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Ensuring rational natural use through effective taxation

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Abstract. The important article substantiates the peculiarities of environmental tax administration in Ukraine and defines its importance in ensuring an ecologically oriented economy. It has been proven that from 2016 to 2020 there is an increase in emissions of pollutants into the atmosphere by more than 10.5%. A thorough analysis of the payment of the environmental tax to the relevant budget was carried out and a close relationship between the number of emissions of polluting substances and the rates of this tax was determined. It has been proven that in Ukraine the environmental tax does not ensure the performance of one of the main functions, namely the preservation of the natural environment. This situation is due to the relatively low rates of this tax, as well as the lack of an effective mechanism for controlling emissions of pollutants. One of the main directions of solving this problem is to use the experience of European countries in diversifying the tax rates under study depending on the type and volume of pollutant emissions.

1. Introduction

In recent years, the issue of environmental pollution and its negative impact on people's health has become more and more relevant in the world. This caused a constant search for levers able to reduce the load on the ecosystem. The world is actively developing effective mechanisms for stimulating the reduction of pollutant emissions and increasing the level of environmental protection. It is possible to prevent the negative consequences caused by the deterioration of the environmental situation due to coordinated systemic actions of the state, society and business entities.

During the last decades, programs that stimulate an ecologically oriented economy began to be actively developed and implemented in Europe. The growth of environmental risks and the significant economic consequences of natural disasters in the world have forced a significant number of countries to develop an effective mechanism for the payment of environmental taxes in order to reduce the anthropogenic burden on the planet's ecosystem.

The increase in greenhouse gas emissions leads to a reduction and shortening of the stratosphere. At the same time, the troposphere, that is, the lower layers of the atmosphere, is warming rapidly. As a result, the stratospheric thickness has decreased by 400 m in the last 40 years [1].

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Decarbonization, greening, and eco-modernization of the economy is an urgent problem today, which requires the development of new ways of solving it. As one of the options, there is a refusal to produce energy from coal, but on the condition that other energy sources are developed. Also, one of the directions is to increase the rates for greenhouse gas emissions, as well as to change the methodology for calculating the amount of greenhouse gas emissions.
In Ukraine, the ecological situation is quite complex, which is due to the lack of regulatory legal acts regarding pollutant emission standards. Russia's war with Ukraine significantly worsened the situation regarding environmental pollution, in order to improve it, it is necessary to ensure the implementation of a significant number of environmental protection measures. One of the main directions of their financing is the environmental tax, but currently its rates are quite low and do not ensure the achievement of environmental security of the state

2. Material and methods.

The basis of this research is the fundamental provisions, approaches and principles of economic theory, theory of taxation, works of leading scientists on the problems of environmental tax administration, legislative and regulatory acts of Ukraine that regulate environmental taxation, data of the State Treasury Service of Ukraine, the State Tax Service of Ukraine.
To study the effectiveness of the environmental tax, we will analyze the income of the environmental tax in terms of constituent pollutants, the volumes of the main components of the tax base, the environmental protection costs of enterprises and the index of the comfort of life by the regions of Ukraine. The choice of indicators is due to the fact that, theoretically, the Pigouva tax should stimulate the financing of environmental protection costs in order to achieve a socially effective level of environmental pollution, as we have raised. We took the index of comfort of life, which is calculated by the State Statistics Service, as a conventional measure of the socially effective level of pollution. This index characterizes not only the state of the environment, but also the development of social infrastructure [2].
The purpose of the study is to analyze the current state of environmental taxation, to study its regulatory role in ensuring the preservation of the natural environment, and to develop effective measures to increase the effectiveness of environmental taxation.

