THE SHARE OF INDUSTRY IN GDP AND PRICES OF ELECTRICITY AND GAS IN POLAND AND OTHER EUROPEAN COUNTRIES

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An analysis of the relationship of GDP and consumption of energy in Poland and other European countries was conducted. Values of energy intensity and energy intensity of industry were compared, as well as the prices of natural gas and electricity. The differences between new and old members of European Union were presented.

GDP, or Gross Domestic Product, is one of the most popular indicators of economic development of the country. It is defined as the sum of goods and services produced in a given time in the country. Among other things, it is used to compare economic growth and living standards in different countries.

One of the important factors related to economic development is energy consumption. In most Western European countries, this relationship is very clear, as confirmed by high Pearson correlation coefficients. With the growth in GDP an increase in energy consumption occurs. In Poland, however, GDP shows a constantly rising trend (except of a small decline in the late eighties and early nineties), while energy consumption grows to the early nineties, followed by a rapid decline and again, since about 2000 slow growth takes place (Fig. 1).

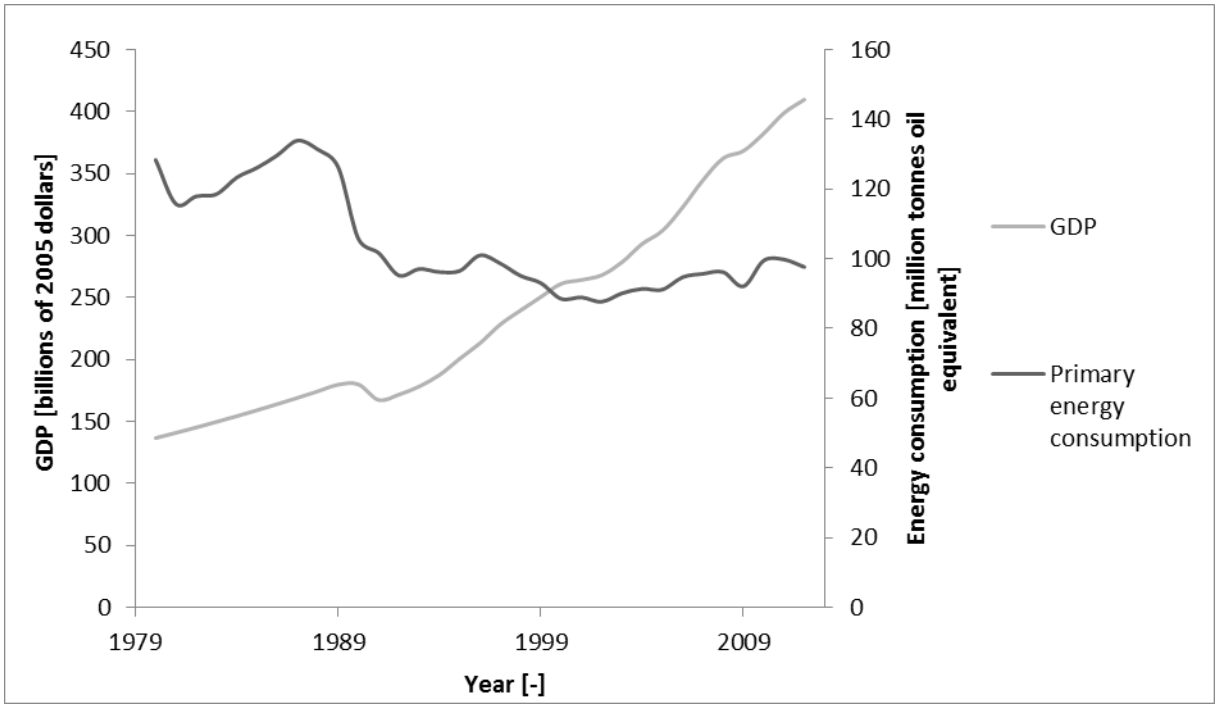

Fig. 1. Primary energy consumption and GDP in the years 1980 - 2012 (own study based on BP Statistical Review of World Energy June 2013 and the United States Department of Agriculture Economic Research Service)

The situation is similar in other countries, such as Bulgaria, the Czech Republic, Romania, Slovakia and Hungary. Also, correlation coefficients in this case are significantly reduced.

The dependence of energy consumption and GDP for selected countries in Europe are shown in Fig. 2 and Fig. 3. There is a clear difference between the situation in the new, poorer (with lower GDP per capita) European Union countries (EU accession after the year 2004) and the old, wealthier member states.

