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IN YEARS 1999-2009

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PREFACE

This publication is successive edition of the study "ENERGY EFFICIENCY" published by the Central Statistical Office (GUS) as part of the series entitled "Information and statistical papers".

The aim of this publication is to present global and sector energy efficiency indicators with their analysis.

The development of energy efficiency indicators adapting statistics to changing economy conditions and present needs (monitoring of energy economy and controlling its management towards "sustainable development") is realized in answer to European Commission and IEA/OECD documents. These documents recommended joined actions of Eurostat and Member States, aimed at creation of statistical indicators system to assess trends in the field of energy efficiency and supporting decisions making and coordination of these actions with works carried by International Energy Agency.

Realization of this objective served works carried in frames of European Union projects SAVE I and SAVE II and carry at the present in frames of "Intelligent Energy for Europe" programme.

Presented results show potentiality of system created in the EU and IAE/OECD and are not full analysis of present state and trends of energy intensity of Polish economy.

The publication was elaborated by employees of the Polish National Energy Conservation Agency, Energy Market Agency and Central Statistical Office.

Wanda Tkaczyk
Deputy Director of
Production Division

Warsaw, June 2011

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1. Introduction

The increase of energy efficiency of generation, transmission and use processes is a pillar of sustainable energy policy. It is reflected in the law and actions undertaken by national institutions and international organizations, among them in regulations connected with energy efficiency, including:

- Directives of the European Parliament and of the Council[1] (including Directive 2006/32/EC of 5 April 2006 on energy end-use efficiency and energy services and repealing Council Directive 93/76/EEC),
- Renewed Lisbon Strategy,
- National Coherence Strategy for years 2007-2013.

Poland, as a member state of the European Union, is actively involved in creating a Community energy policy, and also makes the implementation of legislation according to national conditions, taking into account the protection of the interests of customers, domestic energy resources and technological conditions of electricity generation and transmission. The basic directions of Polish energy policy are:

• Improving energy efficiency;

• Increasing security of supply of fuels and energy;

• Diversification of the structure of electricity generation through the introduction of nuclear power;

• The development of renewable energy, including biofuels;

• Development of competitive markets for fuels and energy;

• Reducing the impact of energy on the environment.

For each of the above directions specific objectives and actions are formulated, for their implementation. The issue of energy efficiency is considered in the Polish energy policy a priority and progress in this field will be the key to achieving all other objectives. In addition, improving energy efficiency is one of the priorities of EU energy policy as designated in 2020 to reduce energy consumption by 20% compared to the "business as usual" scenario. The main objectives of Polish energy policy in the area of energy efficiency are:

[1] See Attachment No. 3

• Striving to maintain a zero-energy growth, i.e. economic development without growth in demand for primary energy;

• Consistent decrease of energy intensity of Polish economy to the level of the EU-15.

The specific objectives in the area of energy efficiency are:

• Increasing the efficiency of electricity generation through the construction of high-efficient generation units;

• Doubling in year 2020 production of electricity in cogeneration, as compared to production in 2006;

• Reducing the rate of network losses in transmission and distribution, through, inter alia upgrading existing and building new networks, exchange of transformers with low efficiency and the development of diffused electricity generation;

• Increased end-use efficiency;

• Increasing the ratio of the annual electricity demand to maximum power demand at peak load, reducing the total cost to meet demand for electricity.

Presented in "Polish Energy Policy until 2030" measures to promote energy efficiency include:

• Establishing national objective of energy efficiency;

• Introduction of systemic support mechanism for actions to achieve the national objective of energy efficiency;

• Stimulating the development of cogeneration through support mechanisms, including co-generation sources of less than 1 MW, and the relevant policy of communities;

• The use of mandatory energy performance certificates for buildings and homes when placed on the market and rent;

• Labelling of energy consumption in equipment and energy-using products and the introduction of minimum standards for energy-using products;

• The commitment of the public sector to perform the exemplary role in the economical energy;

• Support investment in energy saving by using preferential loans and grants from national and European sources, including the law on supporting thermal and renovations, the Operational Programme Infrastructure and Environment, the regional operational programs, the National Fund for Environmental Protection and Water Management;

• Support research on new solutions and technologies that reduce energy consumption in all directions of processing and use;
• Use of Demand Side Management, stimulated by diurnal variation of distribution fees and the price of electricity based on reference prices as a result of the introduction of the current market and the transmission of price signals to customers via two-way communication with remote electronic counters;
• Information and education campaigns that promote energy efficiency.

In addition, the indicative target will be realized due to the Directive 2006/32/EC, i.e. until 2016 to achieve energy savings of 9% compared to the average final energy consumption in the years 2001 - 2005 (i.e. by 53,452 GWh), as defined in the National Energy Efficiency Action Plan.

Directive 2006/32/EC on energy end-use efficiency and energy services, which entered into force on 17 May 2006, imposed on Poland to take actions leading to a reduction of final energy consumption by end users, in the following nine years of its duration, ranging from 1 January 2008. Pursuing the provision of Article 14 Paragraph 2 of Directive, Ministry of Economy has developed a National Energy Efficiency Action Plan. The document defines the purpose of the indicative energy savings target for 2016 as above, in accordance with art. 4 of that Directive. So-called. intermediate national target for energy savings was also set, provided to achieve in 2010 2% energy savings, which is indicative and provides a path to achieve the objective foreseen in 2016, enabling the assessment of progress in its implementation. In addition, the document outlines the measures and the resulting actions implemented or planned at national level aimed at achieving the national indicative targets for the foreseen period.

In order to implement the provisions of Directive 2006/32/EC in April 2011 the Law on Energy Efficiency (OJ 2011 No. 94 pos. 551) was adopted. The Act introduces the obligation to obtain an appropriate amount of white certificates, so called. certificates of origin, by the power company selling electricity, heat or natural gas to end users connected to the network on the Polish territory. The system will work just as already existing green certificates for renewable energy and red certificates for electricity produced in cogeneration. Fines for lack of relevant certificates will be collected by the National Fund for Environmental Protection and Water Management (National Fund) in one account and will be used to finance programs to promote energy efficiency, including cogeneration, or to support the development of renewable energy sources and the construction or reconstruction of networks for connecting these sources.

Beside, the Act sets out rules for drawing up the energy efficiency audit and to obtain energy efficiency audit authorization, and introduces an obligation for the public sector to perform the exemplary role in energy savings. Units of central and regional authorities are required to apply at least two measures for improving energy efficiency, from a list of actions contained in the Act.

Central Statistical Office and National Energy Conservation Agency has participated for several years in projects to evaluate energy efficiency and to identify the implemented measures to improve energy efficiency. Currently they are involved in a 2.5-year (2010-2012) project of the Intelligent Energy for Europe programme named: "Monitoring of the European Union and national energy efficiency targets" with the acronym ODYSSEE-MURE 2010.

The project aims to analyze, using developed energy efficiency indicators economies of the European Union countries, as well as the identification and assessment of the effects of measures for energy efficiency.

In frames of the project ODYSSEE database containing statistical data and values of energy efficiency indicators and MURE database with information on measures to improve energy efficiency are built and developed:

This publication and presented energy efficiency indicators are the result of work carried out under the current and previous projects on energy efficiency indicators of the "Intelligent Energy for Europe" programme and are based on a methodology developed during those projects.

Presented data may differ slightly from data presented in the previous edition, which is the result of data revisions.

Data on energy consumption in year 2009 were collected and processed using NACE Rev. 2.

2. Energy efficiency indicators for Polish economy and its sectors

2.1. Dynamic of development of the economy

Since 1992 all the basic economic indicators in Poland have been improving, after drop at the beginning of the 90's (Figure 1). The fastest rate of growth of value added at constant prices was achieved in the given period in industry sector though the growth was rather unequal with two declining years (2001 and 2002). The lowest pace of growth was achieved in agriculture. (Figure 2). Private consumption was increasing at the rate similar to the rate of growth of GDP (Table 1), except for year 1991. In 2009 the pace of growth of basic indicators slowed down.

Figure 1. Dynamics of basic macro-economic indicators (1990=100)

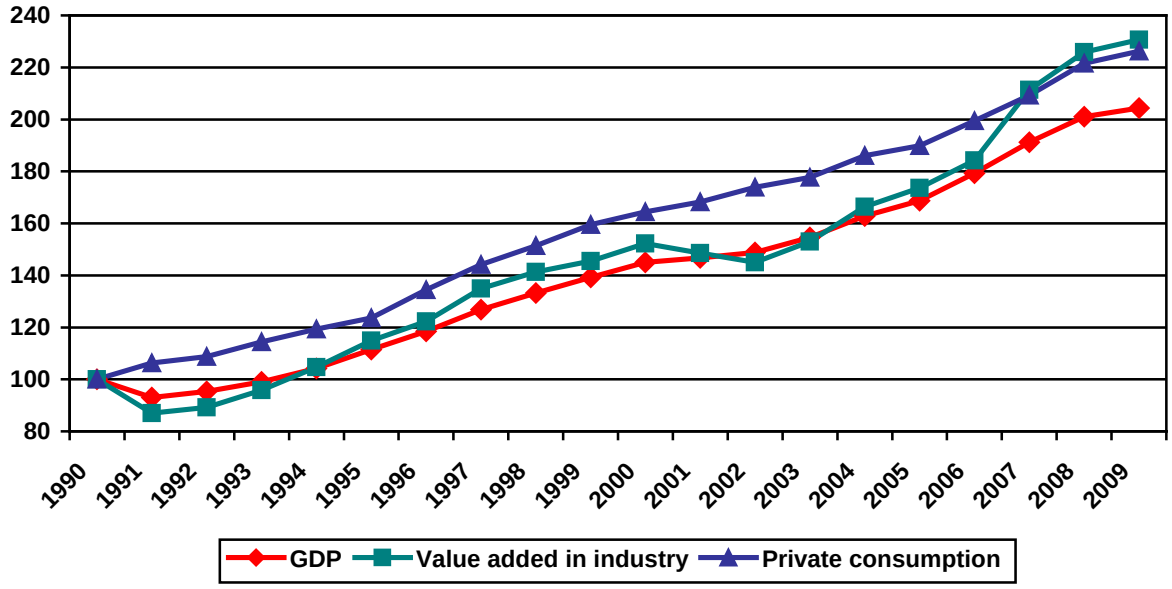
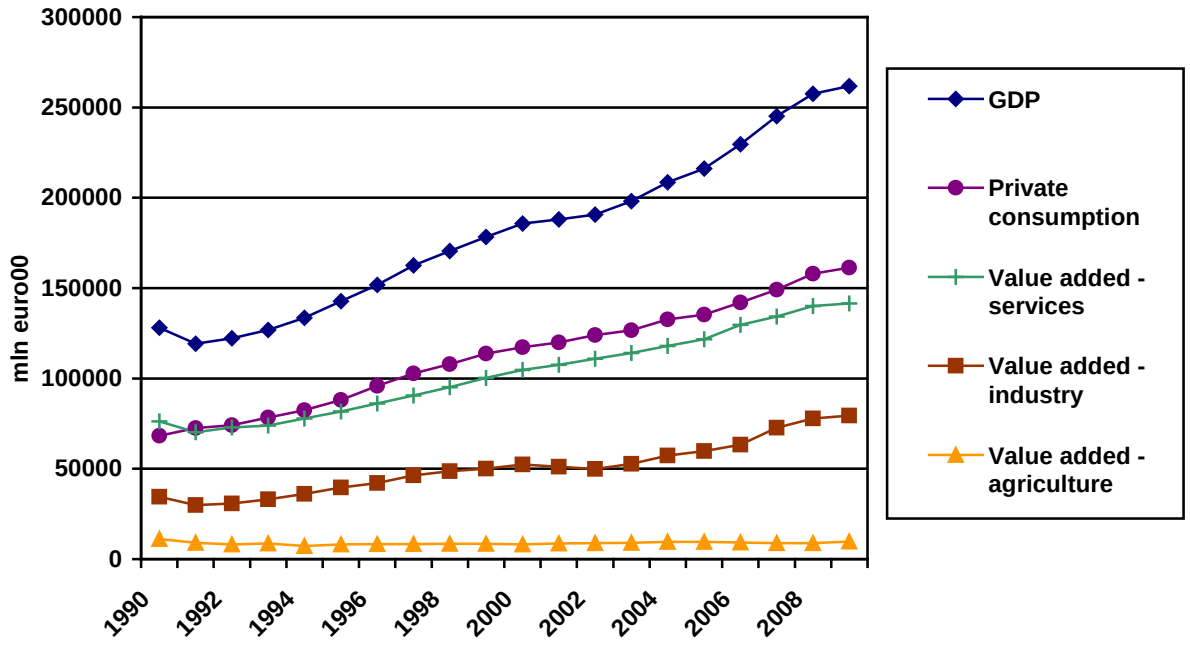


Table 1. Dynamics of basic macro-economic development indicators in Poland in 1990-2009 (%/year)

Specification	1991-2001	2001-2009	1990-2009
GDP	4.66	4.23	3.83
Value added in industry	5.50	5.65	4.50
Private consumption	4.70	3.77	4.39

Figure 2. Changes of GDP, value added in main economy sectors and private consumptions at constant prices



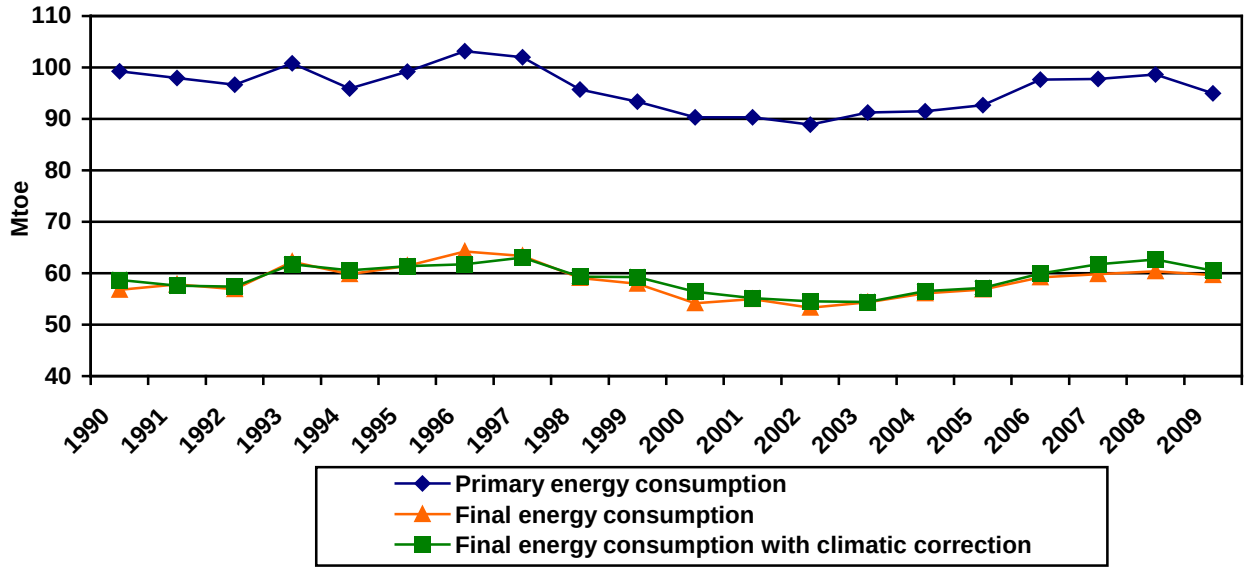
2.2 Energy consumption and prices of energy

After growth in first half of the 90's and reaching top in 1996, total primary[2] and final energy consumption was decreasing between 1996-2002 (Figure 3). Since then growth of consumption has began and lasted until year 2008. In 2009 both primary and final consumption decreased.

Decrease of energy consumption resulted from realization of modernization programmes, restructuring of economy and seasonally lower economic activity. Programmes of energy efficiency improvement and liberalization of energy prices also had their share.

[2] Primary consumption includes also recovery, stock change and foreign trade balance of derived energy carriers according to methodology of Eurostat

Figure 3. Primary and final energy consumption



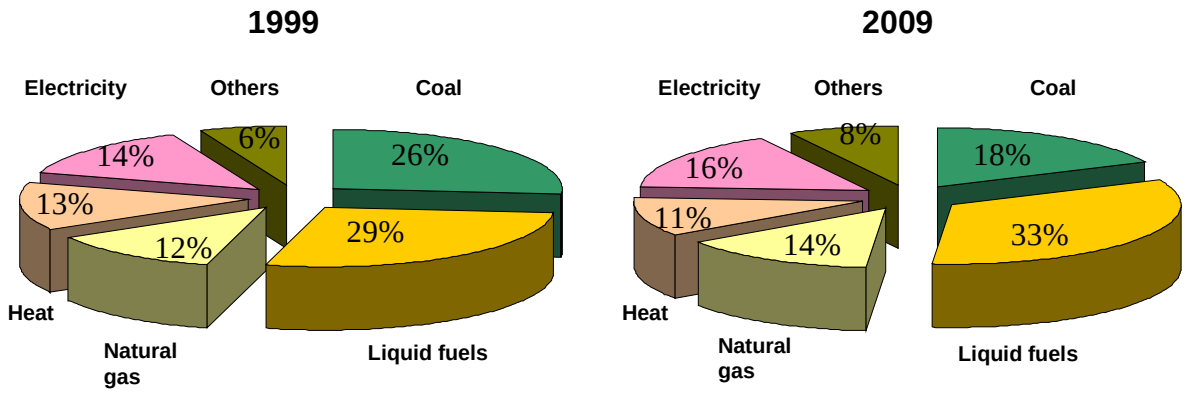
Function of final energy consumption is slightly modified by climatic correction which increases its value for winters characterized by lower degree days value (warmer). Climatic correction concerns households and service sector. Energy consumption with climatic correction describes its theoretical value for a given year, if the weather conditions were similar to long-term average.

