bank Gospodarstwa Krajowego, being the main entity competent for awarding budget funds that constitute the thermomodernisation fund, awards the bonuses within the available resources of the Fund and within the limits of all types of bonuses specified in the financial plan of the Fund. State subsidy for the Thermomodernisation and Repairs Fund reached PLN 200 million in 2011. In the future, the amount will remain on a similar level, budget conditions allowing.

Table 1. Applications accepted until 31 May 2011

Bonus type	Number of applications	Value of investments (from registered applications)
Thermomodernisation	1 198	PLN 423 323 683
Repairs	172	PLN 62 009 232
Compensation	51	PLN 10 641 936

At the same time, the National Fund for Environmental Protection and Water Management, in cooperation with the banking sector, implemented the Subsidy Priority Programme for partial repayments of bank loan capital taken for the purchase and assembly of solar collectors for heating service water and for an additional energy supply for other heat receivers in dwellings. The programme is addressed to natural persons and housing associations. The National Fund for Environmental Protection and Water Management subsidy amounts to 45% of the bank loan capital used for financing eligible expenses of the investment.

PLN 300 million has been reserved in the budget of the programme for subsidies for loan agreements concluded between 2010 and 2014. In the first competition, announced in 2010 with a budget of PLN 200 million for concluding bank loan agreements in 2010-2012, contracts were signed with 6 banks, distributing PLN 138.1 million. The subsidy programme for loans has been present in the banks' offer since August 2010 and is met with very broad interest. By April this year, approximately 4 700 applications for subsidised loans were filed with the banks, and 3 313 applicants were awarded subsidies in the total amount of PLN 18.96 million. The total surface area of the installed collectors is 18.8 thousand m<sup>2</sup>.

The National Fund for Environmental Protection and Water Management acting as the National green investment scheme operator, implements priority programmes in energy management in buildings within the Green Investment Scheme.

The scheme is divided into several parts:

1. Part 1 – energy management in public utility facilities

The total allocation for non-repayable financing is PLN 555 million from the funds gathered from trading in the assigned amount units (accumulated on the Climatic account), or from other funds of the National Fund for Environmental Protection and Water Management (multiannual RES obligation and energy efficiency). The framework of the above mentioned programme also provides funds, PLN 1 010 million from the National Fund for Environmental Protection and Water Management (also on multiannual RES obligations and energy efficiency), for financing investments by means of loans.

Possible beneficiaries of the programme include: local government units and associations thereof, entities which are not entrepreneurs and which provide public services as part of local government own tasks, Voluntary Fire Services, universities, within the meaning of the Act on university education, and research institutes, independent public and non-public healthcare centres, non-governmental organisations, churches, other religious associations, church legal persons which carry out activity in health protection and disease prevention, rehabilitation or social assistance.

The National Fund for Environmental Protection and Water Management announced two competitions in 2010. The allocation of the 1<sup>st</sup> competition for non-repayable financing amounted to PLN 260 million and PLN 520 million in the form of a loan (both manners of financing from the funds of the National Fund for Environmental Protection and Water Management), the allocation of the 2<sup>nd</sup> competition for non-repayable financing amounted to PLN 181 million from funds from the Climatic account. In addition, applicants could apply for a loan from the funds of the National Fund. In the nearest future the National Fund for Environmental Protection and Water Management will announce another call for proposals, with an allocation for non-repayable financing of PLN 50 million from funds from the Climatic account.

2. Part 5 – energy management in the facilities of selected public finance sector entities

Within this programme the budget for non-repayable financing amounted to PLN 500 million (including PLN 100 million from funds from the Climatic account, and PLN 400 million from the National Fund for Environmental Protection and Water Management).

The National Fund for Environmental Protection and Water Management intends to announce two competitions within this project in 2011. The 1<sup>st</sup> competition was announced on 2 May, where proposals were to be filed from 13 May to 13 June. The allocation of the 1<sup>st</sup> competition, which was addressed to: The Polish Academy of Sciences and institutes established by the Academy, state cultural institutions and budgetary institutions, amounts to PLN 50 million from funds from the Climatic account.