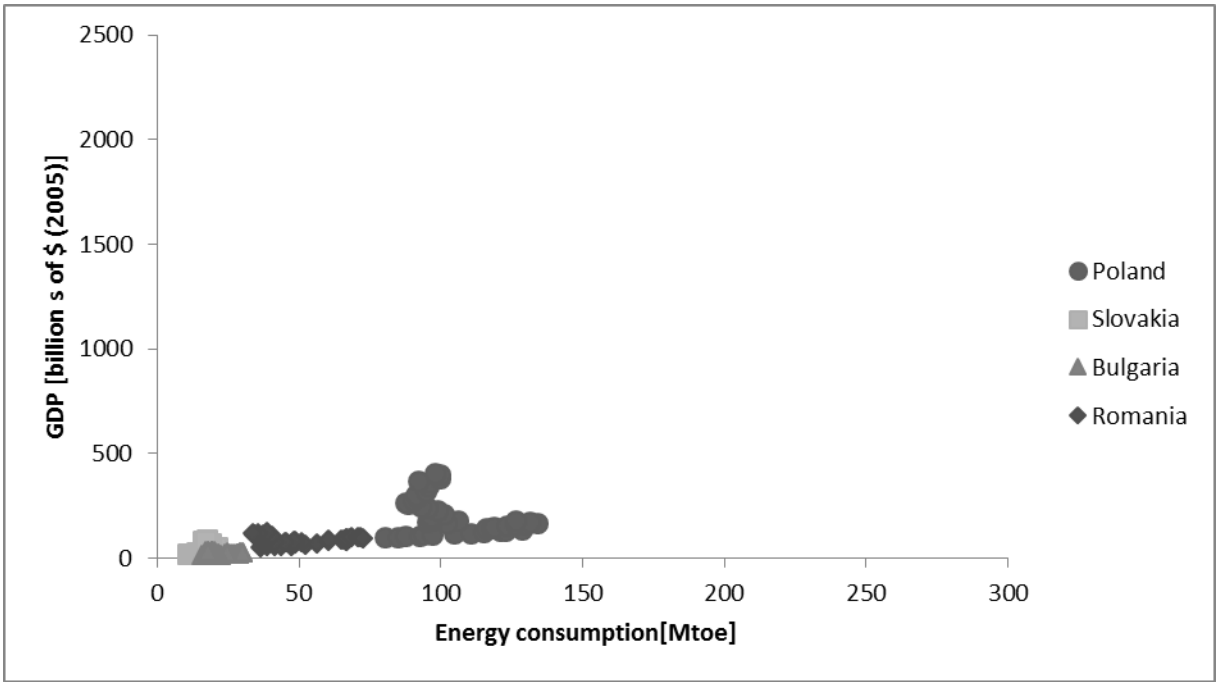

Fig. 2. GDP and primary energy consumption in selected new member states of the European Union (own calculations based on BP Statistical Review of World Energy June 2013 and the United States Department of Agriculture Economic Research Service)

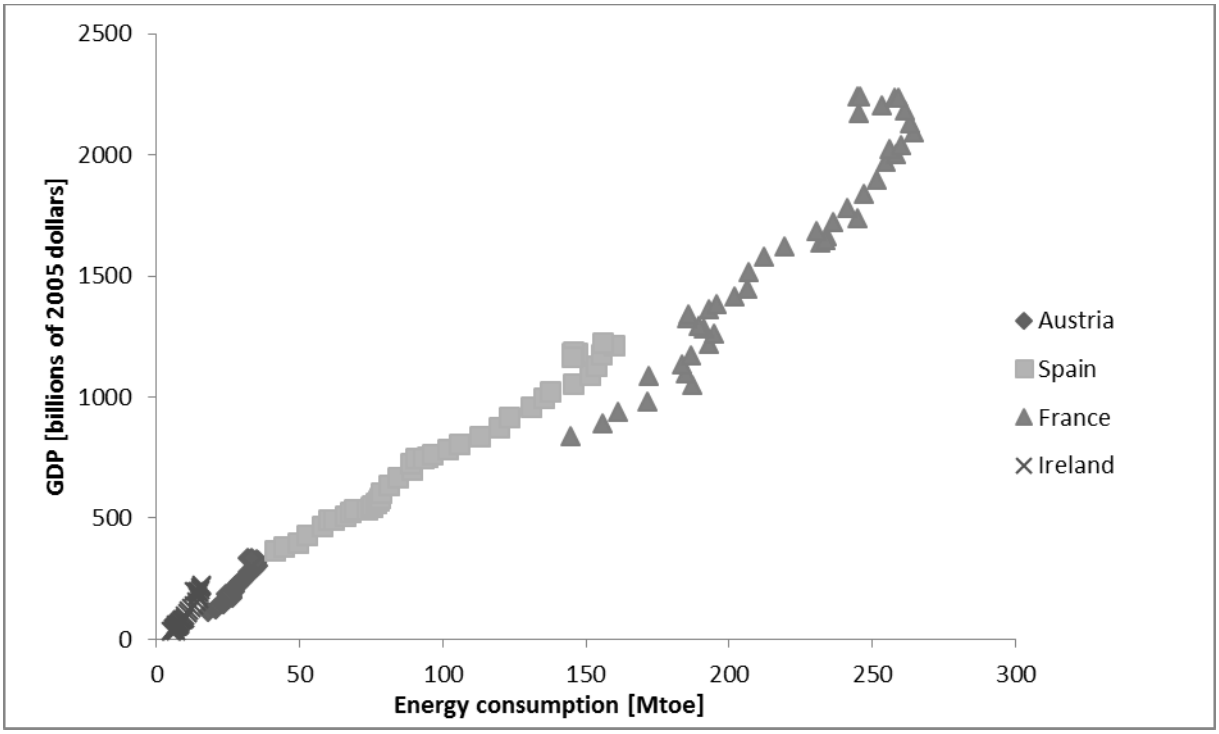

Fig. 3. GDP and primary energy consumption in selected old EU member states (own calculations based on BP Statistical Review of World Energy June 2013 and the United States Department of Agriculture Economic Research Service)

With GDP and energy consumption is related the concept of energy intensity, defined as the ratio of primary energy consumption to GDP. As can be seen on the chart (Fig. 4), the change of energy consumption in Poland in the years 1980-2010 was the largest among the analyzed countries. This results directly from the decline or a slight increase in energy consumption and high GDP growth rate.

