

Environmental Taxation and Its Impact on Stimulating the Development of Smart Industry

Maryna Sadovenko^{1,*} Iryna Vasylichuk¹ Kateryna Slyusarenko¹

¹ *Kryvyi Rih Economic Institute of Kyiv National Economic University named after Vadym Hetman, Kryvyi Rih 50000, Ukraine*

**Corresponding author. Email: sadovenko_mm@kneu.dp.ua*

ABSTRACT

The article presents the results of the research based on the analysis of theoretical concepts for the development of the environmental tax, assessment of the current climate situation in the world and in Ukraine in particular. The article also presents an analysis of qualitative and quantitative indicators of environmental taxation in Ukraine at the macro and micro level. The authors presented the results of the assessment of environmental taxation in Krivoy Rog. In the conclusions, authors emphasized that the environmental tax, which should perform a compensatory, stimulating and fiscal functions, is not a significant lever for achieving the goals of state environmental and economic policy. The final part of the article contains possible development directions of environmental taxation by improving fiscal, financial and credit development mechanisms of smart industry in Ukraine.

Keywords: *environment, pollution, greenhouse gases, environmental tax, smart industry, revenues, state budget, local budgets*

1. INTRODUCTION

In the conditions of the intensification of globalization processes, the growth of economies in the countries of the world and rapid development of smart industry, the ecological situation is constantly getting worse, the threats of natural and technogenic catastrophes are increasing. A good example of this situation is the acceleration of global warming processes and, as a result, the occurrence of large-scale fires in natural ecosystems (in Australia, the Amazon, Siberia, the tropical forests of Africa and Indonesia). Due to the significant deterioration of the environmental situation in August 2019 The UN General Secretary announced: "the world is experiencing a climate emergency: glaciers are melting and carbon dioxide levels are rising" [13]. As taxes and production technologies are in dialectic communications, the application of all range of mechanisms including fiscal ones, for the sake of the solution of pressing environmental problems and increase in the level of environmental safety is very relevant nowadays.

Ukraine, as a member of the world community, a member of the United Nations and many other international organizations dealing with environmental issues, implementing economic policy, as well as environmental security policy, uses the environmental tax. In the light of said above, the chosen topic is relevant and required, taking into account the need to increase the level of environmental safety and avoid negative consequences of environmental degradation in the medium and long term.

1.1. Related Work

International organizations pay significant attention to changes in climate conditions, environmental degradation, and increased greenhouse gas emissions. In particular, the United Nations experience has a significant impact. With the deterioration of the situation in 2019, more and more attention is paid to methods of improving the situation, as well as attracting the international community to these processes [13]. Among Ukrainian scientists, we should note the scientific achievements of M. I. Khilko [16]. In his book, the author analyzes the essence of environmental safety, its components, and research methodology. Valuable from the point of view of the theory is the analysis of the current state of ecological safety of Ukraine's ecosystems with the identification of the most significant problems. Note the article by K. Mashnenkov, which in addition to analyzing the causes of environmental degradation, presents areas for investment that will have a positive impact on the environment in the future [18]. Among the articles dedicated to the improvement of the ecological situation highlight the work of Y. A. Malik, N. J. Loach, J. M. Zachary, I. M. Parsley [17]. In particular, the authors structured the directions for avoiding environmental hazards. The study of the environmental problem is not limited to these works, but they are reflected in the presented study.

Since the problem of the environmental tax, determining its essence, effectiveness, and scope of application is not new, it is also devoted to a lot of works. However, it should be noted that the analysis should pay special

attention to legal documents, in particular when writing the article analyzed the Tax Code of Ukraine, the Budget Code of Ukraine, reports of the accounting chamber of Ukraine and the State fiscal service of Ukraine. In addition to normative documents, the work of K. Kanonishena-Kovalenko, which presents a structured analysis of the environmental tax from its inception to the present, changes in the tax rate, its essence and possible directions of influence on the environmental situation [5]. A. S. Skopova focused on the functions that an environmental tax and its impact on the macro and micro environment [10]. The presented scientific and practical developments form the basis of the presented study of environmental taxation and its development prospects.

1.2. Problem Statement

Environmental policy of Ukraine needs significant improvement, in particular in terms of strengthening the legislative component, as well as reviewing the economic levers of influence on business entities-environmental pollutants. The use of ecological tax as one of the methods of stimulating nature protection activity of smart industry and filling budgets with funds with the aim of their further redistribution for environmental needs acquires special relevance.