Final energy consumption with climatic correction is counted by deducting from final energy consumption the energy consumption in households and service sector and adding energy consumption in these sectors with climatic correction[3].

In the energy field, Poland has traditionally been a supply-oriented country with important hard coal and lignite sector. However, since the beginning of the 90's the share of liquid fuels in final consumption systematically increased and in 1999 final consumption of these carriers with 29% share exceeded for the first time final consumption of coal (Figure 4). In 2009 this share reached level of 33%. During that period share of coal in final energy consumption decreased from 26% in 1999 to 18% in 2009 (Figure 4). Share of natural gas consumption slightly rose and reached 14% in 2009. Similarly, share of final consumption of electricity increased between 1999 and 2009 and amounted to 16% in 2009.

[3] detailed methodology of climatic correction calculation was presented in chapter 2.5

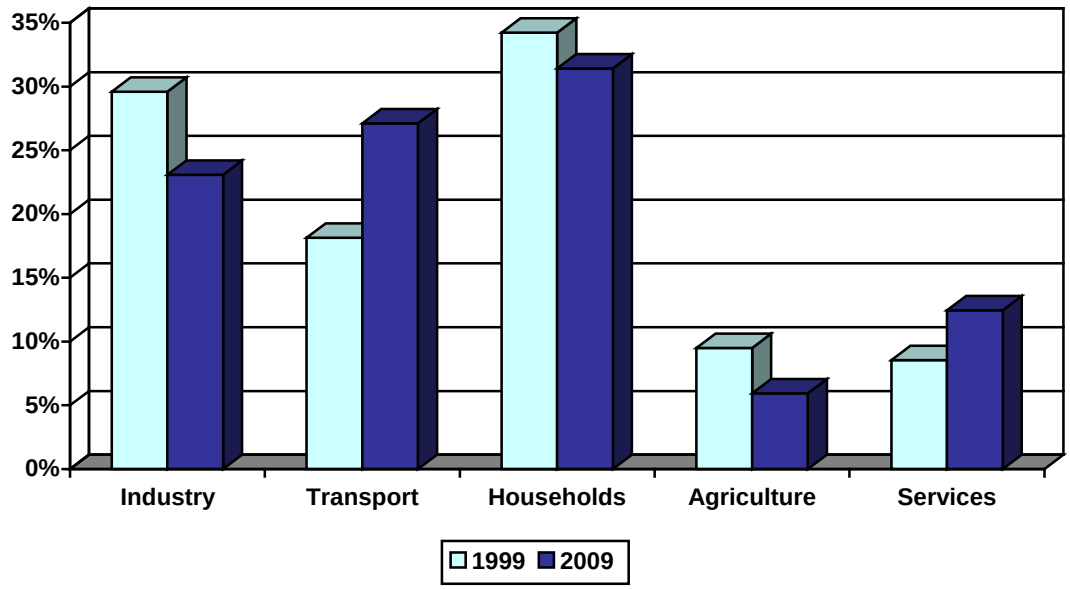
Figure 4. Final energy consumption by energy carrier



Changes of final consumption structure in main sectors of economy (Figure 5) reflect the directions of economy development. Restructuring of industry and actions taken by enterprises aimed at reduction of energy intensity caused decrease of energy consumption in this sector. The development of road transport and services influenced the increase of energy consumption of these sectors. The households sector experienced the activities as thermo-modernization and improvement of heating systems and totally obtained 6% reduction of its energy consumption between 1999 and 2009.

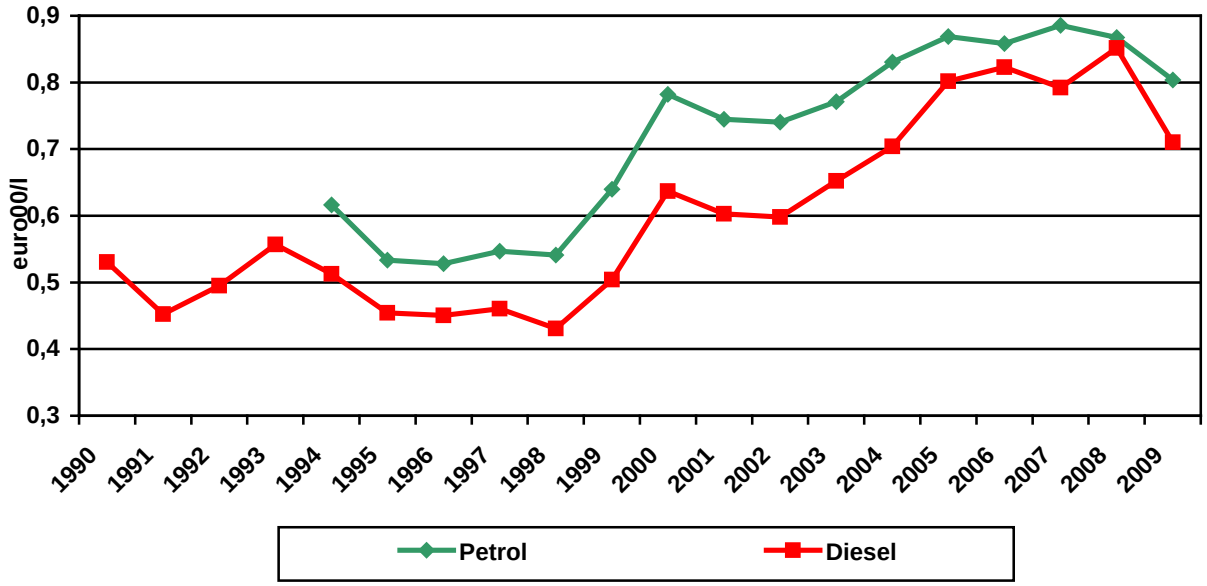
Changes in agriculture sector, consisting in liquidation and privatisation of state-owned agriculture holdings, and building modern large-size farms, did not contribute to save energy. However, since year 2000 energy consumption in agriculture began to decrease.

Figure 5. Final energy consumption by sectors



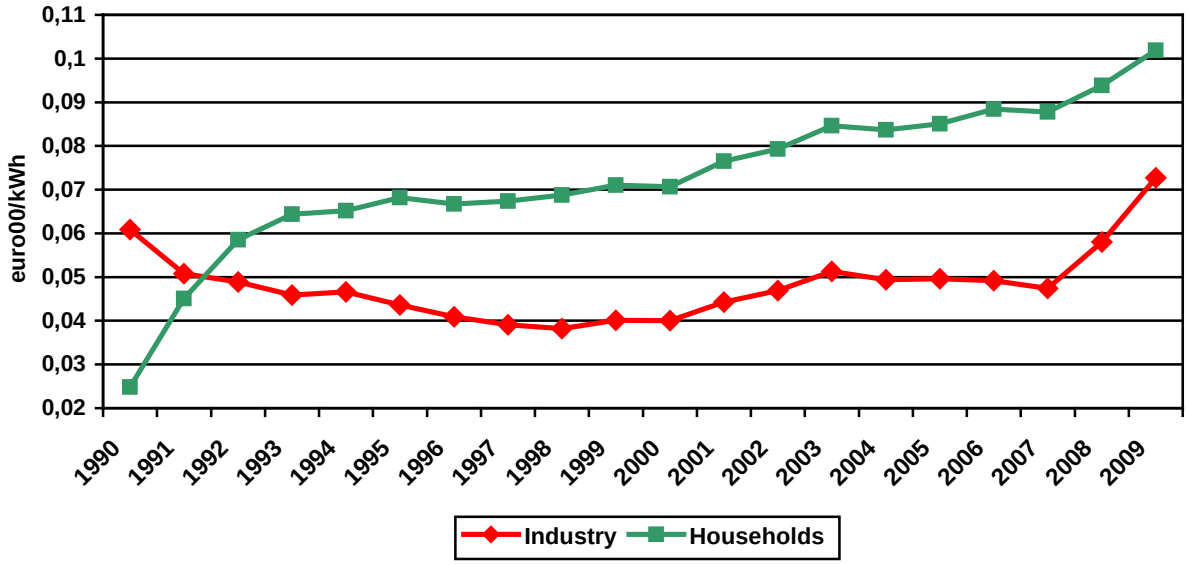
Prices of gasoline and diesel expressed in constant of 2000 have dynamically grown since 1998 with the periodical corrections of the trend (Figure 6). The main factors influencing level of these prices is the level of tax contained in fuel prices (significant increased of excise tax took place at the end of the 90's) and prices of crude oil on world markets. In 2009 after significant drop price of gasoline amounted to 0,80 euro00/l and price of diesel 0,71 euro00/l.

Figure 6. Changes of gasoline and diesel oil prices



At the beginning of the 90's subsidies to electricity were eliminated, what has been achieved by increasing the tariff for household from 0.0248 euro00 for 1 kWh in 1990 up to 0.0664 euro00 in 1993: 160% of growth in constant prices. Since then the price of electricity for households has been increasing and reached level of 0.102 euro00/kWh in 2009. Price of electricity for industry has been decreasing during period 1990-2000 (4.1%/year) – Figure 7. In years 2001-2003 the prices increased by 28% and then started to decline slightly. In 2008 prices started to increase sharply to reach 0.073 euro00/kWh in 2009.

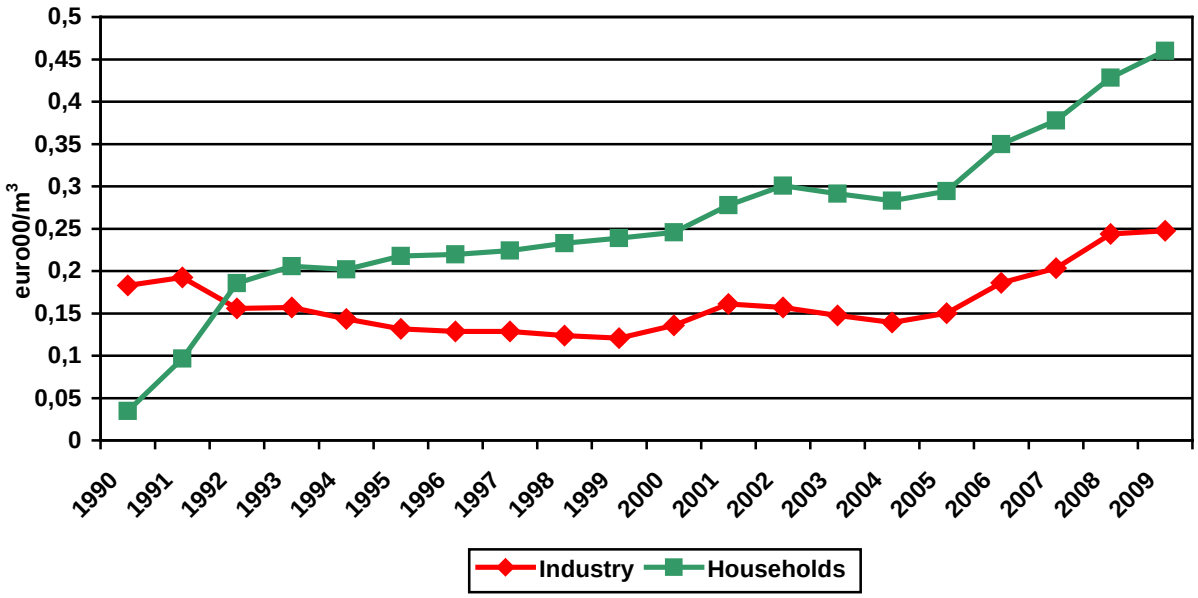
Figure 7. Changes of electricity prices for households and industry



The changes of prices of gas reflected the tendencies observed for electricity prices. In case of gas price the growth for households expressed in constant euro (base year 2000) was much sharper: from 0.0349 in 1990 up to 0.2058 in 1993 (490% of growth at constant Euro 2000 (Figure 8) and up to year 2000 price was steadily growing. In 2001 and 2002 gas price jumped and next years the prices fluctuated. In 2004 prices returned to increasing trend which fastened in 2006 and was continued in next year. In 2009 price of natural gas for households grew by 7.4% and it cost 0.46 euro00/m^3.

In years 1990-1999 gas price for industry declined systematically, then it jumped in 2000-2001. After decreasing until 2004, prices began to grow. In 2009 after little growth by 1.6% price for industry amounted to 0.25 euro00/m^3.

Figure 8. Changes of gas prices for households and industry



2.3. Macro-economic indicators

Stable level of energy consumption and increasing value of Gross Domestic Product caused decrease of primary and final energy intensity of GDP (Figure. 9-11, table 2). Initial growth of intensity until year 1993, was followed by the period of dynamic improvement which lasted until year 2000. Since that time, gradual improvement of intensity at the rate of 2% per year had taken place, which accelerated in year 2007. In 2009 positive trend was continued and final intensity of GDP fell by 3%, while primary intensity fell by 5%.

Table 2. An average annual rate of changes in GDP energy intensity indicators (%/year)

Rate of change	1990-1993	1993-2000	2000-2009	1993-2009	1990-2009
Final intensity of GDP	3.46	-7.16	-2.71	-4.68	-3.44
Primary intensity of GDP	0.84	-6.77	-3.21	-4.78	-3.92

Figure 9. Energy intensity of GDP

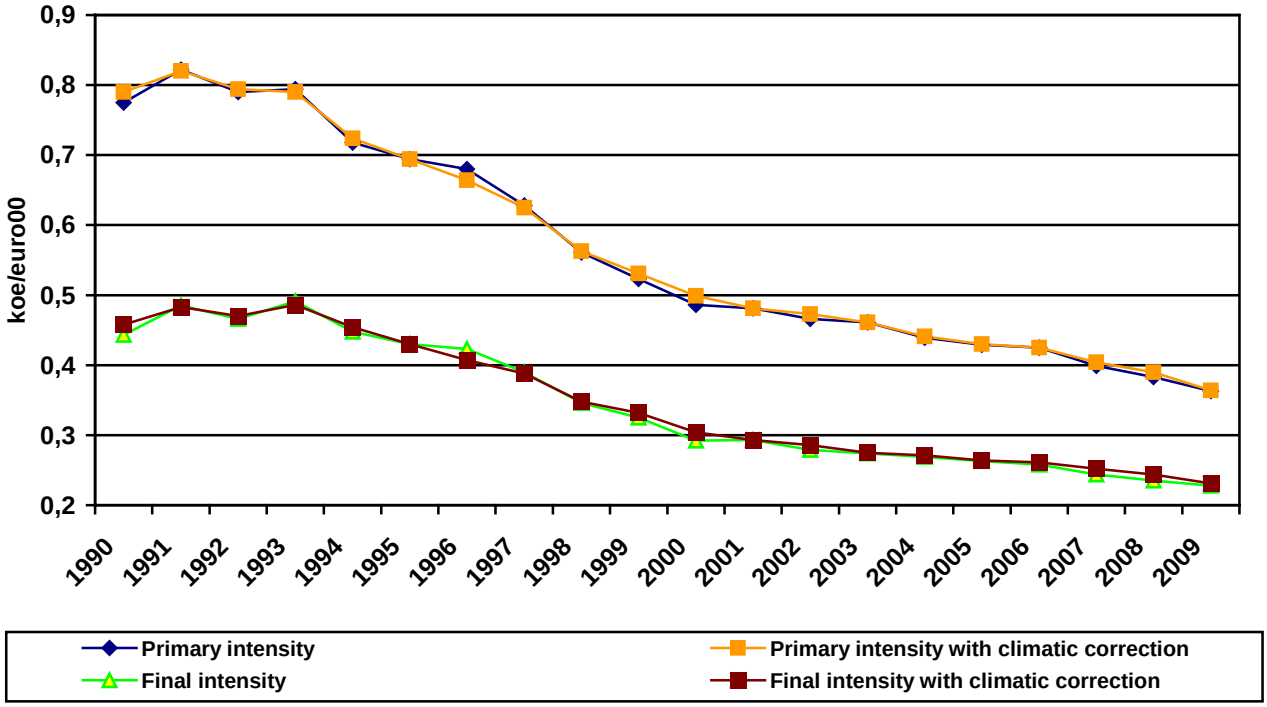
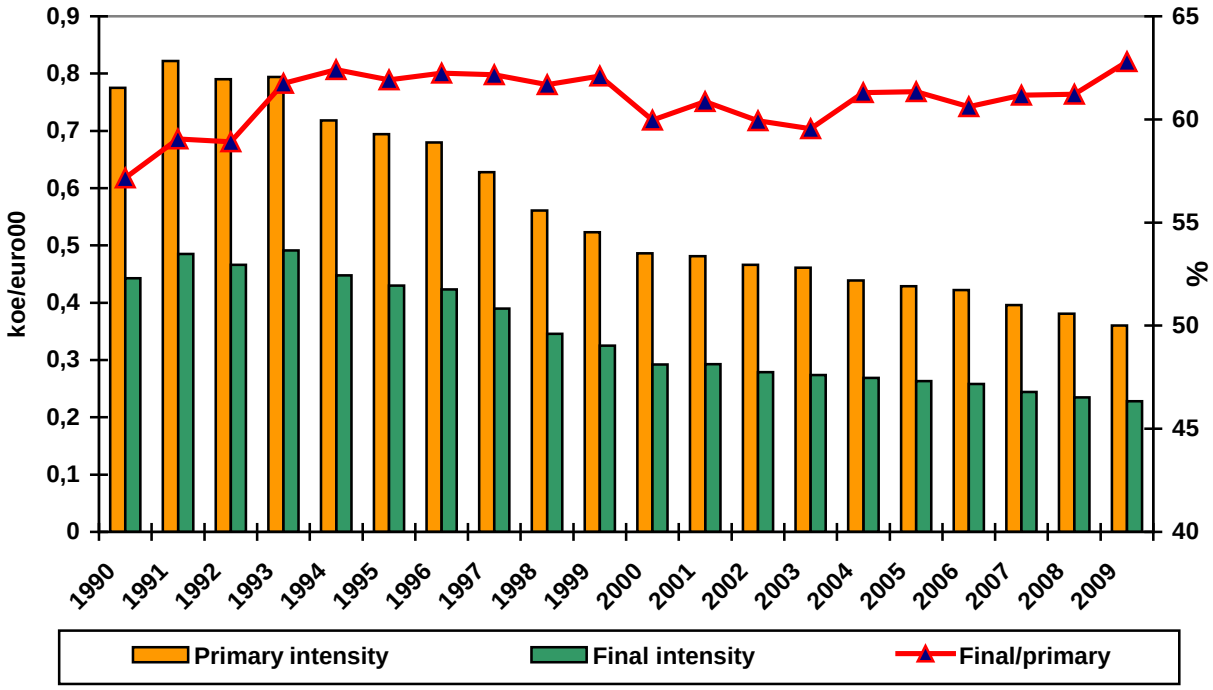