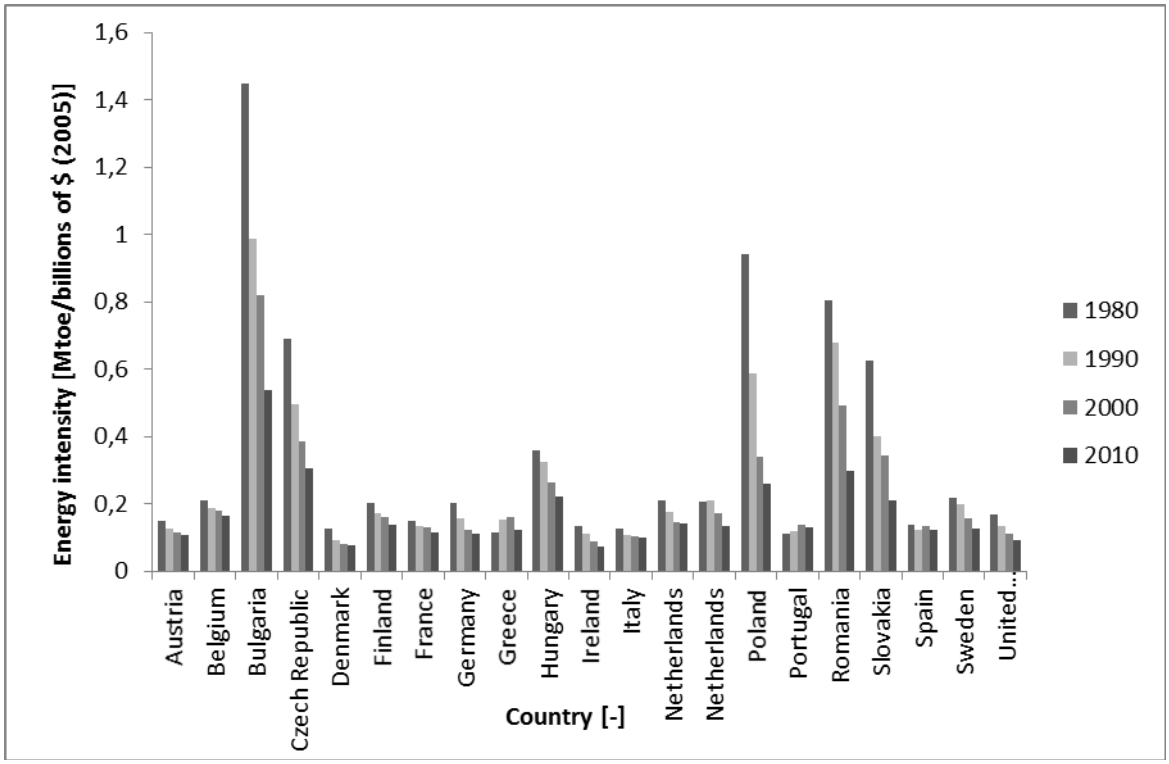

Fig. 4. Energy intensity in the 1980, 1990, 2000, 2010 (own calculations based on BP Statistical Review of World Energy June 2013 and the United States Department of Agriculture Economic Research Service)

However, in recent years the pace of change in energy intensity has decreased considerably. In 2013, energy consumption in Poland after taking into account the climate amendment was 0.104 koe/ €2005p, while the EU average is 0.094 koe/€2005p (Fig. 5).