1.3. Material Presentation and Results

One of the most important indicators for analysis, in the direction of our research, is the volume of CO₂ emissions. According to international organizations, in particular the World Bank, the intensification of policies to reduce harmful emissions into the atmosphere does not closely correlate with the tendency to reduce them. For example, in 2000, the amount of CO₂ emissions per person was 4.03 metric tons per capita. And in 2015, this indicator reached the level of 4.97 metric tons per capita, in the next few years, the trend continued. So, in just 15 years, the volume of emissions into the atmosphere has increased by 23.2 %, which is a significant result of globalization, the growth of the world economy and increase of people presence on the planet. In the ranking of the world's countries with the highest level of CO₂ emissions to the atmosphere, Qatar is in the first place (Figure 1), a country with an extremely highly developed oil and gas industry, which causes such a high level of pollution. It is important to note that along with Qatar, the top 20 most polluted countries include Kuwait, Bahrain, and Saudi Arabia, which are OPEC countries. The ranking of the most developed countries includes the United States in 11th place with an indicator of 16.49 tons per year per capita, Canada - 16th place (15.12 tons), the Russian Federation - 23rd place (11.86 tons), Korea - 24th place (11.57 tons).

If we analyze the ranking of countries with the lowest level of emissions into the atmosphere (Fig. 2) it can be concluded that the top twenty includes countries with low

levels of development or island States. This result can be explained by the fact that these countries are not developed industrially, do not have significant natural resources for production, and therefore do not have a significant impact on environmental pollution.

The implementation phase of the Paris agreement moves to a critical phase in 2020, when countries must submit their updated nationally determined contributions [8]. In this aspect, when analyzing the current climate situation, it is advisable to consider the results of the Climate Change Performance Index (CCPI), which is an independent tool for monitoring the effectiveness of climate protection in countries. It aims to increase the transparency of international climate policy and ensures effective climate protection efforts and progress made by individual countries. Figure 3 shows a map of the world with the distribution of countries by their contribution to control and reduce greenhouse gas emissions.

The results of CCPI 2020 illustrate the main regional differences in climate protection and its effectiveness within the 57 countries and the EU assessed. So far, no country has performed well enough in all the index categories to achieve an overall very high ranking in the index. Sweden leads the index in 4th place, followed by Denmark (5) and Morocco (6). The lowest five current CCPI are the Islamic Republic of Iran (57), the Republic of Korea (58), Chinese Taipei (59), Saudi Arabia (60), and the United States (61), which are rated low or very low for almost all categories [11].

So, as we can see, the climate situation is only getting worse, and the number of emissions is growing from year to year. In the light of our research, we will determine the place of Ukraine in the presented ratings. In terms of CO₂ emissions to the atmosphere, Ukraine is on the 87th place - emissions by 5.02 tons per capita. Ukraine ranks 17th in the CCPI. The political and economic crisis of the previous years continues to affect the indicators of greenhouse gas emissions and energy use, which leads to a high rating in the index. Experts emphasize that instead of being the result of an effective climate policy, the reduction in greenhouse gas emissions and energy use per capita in 2012-2017 is due to the long-term conflict in the Donbas, where the energy and metallurgical industries have suspended their activities. A very low rating of the effectiveness of national policies also reflects the lack of an ambitious environmental policy. National experts criticize the lack of a plan to phase out the use of coal and the government's unambiguous goals [11].

Thus, the goals for reducing greenhouse gas emissions in 2030 and the prospects for developing renewable energy sources are estimated as quite low (Fig.4). In addition, experts emphasize that the strategy for developing low emissions until 2050, adopted in 2018, does not provide an absolute reduction of greenhouse gas emissions from today's level.

Scenarios developed by analysts for changes in emissions until 2050 indicate that the country can significantly exceed the current level of emissions by up to 70 %. Taking into account a more optimistic scenario, the existing environmental policy will keep emissions at the

current level, which is not in line with the Paris agreement [8]. One of transition traits to smart industry is more rational use of resources, including natural ones. The latter has to occur due to the improvement of organization of production processes and use in them new technical and technological means that are created in the sector of information and communication technologies (ICT), on which the development of smart industry is based. The use of ICT (products and services) on a global scale can lead to the reduction of emissions of greenhouse gases in CO2 equivalent in 2030 almost for 20% in comparison with 2015. It should be noted that for Ukraine the estimation of reduction of greenhouse gases emissions in the equivalent

of CO2 has not been carried out yet, the technique of its receiving for other countries has not been found either. For the purpose of stimulating pollutants to reduce the emissions of polluting substances upon transition to smart industry the implementation of standard legislative rules and the use of ecological taxes is very important. It is reasonable to consider that formation of environmental taxation in Ukraine began with the adoption of the Law of Ukraine "About environmental protection" (1991), and with the introduction of a fee for environmental pollution.