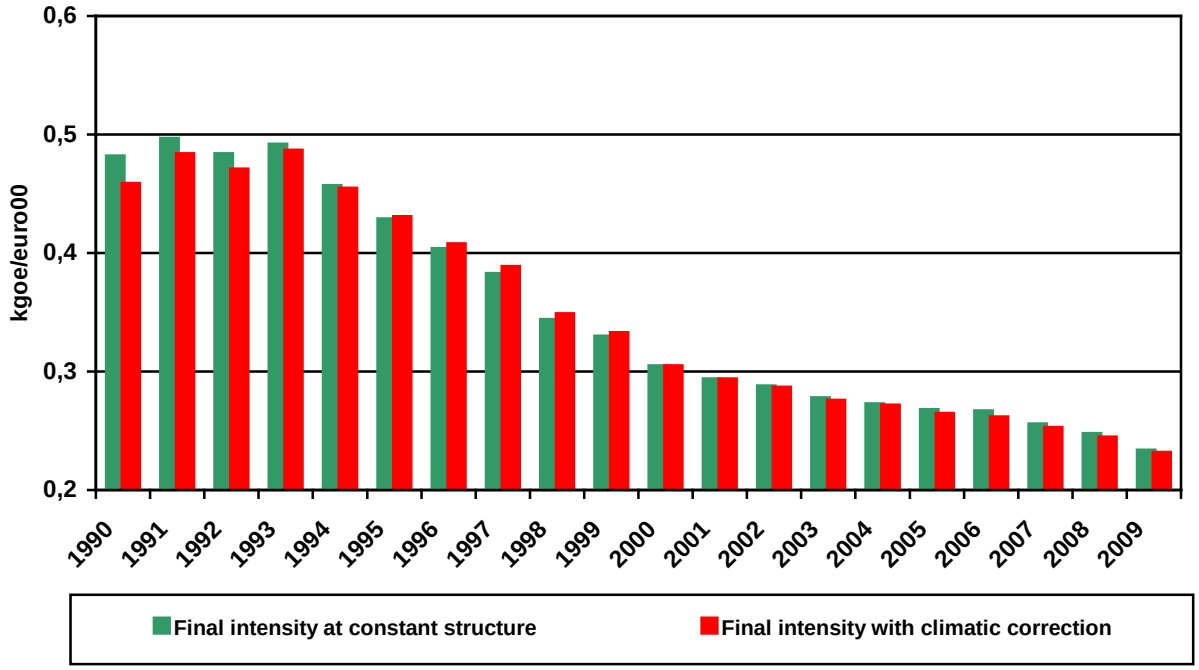
Figure 10. Ratio of final to primary intensity



The rate of improvement of primary intensity indicator was higher than final intensity in early 90's, what resulted in increase of ratio final to primary. Since then, ratio remained at stable level with little declining tendency. This trend was stopped in 2006 and in 2009 this indicator reached highest level of 62.8%. The ratio is shaped by average efficiency of energy

transformations (the higher efficiency the higher ratio) and by pace of growth of electricity consumption (the higher pace the lower ratio).

Figure. 11. Final intensity of GDP



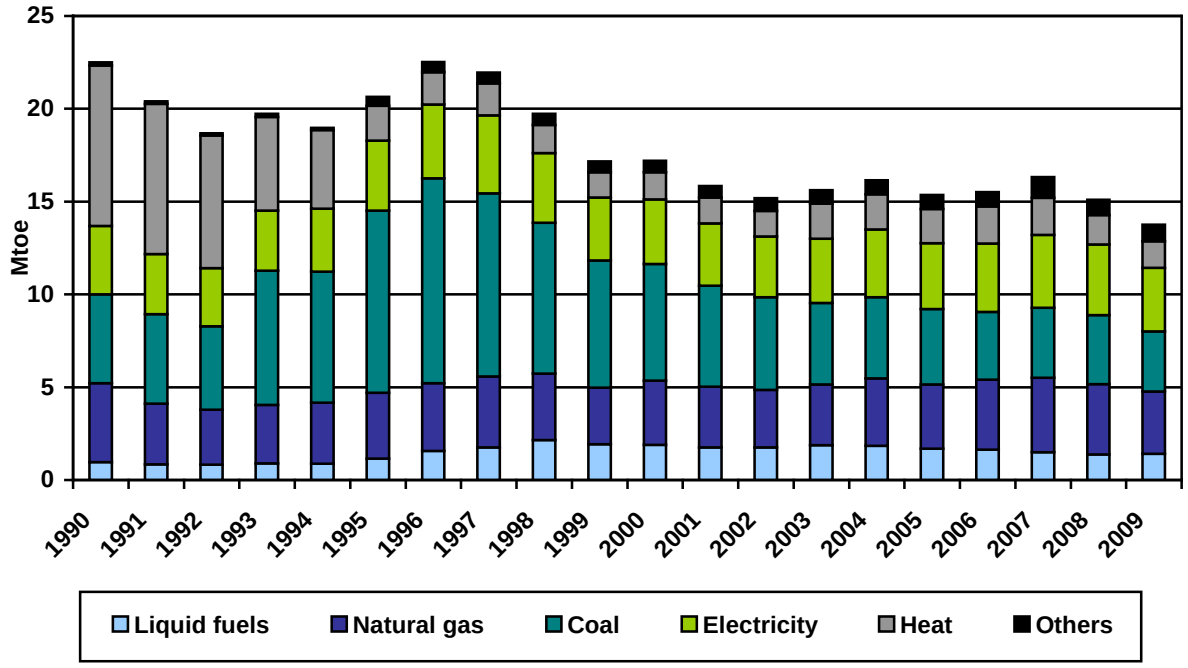
The biggest structural changes took place at the beginning of the 90's. Positive tendencies persist since 1995, but their impact is rather small.

While analysing changes in energy intensities, it is necessary to bear in mind the specific situation before 1990s in the Central European countries, including Poland. In those countries of the central planning, energy prices were very low, which resulted in energy wastage reaching in extreme cases even 60 to 70% of the energy consumed. This caused a habit of excessive energy consumption, difficult to overcome but creating the possibilities to save. Drop of energy intensity was caused partly by use of these simple reserves.

2.4. Industry

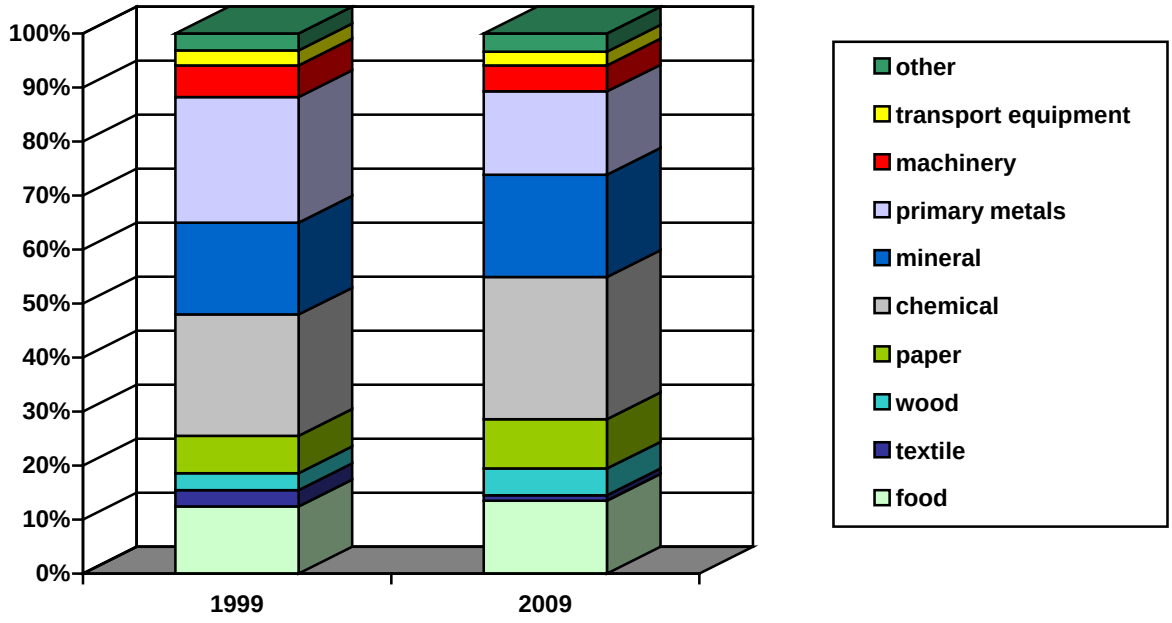
Final energy consumption in industry varied similar to total final consumption. In second half on the 90's decrease of consumption began which reached the bottom at the level of 15 Mtoe in year 2002. Since then consumption remained at similar level until 2007, when it started to fall below 14 Mtoe in 2009.

Figure 12. Final energy consumption in industry by energy carrier



Energy consumption of manufacturing by branch presents Figure 13. About 60% of energy is consumed by primary metals (iron and non-ironic metals), chemical and mineral production, their share did not change much during 10 years. Share of food, wood, paper, chemical, mineral and others industry in final energy consumption of manufacturing increased. Decline of share is observed in case of textile, primary metals, machinery and transport equipment industry. Significant drop of consumption by primary metals is observed. The declines were caused in some cases by limiting production. Structural changes are rather small and do not exceed few percentage points.

Figure 13. Energy consumption in manufacturing by branch



Figures 14 and 15 present energy intensity (final energy consumption/value added) of selected industrial branches in years 1993-2009.

Figure 14. Changes of energy intensity indicators in energy intensive industry branches

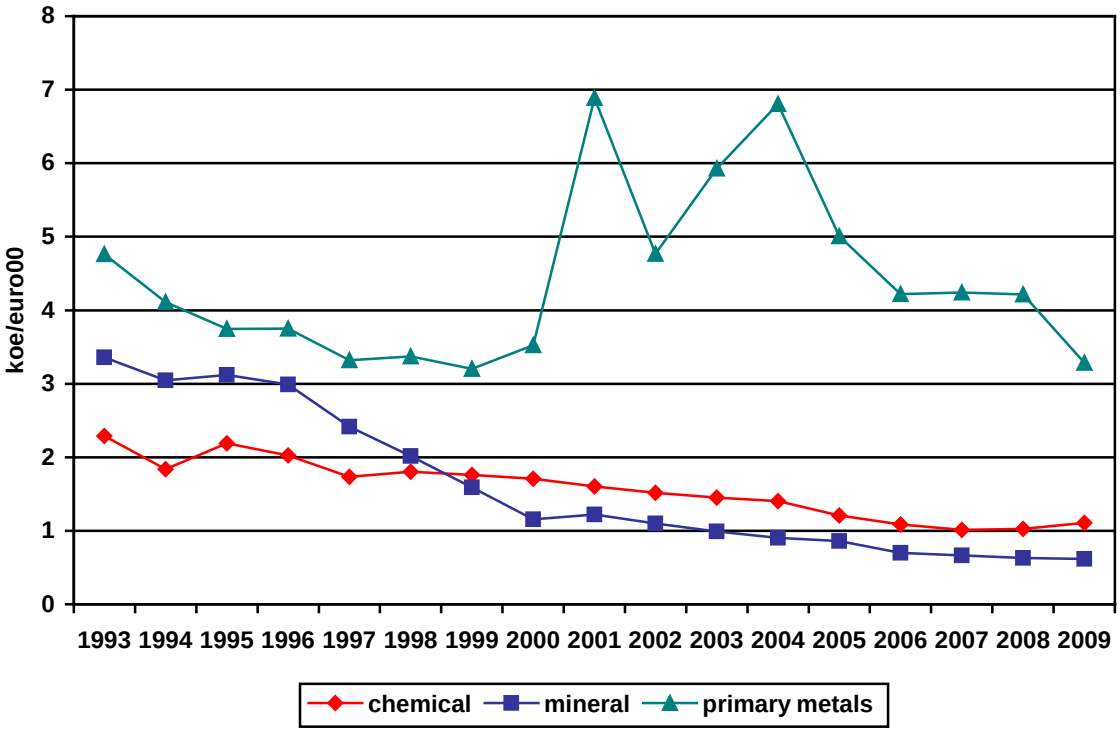
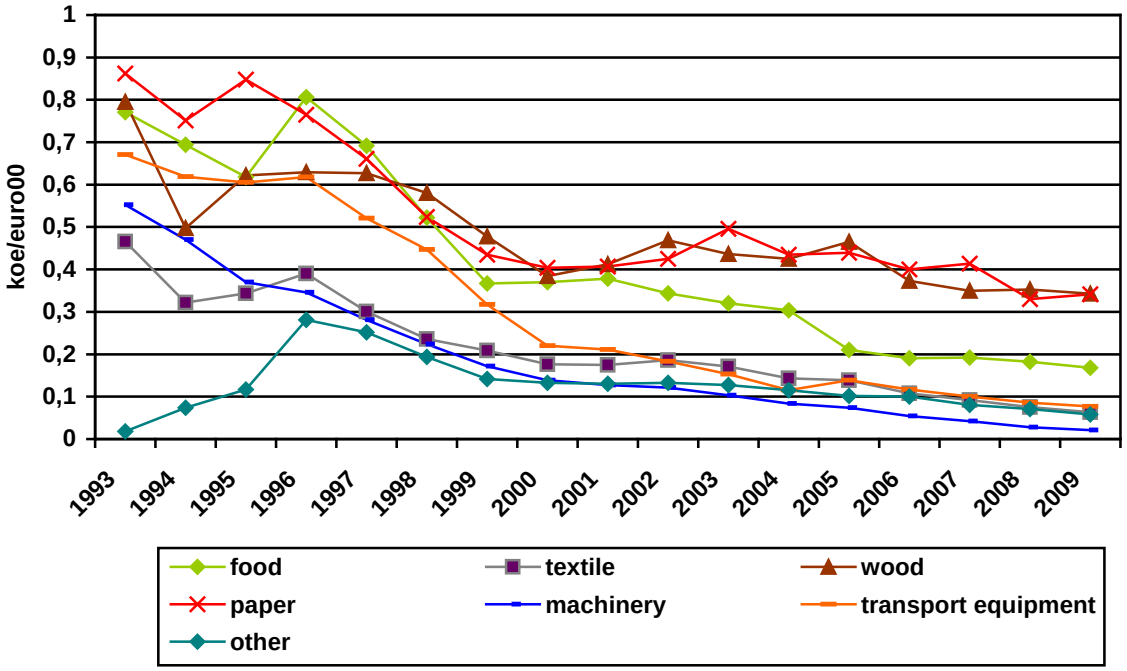


Figure 15. Changes of energy intensity indicators in low energy intensive industry branches



The highest dynamic of improvement was achieved by machinery and transport equipment industry, as well as food and textile industry. The slowest improvement took place in primary metals, paper, wood and chemical industry. Intensity of majority of branches was improving fastest between year 1996 and 2000. In 2009 in all branches, except for paper and chemical industry energy intensity decreased.

Changing shares of manufacturing divisions in final energy consumption and value added, i.e. changing structure has impact on intensity of manufacturing. Values presented below assessing impact of structural changes in manufacturing on level of energy intensity were obtained using Divisia method[4].

Rate of improvement of intensity of manufacturing has been very high since 1994 and exceeded 9%/year. The impact of structural changes was little before year 2000 and amounted to 1.31% per year. After 2000 this impact is four times stronger. Simultaneously, rate of annual improvement at constant structure, showing individual progress at the level of branches fell from 8.1% during period 1994-2000 to 6.1% in years 2000-2009. Overall, in

[4] A Divisia index is a weighted sum of the growth rates of the various components, where the weights are the component's shares in total value. Here, the growth rates are defined as the difference in natural logarithms of share of value added of manufacturing branches in total manufacturing and the weights are equal to the mean of the shares of manufacturing branches final energy consumption in the corresponding years.

years 1994-2009 structural changes caused fall of energy intensity by 3.8% on average annually.