3. Presenting main material

Ecology is probably one of the areas to which Ukraine does not pay enough attention, although the consequences of the Chernobyl disaster should have taught the country that environmental issues should become one of the priorities. The consequence of this was a rapid increase in the number of cancer patients in Ukraine, whose number has already exceeded one million inhabitants [3, 4].
The system of environmental taxation is an important component of the economic mechanism of nature management, as it operates with a fiscal instrument, which is an environmental tax. In the conditions of the Ukrainian reality, the environmental tax is charged for the emissions and discharges of harmful substances, as well as for the placement of waste. Based on the fundamental principles of tax regulation of reproductive proportions, the ecological tax should perform regulatory, stimulating and fiscal functions. A critical study of modern approaches to the formation of a system of ecological regulation of nature use, that the basis of the system of ecological taxation is the promotion of rational nature use. The main components of this system are, first of all, the environmental tax, and the rent and some types of excise tax also play an indirect role. Environmental tax performs two main functions: regulatory (related to the preservation of the environment) and fiscal (filling the budget). However, the dynamics of the payment of this tax and the financing of environmental protection measures show the unsatisfactory dynamics of the development of the environmental tax [5, p. 110].
The problems of the development of environmental taxation are studied by many modern scientists, in particular Y. Dziadykevich [6], N. Novytska [7], D. Serebryansky [7], A. Burlya [8], K. Kanonishenoi-Kovalenko [9] and others.

The peculiarity of the tax ecological and economic toolkit is that the funds are directed to the financing of environmental problems. This tax should ensure the preservation of the natural environment by establishing a dependency between the payment of the tax and the negative impact on the ecological situation in the country.

Based on the main functions of taxation, environmental payments are usually divided into two main groups: compensatory payments and regulatory payments.

Payments made for any negative impact on the environment are called regulatory. Such payments are one of the main economic incentives that force nature users, whose activities are associated with a negative impact on the environment, to independently take measures to reduce such impact. Regulatory payments should prevent actions that harm the surrounding natural environment (for example, payments for environmental pollution, waste disposal, etc.). When determining the size of the rates of these payments, indicators of technical capabilities and economic profitability of business entities whose activities have a negative impact on the environment are taken into account. The rates of regulatory payments correspond to a large differentiation, and therefore reducing the negative impact on the environment is more profitable for business entities than paying these taxes. In addition to the stimulating effect, environmental taxation should have a compensatory nature. Environmental payments form environmental protection funds, as funds are accumulated in these funds to finance environmental protection measures and other purposes related to these activities. That is why in the scientific literature, a second group of ecological payments is distinguished - compensatory payments, which are aimed at collecting money and accumulating it in special ecological funds (for example, a fee for the special use of natural resources). Such payments are often called financing. When determining the rate of these payments, indicators of profitability of enterprises and continuity of financial income are taken into account. Unlike regulatory payments, these payments are aimed at financing environmental protection measures and are not directly related to the amount of negative impact on the natural environment and resources [10, 11].

