

## Diesel fuel consumption in Poland

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**Summary.** The aim of this study was to analyze diesel fuel consumption in Poland and identification of the causes of changes in the needs of individual sectors of the economy for this type of fuel. Time range of the researches covered from 2004 to 2014. Data from the Central Statistical Office (CSO) were the source material.

In the years 2004-2014 diesel consumption in Poland was 111 553 thousand tons. In 2014 domestic consumption of diesel fuel was 11 203 thousand tons and it was more than 2 times higher than the level of consumption of this fuel in 2004. The highest consumption of diesel in Poland in the period took place in 2012. The increase in the consumption of diesel fuel in Poland had benefited from increased demand for diesel in transport, which became a result of an increased amount of transport services. The share of transport in the consumption of diesel fuel in Poland for the period 2004-2014 was about 75%. Another area, which consumes the largest quantity of DF in Poland is agriculture. Consumption of this fuel in agriculture in the years 2004-2014 increased by 7%. DF consumption in industry and the manufacturing sector it was variable. DF biggest consumption in these sectors of the economy in the period was recorded in 2004. The analyzes did not allow to identify the specific causes of changes in the use of DF in the industry and manufacturing. In transport it showed a relationship between the consumption of diesel fuel and the amount of transport work and the transported cargo.

**Key words:** diesel fuel (DF), consumption, Poland, economy

### INTRODUCTION

Economic transformations in Poland, which took place after 1989, as well as the integration with the European Union have an impact on energy consumption by different sectors of the economy. This is also applied to the consumption of diesel fuel (DF), which occupies a considerable share in the consumption of liquid fuels. At the turn of the years 2004-2014, in Poland took place not only an increase in diesel consumption but the share of individual sectors of economy in the structure of domestic consumption of this fuel has changed. Economic transformations in Poland, having dynamic character, affect the size and structure of DF consumption. Hence,

constant DF demand analysis in the various sectors of the economy are justified.

### RESEARCH PROBLEM

Impact on the size of the domestic consumption of diesel fuel in Poland changes and that occur in the various sectors of the economy. In the available literature there is a discernible shortage of publications in which the impact of general economic changes in Poland and in the various sectors of the economy to domestic consumption of diesel fuel is analyzed. During the study of the literature we found only one published item in this field [1]. It concerns the analysis of the demand for liquid fuels in general, without detailed analysis on the diesel. There is therefore a need to make the analysis of changes in the consumption of diesel in Poland and correlate them with changes in various sectors of the economy. This research intends to complement the existing state of knowledge in this field.

The main source of information on the liquid fuel market in Poland, including their consumption, is the annual reports compiled by the Central Statistical Office (CSO), the State Chamber of Liquid Fuels (SCoLF) and the Polish Organization of Oil Industry and Trade (POOID). The reports prepared by these institutions contain data on production, import, export and consumption of liquid fuels including diesel. There is however in these publications a lack of detailed analysis explaining trends in the consumption of this fuel in different sectors of the economy.

Except these reports in the literature we found little work taking up the subject of consumption of liquid fuels in Poland [1, 2, 3, 4,5,6,7]. Even more modest amount of knowledge on the topic is related to the domestic consumption of diesel fuel. In the available resources we found only two publications related to DF consumption in agriculture [8,9,10]. More richer knowledge covering the related issues refers to diesel fuel combustion in car engines or machines [11,12,13,14,15].

### PURPOSE AND SCOPE OF WORK

The aim of the study was to analyze the consumption of diesel fuel in Poland. The article attempts to explain the trends occurring in the use of this fuel in different sectors of the economy outside agriculture. Analysis of

DF consumption in agriculture will be presented in a separate publication.

Time range of the research covered years 2004-2014. In case of certain data, due to availability of information, the analysis was based on some shorter periods.

The source of the material were data received from the Central Statistical Office (CSO) and the Polish Organization of Oil Industry and Trade (POOID) concerning fuel consumption in various sectors of the economy, changes in domestic demand and the number of vehicles that use diesel.

RESULTS

In the period of 2004-2014 in Poland took place almost 2-fold increase in diesel consumption. First of all, more than 2-fold increase in the consumption of the fuel in transport contributed to this. During this period DF use in industry was reduced by 12%, and in processing by 29%. In agriculture, however, there was an increase by approx. 7% [16]. In the case of agriculture, a 6% increase in the consumption DF in took place in 2004-2006. In the following years, changes in the use of this fuel does not exceed 3% per annum.

