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ECOLOGICAL ELEMENTS IMPLEMENTATION
IN THE TAX SYSTEM

This paper presents the economic instruments of environmental policy, among which environmental taxes are inherently included and considered as one of the opportunities for promoting positive changes in the field of environment and natural resources management. The ecological elements implementation in the tax system including the approaches that support positive impact on environment after such implementation have been explored. The tax systems with tax based on the level of environmentally harmful production and consumption are considered.

Keywords: tax system; protection of environment; implementation of environmental taxes.

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ВПРОВАДЖЕННЯ ЕКОЛОГІЧНИХ ЕЛЕМЕНТІВ
У ПОДАТКОВУ СИСТЕМУ

У статті представлено економічні інструменти екологічної політики, зокрема, екологічні податки, що розглядаються як можливість для позитивних змін у сфері екологічної політики та управління природними ресурсами. Описано процеси впровадження екоподатків у систему оподаткування, а також потенційні наслідки від такого впровадження. Також розглянуто системи оподаткування, в яких екоподатки виходять з показників шкідливості виробництва та споживання.

Ключові слова: податкова система; захист навколишнього середовища; впровадження екологічних податків.

Табл. 7. Літ. 17.

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ВНЕДРЕНИЕ ЭКОЛОГИЧЕСКИХ ЭЛЕМЕНТОВ
В НАЛОГОВУЮ СИСТЕМУ

В статье представлены экономические инструменты экологической политики, в частности, экологические налоги, которые рассматриваются как возможность для позитивных изменений в сфере экологической политики и управления природными ресурсами. Описаны процессы внедрения эконалогов в систему налогообложения, а также потенциальные последствия от такого внедрения. Также рассмотрены системы налогообложения, в которых эконалоги исходят из показателей вредности производства и потребления. Ключевые слова: налоговая система; защита окружающей среды; введение экологических налогов.

Introduction. Ecotaxes are an important economic instrument of government policies in protecting the environment. On the one hand, there are codes used to prohibit certain behavior and other dictate; on the other, there are also such tools designed to amend market balance towards the restriction of pollution and environmental degradation. Ecological elements in tax system should support the behavior change of industrial enterprises and other economic entities, consumers of certain goods, motorists etc. Its aim is to reach such state that environmentally friendly behavior is economically worthwhile, and thus to reduce the difference between the price of environmentally friendly and the price of ecologically unfavorable product or

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service (Senova and Antosova, 2011). Only then it can be said that ecological measures within the tax system are environmentally and economically effective. It depends on the adopted concept of taxation, tariffs size, the possibility for commodities substitution and the size of difference between the prices of environmentally friendly goods and services and their close substitutes before taxation or rates increase. Wider economic context leads to re-evaluation of approaches to environmental taxes and in this context to the introduction of environmental elements into the tax system, but not to the implementation of clean environmental taxes. Concept of tax reforms in the OECD countries and the European Union is based on the need to maintain the level of state budget, taxation of energy inputs into production of such commodities that can harm the environment, and to creation of conditions for employment promotion and technological restructuring of production.

Literature review. Theoretical and political views on tax systems present a consequence of historical, economic and political development. A. Smith and D. Ricardo can be considered as the first authors dealing with tax system, which spoke about recommendations for tax system (Dunham and Pierce, 1989).

Pollution problem has its origin in the existence of side effects from industrial production and consumption. External effects are the cause that leads to the failure of the allocated function of the market (Pigou, 1932). Pigou tax is based on the theory of externalities – tax per unit is imposed on every unit of pollution at a level in which the total marginal cost of production is equal to the total marginal utility. The principle of this concept of environmental taxation is the taxation of direct causes of environmental degradation. Conversely, the concept of indirect environmental taxes is used primarily to influence favorably the environment, productive inputs or consumer goods are taxed if there is a direct link between benefits and ecological damage of benefits (carbon tax, excise duty on petroleum products). Besides these best-known concepts, there are taxes on unplanned environmental impacts or environmental purpose tax which is purposely bonded to expenditures on environmental protection. Efficiency of different concepts is affected by long-term stable legislative and economic environment (pricing policy, tax system, accounting systems). Introduction of environmental aspects into the tax system would effectively lead to the solution of problems of economic and environmental efficiency of government policies. In this context, it is necessary to take into account the externalities that positively or negatively affect businesses. Socially efficient solution to the problem of externalities is not to prevent fully their occurrence, for example producing emissions during the production of goods, but their inclusion in the cost of environmental decision-making of these economic entities. The basic idea of Pigou tax is such a size of tax, which would correspond to the difference between the amount of social and private marginal cost of production at the point of Pareto-optimal level of production. Due to a tax introduced, prices increase, the effect of taxation is to reduce the demand for adverse eco-products and transition to relatively cheaper substitutes.

