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## **THE STRUCTURE OF SOURCES OF FINANCING FIXED ASSETS IN ENVIRONMENTAL PROTECTION IN POLAND**

Key words: sources of financing, fixed assets, environmental protection, Poland

**ABSTRACT.** The aim of the research was to determine the structure and dynamics of changes in the sources of financing fixed assets serving environmental protection in Poland. The article covers the years 2012-2013. The analysis concerned sources of financing perceived from a regional perspective, taking average dynamics of changes into account and showcasing the average share of individual sources of financing in voivodships. The support of such financing with EU funds was particularly emphasized. It was proven that, apart from own resources, public funds from the European Union budget and co-financing from environmental funds take up a significant share in the structure of sources of financing of environmental protection. Favorable changes were observed in the financing source structure of fixed assets serving environmental protection in various regions of Poland in the analyzed period. The highest dynamics of changes in Poland and in voivodships applied to foreign funds, a consequence of using financial resources from the EU budget to improve and maintain the quality of the natural environment. A positive effect of these activities was an increase in the value of expenditures on fixed assets in environmental protection after 2004, in other words after joining the EU. This was confirmed by the growing dynamics of changes in investment outlays for fixed assets in environmental protection in Poland and individual voivodships. After 2004, the share of funds from ecological funds as well as domestic credits and loans decreased, while the share of funds from abroad increased significantly.

## **INTRODUCTION**

Important location factors include the condition of the natural environment [Klamut 2000]. The principles of proper use of the environment include ecology science. People are an important factor, obliged to protect natural resources from degradation, taking into account the fact that they use or transform resources in accordance with their needs [Górski 2009]. The following statement by Catherine L. Kling et al., is valid: "Understanding and solving the most urgent environmental challenges today and in the future requires acknowledging the existence of an inseparable link between humans and nature, whereas humans receive innumerable benefits from the natural environment, in the form of goods and services" [Kling et al. 2010]. Growing interest in the problems of eco-development results from the fact that people felt threatened by the deterioration of the environment in which they live. For a long time, the environment had not barred industrial development, until ecological balance was disrupted [Woś, Zegar 2002]. According to Marek Górski,

among all the objectives of state activity, providing society with proper and ecological conditions is extremely significant [Górski 2009]. Therefore, the state should invest more in environmental protection investments. Considerations regarding environmental protection are also linked with economic problems associated with expenditure and environmental protection costs. Activities in the scope of environmental protection are intertwined with the issue concerning public goods [Samuelson 1954, 1955], which, by definition, are desirable by society, however cannot be provided by the market mechanism. The benefits of these goods accrue to the entire community, regardless of whether individuals want to buy them or not [Samuelson, Nordhaus 2006]. The level of financing decisive for the methods and tools that counteract the negative effects of impacts on the environment is important in ensuring the effectiveness of environmental actions taken [Kauf 2013]. At the same time, the level of expenses incurred for environmental protection outlines a positive phenomenon manifested in the efforts undertaken to prevent, limit and eliminate pollution resulting from the consumption of goods and services [Broniewicz 2011]. This expenditure is integrated with the environmental policy implemented with a view of achieving sustainable development [Hrebicek et al. 2011]. Expenditure on environmental protection is incurred to finance tasks in this area. Within the sources of financing tasks in the field of environmental protection, budget funds (central and local self-government), private funds (own investor funds, loans and credits granted by Bank Ochrony Środowiska SA, Bank Gospodarstwa Krajowego, commercial banks, environmental protection funds<sup>1</sup>) and foreign funds (the EU and other foreign sources) are distinguished [Barczak, Kowalewska 2014].

## MATERIAL AND METHODS

The research problem undertaken in this paper concerns the structure of sources of financing fixed assets serving environmental protection, in Poland, in the years 2002-2017. The main objective of the research was to determine the structure and dynamics of changes in the sources of financing fixed assets serving environmental protection in Poland. The structure of financing environmental protection includes expenses incurred by entrepreneurs, municipalities and budgetary units. The assumed research goal was achieved by answering the following research questions:

1. Has the structure of financing sources of fixed assets serving environmental protection in Poland changed upon European Union accession?
2. Has accession to the European Union influenced the pace of changes in the structure of financing sources of fixed assets serving environmental protection?