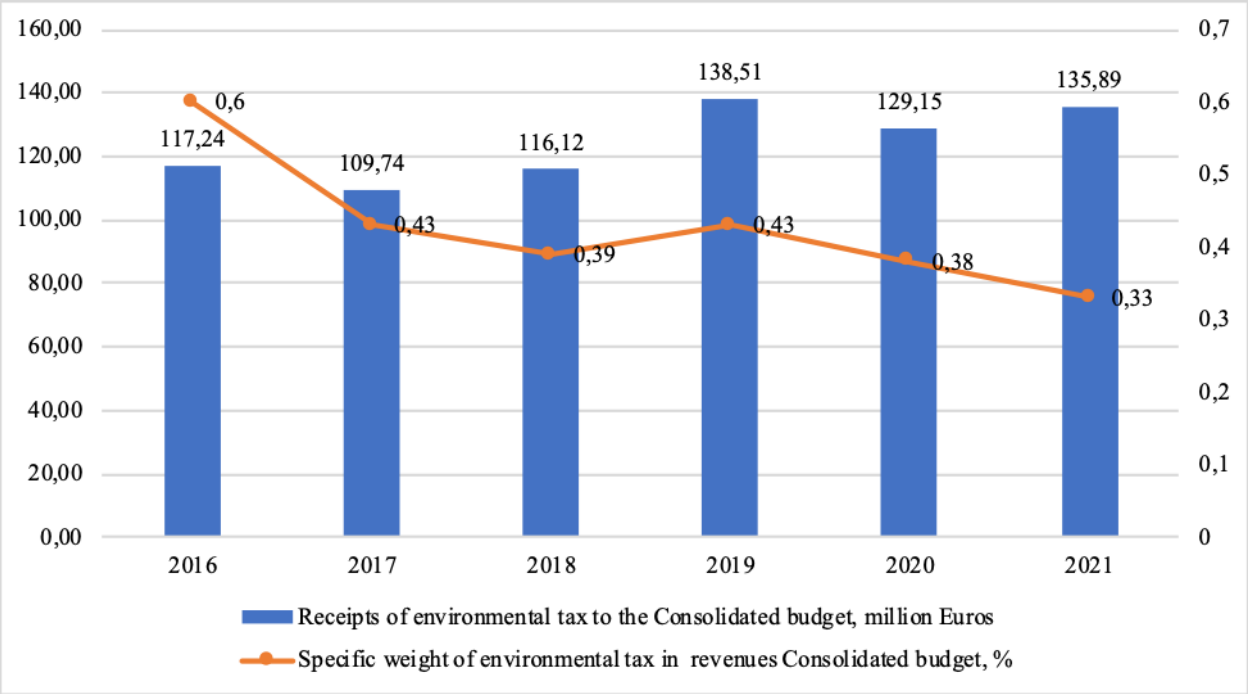


Fig. 1. Receipt of environmental tax to the Consolidated Budget of Ukraine
Source: calculated according to the data of the State Treasury Service of Ukraine.

In Ukraine, for a considerable period of time, environmental tax rates were quite low, which made it impossible to fully implement environmental protection measures and stimulate enterprises to reduce emissions of pollutants into the air and the surrounding natural environment. Understated environmental tax rates for emissions, discharges of harmful and dangerous substances, as well as for the placement of waste did not make it possible to form sufficient financial funds for the reproduction of the natural environment.

The analysis of environmental tax receipts clearly shows that during the period under study, its gradual growth from EUR 117.24 million in 2016 has been observed to EUR 135,89 million in 2021. However, despite the growth of this indicator in dynamics, its specific weight in the revenues of the consolidated budget is being followed. Thus, in 2016, its share was 0.6% and by 2021 it had decreased to 0.33% (Fig. 1). It is worth noting that during the entire period of the study, the revenues from the environmental tax amounted to less than 1% of the revenues of the Consolidated Budget. With such dynamics of environmental tax revenues to the budgets of Ukraine, it is quite problematic to form a reliable source of investment support for the restoration of the natural environment.

The sums of expenses of the consolidated budget of Ukraine for nature protection measures must be adjusted in accordance with the tax revenues from the environmental tax of individual regions of Ukraine. In Ukraine, the unreasonableness of environmental tax rates is observed, in particular, in regions where the level of pollution is high, rates should be increased in order to perform environmental protection functions. The amount of the paid tax is evidence of the damage caused to the environment, the main task of this tax is to improve and restore the ecological situation, therefore the costs of environmental protection measures cannot be less than the amount of the environmental tax.

Having analyzed the structure of revenues from various components of the environmental tax (Fig. 2), it is worth noting that the largest share was in 2021 environmental tax for emissions of polluting materials into the atmosphere - 38% of the total amount of environmental tax paid in the specified period. Almost the same values have indicators of revenues of the consolidated budget of Ukraine for such types of environmental tax as: revenue from waste disposal (21%); environmental tax for carbon dioxide emissions into the atmosphere (19.3%) and environmental tax for temporary storage of radioactive waste (19.1%). The smallest specific weight is occupied by receipts from the discharge of pollutants into water bodies, only 3% in 2021.