Figure 16. Changes of energy intensity of manufacturing - role of structural changes

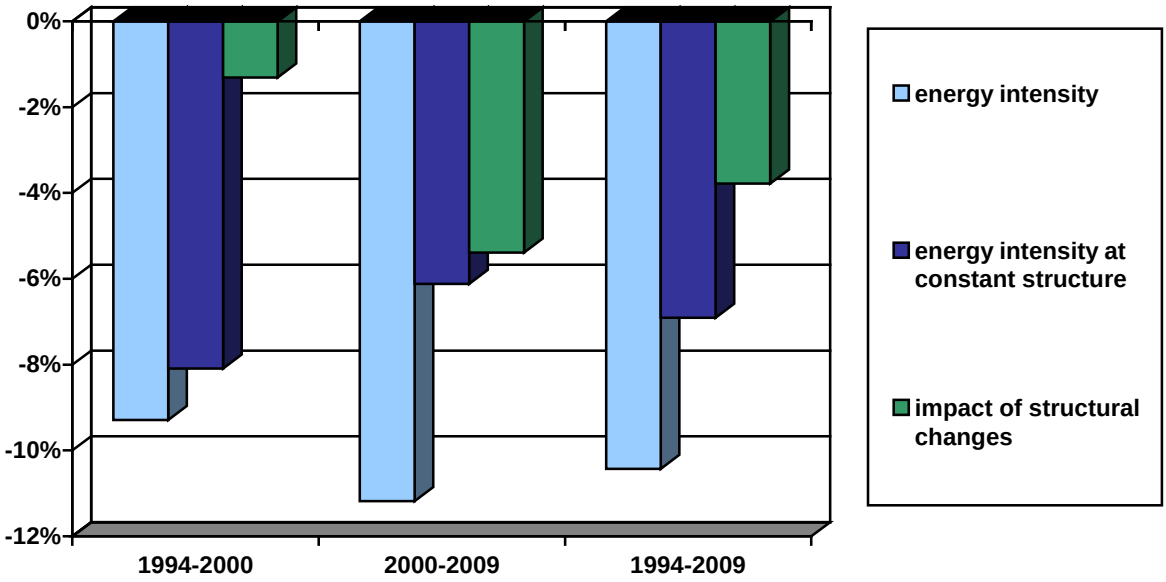


Table 3. Dynamics of changes of energy intensity and impact of structural changes (%/year)

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

Effect of structural changes was influenced strongest by primary metals. It was result of drop of importance of division which consumes a lot of energy and did not improve much its energy efficiency. On the other hand constant development of machinery industry and increasing importance of this branch caused opposite impact on structural changes.

Impact of primary metals on effect of structural changes was strongest after year 2000.

Figure 17. Structural changes – impact of manufacturing branches by period

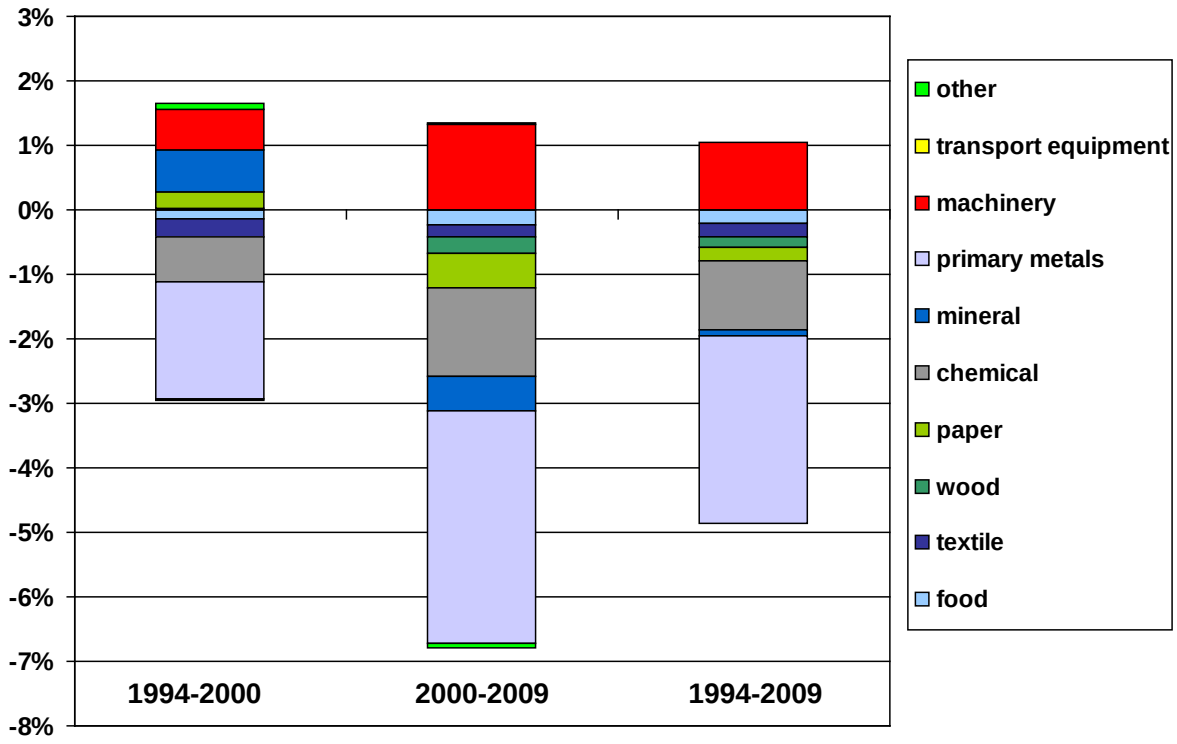
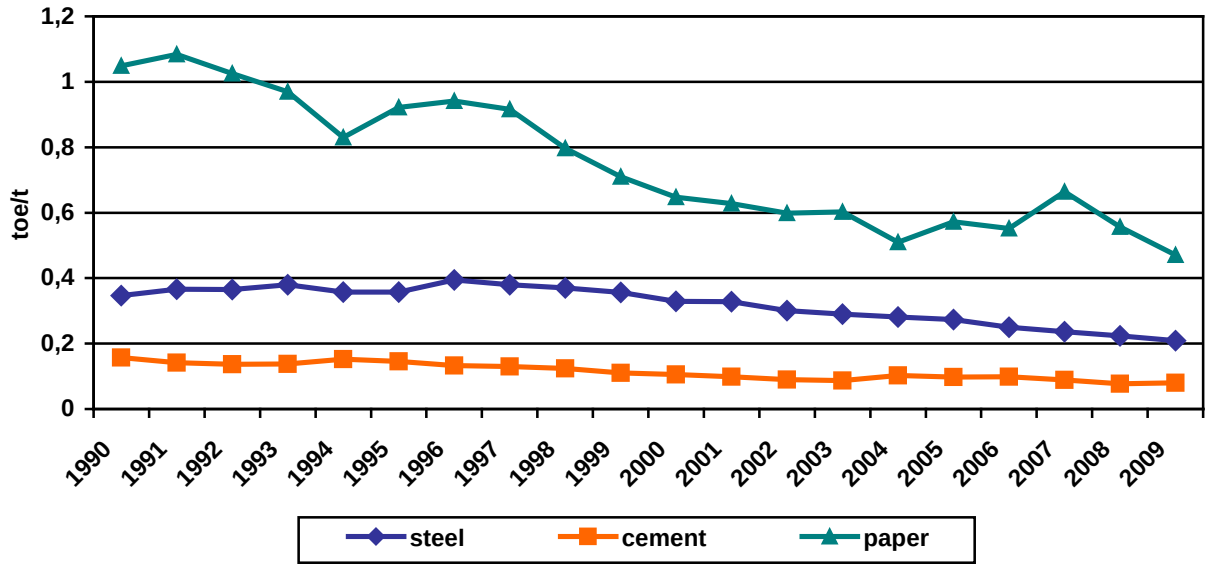


Figure 18 presents energy intensity of steel[5], cement[6] and paper[7] production in years 1990-2009. Energy used to produce these three products amounted to 29% of energy consumption in manufacturing in 2009. Energy intensity of cement production declines systematically. Old-fashioned wet method of production was abandoned what resulted in decline of energy intensity below 0.1 toe/t i.e. value close to European average. Little decline of energy intensity of steel production results from delays in privatisation process and modern technologies implementing. Paper industry was thoroughly modernized after privatisation, which resulted in decrease of intensity to 0.51 toe/t in 2004. Since then intensity of paper production has varied to reach level of 0.47 toe/t in 2009. In years 1990-2009 energy intensity of crude steel production declined by 39.8% (2.6%year), paper production by 55.1% (4.1%/year) and cement production by 49.3% (3.5%/year).

[5] Calculated as final energy consumption in steel industry (since 2009 in groups 24.1, 24.2, 24.3 and classes 24.51 and 24.52 according to NACE Rev. 2) divided by steel production
[6] Calculated as final energy consumption in cement industry (since 2009 in group 23.5 according to NACE Rev. 2) divided by cement production
[7] Calculated as final energy consumption in paper industry (since 2009 in division 17 according to NACE Rev. 2) divided by paper production

Figure 18. Unit consumption of selected industrial products



2.5. Households

Share of energy consumption in households in final energy consumption amounted to 31% in 2009. The structure of consumption by end use, surveyed by CSO in 1993 and 2002 presents Figure 19 and Table 4. Decreasing share of energy consumption for heating and cooking results from replacing low-efficient coal with gas and electric ovens. Growth of consumption by electrical appliances and lighting is connected with richer equipment of households in electrical appliances and behaviour changes (e.g. changes in intensity of appliances use - washing machines, dish washers, TVs, computers).

Figure 19. Structure of energy consumption in households by end use

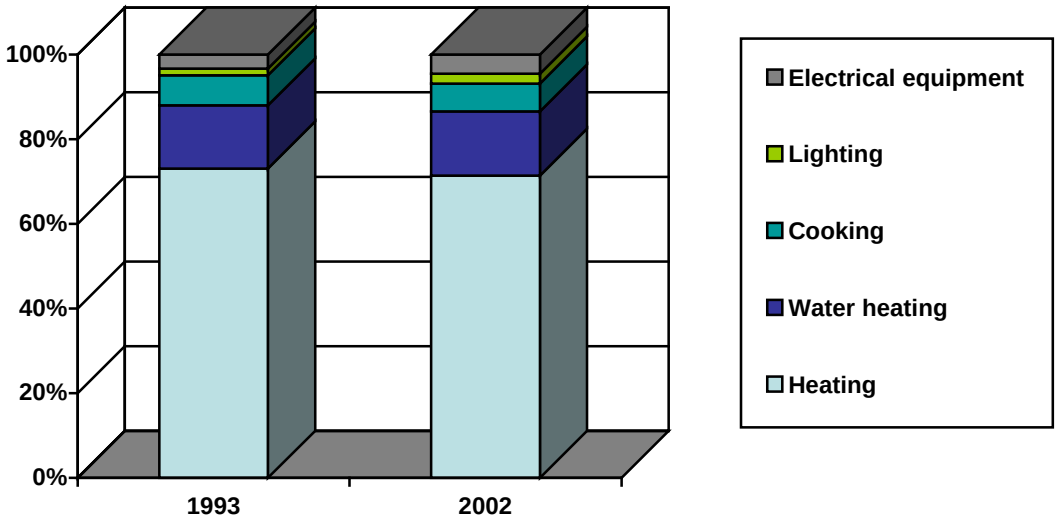
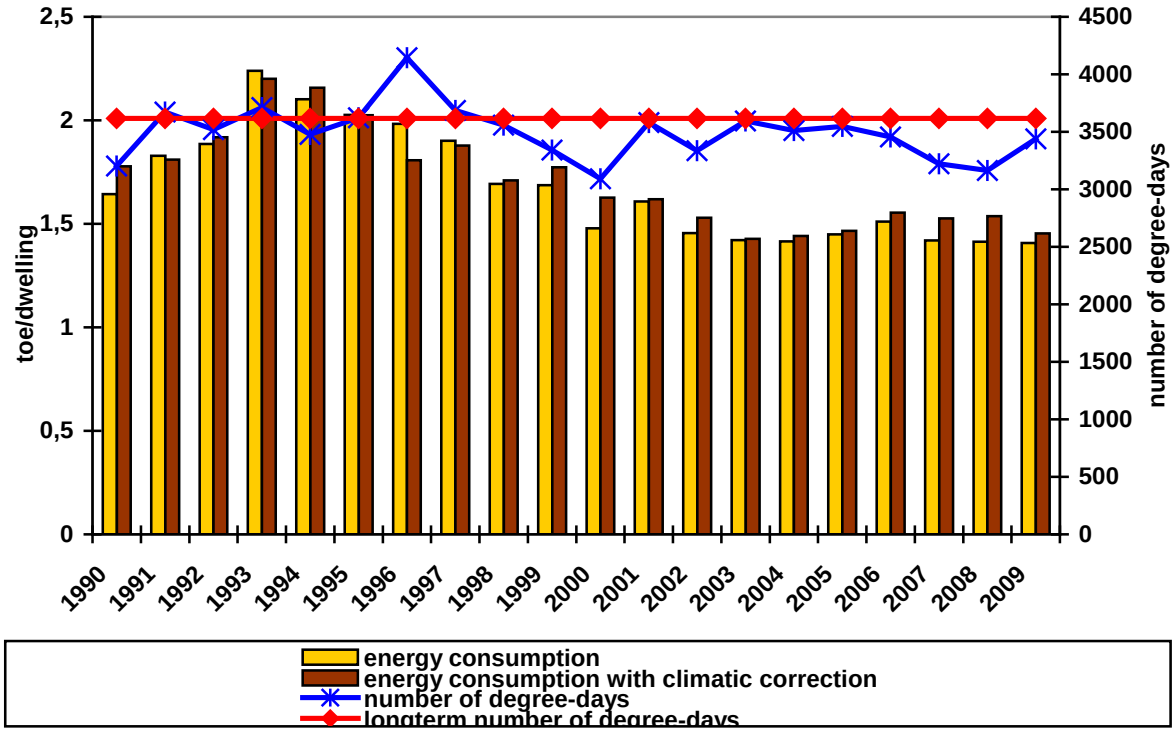


Table 4. Changes in structure of energy consumption in households by end use

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

Figure 20 presents changes of energy consumption per dwelling. The value of indicator with climatic correction tends to decrease with annual decrease rate of 2.0% since 1999. Decrease of unit energy consumption in dwellings is related to buildings thermo modernization, reduction of losses in central heating systems, improvement of efficiency of newly installed devices.

Figure 20. Changes in indicator of energy consumption in households per dwelling



source: Eurostat and Joint Research Center, GUS

The method for the climatic correction of final energy consumption is based on the correlation between energy consumption and outdoor temperature. The consumption is proportional to the Heating Degree Days (SD). The constant heating share approach in calculating of final energy consumption with climatic correction ZEF^{kk} is based on the following formula:

$$ZFF^{kk} = \frac{ZFF}{1 - 0{,}9 \cdot \alpha \cdot \left(1 - \frac{Actual\ SD}{Long - term\ average\ SD}\right)}$$

where: ZEF - final energy consumption, SD - degree days number, α - heating share in total energy consumption in dwelling sector.

Heating Degree Days is introduced to enable control and comparison of energy consumption for heating. It expresses a product of number of heating days and difference between the average temperature of heated room and average outdoor temperature. Numbers of SD degrees in a given year according to Eurostat methodology is calculated as follows:

$$Sd = \sum_{n=1}^{N} \begin{cases} 18^{o}\mathrm{C} - t_{śr}(n) & dla \quad t_{śr}(n) \le 15^{o}\mathrm{C} \\ 0 & dla \quad t_{śr}(n) > 15^{o}\mathrm{C} \end{cases}, \text{[day} \cdot \text{deg/year]}$$

where: $t_{śr}(n) = \frac{t_{\min}(n) + t_{maks}(n)}{2}$ - mean outdoor temperature for *n* day, [°C]; $t_{\min}(n)$, $t_{maks}(n)$ - minimum and maximum temperature of the *n* day, [°C]; N - number of days per year. According to formula and the Eurostat assumption, the mean outdoor temperature of the heating day should be less than 15°C.

The values of heating degree days (*SD*) for 1995-2009 are presented in the table below (long-term average calculated for years 1980-2004 amounts to 3615.77).