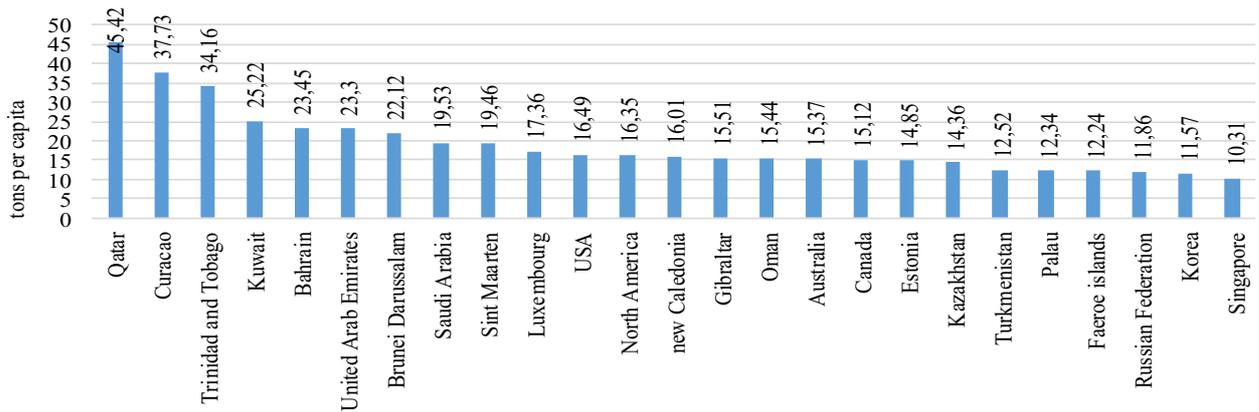


Figure 1 Rating of countries with the highest level of CO2 emissions (metric tons per capita) [15]

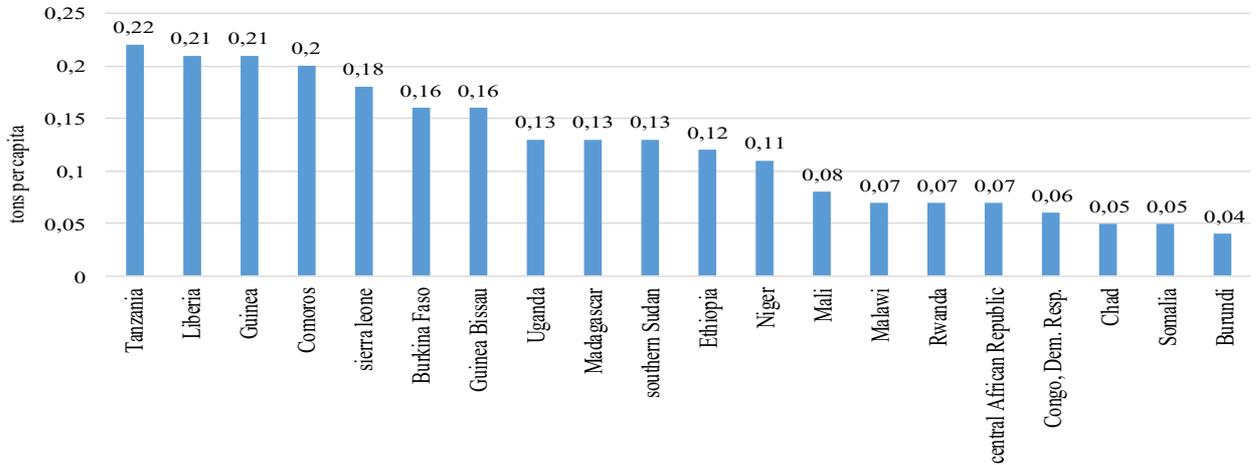


Figure 2 Rating of countries with the lowest level of CO2 emissions (metric tons per capita) [15]

During this period appeared the principle when an economic entity-environmental polluter paid a tax for damage delivered to the environment. With the adoption of the Tax code of Ukraine (2011), the environmental tax was re-introduced. Environmental tax should be defined as a national mandatory payment levied on the actual volume

of emissions into the air, discharges of pollutants into water bodies, waste disposal, the actual volume of radioactive waste temporarily stored by their producers, the actual volume of generated radioactive waste, and the actual volume of radioactive waste accumulated before April 1, 2009 [9].