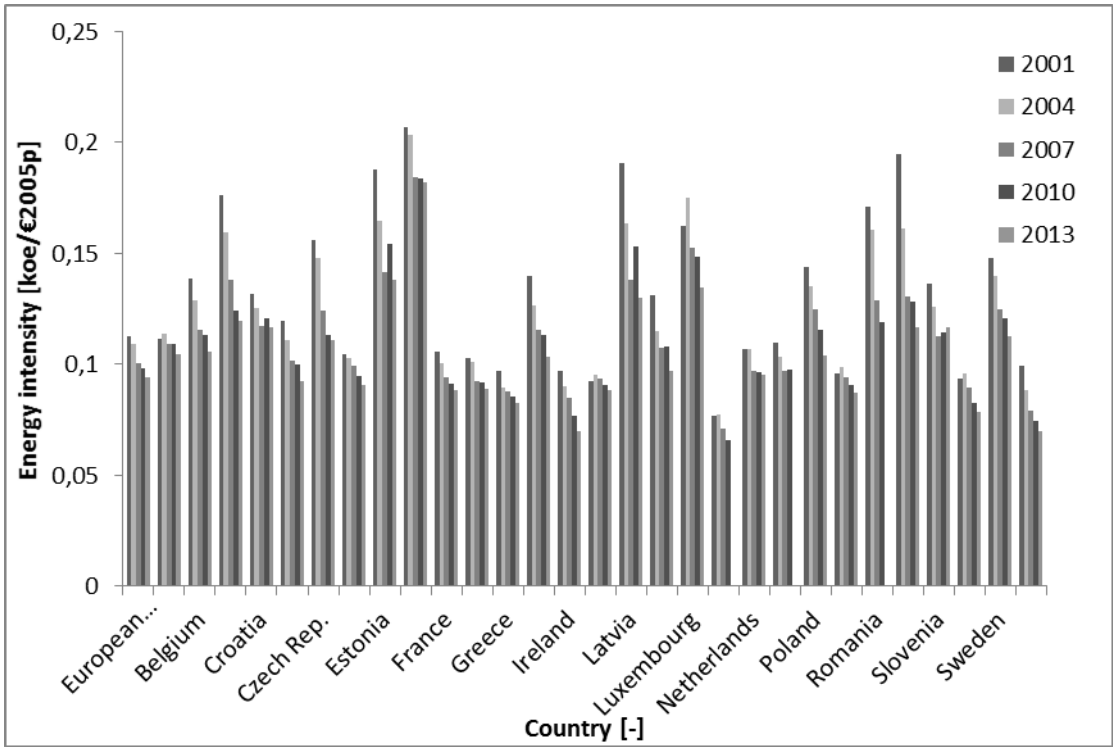

Fig. 5. Energy intensity in selected European countries (own study based on Odyssee-Mure Database)

Energy intensity depends largely on the structure of the economy. One of its most energy-

intensive sectors of is the industry. Therefore, it is worth paying attention to the participation of this sector in GDP (Fig. 6).

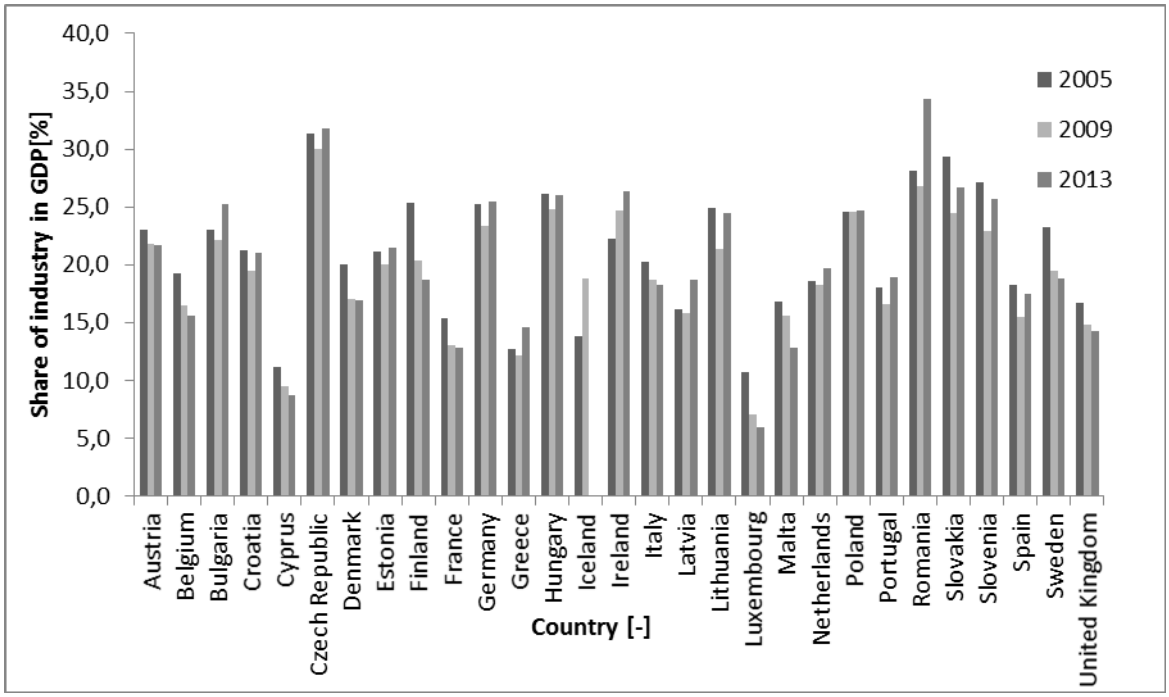

Fig. 6. Percentage share of industry in GDP (own study based on Eurostat Database)

May be noted that most of the countries with higher energy consumption than the European Union average are also the ones with high (above 20%) share of industry in GDP. The share of industry in GDP in Poland is 24.7%, which is over 5% more than the average in the European Union (2013).

Energy intensity is often analyzed in relation to industrial production. Industry energy intensity is defined as the ratio of energy consumption by industry and the value added to GDP by this branch of the economy.