ON consumption in the country and sectors of the economy are presented in Table 1.

**Table 1.** DF consumption in the country and sectors of the economy [thousand. tons]

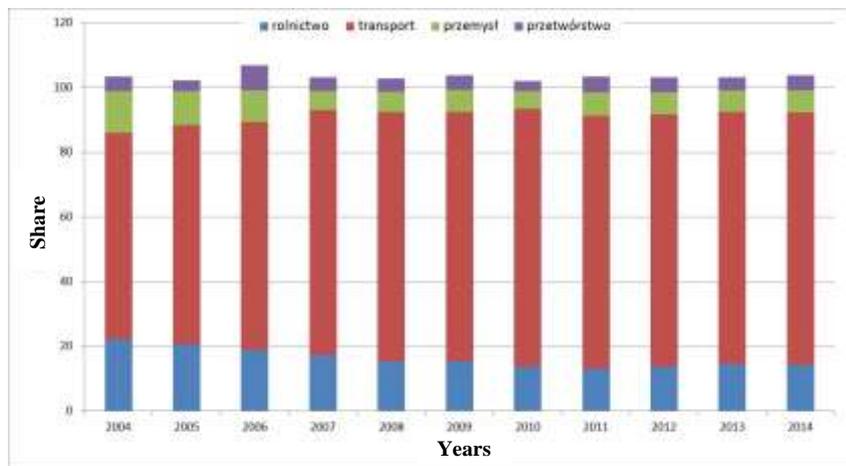
Years	Country	Including			
		agriculture	transport	industry	manufactural processing
2004	6748	1500	4303	874	726
2005	7489	1550	5075	779	633
2006	8527	1600	6010	832	677
2007	9530	1650	7223	563	399
2008	10 441	1600	8070	649	425
2009	10 810	1650	8358	730	487
2010	11 687	1600	9320	629	365
2011	12 219	1625	9583	880	595
2012	11 866	1625	9274	807	544
2013	11 033	1600	8614	716	447
2014	11 203	1604	8734	773	516

Source: CSO [16]

In the analyzed period, the share percentage of individual sectors of the economy which use DF have changed. Contribution to transport increased from 63.8% to 78%. During this period, the share of industry in the consumption structure of DF decreased from 13.0 to 6.9%. At a similar level remained the part of processing. The share of agriculture in national DF consumption decreased from 22 to 14%. Change in the share of agriculture in the national consumption of DF was due to an increase in the consumption of diesel in Poland of the fuel in transport.

In terms of DF consumption the country's agriculture is in second place after transportation. In 2014 DF consumption in agriculture was almost 6 times lower than in transport. In 2004 that difference was two times smaller. With respect to the processing and industry in 2014 agricultural DF consumption was higher by 2 and 3 times respectively. Since 2006 DF consumption in agriculture, by CSO, maintains at a similar level.

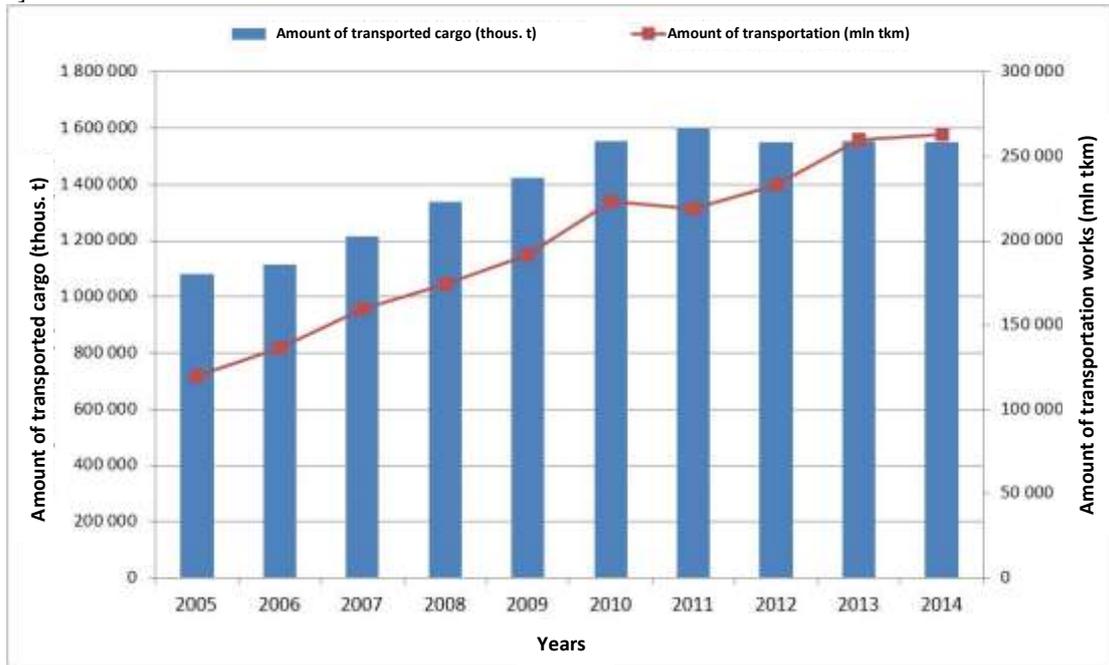
The share of individual sectors of the economy in the use of DF by total is shown in Figure 1.