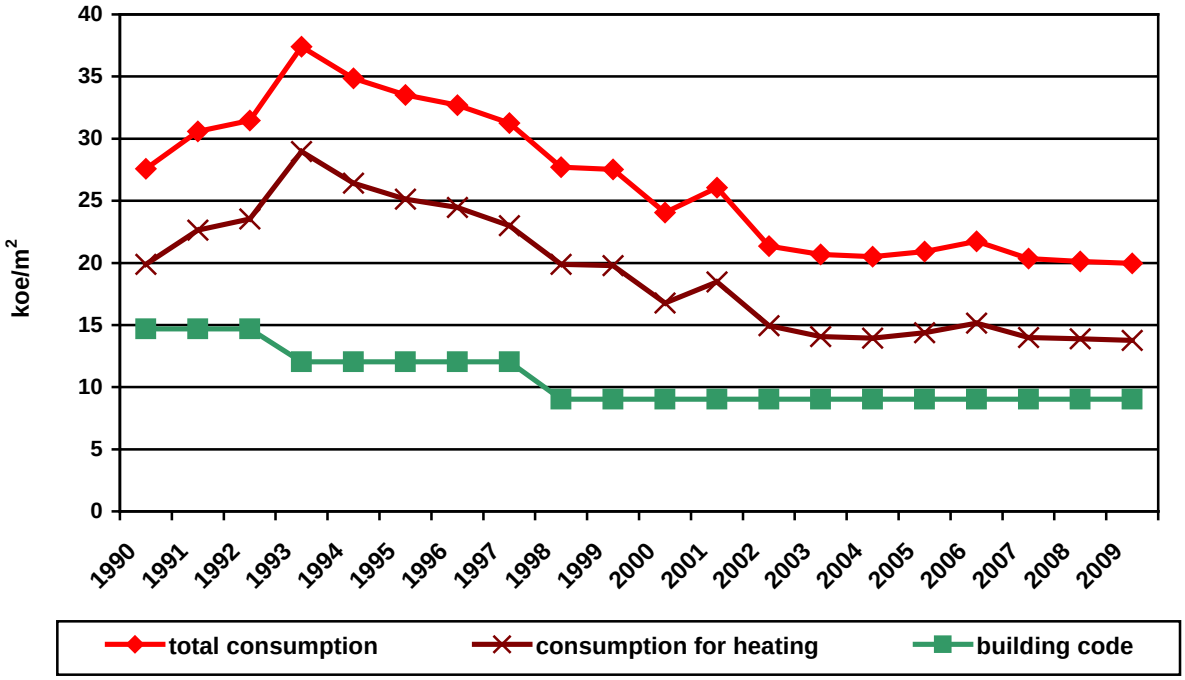
Table 5. Heating degree-days in years 1995-2009

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Sd - annual	3622	4144	3686	3559	3341	3092	3581	3337	3594	3510	3547	3454	3222	3164	3439

source: Eurostat and Joint Research Center

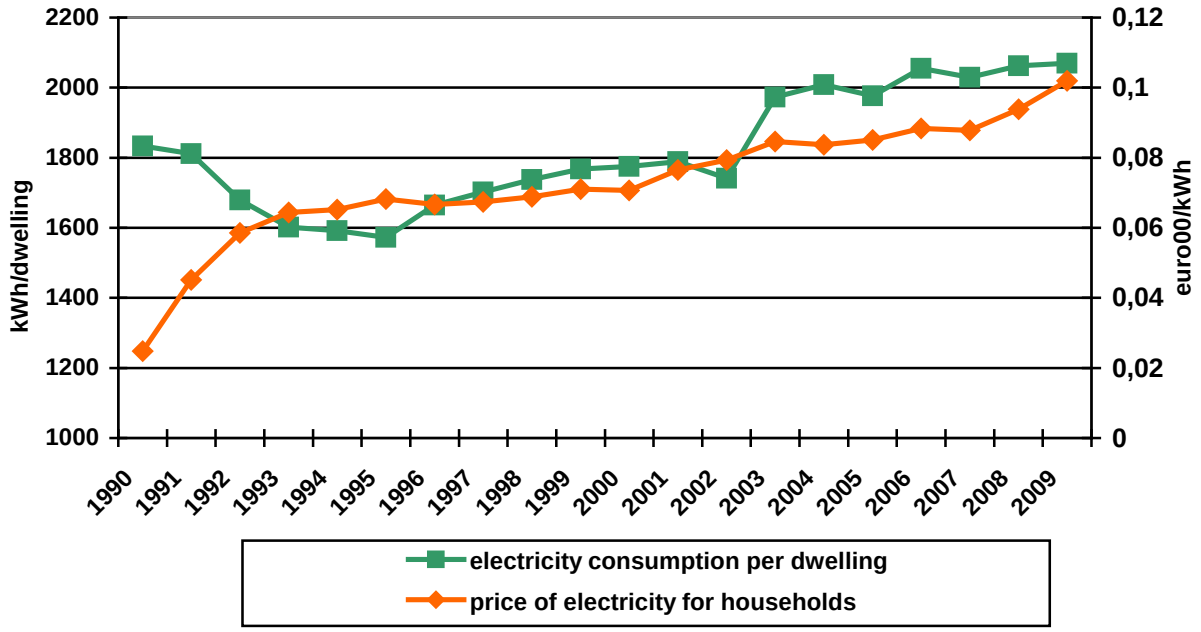
Trend of energy consumption per m^2 looks similar, however dynamic of improvement is higher by 1%, what results from increasing average floor space. Although building code for new buildings allows for twice lower use of energy than present use, the impact of this factor on energy efficiency improvement in whole buildings is little. Figure below presents energy consumption in household dwellings per m^2.

Figure 21. Energy consumption in households per m^2



Energy consumption by the households is shaped by various factors. The most significant are price level and economic situation of households which is reflected in so called behaviour changes resulting *inter alia* in different intensity of household appliances. Increase of prices at the beginning of the 90's resulted in sudden drop of electricity consumption which was compensated thanks to increasing incomes of population at the beginning of the next decade. Subsequent increases contributed to another limitation of electricity use. Growth of consumption in year 2003 resulted from methodological issues (adding electricity consumption by farmers).

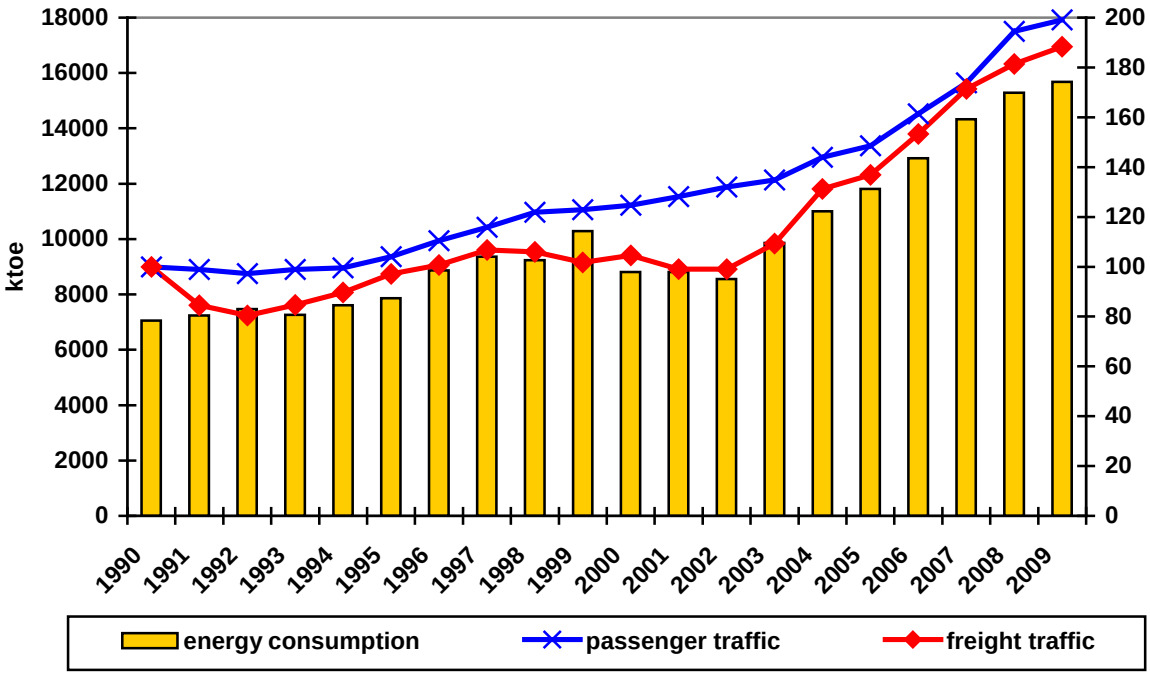
Figure 22. Changes of price and electricity consumption in households per dwelling



2.6. Transport

In Poland almost 95% of energy consumed in transport is used by road transport, more than 2% by rail. Another 3% is consumed by airplanes and trace amounts of energy are consumed by inland and inshore water transport.

Figure. 23. Passenger and freight traffic and energy consumption in transport*



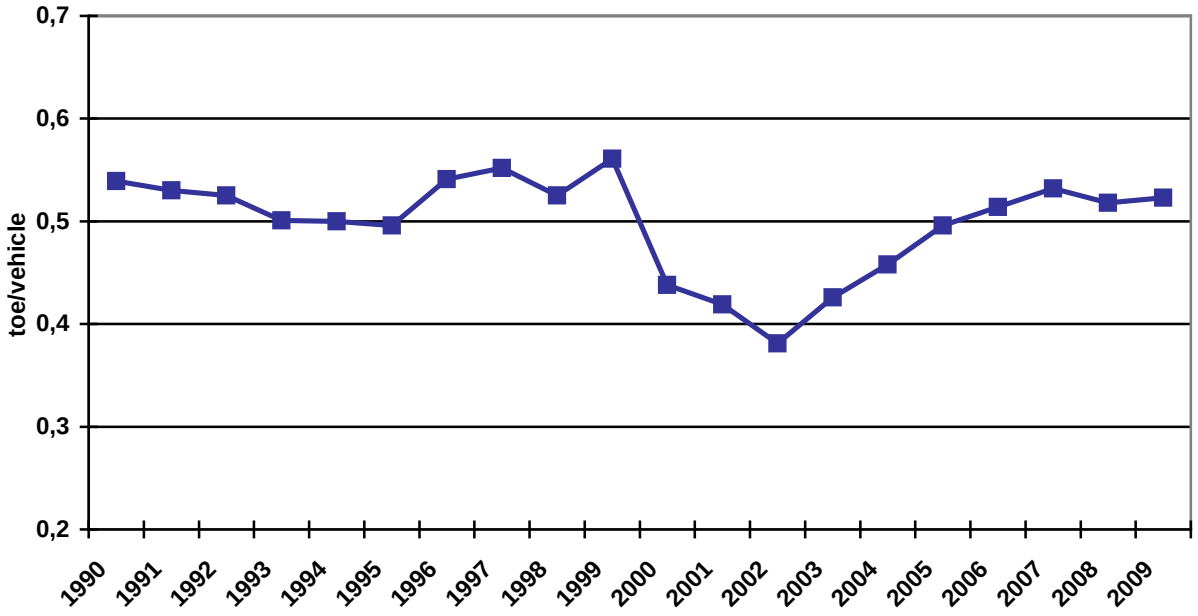
** excluding air transport, source: DG TREN, GUS*

In years 1990-2009 growth of fuel consumption in road transport (5.1% annually) is observed, accompanied by significant drop of energy consumption by rail transport. It is the result of transport modal shift from rail transport to road transport. Since 1990 road traffic has tripled while rail transport decreased by 63% in case of passenger traffic and 48% in case of freight traffic. Totally, since year 1990, 90-percentage growth of freight traffic (124900 Mio tonne-km in 1990) and more 100-percentage passenger traffic (164800 Mio passenger-km in 1990) has taken place, accompanied by doubled energy consumption. The biggest discrepancies between trends were at the beginning of the 90's, later on the rates of growth were similar.

Figure 24 presents unit consumption of fuels per equivalent car[8]. The value of indicator stabilized in years 2008-2009, after growth between 2003 and 2007. The indicator is influenced mainly by economical situation of the country, fuels prices and increasing efficiency of new cars.

[8] stock of equivalent cars was calculated as: Ec = 0.15*M + C + 4*T + 15*B, where Ec – stock of equivalent car, M – stock of motorcycle, C – stock of car, T – stock of truck, B – stock of bus. Parameters are calculated as relation of estimated annual fuel consumption by type of vehicle to annual fuel consumption by car.

Figure 24. Fuel consumption per equivalent car



2.7. Service sector

Service sector has the most stable energy efficiency indicators. Value added energy intensity[9], after drop at the beginning of the 90's shows slight fluctuation and in 2008 it has the same value as in 1994. Improvement rate is lower than the global value and is significantly lower than improvement e.g. in industry but at the same time it is the sector of national income creation that is the most efficient in respect of energy. The electricity intensity indicator is characterized by larger variations and remains in uptrend since 1997 (Figure 25). In 2009 indicator slightly declined.

In case of changes of unit consumption of energy and electricity per employee irregular decrease trend which ended in the second half of the 90's can be observed (Figure 26). Afterwards, consumption of energy and electricity started to rise. The rate of growth of electricity consumption was higher by one percentage point since 1994, due to increasing amount of electrical devices used by service sector enterprises.

[9] Calculation of this indicator excludes energy consumption of transport but includes value addend of transport. The same procedure concerns electricity intensity indicator.

Figure 25. Changes of energy intensity and electricity intensity indicator in service sector

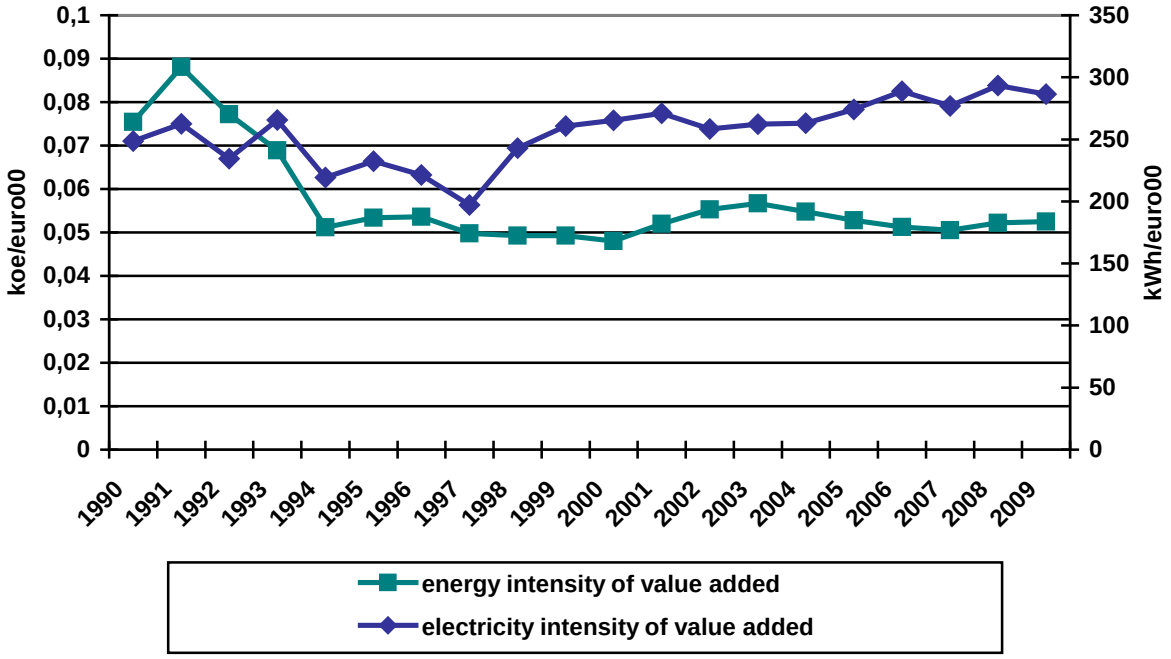
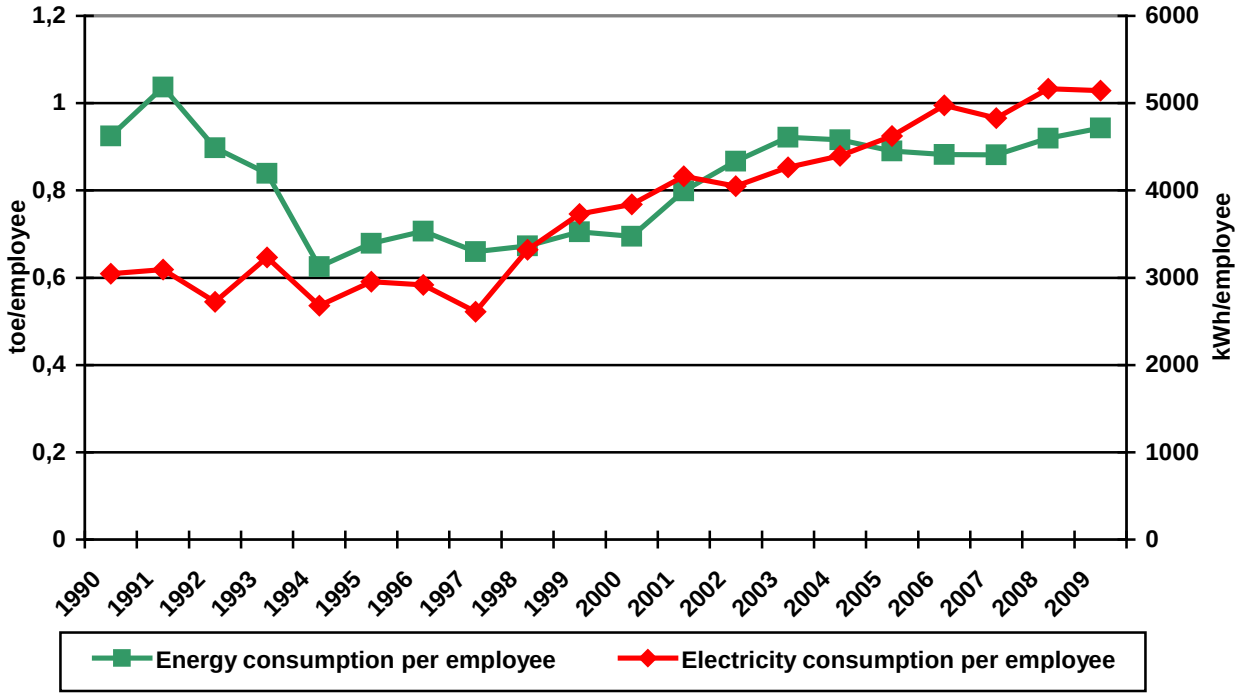


Figure 26. Changes of energy consumption and electricity consumption per employee of the service sector

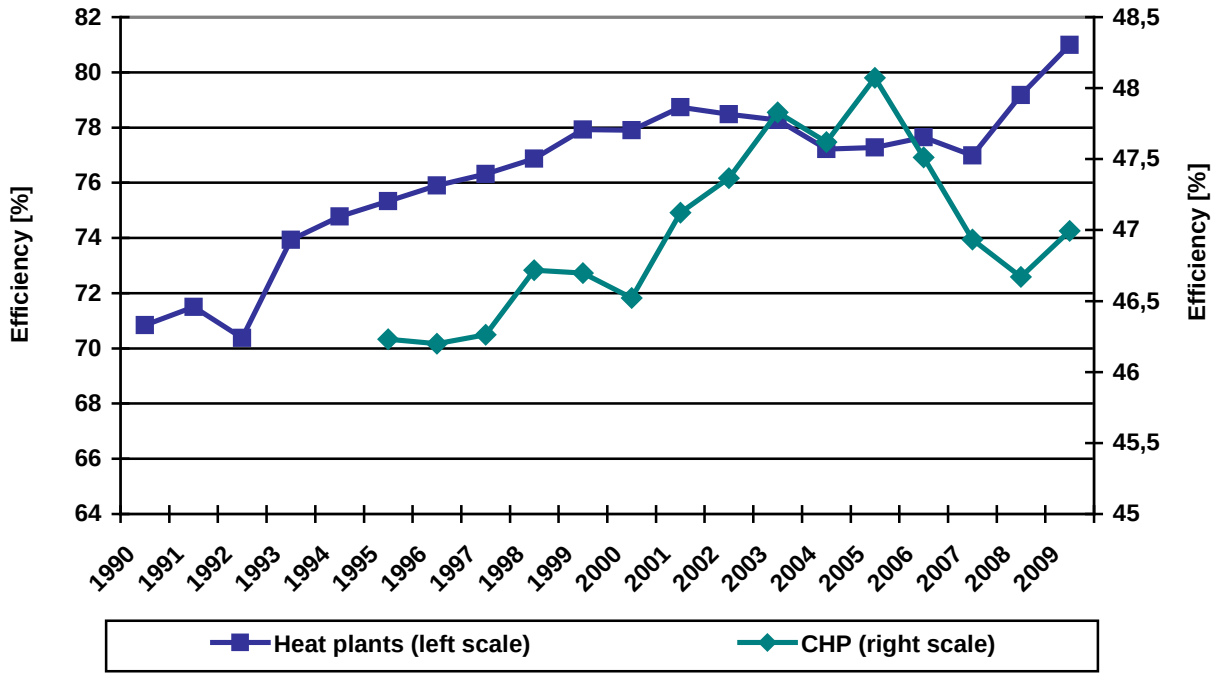


2.8. Heat plants and heat and power generating plants

Figure 27 present changes of efficiency of heat plants and combined heat and power plants.