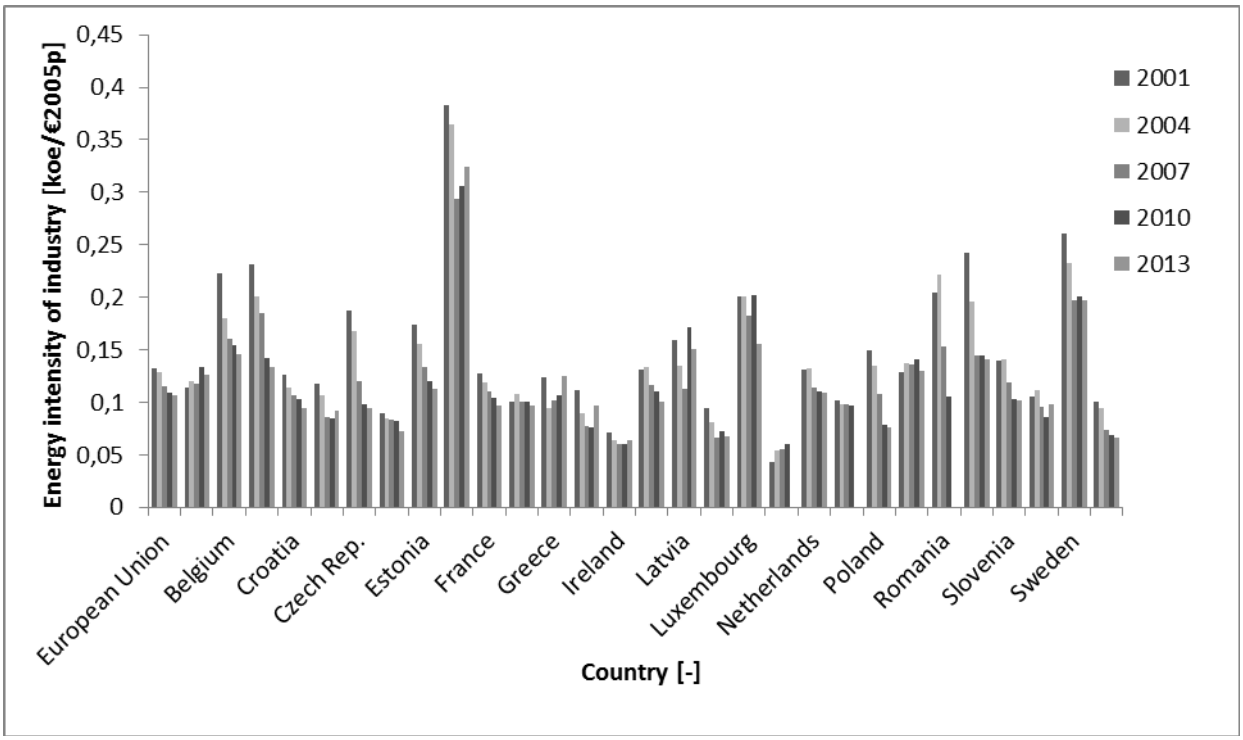

Fig. 7. The energy intensity of industry in selected European countries (own study based on Odyssee-Mure Database)

The graph (Fig. 7) shows how the energy intensity of industry has changed from 2001 to 2013. In Poland, it decreased by almost 50%, which is one of the biggest changes among the analyzed countries. In 2000, energy consumption was higher than the EU average, while in 2013 was lower by about 30%. In Poland, the most energy-intensive industries are chemical, mineral and steel [4].

The larger the share of industry in GDP, the more it is sensitive to the price of gas and electricity. Therefore a comparison of the prices of gas and electricity for industrial users was conducted for Poland and other European countries.