**Fig.1.** The share of individual sectors of the economy in the domestic diesel consumption. Source: CSO [16]

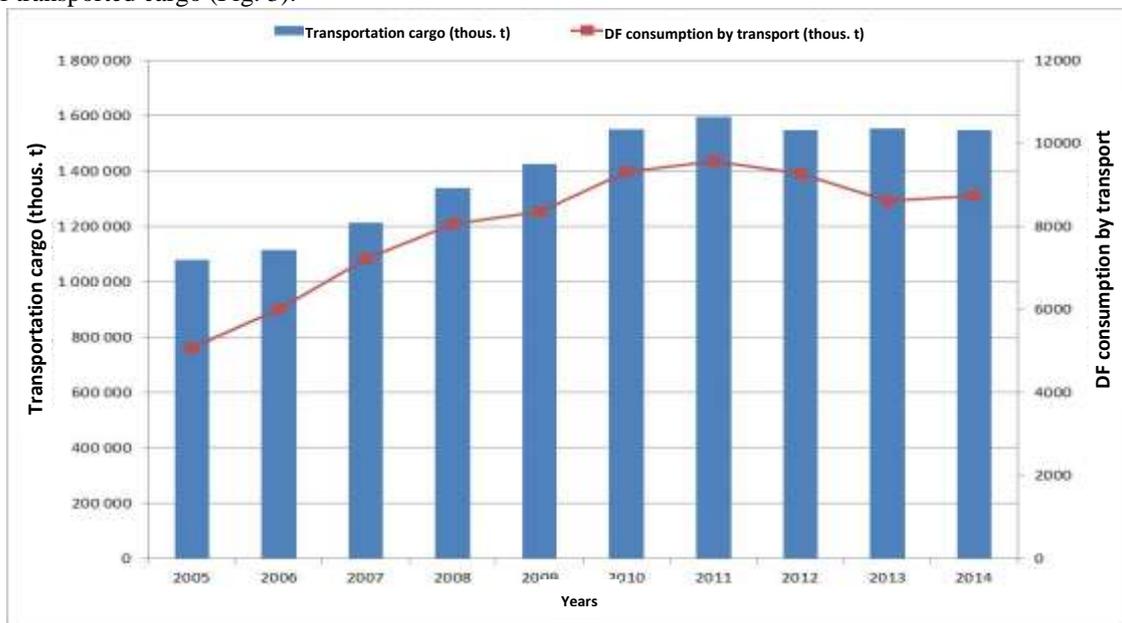
The increase in DF consumption in the transport stems from an increase in the amount of transported cargo and passengers by motor vehicles, transport performance as well as increasing the number of trucks, tractors and buses [17].

In the period 2005-2013 the amount of transported goods by vehicles increased by 40%, while the amount of the transportation works increased more than 2-fold (Fig. 2).



**Fig 2.** The amount of transport activity and Transported cargoes by motor vehicles in Poland over the period 2005-2013  
 Source: our own study based on CSO [17]

As it is revealed by the analysis, the changes in DF consumption by transport are closely linked to changes in the amount of transported cargo (Fig. 3).