To justify the choice of the research problem, the following research hypothesis was put forward: Accession to the European Union influenced the pace of changes in the structure of financing fixed assets to protect the environment. Bearing in mind the large role played

<sup>1</sup> Environmental protection funds were categorized as private funds financing tasks in the scope of environmental protection due to the source of their origin. The National Fund for Environmental Protection and Water Management as well as voivodship funds for environmental protection and water management are not special funds, but state legal entities under legislation in the scope of financial law. Such status is not decisive for the nature of funds available to them. Moreover, the amount of funds is not specified in the Budget Act, and their origin and destinations are multidimensional.

by the quality of the environment and its protection, in the context of the legitimacy of investments in this direction, additional research tasks have been formulated:

A review of sources of financing fixed assets for environmental protection in Poland by voivodship, taking their structure into account, analysis of the dynamics of changes in the structure of financing sources of fixed assets serving environmental protection in Poland by voivodship.

The pace of changes in the level of investment in the scope of environmental protection was assessed on the basis of dynamics indicators in the analyzed period, assuming the level of expenditure in the base year as 100%. A single-base comparison was applied in the study, allowing to determine the change in the value of the phenomenon in a given period in relation to a previously determined base period [Nowak 2005, Bednarski et al. 2003]. Therefore, by calculating one-basic indexes it was possible to determine how much the value of the phenomenon changed in the given period compared to its constant value at the beginning of the analysis. When analyzing the dynamics of total investments for Poland, the trend line was defined as a two-period moving average. The moving average facilitated the analysis by smoothing the changes over the period. The analysis covered the years 2002-2017. The study used data from the Central Statistical Office in the field of environmental protection and available literature on the subject. The descriptive, comparative and analytical methods were used to compile the collected data, and the results are presented in charts and tables [Stachak 2006, Kopeć 1983].

## STUDY RESULTS

Prior to conducting a structure analysis of the sources of financing fixed assets for environmental protection<sup>2</sup>, an analysis of the level of total expenditure for this purpose in Poland was made, assessing the dynamics of changes, the share of investment expenditure on environmental protection in the investment expenditure of the national economy and the moving average 2 periodic trend line in 2002-2017. The results are shown in Figure 1. Studies show that, in the analyzed years, the pace of changes varied and increased until 2015, then a clear downward trend was visible. Periods of increased dynamics of growth in Poland took place in particular in 2005-2006 and 2007-2011. Presumably, it was a result of the possibility of using additional funds for the implementation of tasks in the scope of environmental protection by Poland after its accession to the European Union. It can be assumed, though it was not the subject of analysis, that financial support from the EU

<sup>2</sup> Outlays on fixed assets together with other outlays are capital or financial outlays, the purpose of which is to create new fixed assets or improve existing fixed assets (reconstruction, extension, reconstruction, adaptation or modernization), as well as expenditure on so-called first investment equipment. Expenditure on fixed assets is expenditure, among others on: the acquisition of land (including the right of perpetual usufruct of land), buildings, premises and civil engineering (including construction and assembly work, design and costing documentation), technical devices and machines, means of transport, tools, instruments, movables and equipment, other fixed assets, the purpose of which is to obtain protective effects or effects in water management. Outlays on fixed assets for environmental protection and water management also include outlays incurred on: improving fixed assets related to environmental protection or water management consisting of their reconstruction, extension, modernization or reconstruction, research and development activities [GUS 2018].

budget was an incentive for taking action in the field of environmental protection and also encouraged entrepreneurs to spend national funds and launch their own funds for investments in this scope. In Poland, a very important stimulus for expenditure on environmental protection was the requirement to meet accepted obligations provided for in the Treaty on the Functioning of the European Union [article 191 TFUE]. Attention was paid to the negative dynamics observed in Poland in 2012. In an article by Małgorzata Kożuch, a decrease in investment was pointed to at that time [Kożuch 2018]. It was probably caused by depleting funds from the next stage of financing in the 2007-2013 budget period [GUS 2018]. At that time, the Operational Programme “Infrastructure and the Environment” (OP I&E) was one of the most important sources of financing of environmental protection in Poland, and, from a budget of over EUR 28 billion, more than EUR 5 billion was spent on environmental protection projects. Taking the level of financial resources and Polish membership in the EU into account, it is important to note the National Fund for Environmental Protection and Water Management (NFOŚiGW) and voivodship funds (WFOŚiGW) as institutions implementing OP I&E priorities in 2007-2013. In 2015, the rate of change in the value of investments in fixed assets in environmental protection increased again (Figure 1). This resulted from the completion of the investment from the 2007-2013 perspective and the launch of another financing programme for the 2014-2020 budget period. This period has not yet been settled, so it is still necessary to wait for its final results; nevertheless, significantly decreased dynamics of changes in 2016 do not prove a decline in environmental protection investments, since a slight increase is already visible in 2017. It is most likely that the observed patterns are a result of the fact that the funds from the new perspective have not yet been fully invested [Environmental protection 2018]. These changes are clearly presented by the trend line. The share of investments in fixed assets in environmental protection in relation to total expenditure in the national