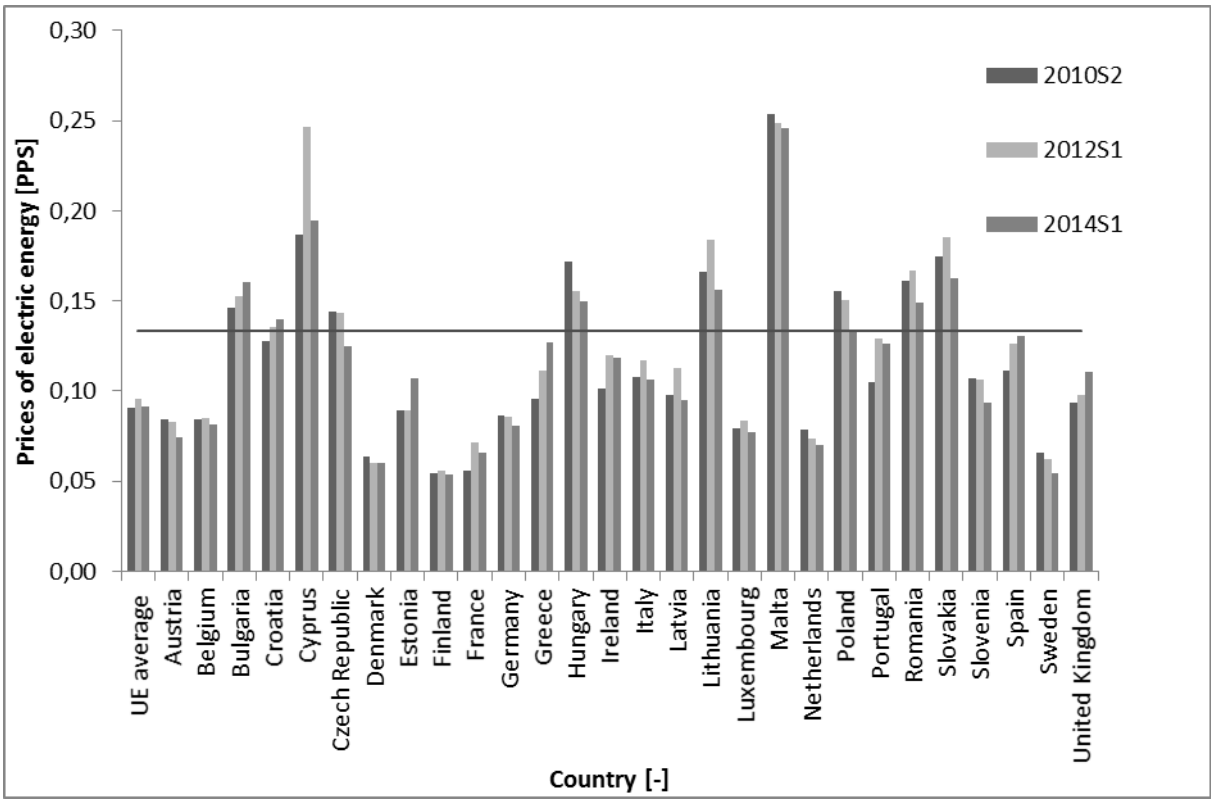

Fig. 8. The prices of electricity for industrial consumers (own study based on Eurostat Database)

The average price of electricity in Poland in the first half of 2014 years is 0.0777€, while the EU average was 0.0917€. However, a better comparison unit is PPS (Purchasing Power Standard - Purchasing Power Standard)). It is an artificial currency unit created to enable a comparison various economic indicators. The price of electricity expressed in PPS in Poland for industrial consumers is 0.1336, which is much more than the EU average - 0.0917 PPS. As the chart shows (Fig. 8), higher price of electricity was in Bulgaria, Croatia, Cyprus, Lithuania, Hungary, Malta, Romania and Slovakia - countries that joined the EU after 2004. At the same time, except Cyprus and Malta are the countries with a high share of industry in GDP.

A similar situation exists for natural gas prices. While in Poland the price in Euro (0.0371€) for industrial customers in the first half of 2014 was slightly higher than the average for the European Union (0,0359€), then expressed in purchasing power standards is almost twice as high (EU average 0,0359 PPS, 0.0637 PPS in Poland). In this case, higher gas prices for industry have only Bulgaria, Lithuania and Hungary, that only those countries with a large share of industry in GDP (Fig. 9). It may be noticed that the high rates are mainly in the poorer EU countries, which joined after 2004.

Also the ratio of prices for industrial consumers to prices for households was analyzed. For gas, it is one of the highest, which means high gas prices in the industry in relation to the prices for households (Fig. 10). This is not an advantageous situation, especially for countries whose economy relies heavily on the industry, as is the case of Poland and most of the new EU Member States.

In the case of the ratio of electricity prices (Fig. 11), the situation is slightly more desirable, but it is worth noting that the ratio of prices for industrial prices for households is highest in countries where the industry is less than 20% of GDP and among the new, poorer EU countries. This is due to the fact

that richer countries can afford to stimulate the development of industry through low electricity prices compared with households, while the situation of the poorer countries due to the lower GDP per capita, does not allow to transfer of the cost of electricity to individual customers [3].Whereas the countries with a small share of industry in GDP are not as sensitive to electricity prices.