**Fig. 3.** The amount of transport activity and transported cargoes by motor transport and transport diesel consumption in Poland over the period 2005-2013  
 Source: our own study based on CSO [16,17]

One of the factors generating DF consumption in the economy is steadily growing number of vehicles that use this type of fuel. At the turn of 2006-2014 the number of passenger cars in Poland with motors consuming DF increased more than 3 times. More than 2-fold increased

the number of tractors. In this period, the number of buses increased by 30%, and specialized vehicles by 50%. The smallest increase (10%) in the years 2006-2014 was recorded in the number of truck vehicles (Table 2.) [17].

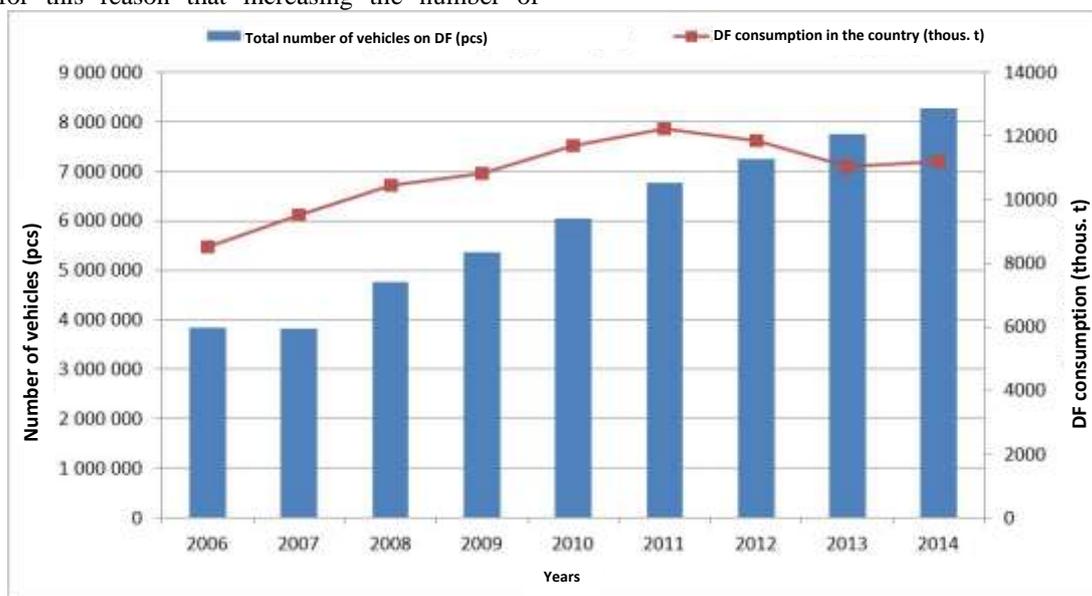
**Table 2.** Motor vehicles consuming diesel in Poland [pieces]

	Light vehicle	Motortruck	Tractor	Bus	Special vehicle
2006	1 639 922	1 919 525	136 818	73 515	65 879
2007	2 182 434	1 325 102	166 847	78 363	74 041
2008	2 906 214	1 494 387	189 711	83 264	85 034
2009	3 370 879	1 613 808	193 944	86 535	94 751
2010	3 871 105	1 785 121	207 643	88 313	102 825
2011	4 415 612	1 923 575	232 526	91 913	114 033
2012	4 829 909	1 969 895	250 234	91 256	115 335
2013	5 259 881	2 027 944	273 099	93 949	93 949
2014	5 675 734	2 114 224	295 745	97 417	97 417

Source: our own study based on CSO [17]

The carried out analysis led us to the conclusion that the increase in the number of vehicles burning diesel was one of the factors that generated the increase in domestic consumption of diesel fuel. However, it was not a major factor, for this reason that increasing the number of

vehicles after 2011 did not contribute to an increase in the consumption of diesel fuel. After 2011, despite the increase in the number of vehicles we can notice DF consumption reduction (Fig. 4).