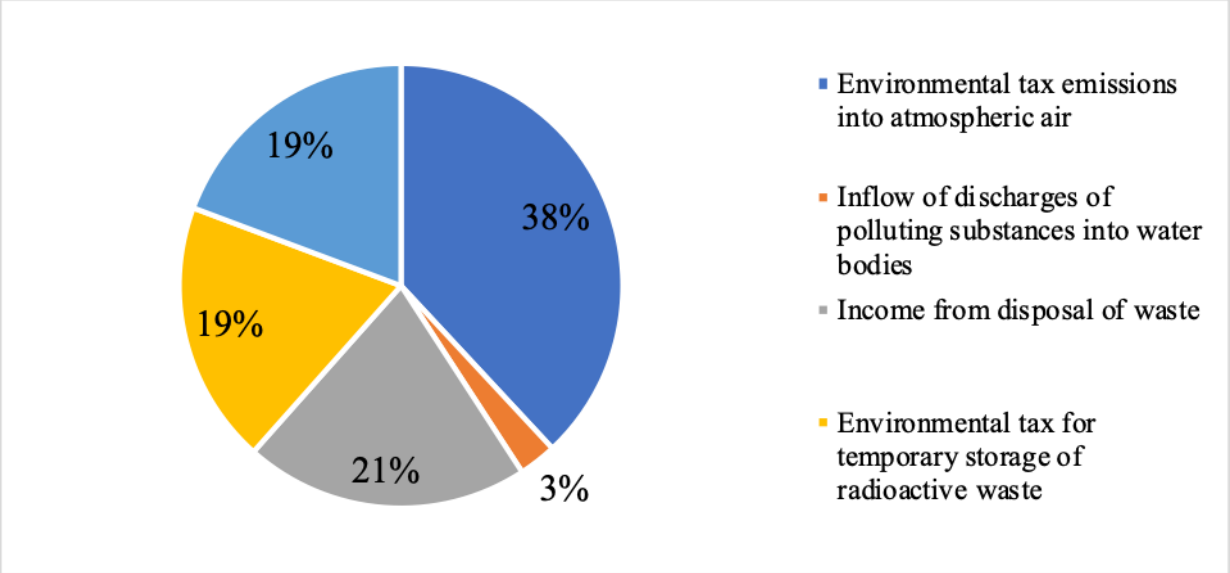


Fig. 2. The structure of revenues of the consolidated budget of Ukraine by types of environmental tax in 2021

Source: calculated according to the data of the State Treasury Service of Ukraine.

The economic essence of any tax is manifested through the implementation of two main functions: regulatory and fiscal. Regarding the environmental tax, the essence of the regulatory function is manifested through the mechanism of stimulating the reduction of emissions of polluting substances, in relation to the fiscal role of this tax, it is insignificant, since the environmental tax makes up a rather small share of budget revenues.
Therefore, in order to study the effectiveness of environmental taxation in Ukraine, it is advisable to conduct an analysis of the dynamics of pollutant emissions, that is, to conduct an analysis of the regulatory function, since it is the main one for this tax.

Table 1 **Dynamics of pollutant emissions into atmospheric air during 2016-2021, thousand tons**

Type of pollutant	Year						2021 in% to 2016
	2016	2017	2018	2019	2020	2021	
Sulfur dioxide (SO_2)	**1094,0**	**744,4**	**716,7**	**695,8**	**619,2**	**595,3**	**79,97**
stationary sources	1076,4	726,2	698,1	676,0	601,0	575,7	79,28
mobile sources	17,6	18,2	18,6	19,8	18,2	19,6	107,69
Nitrogen oxides (NO_2)	**404,5**	**384,3**	**385,7**	**383,9**	**343,1**	**348,4**	**90,66**
stationary sources	240,2	215,5	215,3	205,1	181,3	174,0	80,74
mobile sources	164,3	168,8	170,4	178,8	161,8	174,4	103,32
Non-methane volatile boundary compounds	**222,8**	**223,6**	**206,5**	**205,1**	**182,3**	**195,2**	**87,30**
stationary sources	52,2	53,1	43,7	42,5	40,6	40,1	75,52
mobile sources	170,6	170,5	162,8	162,6	141,7	155,1	90,97
Carbon monoxide (CO)	**2029,9**	**1986,9**	**1974,9**	**2003,6**	**1792,0**	**1869,2**	**94,08**
stationary sources	802,8	728,4	744,3	748,4	707,3	704,3	96,69
mobile sources	1227,1	1258,5	1230,6	1255,2	1084,7	1164,9	92,56

Source: calculated according to the data of the State Statistics Service of Ukraine.