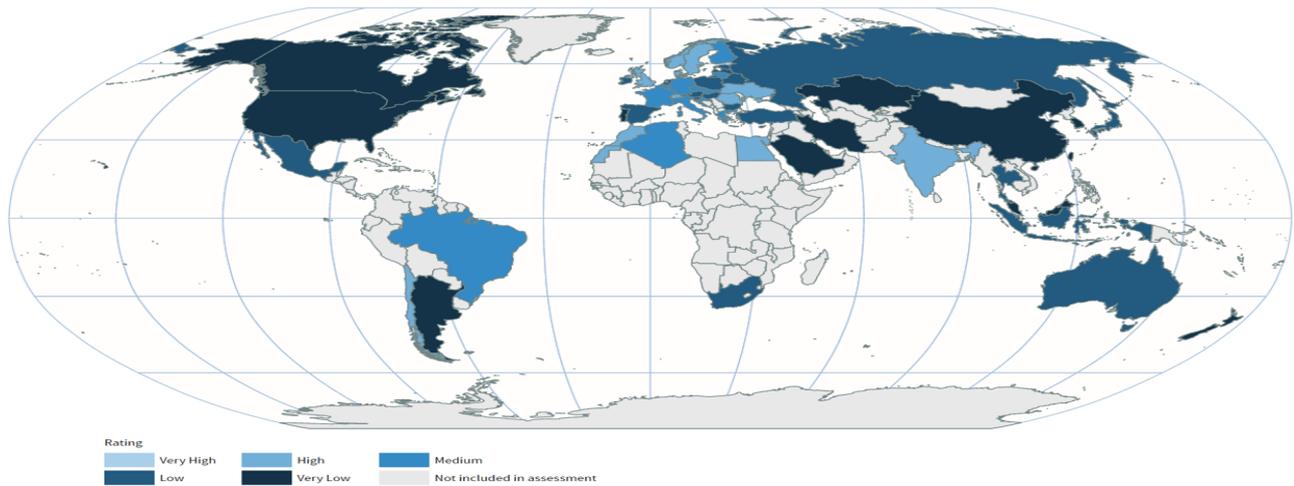


Figure 3 Greenhouse gas emissions in 2019: according to UN data [11]