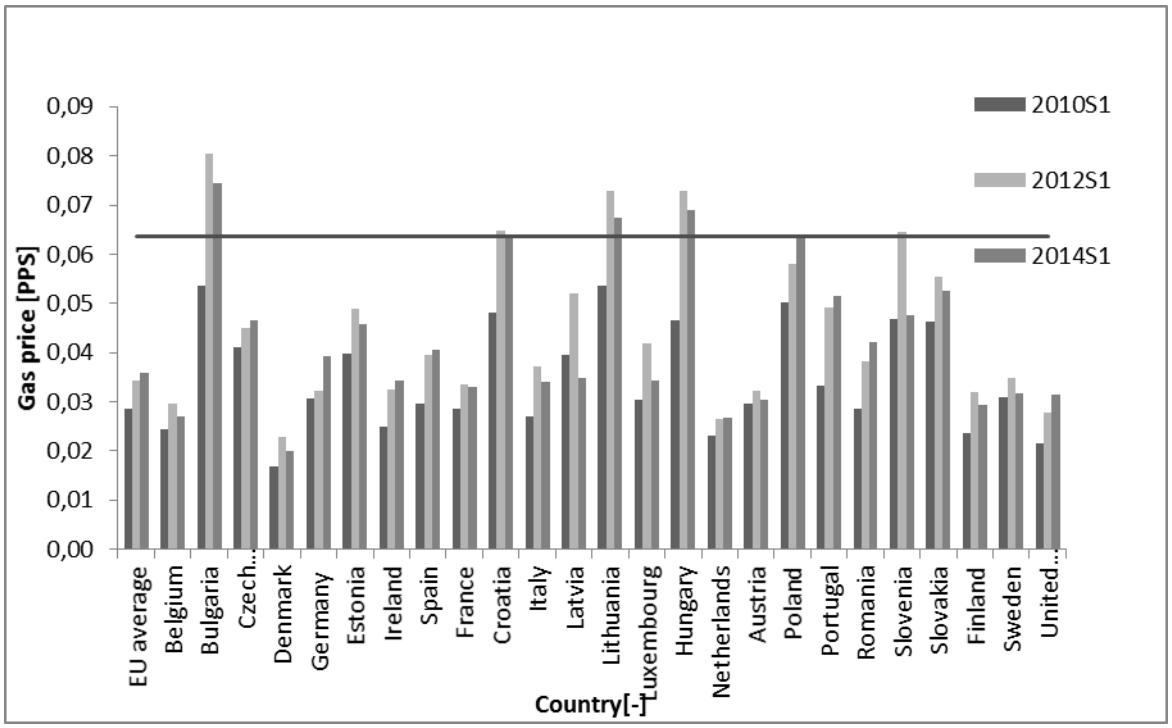

Fig. 9. The prices of natural gas for industrial consumers (own study based on Eurostat Database)

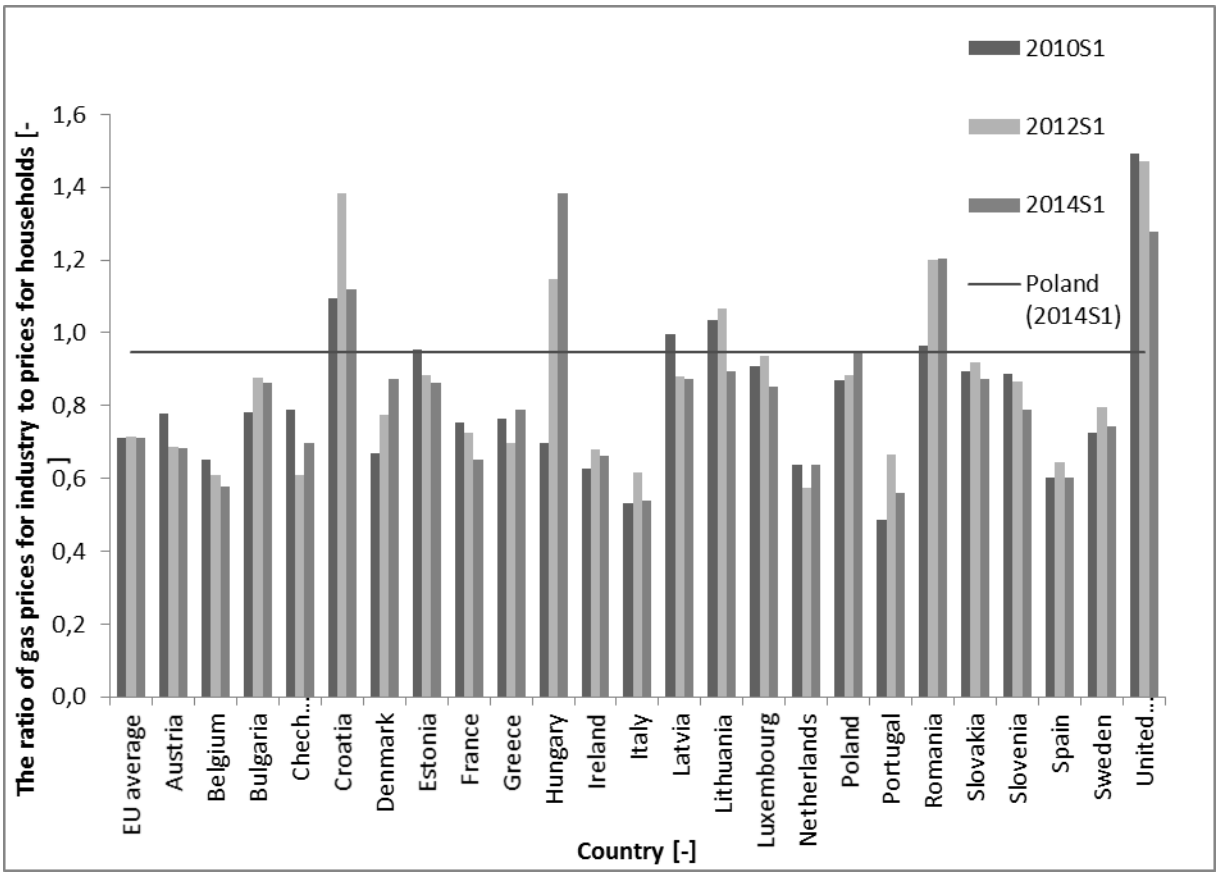

Fig. 10. The ratio of the price of gas for industrial consumers to the prices for households (own calculations based on Eurostat Database)