W.J. Baumol and W.E. Oates in their book "The Theory of Environmental Policy" presented another concept which is based on established standards of environmental quality and subsequently the introduction of such taxes and fees, which would lead to the achievement of these standards (Baumol and Oates, 1988). An important concept in the context of environmental taxation is the concept of double

dividend. The basic idea of this theory is the use of the proceeds from the introduction of environmental taxes to reduce tax burden on other production factors such as work. Reducing the cost of this production factor gives impetus to increased demand for labor, thereby achieving positive effects on employment. The theory of double dividend is applied only in the case when there is a second dividend. However, it depends on the occurrence of many factors. For example, favorable demand for labor due to reduction in tax burden on labor, but it may also have contradictory effects such as possible transfer of economic operators to the countries with lower labor taxes. The use of environmental tax revenues to reduce labor costs can cause upward pressure on workforce competitiveness.

Within market economy state interests in economic, social and cultural fields are realized by economic-financial levers among which the most important is the tax system applied to legal and physical persons. From the economic point of view, taxation represents not only the assembly of settlements regarding fixing and perception of taxes, but also a characteristic of state policy when it comes to taxes and an expression of fiscal duties for different categories of contributors. Taxes are used as a political and economical lever through the way they are established and collected. Apparently, taxation creates exclusive or prevailing obligations for a contributor, but actually, it creates important obligations for the state as an administrator of taxes. Taxation effects therefore cannot be seen in the way taxes are collected, but in the way in which these taxes are coming back as a form of public services' quality (Crisan, 2014).

Sensoy and Hacıhasanoglu (2014) studied the presence of long-range dependence in energy futures markets. Their results reveal that efficiency of energy futures markets is clearly time-varying and changes are drastical over the sample period. In general, the efficiency of energy futures markets is found to be decreasing dramatically when time to maturity is increasing.

Fuel saving is found under the economic aspect into fuel expenses, reducing and under the ecologic aspect into environment pollution reducing. New energy systems provide possibility to decrease costs, as well as distribution taxes and also intermediary companies' taxes (Patrascu and Diaconescu, 2009). Darby et. al (2014) examined also the implications of international tax competition.

Some studies suggest evidence of long-run causality running from economic growth to increased revenue from environmental taxes, with also some evidence of short-run causality in the reverse direction (Abdullah and Morley, 2010). Augusiak et. al (2014) proposed a set of terms which can help quality assessments and reality checks of ecological models. Musaeva (2013) investigated the methodological bases of tax planning and its role in the system of tax management, along with institutional conditions for efficiency increase of tax planning on macro and micro levels.

Governments utilize inter-firm transaction network information for corporate tax discrimination. On the other hand, governments offer a different tax level to each firm. Next, firms embedded in a fixed transaction network choose a region in which to invest, prompted by the incentive of co-locating with their direct transaction partners. When two competitive regional governments play the first stage to maximize their tax revenue, they both propose lower tax levels to firms with more direct partners. Second, when the central government plays the game to maximize social wel-

fare, it offers a tax incentive to concentrate firms in an advantageous region (Itoh, 2014). Centralization of tax policies has fundamentally changed the relationship between central and local administrative levels (Kennedy, 2013).

Governments in Finland (1990), then in Sweden (1991) and Denmark (1993) were the first ones to accept the EDR concept and strategy and they introduced new taxes or improved the existing ones in the frame of this concept. This trend has been followed by other European countries, for example the Netherland (1996; 2001), Germany (1999) and Great Britain and Northern Ireland in 1996, 2001, 2002 (Taxes in Sweden, 2013).

Development of environmental policy in the Central and Eastern Europe (CEE) was initiated and influenced by international events and organizations (e.g. the European Union, International Monetary Fund, and United Nations) in the 1990s when these countries became independent and opened up to the Western world (Waldmaa, 2014).