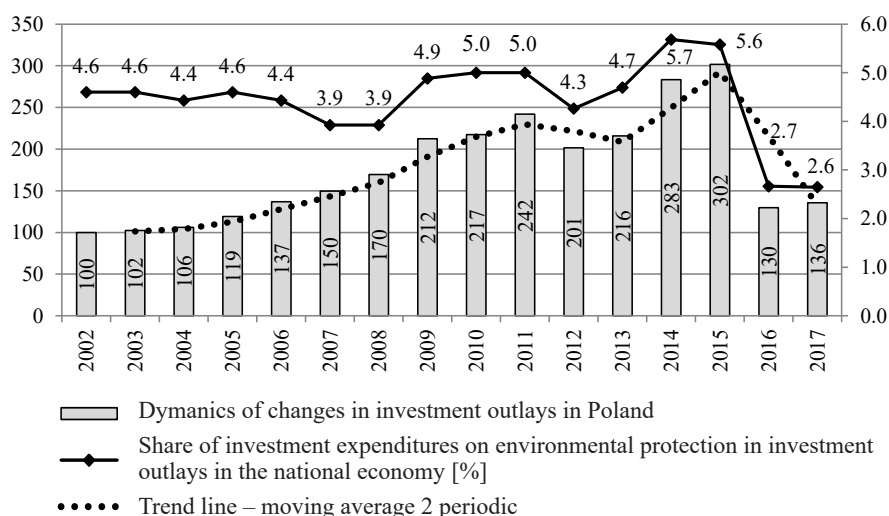


Figure 1. Dynamics of changes in total investments in fixed assets in environmental protection in Poland and their share in investment expenditure in the national economy in the years 2002-2017

Source: own elaboration based on Central Statistical Office data [GUS 2002-2017]

economy in Poland amounted to 4.5% on average. In the analyzed period, the share of expenditure on environmental protection ranged from 4% in 2007 to about 6% in 2014.

The main sources of financing activities in the scope of environmental protection in the country have, for many years, included the own resources of investors, mainly entrepreneurs (Figure 2). The share of own resources involved in pro-ecological undertakings in the sources of financing environmental protection, in total, in 2002-2017, amounted to 49% on average, and ranged from approximately 42% in 2015 to almost 64% in 2017. At that time, ecological funds constituted, on average, 17.5% of total financing, foreign funds ~16%, credits and loans – over 9%, whereas the smallest shares were those of budget funds – around 4.5%, and other funds – over 3.5% of the structure of sources of financing. When analyzing changes in the structure of financing sources of fixed assets in environmental protection, a decrease in the share of resources from ecological funds as well as domestic credits and loans can be observed in favor of funds from abroad. In a publication by Barbara Gołębiewska, similar observations are found regarding changes in the structure of financing fixed assets up until 2011 [Gołębiewska 2013]. This demonstrates the effective use of financial opportunities that appeared after joining the European Union. The data in Figure 2 indicate further changes in this direction and the maintenance of this trend until 2017.

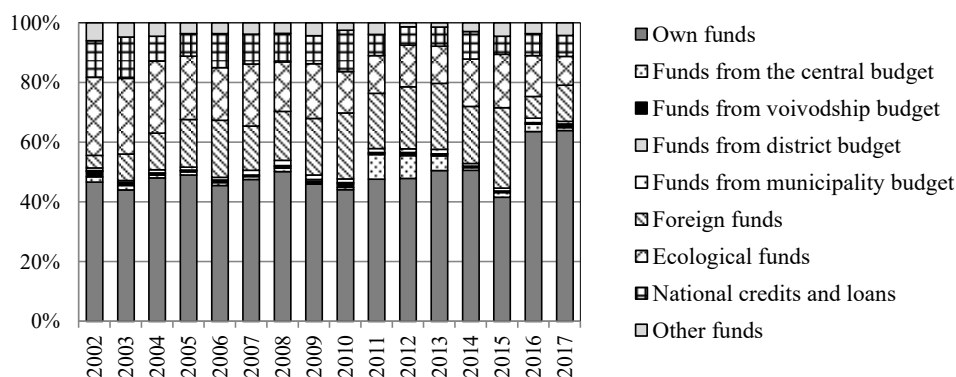


Figure 2. Structure of sources of total financing of fixed assets for environmental protection in Poland in 2002-2017