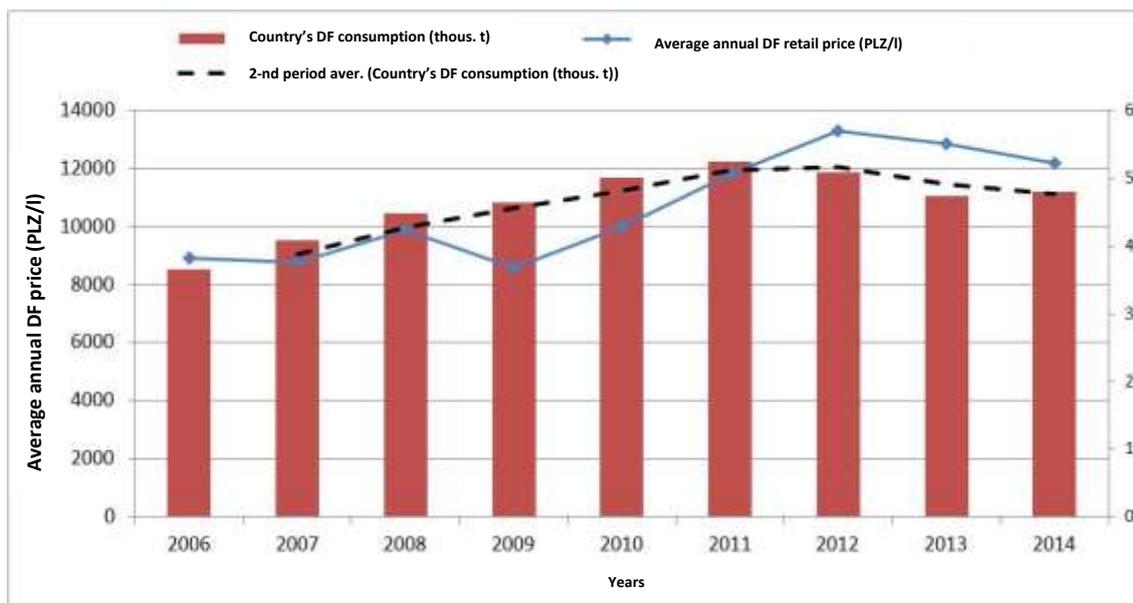
**Fig. 4.** Changes in the number of vehicles that use diesel fuel and diesel fuel consumption in Poland in the years 2006-2014

Source: our own study based on CSO [16, 17]

The carried out analysis showed that the diesel prices were a key factor in generating demand for this type of fuel in Poland. In the period 2006-2014 we can notice an increase in DF consumption, the years in which the prices of the fuel were higher than in other periods. In the year 2012 with the increase of DF price by 12% decreased the consumption of the fuel by 3%. However, a year later,

with the fall of the fuel prices by 4% decreased the fuel consumption by 8%. A similar situation took place in 2008. With the increase of DF price by 12% increased the consumption of diesel fuel in Poland by 9%.

Domestic consumption of diesel in Poland in relation to the average annual price of the fuel is shown in Figure 5.

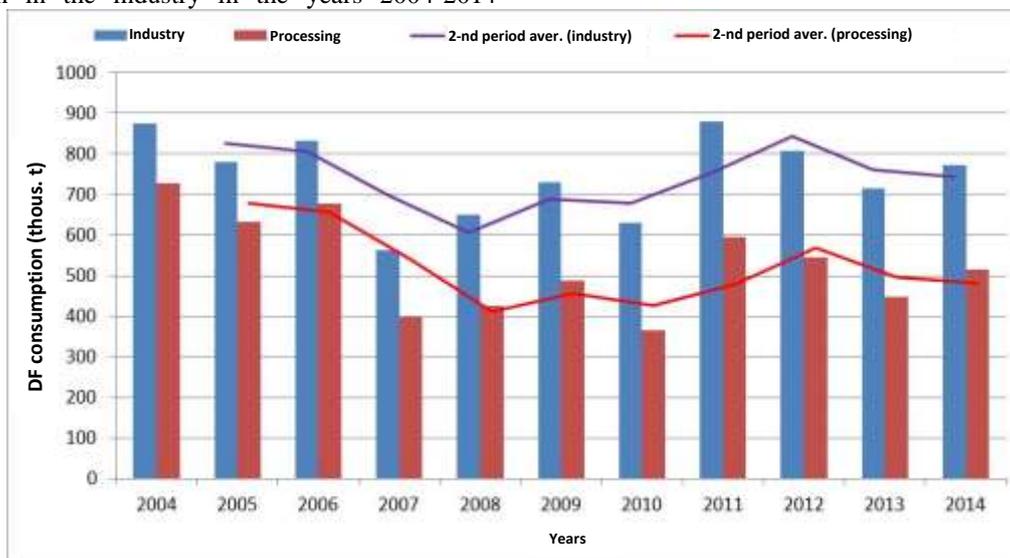


**Fig. 5.** Domestic consumption of diesel in Poland in relation to the average annual prices of diesel fuel in Poland over the period 2006-2014