The conducted analyzes of the dynamics of pollutant discharges clearly demonstrate the low efficiency of the environmental tax and, as a result, the system of environmental taxation in Ukraine in general. The slight decrease in emissions of polluting substances is due, first of all, to the reduction of aggregate volumes of industrial production in Ukraine, and not to the impact of environmental taxation in general. In particular, a slight decrease in emissions from stationary sources of pollution is observed. Meanwhile, there is an increase in emissions of nitrogen oxide by 3.32% and sulfur dioxide by 7.7% from mobile sources, which indicates the insufficient impact of the said tax on the ecological situation in the country as a whole.
The worst situation is observed in terms of carbon dioxide emissions, both from stationary and mobile sources. During the research period, its decrease was only 3.31 and 7.44%, respectively.

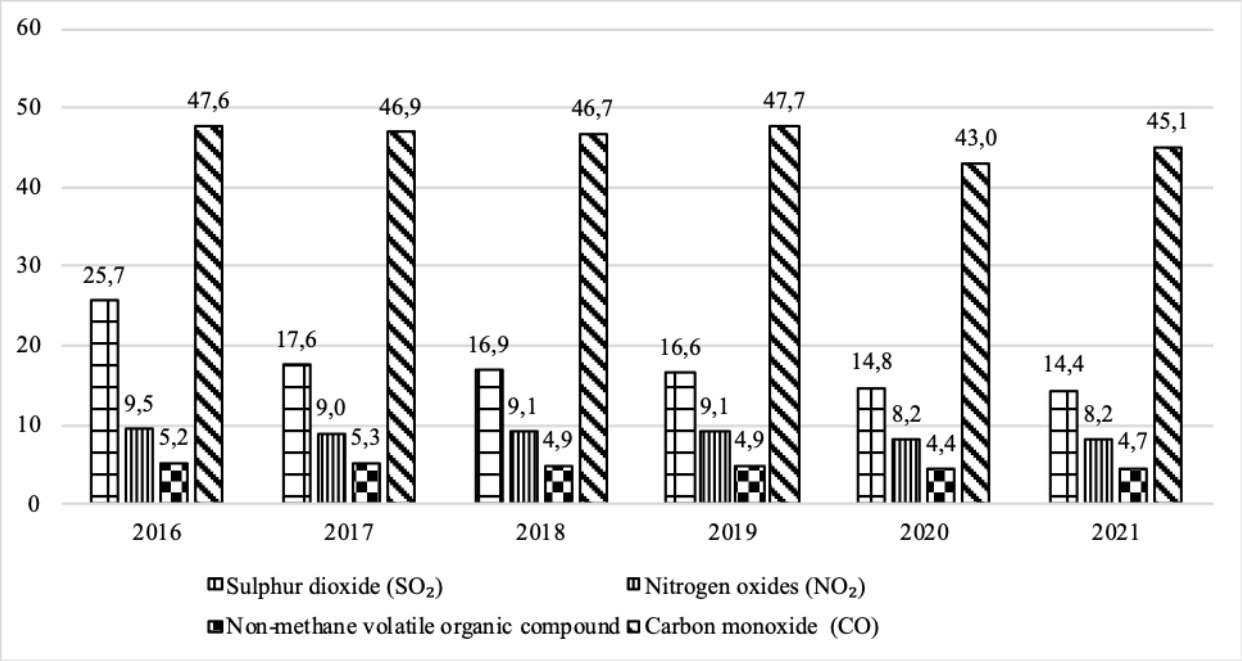


Fig. 3. Emissions of major pollutants per person in 2016-2021, kg
Source: calculated according to the data of the State Statistics Service of Ukraine

The analysis of pollutant emissions per person shows that only sulfur dioxide emissions significantly decreased from 25.7 kg in 2016 to 14.4 kg in 2021. The situation has practically not changed for the rest of the studied pollutants. It is worth noting that a slight increase in carbon dioxide emissions is being monitored in 2021 compared to 2020 by almost 5%, as well as non-metallic light organic compounds from 4.4 kg per person in 2020 up to 4.7 kg in 2021 (Fig .3)

The conducted analysis shows that the current mechanism of environmental tax does not stimulate business entities to reduce the volume of emissions of pollutants into atmospheric air and water bodies, to comply with their standards and limits.