The efficiency of heat plants grew significantly in years 2008-2009 and exceeded 80%. Earlier, since 2001 efficiency of heat plants had decreased. In case of heat and power-generating plants, in year 2009 efficiency increased after earlier 3-years decline. Before that, efficiency of CHP was generally growing, with single exceptions.

Figure 27. Efficiency of heat plants and CHP



2.8. ODEX indicator and energy savings

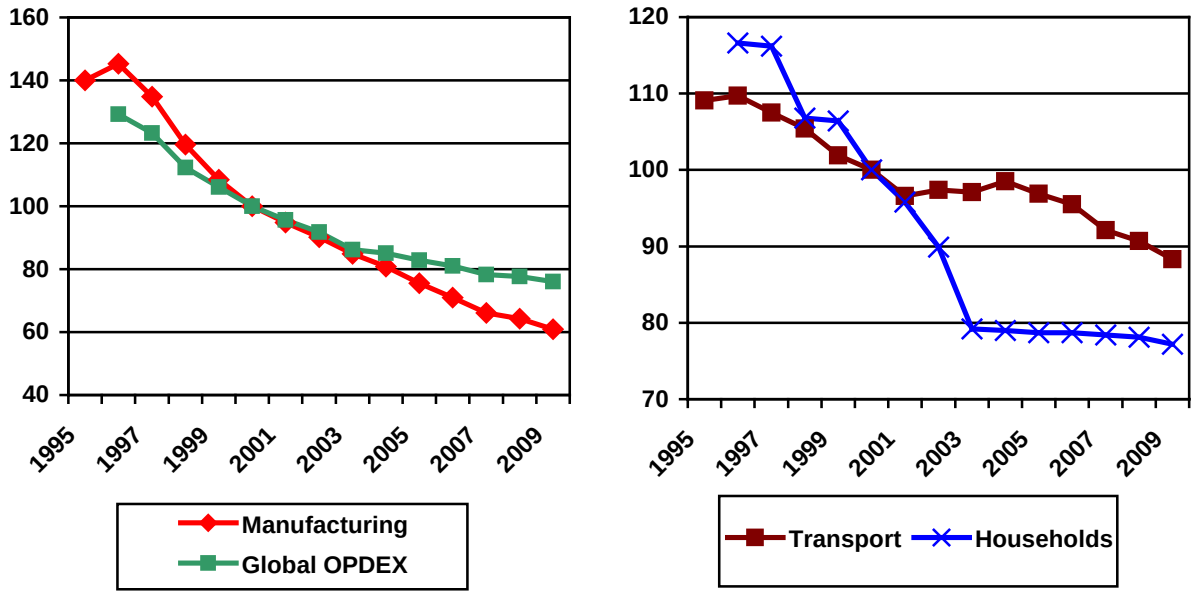
ODEX indicator is an aggregated energy efficiency indicator. It was elaborated to meet the needs related to monitoring of energy effectiveness and in order to obtain understandable, simple to elaborate and comparable indicator reflecting progress in respect of energy efficiency in the European Union Member States. The indicator is obtained through aggregation of changes in unit energy consumption observed in a given period of time at the specified levels of end-use. By application of reference physical parameters, the ODEX indicator illustrates progress in respect of energy efficiency. ODEX is an alternative for monetary indicators of energy intensity which depend on many factors related - not directly - to energy efficiency. ODEX indicator does not show current level of energy intensity but the progress in respect of the base year. The ODEX indicators are useful for monitoring of

indicative target implementation in the scope of energy efficiency laid down in Directive 2006/32/EC.

The methodology of ODEX indicators calculation is currently being elaborated *inter alia* under the programmes of the European Commission named ODYSSEE which is participated by GUS and KAPE S.A. At present, two alternative methods of ODEX calculation are applied which give the same result. The first method (aggregation method based on unit consumption effect) combines the progress in energy efficiency achieved in all sub-sectors on the basis of saved energy quantity (e.g. Mtoe): it is based on „unit consumption effect". The second method (weighted indicator method) weighs a separate unit consumption indicator of each sub-sector on the basis of its share in energy consumption for the entire sector.

We can observe decreasing trend of ODEX indicators in years 1996-2009 what means improvement of energy efficiency. The rate of improvement for Poland amounted to 4.0% annually. The fastest rate was achieved by manufacturing, which amounted to 6.5% and was higher before year 2000. In household sector ODEX indicator (technical) started to fall in 1997, since 2003 the improvement has been relatively small. Average annual improvement in this sector amounted to 3.1% in years 1996-2009. In transport sector ODEX indicator was decreasing in years 1996-2001 and 2005-2009. Overall the rate of improvement amounted to 1.7%[10].

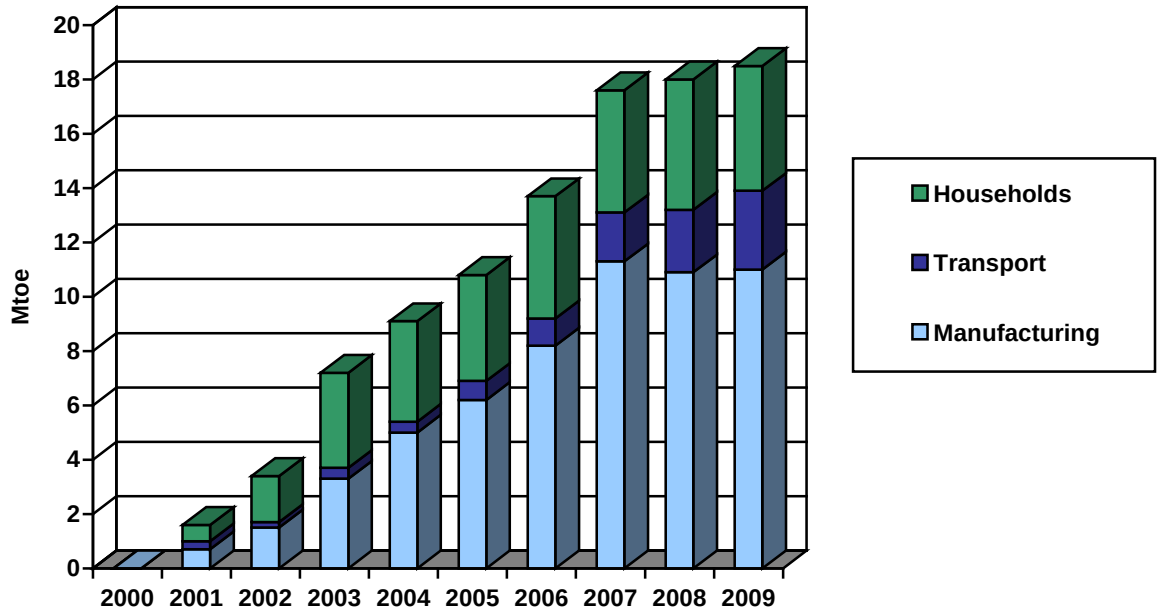
Figure 28. ODEX indicator



[10] Because of lack of official data on specific consumption of different types of transport, calculation of indicator for transport is based on estimated and constant parameters and therefore can be burdened with a mistake

ODEX indicator, apart from energy efficiency assessment can be used to calculate energy savings. Figure below presents cumulated energy savings in manufacturing, households and transport since year 2000.

Figure 29. Cumulated energy savings

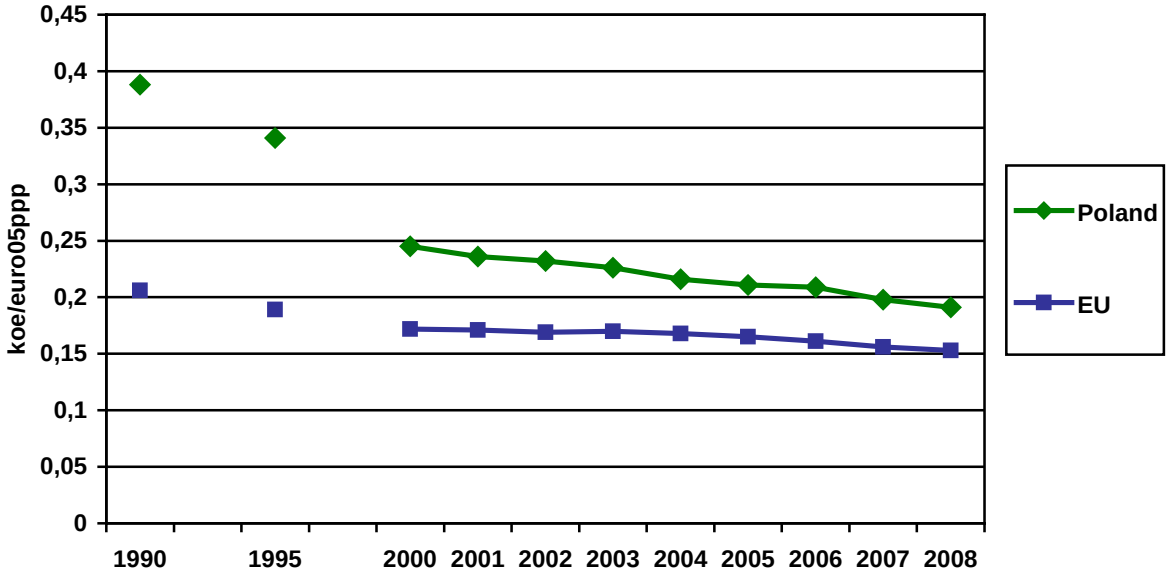


Cumulated energy savings since year 2000 amounted to 18.5 Mtoe in 2009, i.e. about 32% of annual final energy consumption in Poland. This amount includes savings made by sectors covered by European Trading Scheme which should not be counted in, according to Energy Service Directive.

3. Poland against a background of other EU countries[11]

Primary intensity of GDP at constant prices and purchasing power parity (base year 2005) amounted in Poland in 2008 to 0.191 koe/euro05ppp and was 25% higher than European average. High dynamic of energy efficiency improvement before year 2000 can be observed, in contrast with little and stable improvement in "old" Member States.

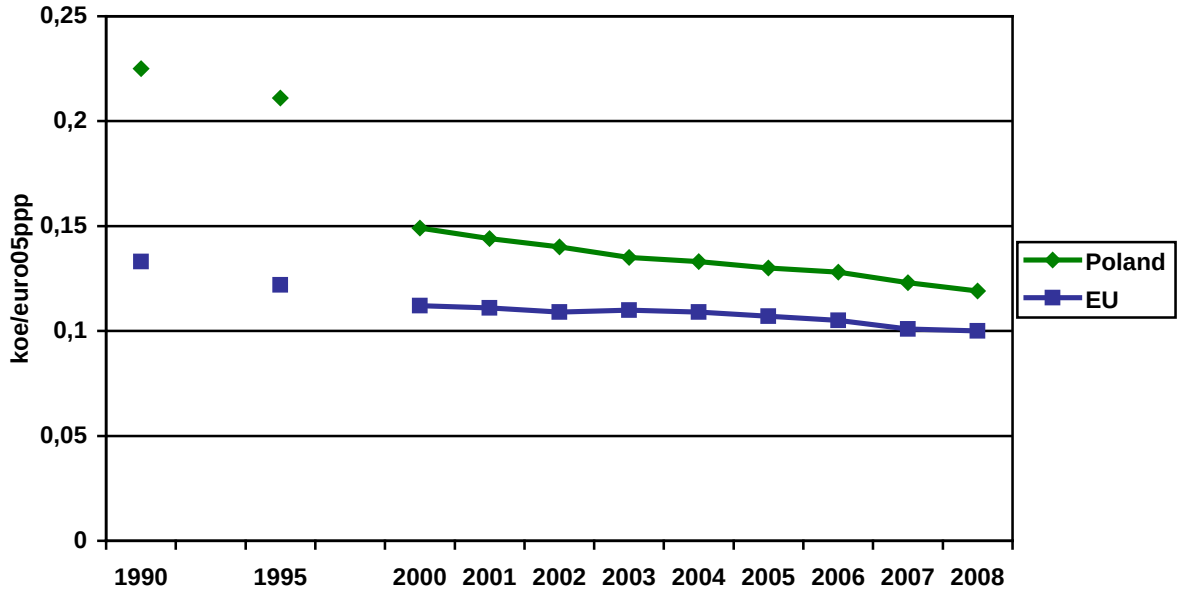
Figure 30. Primary intensity of GDP (euro05, ppp)



In case of final energy intensity difference is smaller and amounts to 19% between Poland (0.119) and EU average (0.100). It is the result of the fact, that ratio of final to primary energy consumption is lower in Poland than in Europe.

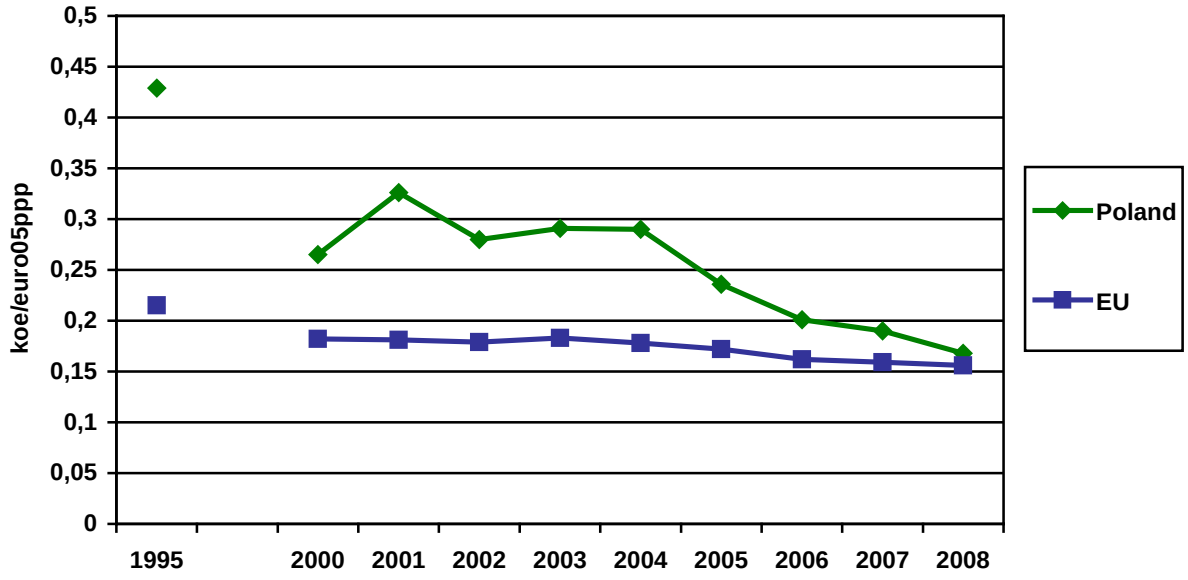
[11] Data comes from Odyssee database

Figure 31. Final intensity of GDP (euro05, ppp)



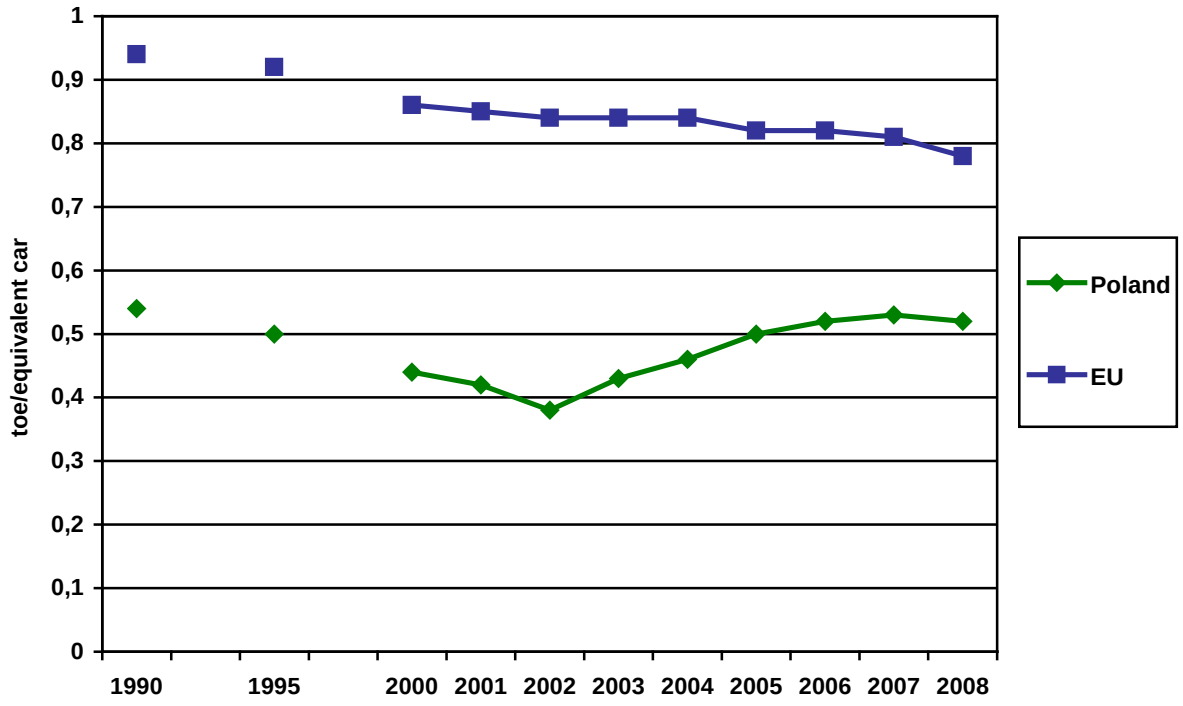
Final energy intensity of manufacturing at EU structure and using purchasing power parity in Poland was higher by 8% in comparison with European average in 2008. Using average European structure aims at elimination of differences between countries resulting from different shares of branches. Strong fluctuations in years 2000-2002 result from structural changes.