Source: our own study based on CSO [16, 18]

Diesel fuel consumption in industry and processing makes an impact on the dynamics of its consumption in Poland. The conducted analysis points out, that DF consumption in these sectors is variable in nature. This is due to the fact that the volume of production and processing is variable in each year. DF average consumption in the industry in the years 2004-2014

amounted to 748 thousand tons, while the processing 529 thousand tons. The largest deviation from the average for the industry was recorded in 2004, 2007, 2010 and 2011, but in the case of processing in 2004-2008 and 2010. As it is noted the dynamics of changes in the DF use in industry and processing has a similar character.

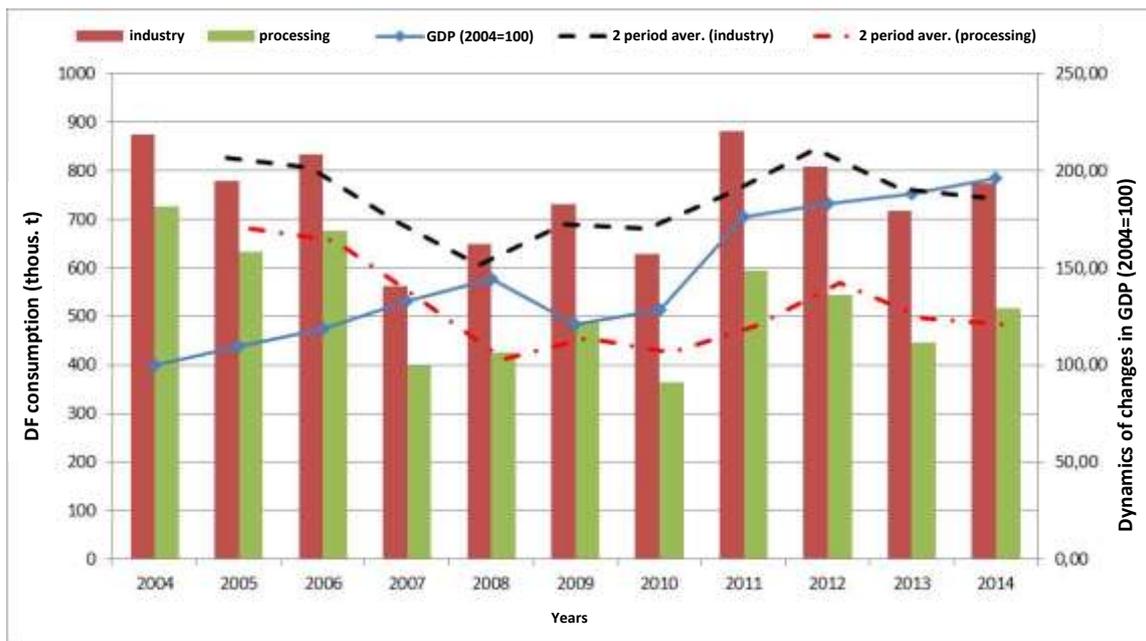


**Fig. 6.** Diesel fuel consumption in industry and processing industry in the period 2004-2014

Source: CSO [16]

The studies have analyzed the consumption of diesel in the industry and the processing sector in relation to the dynamics of changes in Gross Domestic Product (GDP), taking as a reference the year 2004. It has been discovered that in the years 2004-2008 when GDP change was of a

growing tendency DF consumption in industry and processing was declining. In 2009, when the GDP growth weakened - DF consumption in these industries increased. From 2011 despite the rise in GDP, DF consumption in industry and processing dropped (Fig. 7).