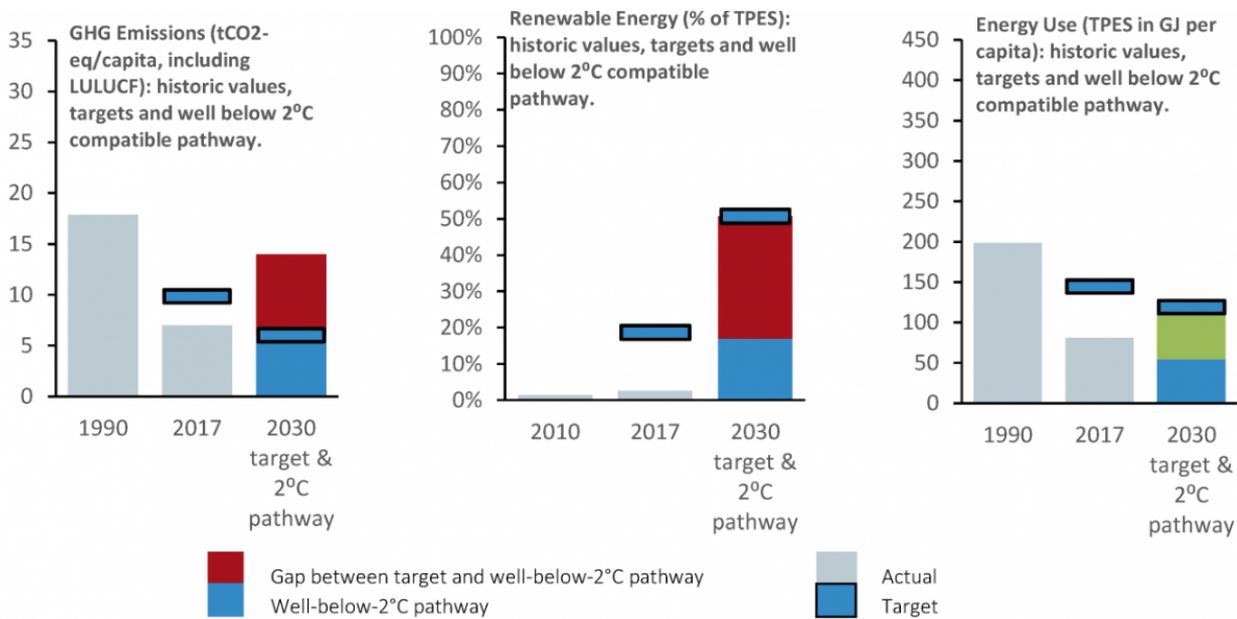


Figure 4 Well-below -2 C compatibility of current levels and 2030 targets [11]

Today, the environmental tax has next aims: protecting the environment through mechanisms to encourage investment in environmental protection measures; accumulating financial resources to finance measures to protect and restore the environment; and filling state budget revenues. Taking into account above statements, the environmental tax is a fiscal part of state environmental policy, a certain lever of state influence on the activity of business entities, incentive for production modernization and intensification of innovative processes at the enterprises, confirmation of Ukraine's international obligations. All this determines the relevance of the study of the environmental tax and outlines the prospects for both results and conclusions. According to the Tax Code of Ukraine, taxpayers are business entities, legal entities that do not carry out economic (business) activities, budgetary institutions, public and other enterprises, institutions and organizations,

permanent representative offices of non-residents, during the implementation of their activities on the territory of Ukraine and within its continental shelf and exclusive (Maritime) economic zone. [9]: emissions of pollutants into the air by stationary sources of pollution; discharges of pollutants directly into water bodies; placement of waste (except for the placement of certain types (classes) of waste as secondary raw materials placed on their own territories (objects) of economic entities); generation of radioactive waste (including already accumulated); temporary storage of radioactive waste by their producers beyond the period specified by the special license conditions. In the system of environmental taxation, it is advisable to identify the entities that ensure the process and its results

(table. 1). As we can see, virtually all citizens take part in the process of environmental taxation, having different goals and levels of responsibility.

Table 1 The subjects of the ecological taxation system in Ukraine [5]

Participant	Role in the environmental tax process
Parliament	approval of legal acts regulating the system of environmental taxation
Ministry of ecology and natural resources	formation and implementation of environmental policy, in particular, development and approval of draft legal acts, setting standards, licensing conditions, methods and rules in areas related to environmental tax
State environmental Inspectorate of Ukraine	state supervision (control) of compliance with legislation on air protection, protection, rational use and reproduction of water and reproduction of water resources, waste management, etc.
Executive body	participation in issuing permits and licenses
State fiscal service of Ukraine	development of reporting forms, control over the timeliness and completeness of environmental tax payments
Public organizations	monitoring the activities of enterprises, the state of the natural environment, conducting public examinations, submitting proposals to government agencies, etc.
Business entities	implementation of relevant activities and payment of environmental tax
Society	obtaining the effects of pollutants on the environment

It is also important to note that the environmental tax is paid once a quarter after the tax return is submitted to the fiscal authority. In the aspect of determining the weight of the environmental tax in filling budgets in paragraph 16-1 of article 29 of the Budget code of Ukraine [1] the mechanism of distribution of funds is the next one:

(1) in terms of carbon dioxide emissions into the atmosphere, 100 % of the total budget is credited to the General Fund of the state budget, while environmental tax revenues from emissions of other types of pollutants are credited to the General Fund of the state budget only in the amount of 45 %;

(2) for emissions, other than carbon dioxide emissions into the atmosphere, discharges of pollutants and waste disposal, by one payment order to accounts opened in bodies that provide Treasury services for budget funds, which ensure the distribution of these funds in the ratio determined by the Budget code of Ukraine:

45 % - to the General Fund of the State budget of Ukraine; 55 % - to the special Fund of local budgets (except for the

tax levied for the radioactive waste formation), including 25 % to rural, town, city budgets, budgets of United territorial communities created according to the law and the long-term plan for the community territories formation; (3) the tax levied for the generation of radioactive waste (including those already accumulated) and / or temporary storage of radioactive waste by their producers beyond the period specified in the special conditions of the license shall be credited to the special Fund of the state budget in full.