Problem statement and the research objective. According to the OECD taxes related to environment are defined as no required payments attributed to a relationship with the environment. The Eurostat for its purpose defines tax related to environment as a tax which base is expressed in units that have demonstrated a negative impact on the environment. In contrast, ecotaxes refer to those that were established primarily for the purpose of limiting the existence of negative externalities affecting the environment. At the same time, however, ecotaxes in their pure form are found rarely, and some have a character of charges. Proceeding on the well-known definition of tax, the difference between the tax and the fee is that the latter is in direct relation to the state and tax payer who receives something for this payment (fee in its nature is the payment for performed service, e.g., fee for removal of rubbish). The concept of introducing environmental aspects in the tax system is based on the definitions of environmental taxes types.

The first integrated concept of ecological tax reform (ETR) appeared in the 1980s though it was theoretically developed in the 1970s. Ideologically it is based on two philosophies – the Anglo-Saxon environmental economics and German ecological modernization. Both these streams are based on the fundamental principle of environmental protection – "polluter pays", although they differ in its interpretation. Environmental economics is built on division of normative instruments (command – ban – permission) and economic instruments (taxes, tradable permits), the advantage is that polluter is allowed to choose the way of adapting to environmental quality standards. Polluter, for whom the cost of reducing pollution is higher than the tax, would prefer to pay this tax. On the contrary, polluter with low cost of reducing pollution would prefer investing in equipment to reduce its production. In summary, there would be achieved the level of pollution at lower costs with additional possibility for using public funds to meet other public needs. Paying taxes or buying tradable permits creates a permanent incentive to develop new technologies and processes leading to cost reduction and pollution prevention.

Key research findings. Due to the harmonization processes in the European Union in adopting the environmental elements into tax systems, the states must deal with the crucial issue of the environmental elements impact on the tax system functioning within national economy. The decision on introducing environmental elements

into the tax system has its advantages and disadvantages. In its favor, there are emissions reduction, energy demand decrease, development of alternative energy sources, improvement of environment, impact on employment and public finance. And its opponents reveal the risk to competitiveness of producers for whom energy taxation would increase prices of inputs and production. Although environmental tax reform does not have a negative impact on economic growth, its effects may have different impacts on different sectors, and thus can reduce competitiveness in some of them.

Income taxes and duties within the concepts of environmental tax reforms can be implemented within the framework of fiscal reform, in which environmental tax revenues are used to reduce other taxes, purposeful fixed revenues for specific programs of environmental protection or compensatory actions, when revenues are used to offset energy-intensive industries.

The most widespread method is the way of fiscal reform, which leads to shifting the tax burden with subsequent allocation and distributional impacts. Taxation will result in:

- reduction in income tax in the form of corporate tax reduction or accelerated depreciation;
- reduction of tax or non-tax labor costs through the reduction of marginal rates of income tax or increase of tax allowances;
- reducing the rates of value added tax.

These options have different consequences in terms of administrative costs, impact on employment, economic growth and investment. If this reduction is made in the same way as the introduction of eco-taxes, fiscal reform is neutral and does not result in a tax burden. The whole pressure and form of such fiscal reform is transmitted to the needs of public budgets. In practical application, the concept of revenue neutrality is often disrupted, i.e. tax transfer is not made in equal amounts, but taxes are less reduced and a part of new revenues is used for other purposes. When designing laws additional revenues may be used to compensate low-income social groups in order to mitigate negative impacts of taxation or to adjust the pressure to reduce the budget deficit and the need to reduce government debt. Due to the absence of a harmonized adoption of environmental tax reforms at the European level, the states must deal with the crucial issue of the impact of ecological tax reform on national economies functioning.

Economic instruments of environmental policy, which inherently include environmental taxes, are viewed as one of the opportunities to promote positive changes in environmental and natural resources management. Environmental efficiency of their application lies in reducing negative impacts of the environment or reducing environmental damage. Economic efficiency contributes unambiguously to revenues increase to state budget.

There is a variety of fees to protect the environment in Slovak Republic. They are briefly mentioned at the end of the chapter.