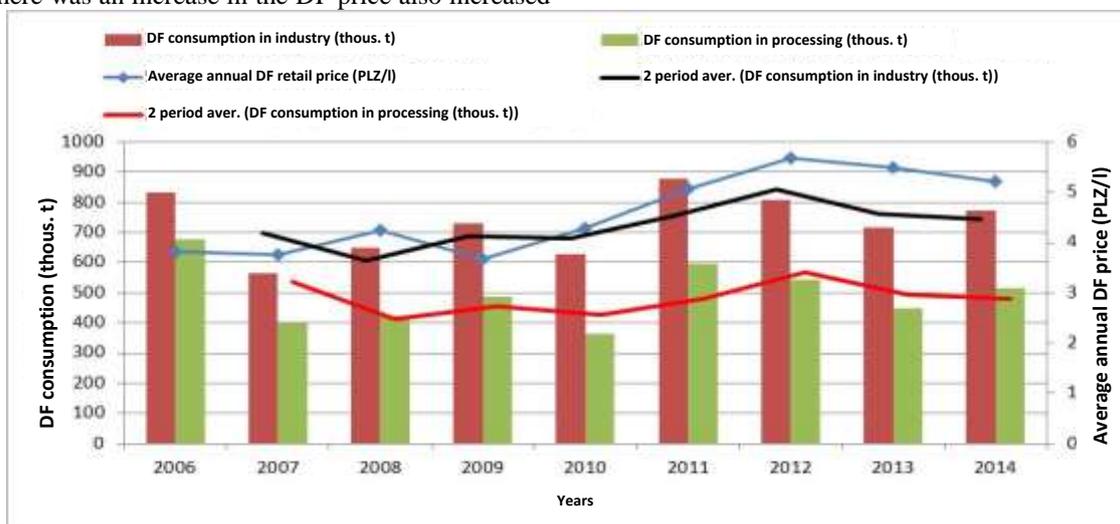


**Fig. 7.** Diesel fuel consumption in industry and industrial processing with regard to the dynamics of changes in GDP over the period 2004-2014

Source: CSO [14, 19, 20]

The the performed analysis, we can not confirm any links between the average price of diesel and the consumption of this fuel in industry and processing (picture 6). It was noted that during the period 2009-2012 when there was an increase in the DF price also increased

the consumption of this fuel in those sectors of the economy. After 2012 DF prices decline was accompanied by a reduction in diesel consumption in industry and processing. (Fig. 8)

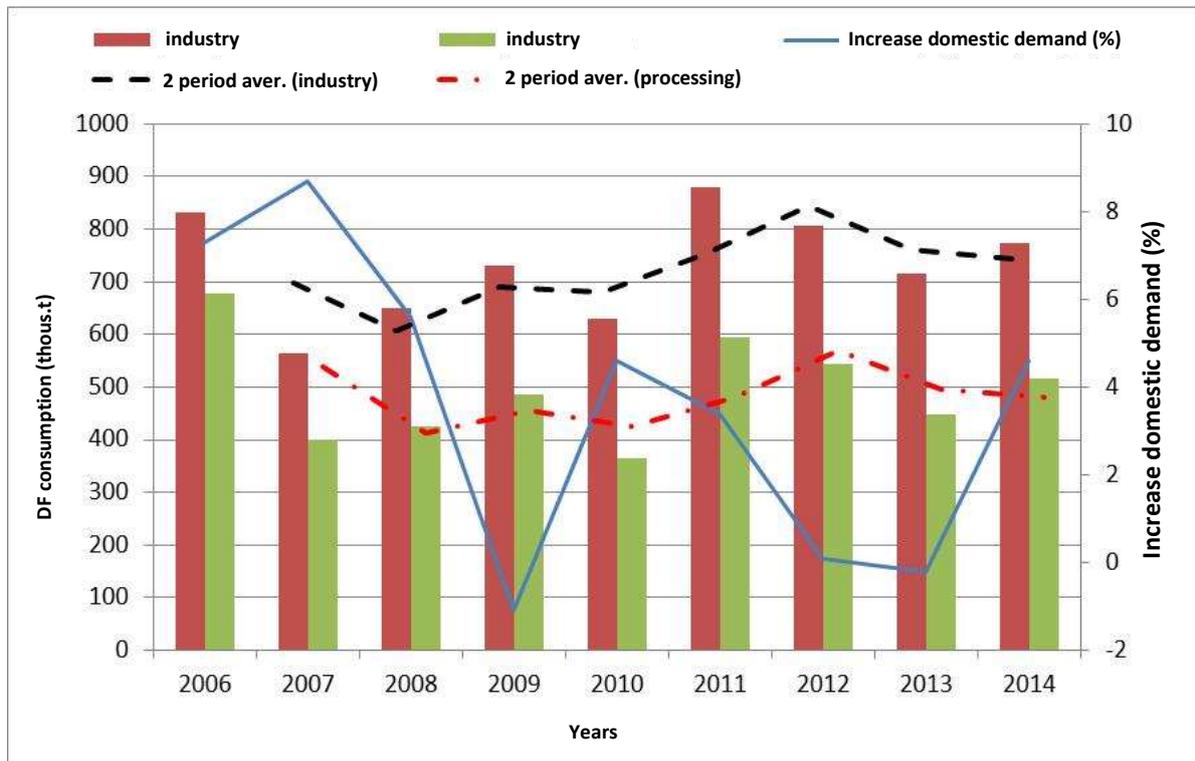


**Fig.8.** Diesel consumption in industry and processing in relation to the average annual price of diesel fuel over the period 2004-2014