Source: own study based on Central Statistical Office data [GUS 2002-2017]

Subsequently, average shares of sources of financing of fixed assets in environmental protection in Poland for individual voivodships were analyzed. This classification is presented in Table 1. The results for individual voivodships indicate a similar tendency to use own funds to finance tasks related to environmental protection, as in Poland.

In the analyzed time, the lowest average share – about 41% of own funds – referred to Łódzkie and the highest – almost 63% – to Mazowieckie. At the same time, it is worth noticing that, in Łódzkie, the average share of budget funds in financing environmental protection was the highest and amounted to about 12.5%, whereas in Mazowieckie the average share of budget funds was only 3% of finances dedicated to environmental protection.

Table 1. Structure of sources of financing of fixed assets used in environmental protection in Poland and voivodships – average share in 2002-2017

Details	Own funds	Funds from the central budget	Funds from the voivodship budget	Funds from the district budget	Funds from the municipality budget	Foreign funds	Ecological funds	National credits and loans	Other funds
	%								
Poland	49.22	2.26	0.64	0.28	1.17	16.22	17.50	9.09	3.63
Dolnośląskie	51.86	0.81	0.45	0.17	0.43	13.42	18.7	12.31	1.79
Kujawsko-pomorskie	52.67	2.23	0.87	0.22	0.96	15.66	20.01	4.14	3.25
Lubelskie	43.61	1.81	1.77	0.25	0.79	20.02	18.74	9.31	3.70
Lubuskie	39.5	2.49	0.58	0.26	1.29	24.75	11.21	17.82	2.04
Łódzkie	41.46	11.25	0.60	0.13	0.55	10.92	20.90	8.95	5.24
Małopolskie	46.02	1.13	0.60	0.24	1.40	20.12	20.93	6.69	2.89
Mazowieckie	62.95	0.57	0.59	0.19	1.69	11.31	13.72	6.05	2.93
Opolskie	45.65	0.78	0.75	0.16	1.16	12.97	23.49	11.98	3.05
Podkarpackie	44.75	2.49	0.89	0.11	0.98	23.06	16.72	8.19	2.82
Podlaskie	49.91	1.17	0.86	0.25	0.40	15.09	21.55	8.37	2.40
Pomorskie	55.08	1.36	0.41	0.09	2.09	18.46	14.69	6.27	1.55
Śląskie	51.03	1.34	0.63	0.21	1.27	16.85	19.09	7.18	2.41
Świętokrzyskie	56.51	0.72	1.06	0.29	1.57	16.94	14.54	6.51	1.85
Warmińsko-mazurskie	46.75	1.47	1.46	0.20	1.01	19.35	17.65	9.39	2.72
Wielkopolskie	45.96	0.40	0.27	1.49	1.69	13.48	16.86	12.42	7.43
Zachodniopomorskie	42.08	1.17	0.27	0.14	0.56	19.03	14.91	13.28	8.55

Source: on elaboration based on Central Statistical Office data [GUS 2002-2017]





Both in Poland and all voivodships means were also obtained from ecological funds; the highest score in this respect belongs to Opolskie (23.5%). The lowest share of means from environmental funds (about 11%) was used in Lubuskie. At the same time, in Lubuskie as much as 25% of environmental protection financing of fixed assets was covered by foreign funds, with 18% of financing covered by domestic credits and loans. As shown in the data presented in Table 1, next to own resources, public funds from the EU budget and co-financing from environmental funds constitute a significant part of the structure of sources of financing environmental protection. However, the granting of public subsidies to selected entities is generally criticized as it does not result from their position on the market, but rather from the fulfillment of procedural requirements.

This results in improving the market situation of some entrepreneurs, granting them an undeserved bonus, which violates the principles of market competition [Śleszyński 2000].