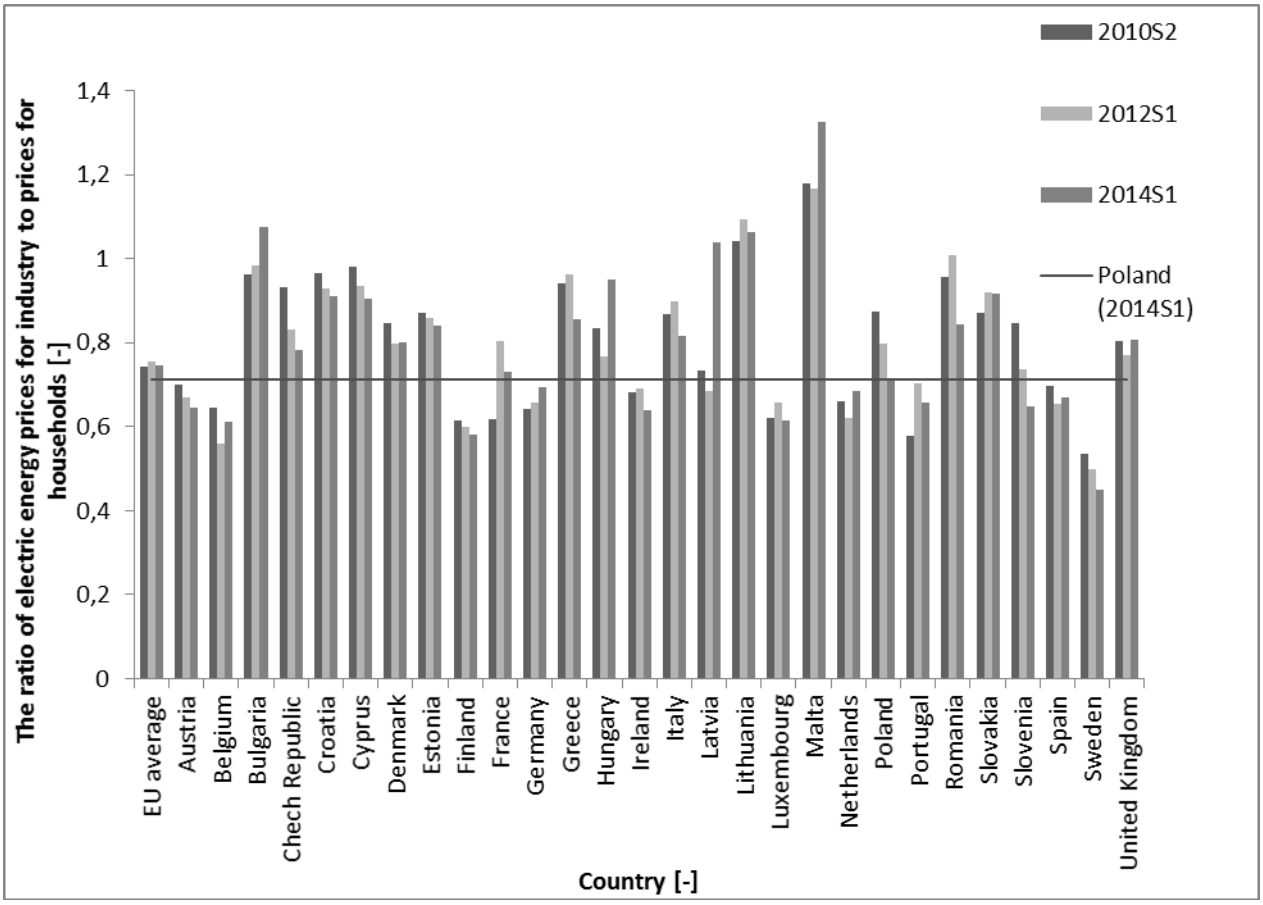

Fig. 11. The ratio of the price of electricity for industrial consumers to the prices for households (own calculations based on Eurostat Database)

Currently, the European Union postulates for a return to greater industry participation in the economy, which aims to create new, sustainable jobs, and ensure economic growth. In Poland, also it is planned to increase the participation of industry, but as the value is greater, the higher is the sensitivity to prices of energy and its carriers.

The high price of gas and electricity may mean high production costs, lower competitiveness and economic downturn [1]. They may have a particular impact especially on the chemical industry, because it is characterized by high consumption of gas and high energy consumption and it is one of the most important industries in Poland (in terms of number of employees and participation in the industrial production of the country) [2].

There is a noticeable difference in the situation in the old and new EU countries. The high price of gas and electricity may have a much greater impact on the poorer countries of the EU, as they have higher share of industry in GDP. It also increases the sensitivity of the new countries in the EU to the effects of climate policy, which leads to higher prices [3],[5].

References

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5. Szczerbowski, R., (2013), Bezpieczeństwo energetyczne Polski – mix energetyczny i efektywność energetyczna, Polityka Energetyczna, vol 16, no. 4, 35-46, 2013.