Source: CSO [16,18,19].

The conducted analysis found no relation between DF consumption in the industry and the processing industry and the change in domestic demand. In the years 2009 and 2012 - 2013 when there was a decline in

domestic demand DF consumption rose. In other years, the growth in domestic demand was accompanied by a drop in DF consumption in industry and processing (Fig. 9).



**Fig. 9.** Diesel consumption in industry and processing in relation to changes in domestic demand over the period 2004-2014

Source: CSO [16,20].

### CONCLUSIONS

In the period 2004-2014 the diesel fuel consumption in Poland increased more than 2-fold. To this state contributed almost 2-fold increase in demand for this fuel in transport. In the case of agriculture, the consumption of diesel fuel in the period 2004-2014 increased by 7%. The variable trend of DF consumption was in industry and processing. In relation to the state in 2004 diesel consumption in industry and processing in 2014 was lower than the corresponding 13% and 40%.

In the case of DF consumption in transport a relation could be found between the increasing demand for this fuel and the increase in carried freight and transport performance.

Certainly, the increase in the consumption of diesel in Poland was affected by the increasing number of diesel vehicles. However, after 2011 despite a further increase in the number of vehicles burning DF, domestic consumption of the fuel decreased. It can be assumed that the impact on this state had a decrease of DF consumption in industry and processing.

As it is revealed by the analysis, domestic consumption of diesel in Poland do not fully correlate with the changes in prices for this type of fuel. It was found that with the increase in prices for diesel fuel also increased DF domestic consumption. It was noted that it was decreasing with the decreasing DF prices.

Analysis of changes in the DF consumption in industry and in the processing industry showed no

relationship between the price of the DF and the dynamics of changes in GDP and domestic demand.

This creates a need for further analysis to determine the causes of changes in DF consumption in industry and processing.

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#### ZUŻYCIE OLEJU NAPĘDOWEGO W POLSCE

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**Streszczenie.** Celem opracowania była analiza zużycia oleju napędowego w Polsce oraz identyfikacja przyczyn wywołujących zmiany w zapotrzebowaniu poszczególnych działów gospodarki na ten rodzaj paliwa. Zakres czasowy badań obejmował lata 2004-2014. Materiałem źródłowym były dane Głównego Urzędu Statystycznego (GUS).

W latach 2004-2014 zużycie ON w Polsce wyniosło 111 553 tys. ton. W 2014 r. krajowego zużycie ON wyniosło 11 203 tys. t i było ponad 2-krotnie wyższe od poziomu zużycia tego paliwa w 2004 r. Największe zużycie ON w Polsce w analizowanym okresie miało miejsce w 2012 r. Na wzrost zużycia oleju napędowego w Polsce miał wpływ zwiększający się popyt na ON w transporcie, który wynikał ze wzrostu usług przewozowych. Udział transportu w zużyciu oleju napędowego w Polsce za okres 2004-2014 wyniósł około 75%. Kolejnym działem, który zużywa w Polsce najwięcej ON jest rolnictwo. Zużycie tego paliwa w rolnictwie w latach 2004-2014 wzrosło o 7%. Zużycie ON w przemyśle oraz przetwórstwie przemysłowym miało charakter zmienny. Największe zużycie ON w tych działach gospodarki w analizowanym okresie odnotowano w 2004 r. Przeprowadzone analizy nie pozwoliły zidentyfikować konkretnych przyczyn wywołujących zmiany w zużyciu ON w tych przemyśle oraz przetwórstwie przemysłowym. W transporcie stwierdzono zależność pomiędzy zużyciem oleju napędowego a ilością pracy przewozowej i ilością przewożonych ładunków.

**Słowa kluczowe:** olej napędowy, zużycie, Polska, gospodarka.