The dynamics of changes in the structure of financing sources for investment serving environmental protection, referred to as an average change in the years 2002-2017, confirmed the existence of phenomena already observed in the structure of financing tasks in the scope of environmental protection (Table 2). The highest dynamics of changes in Poland and voivodships applied to foreign funds, which is a consequence of using financial resources from the EU budget to improve and maintain the quality of the natural environment. The only case of negative dynamics of changes observed in the scope of obtained foreign funds was Dolnośląskie, with a 5.5% decrease. The highest average change in the analyzed years was recorded for Łódzkie, with an increase of about 5666% in relation to the first year covered by the analysis, with much lower dynamics of changes concerning ecological funds. Małopolskie followed close behind with 4148% and Podlaskie with 3176% (initial value of foreign funds). High values of dynamics of changes in foreign funds obtained in the investment financing structure in the indicated voivodships are probably due to their lower level in the initial period of analysis and effectively used financing opportunities that appeared after joining the European Union. The dynamics of changes in the structure of other sources of financing investments in fixed assets serving environmental protection in individual voivodships was very diverse.

## CONCLUSIONS

An increase in financial possibilities from the European Union budget has significantly contributed to an increase in investment outlays on environmental protection, in particular in the scope of the economy and the development of infrastructure serving environmental protection. The positive effect of these activities was an increase in the value of outlays directed to fixed assets serving environmental protection after 2004, that is after joining the EU. This was confirmed by growing dynamics of changes in total investment outlays on fixed assets serving environmental protection in Poland and individual voivodships. In the analyzed years, the share of expenditure on fixed assets in environmental protection in total investment expenditure in the Polish national economy amounted to about 4.5%. Both in Poland, in general, and individual voivodships, the structure of financing sources was dominated by own funds, which represented 41-63% of total funding. Almost 34% of financing was covered jointly by ecological funds and foreign funds. In the structure

of financing sources of fixed assets in environmental protection, since 2004, the share of resources from ecological funds as well as domestic loans and credits has decreased, while the share of funds from abroad has increased significantly. The highest percentage of foreign – including European – funds used on environmental protection was used by the Lubuskie Voivodship, while the lowest share of foreign funds in the structure of sources of financing was recorded for the Łódzkie Voivodship.

In conclusion, one can confirm the hypothesis put forward in the work that Poland's accession to the European Union influenced the pace and change in the structure of financing fixed assets to protect the environment.

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## STRUKTURA ŹRÓDEŁ FINANSOWANIA ŚRODKÓW TRWAŁYCH W OCHRONIE ŚRODOWISKA W POLSCE

Słowa kluczowe: źródła finansowania, środki trwałe, ochrona środowiska, Polska

### ABSTRAKT

Celem badań było określenie struktury i dynamiki zmian źródeł finansowania środków trwałych służących ochronie środowiska w Polsce. Zakres czasowy badań obejmował lata 2002-2017. Analizie poddano źródła finansowania w ujęciu regionalnym, uwzględniając średnią dynamikę zmian oraz wykazując średni udział poszczególnych źródeł finansowania w województwach. Zwrócono szczególną uwagę na wsparcie tego finansowania ze środków funduszy unijnych. Wykazano, że w strukturze źródeł finansowania ochrony środowiska, oprócz środków własnych znaczny udział miały środki publiczne z budżetu UE oraz dofinansowanie z funduszy ekologicznych. Zaobserwowano korzystne zmiany, które nastąpiły w badanym okresie w zakresie struktury źródeł finansowania środków trwałych służących ochronie środowiska w różnych regionach Polski. Najwyższą dynamiką zmian w Polsce, a także w województwach charakteryzowały się środki z zagranicy, co wynikało ze skutecznego wykorzystywania środków finansowych z budżetu UE w celu poprawy i utrzymania stanu jakości środowiska naturalnego. Pozytywnym efektem był wzrost wartości nakładów skierowanych na środki trwałe służące ochronie środowiska po 2004 roku, czyli po wstąpieniu do UE. Potwierdzeniem tego była rosnąca dynamika zmian nakładów inwestycyjnych na środki trwałe w ochronie środowiska w Polsce i poszczególnych województwach. Po 2004 roku zmniejszył się udział środków pochodzących z funduszy ekologicznych oraz kredytów i pożyczek krajowych, natomiast wyraźnie zwiększył udział środków pochodzących z zagranicy.

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