We advise to start analyzing the weight of the environmental tax by evaluating the basic statistical data, namely, the dynamics of tax paid to the State and local budgets (Fig. 5).

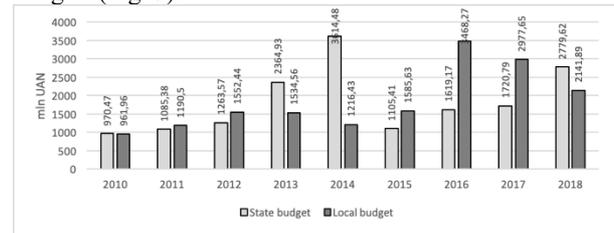


Figure 5 Dynamics of the environmental tax amount paid to the State and local budgets of Ukraine in 2010-2018 [3]

In the period 2010-2014, there was a clear trend towards an increase for tax paid to the budget. In 2015, the volume of revenues decreased by 44.29 %, which was primarily due to the beginning of the armed confrontation in Eastern Ukraine, the beginning of the occupation of Donbass and the Autonomous Republic of Crimea. In 2016, the volume of environmental tax restored the crisis dynamics and amounted to 4987.44 million UAH. Considering the distribution of revenues between the State and local budgets, it is worth noting that by 2015, the main part of the funds went to the State budget. Since the beginning of the administrative reform and active decentralization, most of it has been concentrated on the local level, as evidence data for period 2016-2017.

While analyzing how the budget was filled with funds for paying the environmental tax, it should be noted that in 2014-2015, the planned indicators were not met (the so-called gross tax gap), which was again explained by the deterioration of the political situation, and at the same time, the deterioration of economic dynamics (Fig. 6).

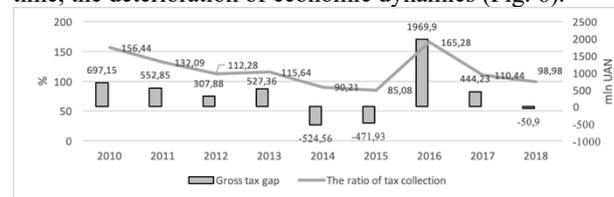


Figure 6 The value of the gross tax gap and ration of tax collection in the Consolidated budget of Ukraine in 2010-2018 [4]

In particular, in 2014, the budget received less than 524.56 million UAH, and in 2015 – 471.93 million UAH. Another important indicator is the ration of tax collection, which indicates the excess of planned fees in the period 2010-2013 and 2016-2017.

According to The Accounting Chamber, there was a discrepancy in the data on the number of reporting environmental taxpayers, in particular, during 2015-2017, 25.5, 23.3 and 21.6 thousand more payers submitted reports for emissions into the air, and on the contrary, 280, 430 and 301 less payers reported for discharges into water bodies than they had the appropriate permits (table. 2). This indicates that taxpayers submit tax reports for their lack of permits for emissions into the air and, conversely,

failure to submit tax reports for discharges into water bodies if they have the appropriate permits.

Thus, the State Fiscal Service of Ukraine does not ensure the proper level of organization and implementation of measures to constantly monitor the completeness of accounting by its territorial bodies of environmental taxpayers for emissions/discharges into the atmosphere/water bodies, which creates risks of non-attraction to taxation of all environmental taxpayers, as a result of non-receipt of tax to the state budget [4].

Assessing the weight of the environmental tax in the state budget, let's consider the indicators of the fiscal significance (Fig. 7).

Table 2 Number of business entities that have received permits for emissions and special water use, and reporting environmental taxpayers [4]

Indicator	As of date		
	01.01.2016	01.01.2017	01.01.2018
1. Number of business entities that had permits for emissions into the air, units.	30921	32364	33357
1.1. Of these, the number of payers who submitted tax reports, units.	30223	31513	32479
The level of attraction of taxpayers who had permits for emissions before tax, %	97.7	97.4	97.4
2. Total number of taxpayers reporting for emissions into the atmosphere, units.	56452	55629	54958
Deviation of the number of entities that had emission permits from the reporting payers, units/%	25531/182.6	23265/171.9	21601/164.8
3. Number of economic entities that had permits for special water use with established limits for discharges to water bodies, units.	2568	2589	2514
3.1. Of these, the number of payers who submitted tax reports, units.	2403	2446	2368
The level of attraction of payers who had permits for special water use, before tax, %	93.6	94.5	94.2
4. Total number of reporting taxpayers for discharges into water bodies, units.	2288	2159	2213
Deviation of the number of entities that had permits for special water use from the reporting payers, units/%	-280/89.1	-430/83.4	-301/88.0