The essence of environmental taxation is to determine the methods of charging individuals and legal entities with fees for negative impact on the environment, as well as a set of taxes and fees, the collection of which is aimed at stimulating the rational use of nature. The main idea of environmental taxation is to establish a relationship between the deductions of business entities to the budgets and the degree of damage caused by them to the environment and natural resources. However, in Ukraine, despite the growth of environmental tax rates, in relation to emissions of certain polluting substances, they remain quite low, and this causes the tax to fail to fulfill one of its functions, namely environmental protection.

In order to stimulate the reduction of environmental pollution and to fully cover the damages caused, it is proposed to fully return to the Ukrainian legislation the system of limits with the application of a progressive scale of rates for over-limit pollution and the implementation of quarterly indexation of environmental tax rates taking into account the inflation index as of the end of the reporting period quarter

It should be noted that in Ukraine, in addition to the environmental tax, the nature protection function is also indirectly performed by some other taxes, in particular:

- rent;
– excise tax [12].

In foreign countries, the system of environmental taxation is more developed.

In the developed countries of the world, the totality of environmental taxes consists of the following groups:
– environmental taxes and fees of a fiscal nature (aimed mainly at maximizing budget revenues);
– environmental taxes and fees of a compensatory nature (aimed directly at covering losses due to environmental damage caused by business entities);
– environmental taxes and fees of a stimulating nature (aimed primarily at stimulating the greening of production) [13, 14].
Improving the system of environmental taxation in Ukraine is possible by: introduction of a progressive scale of environmental tax taxation (tax rates should increase for larger volumes of emissions and waste); today, the differentiation of environmental tax rates is limited only to classes of pollutants; providing tax benefits to business entities that use resource-saving technologies; introduction of a tax on products containing environmentally harmful substances (this tax exists in most European countries); introducing an environmental protection fee for business entities that are environmental tax payers; at the same time, payments from this fee must go to a special fund with a target direction for environmental protection measures.
Taking into account the positive European practice of the functioning of the system of financing environmental protection measures, the proposals of the Ministry of Environment and Natural Resources of Ukraine regarding the creation of a special fund are appropriate. To which 100% of the environmental tax on CO2 emissions should be directed, and the main purpose of its operation should be the introduction of tools to stimulate the restoration of the natural environment, in particular with regard to climate change [15]. Most European countries have developed programs aimed at decarbonizing the economy and developing a strategy for adapting the financial sector to prevent climate change.
Considering that Ukraine is an agrarian country, the question of implementing the experience of the EU countries regarding the tax on fertilizers and pesticides is gaining relevance [16, p. 630, 17-18]. The use of fertilizers has negative consequences, as fertilizers can enter groundwater and make it unfit for consumption. In addition, in case of violation of fertilizer application technology, nitrogen and other pollutants enter the atmosphere, and soils may become unsuitable for agricultural use. In the case of the use of pesticides, the atmospheric air is polluted by the entry of toxic substances into it. In addition, pesticides kill microorganisms in the soil, which also affects soil fertility.