The 2<sup>nd</sup> competition will allocate PLN 100 million from the National Fund for Environmental Protection and Water Management. State budget units will also be able to apply for financing within the 2<sup>nd</sup> competition. The 2<sup>nd</sup> competition is due to be announced in June this year.

Table 2. Summary of the scheme parts

No	GIS Priority Programme	Programme allocation	Avoiding CO <sub>2</sub> emissions (thousand Mg)
1.	Part 1) Energy management in public utility facilities	For a subsidy – PLN 555 million from the Climatic account or other funds of the National Fund for Environmental Protection and Water Management; possibility to obtain a loan of up to 60% of the investment's eligible costs from the National Fund	370 000
2.	Part 5) Energy management in the facilities of selected public finance sector entities	PLN 500 million as subsidies from the Climatic account and other resources of the National Fund for Environmental Protection and Water Management	115 000

Another financial support pillar that provides funds for investments that improve energy features of buildings consists of operational programmes co-financed from the Cohesion Policy Fund, which falls within the competence of the Ministry of Regional Development.

Interventions of the Operational Programme Infrastructure and Environment (OPIE) – Priority 9: “Environment-friendly energy infrastructure and energy efficiency” includes Measure 9.3: “Thermomodernisation of public utility facilities”. Financial allocation for 2007-2013 in this allocation amounts to EUR 76.67 million (approx. PLN 304.74 million, depending on the euro exchange rate at the given reporting period and on the adopted so-called contracting limits). The above mentioned allocation constitutes approx.10.2% of the total funds allocated for OPIE Priority 9. Until now approx. 86.43% of the amount has already been contracted within 34 thermomodernisation projects with the total EU subsidy value of PLN 263.4 million. PLN 41.35 million remains to be distributed.

Among leading beneficiaries of thermomodernisation projects under the Operational Programme Infrastructure and Environment, we can distinguish local government units – municipalities and poviats and associations thereof, as well as associations and agreements. Additionally, the investments selected for financing on the ranking list include projects by entities from the healthcare sector (hospitals and independent healthcare centres), as well as investments by the police, universities, and the Catholic Church.



The Regional Operational Programme for 2007-2013 (ROP) provides aid for investments in increasing energy efficiency of buildings and public utility facilities (thermomodernisation), which are a part of a comprehensive investment. Actions concerning thermomodernisation of buildings are included in ROP priority axes related to e.g. housing and environment protection.

## 1. Housing

Actions concerning thermomodernisation are a part of projects related to housing.

The investments may include: projects related to refurbishment of common areas of multi-dwelling units, including refurbishment of the main construction elements of buildings: roofs, façades, windows and doors, staircases, internal and external corridors and hallways, and entrance and its external construction, lifts; technical installation of the building; actions concerning energy savings and projects related to preparing modern, good standard social housing buildings by means of renovation and adaptation of existing buildings owned by public authorities or by non-profit entities.

The funds for housing infrastructure investments may not exceed 3% of funds allocated for the given ROP. Over EUR 243 million was allocated for housing under all ROP.

## 2. Environmental axes

Comprehensive investments are preferred. The investments are aimed at improving air quality and increasing energy savings.

The following persons and entities may be the beneficiaries of the investments, depending on the ROP: local government units and associations and agreements thereof, organisational units with legal personality, government administration, healthcare centres operating in the public healthcare system (and their founding bodies), scientific bodies, cultural institutions, universities, legal persons and natural persons who are bodies operating schools and educational facilities, non-governmental organisations, churches and religious associations, legal persons of churches and religious associations.

Within the aid offered under the projects in environmental axes, we may distinguish direct actions concerning the modernisation of heating systems and renewable energy generation. Indirect actions, in turn, will be targeted at ensuring energy efficiency and savings and for using modern, environment-friendly technologies. It should be emphasized that the above mentioned measures will contribute to reducing greenhouse gas emissions by buildings.