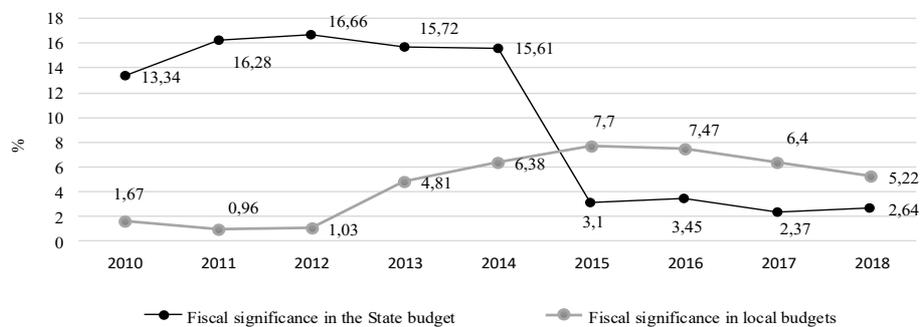


Figure 7 Dynamics of fiscal significance indicators of environmental payments in the structure of state and local budgets revenues in 2010-2018 [10]

In the structure of revenues to the State budget, the environmental tax took on average 15.5 % in the period 2010-2014, but in 2015-2018 – 2.9 %. In the structure of local budgets, there was an increase in the period 2015-2018 (on average, environmental payments amount 6.7 % of all revenues). So, the fiscal significance of the environmental tax is not so significant as it should be.

To assess the regional aspect was chosen the large industrial city Krivoy Rog, which is the center of the Krivoy Rog iron basin. About 80 % of all Ukrainian mining and processing of iron enterprises are located in this region. The city is home to one of the world's largest metallurgical plant, PJSC ArcelorMittal Krivoy Rog. It is also worth noting that Krivoy Rog is one of the most polluted cities in Ukraine. According to the Central geophysical Observatory Boris Sreznevsky to the most polluted also included the following cities: Odessa, Lutsk, Dnipro, Kiev, Nikolaev, Zaporozhye [2]. In order to improve the environmental situation in these cities, the following measures can be proposed:

- set high fines for excessive pollution of the environment for violation of waste management rules;
- provide subsidies to private firms to ensure

environmentally friendly production;

- provide low-interest loans for the introduction of an environmentally friendly production process;
- apply accelerated depreciation, which allows you to update fixed assets at a faster pace;
- introduce preferential rates or even exempt from VAT operations for the sale of environmental equipment;
- introduce a preferential real estate tax regime for nature protection structures.

According to the Krivoy Rog city Council [6], in 2018 there was a slight increase in waste volumes (by 1.1 % compared to 2017) and a reduction in emissions of pollutants into the air (by 17.6 %) (table 3).

The budget of Krivoy Rog receives an environmental tax for emissions of pollutants into the air by stationary sources of pollution, for discharges of pollutants directly into water bodies and for waste disposal. During the studied period, the city's enterprises paid environmental tax in the total amount of 630.9 million UAH, including 157.7 million UAH. was paid to the city budget (table 4). Only 25 % is paid to the city budget, 30 % to the regional budget, and 45% to the state budget [6].

Table 3 Environmental indicators of Krivoy Rog in 2016-2018 [6]

Indicators	2016	2017	2018
Volume of emissions of pollutants into the air, thousand tons	340.9	323.5	266.5
Volume of return water discharge to surface water bodies, million m ³	72.7	67.7	93.3
Of these, polluted return water, million m ³	20.0	15.9	10.7
Volume of waste			
Education, thousand tons	194736.7	230190.9	232720.3
Utilization, thousand tons	65459.0	78487.9	80797.9
Waste disposal, thousand tons	129990.5	152772.2	153131.4

Table 4 Indicators of environmental tax in Krivoy Rog in 2016-2018 [6]