Figure 32. Final intensity of manufacturing at EU-27 structure (euro05, ppp)



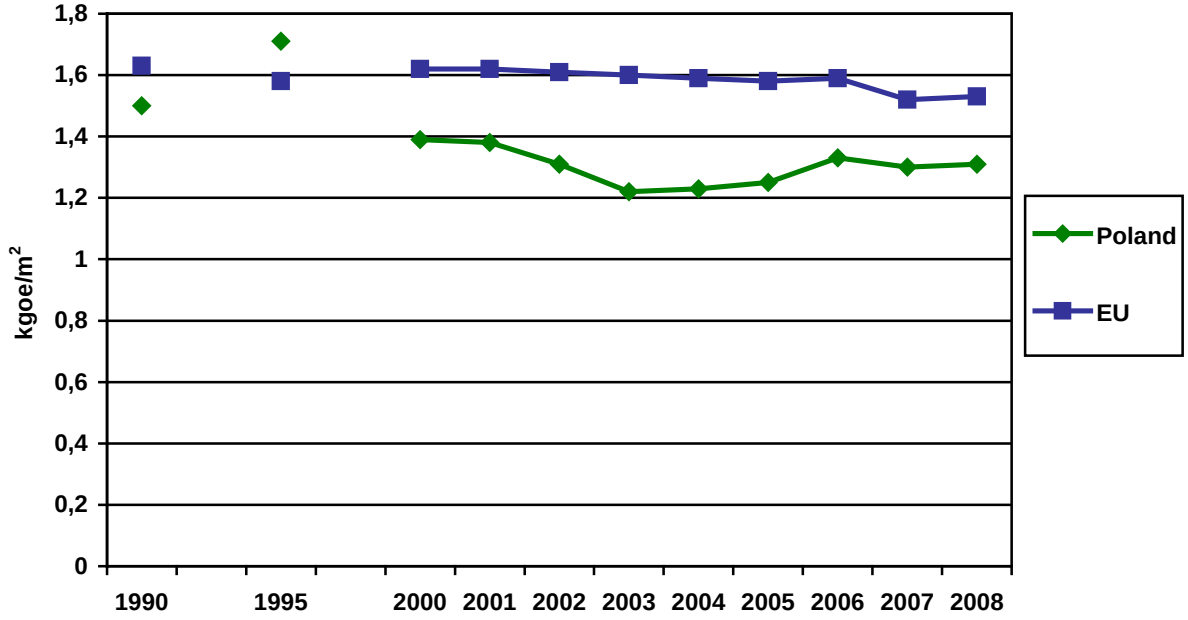
Energy consumption per equivalent car was at almost the lowest level in Europe and amounted to 0.52 toe per equivalent car in 2008, in comparison to 0.78 toe per car equivalent in the EU.

Figure 33. Energy consumption per equivalent car



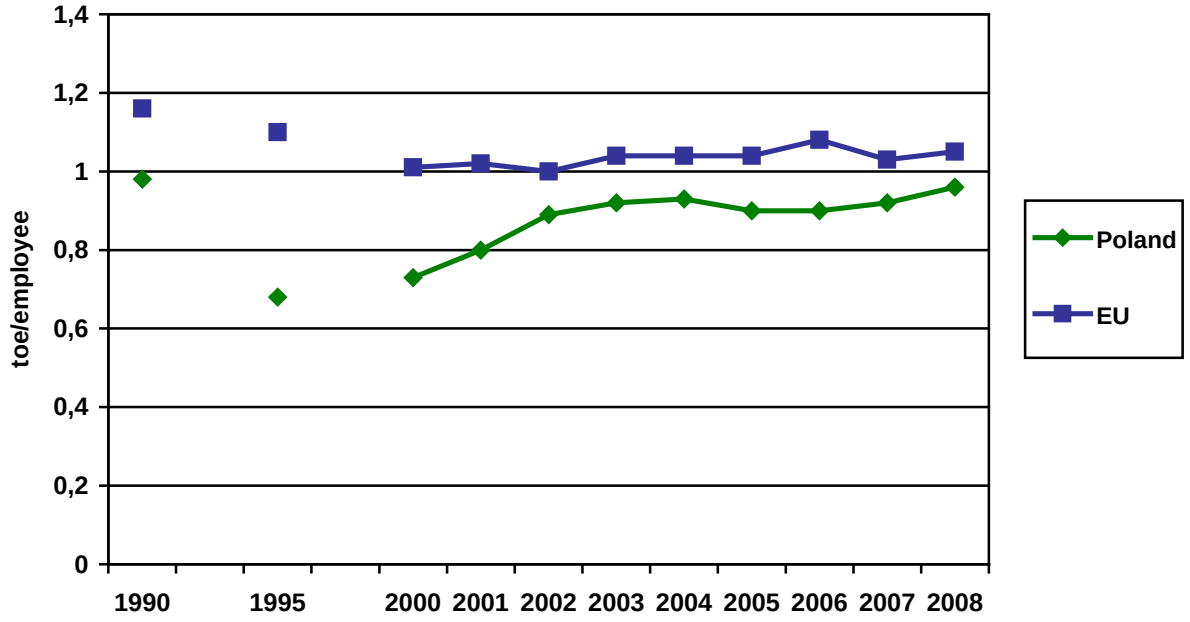
Average consumption per dwelling scaled to European average climate was lower by 14% than in EU in year 2008. This value can be influenced by technical parameters of dwellings (bigger area of dwelling in the EU), dwellings equipment and by inhabitants behaviour (temperature of heating and cooling, usage of domestic appliances, etc.).

Figure 34. Energy consumption per dwelling scaled to average EU climate



Energy consumption per employee in service sector in Poland was lower by 9% in 2008 in comparison with EU average. Since 2002 those trends have been similar.

Figure 35. Energy consumption per employee in service sector with climatic correction



For the purpose of monitoring of the Strategy 2020 currently is used indicator of "Energy intensity" which is defined as the ratio of gross inland consumption to gross domestic product at constant prices of 2000. Values for the Polish and the EU in accordance with the data calculated by Eurostat are presented in the following table.

Table 6. Energy intensity of Poland and the EU (kgoe/1000 euro00)

Specification	**2005**	**2006**	**2007**	**2008**	**2009**
Poland	430.6	425.4	396.8	384.0	363.7
EU	181.0	175.5	168.7	167.4	165.2

Source: Eurostat

This indicator does not reflect the actual disparity between the energy efficiency of the Polish economy and the EU due to differences in purchasing power, which means that the price levels of goods and market and non-market services in different countries vary (euro's purchasing power in Poland is higher than in the EU).

4. Conclusions

During last 20 years Poland has achieved one of the greatest progress in scope of efficient energy use. It was industry sector that contributed most, due to improvements at branches level and structural changes. Improvements were mainly autonomous decisions based on economical calculation. Modernizations were also conducted after privatization of state-owned enterprises. One of the biggest national program of energy efficiency support is Thermomodernization Fund addressed to household and service sector. In 2008 positive trends were continued and in some cases accelerated. The distance to the European averages of major energy efficiency indicators has decreased to less than 20%, but to most efficient countries remains significant.

New policy of the EU, expressed through new directives, especially directive on energy end-use efficiency and energy services, obliges to monitor energy efficiency. According to the articles energy savings should be counted as decrease of energy consumption as a result of organization activities and achieved as a result of realization of investments or modernizations.

At the present, statistical data obtained in frames of public statistics statistical surveys, do not allow to calculate all proposed in the directive indicators.

The necessity of monitoring effects of actions towards energy efficiency improvement, described in Directive 2006/32/EC, endeavour to harmonization and making international comparisons possible, force to introduce changes in respect of collection of statistical data i.e. enlarge subject and object scope of surveys, as well as to supplement administrative data bases (administrative sources).

5. Abbreviations

koe - kilogram of oil equivalent

toe - ton of oil equivalent

euro00 - market value of euro in 2000

euro05ppp - value of euro in 2005 according to purchasing power parity

kWh - kilowatt hour

Names of branches used in publication are colloquial and mean:

	NACE rev. 1.1	NACE rev. 2
Food	15-16	10-12
Textile	17-19	13-15
Wood	20	16
Paper	21-22	17-18
Chemical	24	20-21
Mineral	26	23
Primary metals	27	24
Machinery	28-32	25-28, 33
Transport equipment	34-35	29-30
Other	25, 33, 36-37	22, 31-32

Attachment No. 1: Data presented in the brochure

#	Specification	Unit	1998	1999	2000
1	Primary energy consumption	Mtoe	95.7	93.3	90.3
2	Final energy consumption	Mtoe	59.1	58.0	54.2
3	Final energy consumption with climatic correction	Mtoe	59.3	59.2	56.4
4	Primary energy intensity	kgoe/euro00	0.561	0.523	0.486
5	Final energy intensity	kgoe/euro00	0.346	0.325	0.292
6	Final energy intensity with climatic correction	kgoe/euro00	0.348	0.332	0.304
	Final intensity in industry:				
7	Food	kgoe/euro00	0.522	0.367	0.370
8	Textile	kgoe/euro00	0.236	0.209	0.176
9	Wood	kgoe/euro00	0.580	0.478	0.384
10	Paper	kgoe/euro00	0.524	0.435	0.404
11	Chemical	kgoe/euro00	1.805	1.759	1.708
12	Mineral	kgoe/euro00	2.015	1.591	1.154
13	Primary metals	kgoe/euro00	3.373	3.201	3.524
14	Machinery	kgoe/euro00	0.224	0.172	0.139
15	Transport equipment	kgoe/euro00	0.447	0.317	0.220
16	Other	kgoe/euro00	0.194	0.142	0.133
	Energy intensity of production:				
17	Steel	toe/t	0.370	0.356	0.329
18	Cement	toe/t	0.124	0.111	0.105
19	Paper	toe/t	0.797	0.710	0.647

2001	2002	2003	2004	2005	2006	2007	2008	2009	#
90.3	88.9	91.2	91.5	92.7	97.7	97.8	98.7	95.0	1
55.0	53.3	54.3	56.1	56.8	59.2	59.8	60.4	59.6	2
55.1	54.5	54.4	56.5	57.1	59.9	61.7	62.7	60.5	3
0.481	0.466	0.461	0.439	0.429	0.425	0.399	0.383	0.363	4
0.293	0.279	0.274	0.269	0.263	0.258	0.244	0.235	0.228	5
0.293	0.286	0.275	0.271	0.264	0.261	0.252	0.244	0.231	6
0.378	0.344	0.320	0.304	0.210	0.191	0.192	0.182	0.168	7
0.175	0.186	0.171	0.143	0.139	0.108	0.092	0.075	0.063	8
0.412	0.469	0.436	0.425	0.465	0.373	0.350	0.353	0.343	9
0.407	0.425	0.496	0.435	0.439	0.400	0.414	0.330	0.341	10
1.604	1.517	1.453	1.405	1.206	1.088	1.012	1.027	1.110	11
1.223	1.099	0.992	0.903	0.861	0.701	0.664	0.630	0.619	12
6.886	4.767	5.929	6.803	5.004	4.218	4.240	4.216	3.287	13
0.127	0.121	0.103	0.084	0.074	0.054	0.042	0.028	0.021	14
0.211	0.183	0.153	0.115	0.139	0.117	0.100	0.086	0.077	15
0.130	0.133	0.127	0.115	0.102	0.100	0.081	0.071	0.058	16
0.328	0.300	0.290	0.281	0.273	0.250	0.237	0.223	0.209	17
0.098	0.090	0.087	0.102	0.098	0.098	0.089	0.078	0.080	18
0.628	0.598	0.603	0.510	0.572	0.552	0.664	0.556	0.471	19

#	Specification	Unit	1998	1999	2000
	Households:				
1	Energy consumption per dwelling	toe/dwel.	1.693	1.686	1.479
2	Energy consumption per dwelling with climatic correction	toe/dwel.	1.710	1.773	1.626
3	Energy consumption per m^2	kgoe/m^2	27.7	27.5	24.1
4	Energy consumption for heating per m^2	kgoe/m^2	19.9	19.8	16.8
5	Electricity consumption per dwelling	kWh/dwel.	1737.7	1767.9	1775.5
	Services:				
6	Energy intensity	kgoe/euro00	0.049	0.049	0.048
7	Electricity intensity	kWh/euro00	243.0	260.8	265.3
8	Energy consumption per employee	toe/emp.	0.673	0.705	0.695
9	Electricity consumption per employee	kWh/emp.	3318.9	3732.0	3841.7
	Transport:				
10	Fuels consumption per equivalent car	toe/eq.car	0.525	0.561	0.438
	Energy sector:				
11	Heat plants efficiency	%	76.87	77.92	77.90
12	CHP efficiency	%	46.72	46.70	46.52
	ODEX indicator:				
13	Manufacturing		119.6	108.4	100.0
14	Transport		105.4	101.9	100.0
15	Households		106.8	106.4	100.0
16	Global ODEX		112.3	106.1	100.0

* since 2003, consumption of electricity by farmers is included

2001	2002	2003	2004	2005	2006	2007	2008	2009	#
1.609	1.455	1.422	1.415	1.449	1.511	1.420	1.413	1.408	1
1.618	1.529	1.427	1.441	1.466	1.556	1.526	1.537	1.454	2
26.1	21.4	20.7	20.5	20.9	21.7	20.3	20.1	20.0	3
18.5	14.9	14.1	14.0	14.4	15.2	14.0	13.9	13.8	4
1789.1	1741.0	1972.7*	2008.3	1976.2	2055.4	2029.4	2061.9	2069.9	5
0.052	0.055	0.057	0.055	0.053	0.051	0.051	0.052	0.052	6
271.0	258.5	262.3	263.0	274.1	288.8	277.0	293.3	286.4	7
0.799	0.867	0.922	0.916	0.891	0.883	0.882	0.919	0.943	8
4162.4	4050.1	4265.9	4396.5	4625.3	4973.4	4829.9	5165.6	5144.5	9
0.419	0.381	0.426	0.458	0.496	0.514	0.532	0.518	0.523	10
78.73	78.48	78.27	77.22	77.27	77.65	76.99	79.17	80.99	11
47.12	47.36	47.83	47.62	48.07	47.51	46.93	46.67	46.99	12
94.8	90.2	84.9	80.8	75.5	71.0	66.1	64.3	60.9	13
96.6	97.4	97.1	98.5	96.9	95.5	92.1	90.7	88.3	14
95.8	89.9	79.2	79.0	78.7	78.7	78.4	78.1	77.2	15
95.6	91.8	86.2	85.1	82.8	81.0	78.3	77.7	76.0	16

Attachment No. 2. Measures towards energy efficiency improvements

Taken or planned activities and measures to improve energy efficiency in all European countries, including Poland, are presented in the MURE database (mesures d'Utilisation de l'Energie Rationnelle, http://www.mure2.com/). MURE database was developed under the SAVE programme "Intelligent Energy - Europe" by a team of European experts and coordinated by ISIS (Institute of Studies for the Integration of Systems, Italy) and the Fraunhofer Institute for Systems and Innovation Research ISI (Germany). MURE database provides descriptions of ongoing, planned or already completed efforts to improve energy efficiency along with their qualitative and quantitative assessment. The involvement of the European Union guarantees the continuous updating of the database, which also contains some statistics and an overview of the issues of energy efficiency in each country. It consists of five sections of classifying information on programmes to improve efficiency in relation to four main sectors: industry, households, transport, services, and for the actions of a horizontal nature (on the whole economy).

The number of presented in the MURE database measures to improve energy efficiency, for all European countries and the Poland are presented in the figures below (as at 15th June 2011).