4. Conclusions

Environmental taxation is an important tool for effective environmental policy of the state. Today, despite its significant role, it is an ineffective and ineffective regulatory tool. The analysis shows a low level of ecological and economic indicators in Ukraine. The analysis of pollutant emissions per person shows that only sulfur dioxide emissions significantly decreased from 25.7 kg in 2016. to 14.4 kg in 2021 The situation has practically not changed for the rest of the investigated pollutants.
In Ukraine, there is no effective model of environmental tax management, which is due to the inconsistency of the mechanism of distribution of revenues from the tax under study to the budgets of different levels. A significant deficit of the state budget makes it impossible to use financial resources from environmental taxes for the implementation of environmental projects due to their accumulation mainly in the revenue part of the general fund of the budget, which is used to solve other socio-economic problems.
The formation of an effective mechanism for the tax administration of the environmental tax with a simultaneous increase in the costs of decarbonization will contribute to the reduction of greenhouse gas emissions and have a positive impact on climate change. Increasing the tax burden is one of the tools to achieve carbon neutrality, but increasing rates is an important, albeit small, step toward decarbonizing the economy. Only the consistency and effectiveness of the implementation of the principles of decarbonization, including taxation of emissions will provide an opportunity to improve the ecological situation in the country.

References

[1] Hura K Yu, Petruk V G 2021 Analysis of current trends of decarbonization and eco-modernization of energy in ukraine and the world. *Bulletin of the Vinnytsia Polytechnic Institute.* **5** 19-26
[2] Statystychnyi buleten Regional Human Development 2014 Kiev p 63
[3] More than a million cancer patients were counted in Ukraine Available at: https://www.unian.ua/society/1090486-v-ukrajini-narahuvali-bilshe-milyona-onkologichnih-hvorih.html
[4] Koval V, Olczak P, Hakova M, Bilyi M, Kretov D and Laktionova O 2023 Analysis of financial outsourcing management in regional environmental systems *Sustainability* **15** 11966
[5] Nikola S O, Gusev A O 2020 Ecological taxation as a tool of state influence on the economy of nature use. *State and regions. Series: Economy and entrepreneurship*. **4 (115)** 108-111.
[6] Dziadykevich Yu V 2016 Economics of environment and natural resources: monograph. Ternopil: Aston p 392
[7] Serebryanskyi D, Novytska N. 2009 Levy for pollution of the natural environment: study of the semantics of the term and analysis of economic and ecological effectiveness. *Collection of scientific works of the National University of the State Tax Service of Ukraine.* **2** 320-331
[8] Burliai A, Revutska A 2017 Development of environmental taxation in Ukraine. *International Scientific Conference Innovative Economy: Processes, Strategies, Technologies: Conference Proceeding* **1** 146-150.
[9] Kanonishena-Kovalenko K 2017 Environmental tax from A to Z. Kyiv: Open Society Foundation p 108
[10] Yakusha Ya 2014 Environmental taxation as a component of the state's environmental policy. *Collection of scientific papers of the Cherkasy State University of Technology. Series: Economic Sciences* **1** 35-39
[11] Koval V, Laktionova O, Udovychenko I, Olczak P, Palii S and Prystupa L 2022 Environmental taxation assessment on clean technologies reducing carbon emissions cost-effectively *Sustainability* **14** 14044
[12] Tax Code of Ukraine 2010 Law of Ukraine 2755-VI.
[13] European Environment Agency: official website of the European Environment Agency. Available at: https: // www.eea.europa.eu /about-us /who#tab-related-publications
[14] Trusova N V, Synchak V P, Borovik L V, Kostornoi S V, Chkan I A, Forkun I V 2020 Fiscal policy in a decentralized space of the financial system of Ukraine. *International Journal of Criminology and Sociology*, **9** 2891-2904.
[15] Report on instruments for stimulating green modernization of industrial enterprises in EU countries and Ukraine 2021. Public Council under the Ministry of Environment and Natural Resources of Ukraine; NGO "Living Planet" Available at: https://mepr.gov.ua/files/%D0%B7%D0%B2%D1%96%D1%82.pdf
[16] Naidenko O E 2017 Problems of environmental taxation and ways to solve them. *Economy and society* **8** 627-631
[17] Abuselidze G 2023 Local Budget Revenue Formation Reality, Obstacles and Prospects in Georgia: *An Empirical Examination and Creative Approach. Lecture Notes in Computer* **13957 LNCS** 197–209
[18] Ohorodnyk V, Nimko O, Nehrey M 2023 The Impact of Environmental Social Responsibility Concept on Sustainable Development in the Context of Big Data. *Lecture Notes on Data Engineering and Communications Technologies* **158** 472 -480