Indicators	Years		
	2016	2017	2018
Total amount of environmental tax, mln.	183.1	206.8	241
State budget, mln.	36.6	41.4	108.5
Regional budget, mln.	100.7	113.7	72.3
The amount of environmental tax received by the city budget, million UAH.	45.8	51.7	60.2
The cost of the environment	68.2	67.8	101.8
Environmental tax paid by businesses in the city	45.8	51.7	60.2
The ratio of expenditures on environmental protection revenue environmental tax, %	148.9	131.1	169.1

The main source of funding for environmental activities in the Krivoy Rog is the funds of the city environmental protection fund, which is formed by deductions of environmental tax and monetary penalties for damage caused by violation of legislation on environmental protection as a result of economic and other activities. Revenues to the city fund for environmental protection from monetary penalties for damage caused by violation

of legislation on environmental protection as a result of economic and other activities for 2016-2018 amounted to 0.8 million UAH (2016 – 0.2 million UAH, 2017 – 0.3 million UAH, 2018 – 0.3 million UAH) [6].

Based on a large number of technocratic researches about ICT, digitalization, robotization and cybernetic systems the issues of how such transformations influence the level of tax revenues and the system of taxation in general are being raised. In the given research several

significant problems which require the immediate solution and are perspective for future researches are revealed, namely:

- 1) there is a constant change in the proportions of the funds distribution from the environmental tax payment between the state and local budgets and between special and General budget funds, which negatively affects the ability to form a permanent and consistent state environmental policy and in particular regional policies;
- 2) 45 % is credited to the General Fund of the State budget of Ukraine, therefore these funds lose their intended purpose for correcting the damage caused to the environment by pollutants. Thus, the environmental tax does not perform a compensatory function. At the same time, the total expenditures for environmental protection exceed the revenues of the environmental tax as a whole, and these expenses are financed from other budget revenues;
- 3) environmental tax have been constantly increasing

2. CONCLUSION

Every year, the environmental situation in the world is only worsening, despite the full range of measures applied by countries. The analysis of Ukraine's place in international environmental ratings showed a slight weight of the state's environmental policy, which can be traced through high positions among countries with a significant level of harmful emissions into the atmosphere. In Ukraine, the environmental tax, which should perform a compensatory, stimulating and fiscal function, is not a significant lever for achieving the goals of state environmental and economic policy. As an evidence could be following results:

- there is a tendency to decrease revenues from the environmental tax to the State and local budgets;
- there are significant fluctuations in the implementation of planned indicators of tax payments, as well as significant dynamics of the tax collection ratio;
- the number of entities that have permits to release harmful substances into the atmosphere does not correspond to the number of enterprises that pay environmental tax;
- in the structure of revenues to the State and local budgets, the environmental tax has a fairly low weight;
- in the regional context (for example, Krivoy Rog), it was determined that the increase in emissions of harmful substances into the atmosphere does not correspond to changes in the amount of environmental tax payment.

As a result it is worth defining the possible directions of the development of ecological taxation through the improvement of tax and budget and financial and credit mechanisms of the development of smart industry in Ukraine:

- establish progressive or regressive environmental taxation depending on the amount of anthropogenic impact of economic activity on the environment;
- to finance targeted environmental programs;
- change the procedure for collecting environmental tax in

since its first introduction, the amount of revenue from this type of taxation and its share in tax revenues remain insignificant and insufficient in order to finance the necessary environmental measures, hence the compensatory and fiscal functions of the environmental tax are not realized;

4) in Ukraine the rates of ecological taxes do not encourage pollutants to reduce the level of emissions, dumps and formation of wastes (these rates in tens and hundreds of times are lower than European ones) and do not provide sufficient receipts for financing in order to solve the burning environmental problems;

5) insufficient information coverage about the use of state and local budget funds in financing environmental measures and their compliance with the position of Ukraine in international environmental organizations.

order to implement the principle of "polluter payers", that is, the tax should not be included in the price of the product, but paid out of profit;

- enter coefficients for adjusting the amounts of environmental payments depending on changes in economic damage and the rate of price growth;
- carry out appropriate reform of the existing practice of financing environmental activities;
- improve the system of statistical reporting, control of reporting data of natural resource users, accounting, and accounting of payment receipts;
- improve the system of fines for environmental violations;
- introduce various types of tax incentives, preferential loans and preferential credit to support and stimulate environmental activities of business entities;
- improve the existing system of environmental licensing and the like.

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