Figure 36. The number of energy efficiency improvement measures implemented or planned in European countries, as described in the MURE database

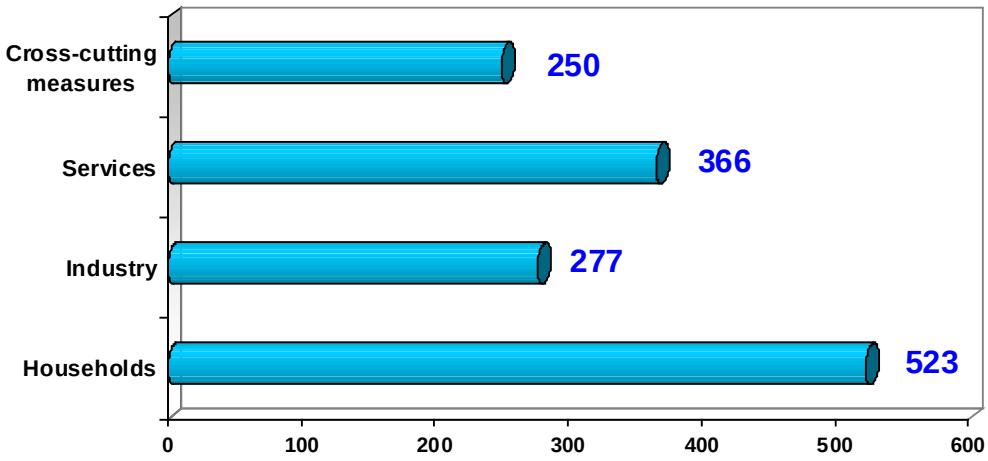
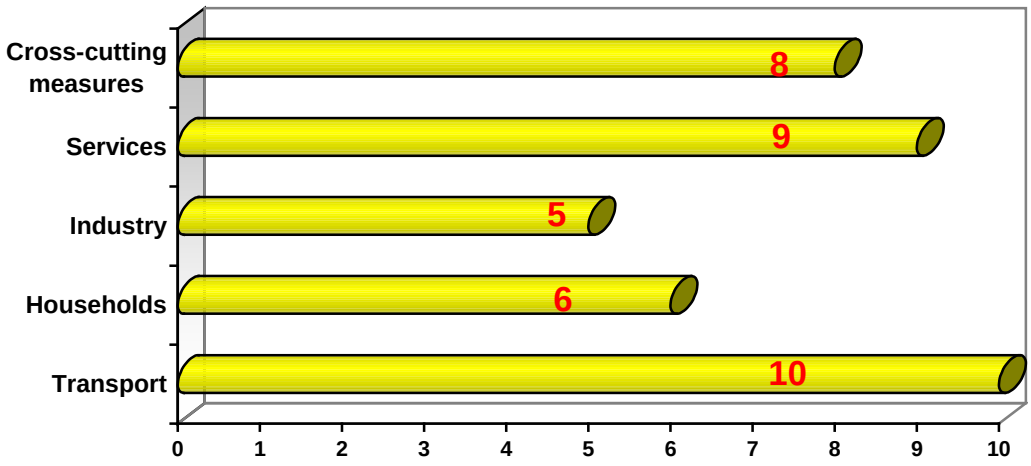


Figure 37. The number of energy efficiency improvement measures implemented or planned in Poland, as described in the MURE database



Selected energy efficiency improvement measures in Poland described in the MURE database are listed below. Entries in this field are being provided by the Polish National Energy Conservation Agency, a partner in the project "ODYSSEE-MURE 2010" of programme Intelligent Energy for Europe.

Residential Sector

Instruments to improve energy efficiency in the residential sector in Poland, described in the MURE database include:

• Thermomodernisation Fund;

• Minimum energy efficiency standards for household appliances;

• Standards for thermal protection of buildings according to the Regulation of the Ministry of Infrastructure of 12 April 2002 (Journal of Laws No. 75, pos. 690), with later amendments, on technical conditions to be met by buildings and their location;

• The energy certification of buildings;

• Promoting energy efficiency in buildings;

• Advisory and information services run by local and regional energy agencies;

• Priority Programme "Renewable energy sources" of the National Fund for Environmental Protection and Water Management - a programme of surcharges for the purchase and installation of solar collectors for individuals.

Act of 21 November 2008 on supporting thermo-modernisation and repair (Journal of Laws No. 223, item. 1459) determine the form of State aid in the process of reducing heat consumption in buildings. The basis for cancellation of 20% of the loan on the investment is to implement the recommendations of energy audit, which methodology is defined in the Regulation of the Minister of Infrastructure dated 17 March 2009 on the detailed scope and form of energy audit and part of the repair audit, design of audit charters, as well as the algorithm assessing the profitability of the thermo-modernisation project. The programme is available to all investors, including owners and administrators of buildings, local heat sources and local heating networks. The number of applications for thermal insulation premium has increased over the past few years. Table below presents the number of applications in 1999-2009.

Table 7. Thermo-modernisation and renovation funds in numbers (as of 31 December 2009)

	1999-2006	2007	2008	2009	TOTAL
Amount of government's contribution to the Fund (mil. of PLN)	343.39	298.0	270.0	109.3	1 020.69
Number of applications	8351	3314	2859	3363	17887
Number of granted thermo-modernisation bonuses	6328	4201	2759	3267	16555
Amount of granted thermo-modernisation allowances (mil. of PLN)	336.60	247.86	170.06	193.58	947.97
Total value of investments supported by all applications (mil. PLN)	2571.77	1111.03	1047.79	1314.93	6045.96
Value of running projects (mil. PLN)	2324.22	961.11	909.57	1150.45	5579.09

In accordance with the relevant provisions, and with EU standards, the minimum energy efficiency standards for many appliances (boilers for central heating, air conditioning, appliances, boilers, gas heaters, light bulbs and fluorescent tubes, etc.) have been introduced in Poland.

The aim of the introduction of buildings energy evaluation system - certification of new and existing residential buildings, in accordance with Directive 2002/91/EC, is to increase public awareness with regard to energy consumption in buildings and ensuring the implementation of actions recommended in issued certificates of energy efficiency of buildings, that lead to energy saving. In addition, in June 2010 the National Fund launched programme of 45% surcharge on the purchase or installation of solar collectors for individuals and residential communities. The amount of surcharge is calculated in proportion to the cost but no more than 2500 Polish zloty (PLN) per m^2 of total area of installed solar collectors. This is the first

programme which allows support for small RES investments. National Fund allocated 300 Mio PLN for subsidies for the period 2010 to 2014. According to calculations, this will reduce carbon dioxide emissions by 35600 tonnes per year.

Transport Sector

Instruments to improve energy efficiency in transport in Poland, identified MURE database are as follows:

• Introduction of traffic and transport infrastructure management systems;
• Promotion of sustainable transport and efficient use of fuels in transport;
• Speed limits;
• Fuel tax;
• Technical inspection of vehicles;
• Excise duty on cars;
• The "City Bike" project;
• Promote the use of biofuels in transport;
• Development of intelligent transport networks.

Polish transport policy is aimed at improving the transport system in accordance with the principles of sustainable development, so as to ensure a balance between social, economic, spatial and environmental protection. Key actions are aimed at:

• influencing the demand for transport and how to meet it,
• promote energy efficient and less environmentally damaging industries and forms of transport,
• ensure a balance between meeting the needs of international, national, regional and local transport (including transit and tourist),
• rationalizing the use of transit traffic,
• maintain the right balance between infrastructure development and maintenance and reconstruction of existing resources.

The purpose of promotional activities in the field of sustainable transport and efficient use of transport fuels is the introduction of energy-efficient transport means and clean driving style. The "city bike" is the promotion and support for the use of bicycles by:

• improving conditions for bicycle movement in the cities and outside;
• improving road safety with particular emphasis on vulnerable (unprotected) road users;
• popularization of the bicycle as an environmentally friendly mean of transport;
• improving the quality of life by increasing free choice of means of transport.

Another initiative is the action carried out under the Operational Programme Infrastructure and Environment - Priority 8: Transport safety and national transport networks - Development of intelligent transport systems. The programme aims to improve traffic management through the implementation of ITS (Intelligent Transport System) in road transport. ITS is a system that covers a wide range of technologies and techniques of traffic management in transport, which allows, among others, increasing capacity of streets, improving traffic safety, reduce travel time and therefore reducing energy consumption. Intelligent Transport System is one of the important actions to reduce energy consumption and reduce CO_2 emissions in transport. For the funding in frames of the programme may apply communities, administrators and managers of roads infrastructure.

In case of renewable energy sources, the share of biofuels in transport is regulated by the Law on biocomponents and liquid biofuels of 25 August 2006. This Act had significant impact on increase of the use of bio-components and biofuels in transport. Implementing Regulation to the Act – Regulation of the Council of Ministers of 15 June 2007 on the national indicative targets for the years 2008 - 2013, specifies the minimum percentage share of biofuels and other renewable fuels in the total amount of fuels used in transport. National indicative targets (NCW) are presented in table below.

Table 8. National Indicative Targets (NCW)

Year	Share
2008	3,45 %
2009	4,60 %
2010	5,75 %
2011	6,20 %
2012	6,65 %
2013	7,10 %

Source: Regulation of the Council of Ministers of 15 June 2007 on the national indicative targets for the years 2008 – 2013

A progressive increase in the use of bio-components and biofuels in the market reflects the path of reaching a 10% share of biofuels in 2020, in accordance with the provisions of Directive 2009/28/EC on the promotion of energy from renewable sources.

Industrial Sector

Instruments to improve energy efficiency in industry, described in the MURE database include:

• Operational Programme Infrastructure and Environment 2007-2013 and Regional Programmes;

• Develop an energy management system and system of energy audits in industry;

• Priority Programme "Energy efficiency".

The purpose of the Operational Programme Infrastructure and Environment 2007-2013, the Regional Programmes is financial support for activities relating to high-efficient electricity generation and reduce losses in electricity distribution and support for businesses in the implementation of best available techniques (BAT).

Another measure of energy efficiency improvement is programme prepared by the National Fund, addressed to companies consuming over 50 GWh per year. The programme aims to increase the energy efficiency of enterprises through investment activities leading to efficient energy use. The programme includes two types of actions:

1. Grants for energy audits and electricity;
2. Co-financing of investment projects.

In frames of first action the cost of energy audit is subsidized up to 70% of eligible costs. The second part of the programme includes the loan to the company interested in carrying out projects aimed at reducing energy consumption by at least 7%. The loan is provided up to 70% of the total eligible costs of investment. The programme is planned to reduce by 1000 thousand MWh of energy consumption in the years 2011 - 2015.

Tertiary Sector

The range of instruments to improve energy efficiency in the services sector, in addition to the above in relation to the housing sector, and on and the service sector, include among others:

• Increase market share of energy-efficient products that use energy;

• Energy saving management programme in the public sector;

• The priority programme, "Energy management in public buildings" of National Fund;

• Exemplary role of public sector - the Energy Efficiency Act.

Increasing market share in energy-efficient products that use energy is achieved by defining the minimum requirements for energy efficiency for new energy-using products that are marketed (implementation of Directive 2005/32/EC).

Energy saving management programme in the public sector will be executed through the commitment of government to take energy saving measures in the framework of its exemplary role.

Another initiative is the Priority Programme prepared under the National Fund Green Investments Scheme - Energy management in public buildings. Under this programme, managers of public buildings may apply for a grant of up to 30% of the eligible costs and loan up to 60% of the eligible cost. Funding includes a change of building equipment for devices with higher energy efficiency, thermomodernization of buildings, replacement of windows and doors, reconstruction of heating systems, ventilation and air conditioning systems and the use of renewable energy sources.

General cross-cutting measures

Examples of instruments to improve energy efficiency in the horizontal actions, described in the MURE database include:

• The system of green certificates;

• Promotion of high efficiency cogeneration (CHP);

• Activities of the National Fund for Environmental Protection and Water Management (National Fund);

• Information, training and education campaigns;

• The system of white certificates;

• The Polish Sustainable Energy Financing Facility -PolSEFF.

Issues of energy efficiency and renewable energy sources (RES) are closely related to each other. In Polish legislation adopted a system of support energy production from RES based on "green certificates" trade which constitute property rights arising from certificates of origin of energy. This system is based on two assumptions: a certificate of origin may be sold and certain entities are obliged to acquire them for submission to the relevant state authority for cancellation. Legal instruments on which such system is based, are defined in the energy law and regulation of the Minister of Economy on the responsibilities for obtaining and presenting for redemption of certificates of origin, the substitute fee, purchase of electricity and heat produced from renewable energy sources and the obligation to confirm the data on the amount of electricity generated from renewable energy sources of 14th August 2008.

Efficiency improvement measures include also organizing and conducting information campaigns and educational activities in the field of energy efficiency and financial support for activities related to the promotion of energy efficiency. Since 2007, the Ministry of Economy

has conducted an information campaign for energy efficiency named "Time to save energy." The campaign aims to present issues related to the principles and profitability of the application of energy efficient solutions and familiarize Polish society with the issues reflected in the actions of the Minister of Economy to increase the energy efficiency of the Polish economy.

The new initiative is a programme PolSEFF (The Polish Sustainable Energy Financing Facility), launched in January 2011, aimed at small and medium-sized companies interested in investing in new technologies to reduce energy consumption. The programme covers four groups of investments:

1. Investment projects - to achieve at least 20% savings of energy use.
2. Investment projects that increase energy efficiency in buildings that allow to reduce energy consumption in commercial and administrative buildings of SMEs by 30%.;
3. Investments in renewable energy sources;
4. Investments covering selected technologies - investments in enterprises and equipment selected from prepared list of technology.

Attachment No. 3. List of legal acts

EU documents concerning issues related to energy efficiency are as follows:

1) *Green Paper for a European Union Energy Policy (1995).*
2) *Energy Charter Treaty and Energy Charter Protocol on Energy Efficiency and Related Environmental Aspects (PEEEREA).*
3) *White Paper Energy for the Future: RES.*
4) *Council Resolution on energy efficiency in the European Community (1998).*
5) *Action Plan to Improve Energy Efficiency in the European Community.*
6) *European Climate Change Programme (ECCP).*
7) *A sustainable Europe for a better world – A European Union strategy for sustainable development.*
8) *Green Paper - Towards a European Strategy for Energy Supply Security.*
9) *White Paper. European Transport Policy for 2010: Time to Decide.*
10) *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.*
11) *Regulation (EC) No 1099/2008 of the European Parliament and of the Council of 22 October 2008 on energy statistics.*
12) *Directive 2010/31/EU of the European Parliament and of the Council of 19 May 2010 on the energy performance of buildings*

Directives concerning energy efficiency of appliances:

1. *Council Directive 78/170/EEC of 13 February 1978 on the performance of heat generators for space heating and the production of hot water in new or existing non - industrial buildings and on the insulation of heat and domestic hot-water distribution in new non-industrial.*
2. *Council Directive 79/531/EEC of 14 May 1979 applying to electric ovens Directive 79/530/EEC on the indication by labelling of the energy consumption of household appliances.*
3. *Council Directive 92/42/EEC of 21 May 1992 on efficiency requirements for new hot-water boilers fired with liquid or gaseous fuels.*

4. *Council Directive 92/75/EEC on the indication by labelling and standard product information of the consumption of the energy and other resources by household appliances.*
5. *Commission Directive 94/2/EC of 21 January 1994 implementing Council Directive 92/75/EEC with regard to energy labelling of household electric refrigerators, freezers and their combinations.*
6. *Commission Directive 95/12/EC of 23 May 1995 r. implementing Council Directive 92/75/EEC with regard to energy labelling of household washing.*
7. *Commission Directive 95/13/EC of 23 May 1995 implementing Council Directive 92/75/EEC with regard to energy labelling of household electric tumble driers.*
8. *Directive 96/57/EC of the European parliament and of the council of 3 September 1996 on energy efficiency requirements for household electric refrigerators, freezers and combinations thereof.*
9. *Commission Directive 96/60/EC of 19 September 1996 implementing Council Directive 92/75/EEC with regard to energy labelling of household combined washer-driers.*
10. *Commission Directive 96/89/EC of 17 December 1996 r. amending Directive 95/12/EC implementing Council Directive 92/75/EEC with regard to energy labelling of household washing machines.*
11. *Commission Directive 97/17/EC of 16 April 1997 implementing Council Directive 92/75/EEC with regard to energy labelling of household dishwashers.*
12. *Council Directive 98/11/EC of 27 January 1998 implementing Council Directive 92/75/EEC with regard to energy labelling of household lamps.*
13. *Directive 2000/55/EC of the European Parliament and of the Council of 18 September 2000 on energy efficiency requirement for ballasts for fluorescent lighting.*
14. *Commission Directive 2002/31/EC of 22 March 2002 implementing Council Directive 92/75/EEC with regard to energy labelling of household air-conditioners.*
15. *Commission Directive 2002/31/EC of 22 March 2002 implementing Council Directive 92/75/EEC with regard to energy labelling of household air-conditioners.*
16. *Directive 2002/91/EC of the European Parliament and of the Council of 16 December 2002 on the energy performance of buildings.*
17. *Commission Directive 2003/66/EC of 3 July 2003 implementing Council Directive 92/75/EEC with regard to energy labelling of household electric refrigerators, freezers and their combinations.*

18. *Directive 2005/32/EC of the European Parliament and of the Council of 6 July 2005 establishing a framework for the setting of ecodesign requirements for energy-using products and amending Council Directive 92/42/EEC and Directives 96/57/EC and 2000/55/EC of the European Parliament and of the Council.*
19. *Directive 2010/30/EU of the European Parliament and of the of 19 May 2010 on the indication by labelling and standard product information of the consumption of energy and other resources by energy-related products*