According to the most recent data, the value of EU financing in the concluded agreements, in relation to the indicative allocation, amounted to the following in individual intervention categories: 61 – Integrated projects for urban and rural regeneration: 80.6%, and in category 78 – Housing infrastructure: 12%.

Apart from these, two aid schemes also operate: the European Economic Area Financial Mechanism and the Norwegian Financial Mechanism, within which the following projects were carried out:

- according to the data provided by the National Fund for Environmental Protection and Water Management, by 31 March 2011 a total amount of EUR 83 878 044 was paid for the contracts, which amounts to 75% of the entire allocation,
- for nine projects, that is: PL0285, PL0327, PL0333, PL0341, PL0349, PL00421, PL0463, PL0468, PL0476 the expense eligibility period or project extension period was extended until 30 April 2012.

Moreover, within the European Economic Area Financial Mechanism the following environmental priority was carried out: “Protection of the environment, including the human environment, through, inter alia, the reduction of pollution and the promotion of renewable energy”, which includes projects concerning the construction and modernisation of environment protection infrastructure and in particular the following actions:

- limiting the use of individual heating systems and connecting users to collective/district heating grids,
- replacing outdated heating sources with modern, energy efficient and environment-friendly energy sources,
- thermomodernisation works in public utility facilities,
- investments in renewable energy sources, i.e. using hydroelectric power (small hydroelectric plants up to 5 MW), solar energy and biomass in individual heating systems.

In July 2010, the European Commission and Donor Countries concluded agreements on the next financial perspective of the European Economic Area Financial Mechanism and the Norwegian Financial Mechanism 2009-2014. Within both mechanisms Poland will be eligible for EUR 578.1 million; EUR 266.90 million from the EEA Financial Mechanism and EUR 311.20 million from the Norwegian Financial Mechanism.

According to the information from the National Contact Point, priorities related to the environmental sector will be implemented exclusively under the EEA Financial Mechanism, where at least 30% of funds have been allocated for operational programmes created for two priority sectors, “Environment protection and management” and “Climate change and renewable energy”.

In its position on the Communication from the Commission “Regional Policy contributing to sustainable growth in Europe 2020”,<sup>28</sup> which sets out the role for Regional Policy in contributing to the implementation of the Europe 2020 strategy and in particular to the flagship initiative, “Resource Efficient Europe”, the government of the Republic of Poland shares the view that regional policy plays an essential role in driving the shift to investment in smart and sustainable growth through the actions that it can support to tackle climate, energy and environmental issues.

Investments implementing the objectives of the “Europe 2020” strategy, in particular those referring to low-emissions economy, include on a local level e.g. investments in sustainable infrastructure, including energy efficient buildings (not only public utility facilities and commercial buildings but also housing, including single-family housing), and projects in sustainable transport. Providing favourable economic conditions for thermomodernisation projects may, to a large extent, improve air quality in cities and towns, particularly in the winter. The government of the Republic of Poland notes that further efforts need to emphasize the development of distributed renewable energy

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<sup>28</sup> Communication from the European Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, published on 26 January 2011.

sources, also in rural areas, with particular regard for micro-sources of cogeneration with appropriate infrastructure allowing for a connection to the transmission grid. One of the many needs of the Polish economy is the need to rebuild the transmission and distribution grids, enabling the efficient reception of energy from renewable sources.

Increased use of renewable energy sources and construction of buildings with nearly-zero energy can significantly reduce the dependence of the Member States on imported fuels, which is important for ensuring the security of energy supply.

Limiting the discrepancies between individual countries in order to achieve the comfort of energy independence and reducing greenhouse gas emissions, mainly CO<sub>2</sub>, is a satisfactory reason to implement the provisions of Directive 2010/31/EU, which undoubtedly require appropriate aid instruments stimulating the development of low-energy construction and broadly-understood thermomodernisation.