Environmental, at that time marked as energy taxes were implemented in September 2007, when Slovak Republic approved the new Law No. 609/2007 Coll. on the excise duty on electricity, coal and natural gas and amending Act no. 98/2004 Coll. on the excise duty on mineral oil as amended. Until then, the environmental aspects of tax policy were applied particularly through various tax benefits such as

lower excise duty on unleaded petrol and biofuels, exemption from road tax for vehicles in combined transport, the cost of running own equipment for environmental protection etc.

The intention of the above mentioned Act was to implement the taxation of electricity and solid fuels (coal and coke) which had not been subject to excise duty. The proposed law incorporates tax benefits – tax exemption to all statutory purposes, such as the use of chemical, electrolytic and metallurgical processes, electricity, coal and natural gas used in households.

The following tables give the subject (in brackets there is the nomenclature under applicable tariff) and the rate of tax under Act no. 609/2007 Coll. on excise duty on electricity, coal and natural gas.

Table 1. Excise duty on electricity

Subject to taxation	Tax rate
Electricity (2716)	1.32 EUR/MWh

Source: own processing according to the Financial Report of Slovak Republic, 2014.

Table 2. Excise duty on coal

Subject to taxation	Tax rate
- black coal (2701) - brown coal (2702) - coke and semi-coke of coal (2704) - other solid hydrocarbons (2706 to 2715)	10.62 EUR/t

Source: own processing according to the Financial Report of Slovak Republic, 2014.

Table 3. Excise duty on natural gas

Subject to taxation	Tax rate
- liquefied natural gas (2711 11) - natural gas in gaseous state (2711 21) - other in gaseous state (2711 29) - coal gas, water gas, producer gas and similar gases, other than petroleum gases and other gaseous hydrocarbons (2705)	- as fuel for heating – 1.32 EUR/MWh - as fuel – 9.36 EUR/MWh - CNG for heating – 0.01989 EUR/kg - CNG as fuel – 0.141 EUR/kg

Source: own processing according to the Financial Report of Slovak Republic, 2014.

Environmental taxes came into effect on January 1, 2008 in Czech Republic. This was actually the launch of the first phase of environmental tax reform. This reform has been at its second phase when the CO₂ tax should be introduced. This tax has been dropped down due to the forthcoming review of the European Directive 2003/96 EC, which should address the CO₂ tax within energy taxes.

Sweden was one of the first countries in Europe in the 1990s starting the environmental fiscal reform in the spirit of the principle of revenue neutrality, without waiting for the results of lengthy negotiations in the efforts to harmonize taxes at the EU level. Energy sources, which are essential for this Nordic country, were taxed through VAT. By the same way, CO₂, SO₂ and nitrogen oxides were taxed, which are the biggest polluters.

There was also observed a gradual increase in tax burden. At the beginning, there was the uniform rate for households and industrial companies, but it was gradually

increased for companies over time. Like the Directive 2003/96/EC, it is in favor of combined heating and power and completely exempts bio fuels.

Tax burden is geographically differentiated. It is obviously influenced by the climate and local conditions, as the northern part of the country is more demanding for thermal energy sources, so there is tax liability lower than in the south. Swedish environmental tax reform can be considered as a complete system solution from both legal and economic perspectives. By using different types of instruments (legal, economic and administrative) and putting them into effect, they managed to reduce greenhouse gas emissions.

Annex II to the Directive 2003/96/EC in accordance with Art 18 paragraph 1 authorizes the member states to continue applying reduced levels of taxation or exemptions, and it refers to Sweden as an example, for the following situations:

- Reducing the tax rate for diesel in its classification of environmental protection;
- exemption from excise duty for biologically produced methane and other waste gases;
- reducing the rates of excise duty on mineral oils used for industrial purposes, these rates are consistent with the obligations of this Directive.

Sweden also has a high quality sophisticated system of energy taxes, composed of 3 fundamental pillars:

- energy tax on electricity;
- energy tax and CO₂ tax on all types of fossil fuels;
- taxes on the sulfur content of all kinds of fossil fuels.

Introduction of the CO₂ tax reduced simultaneously the existing energy tax and labor tax. Initially CO₂ tax charged the same rate on households and industry later was the tax rate reduced for industry in order to maintain competitiveness. The main reason for the CO₂ tax introduction was to create a uniform price of CO₂ emissions, regardless of which fuel is used, with the central exception of taxation for the products produced from biomass. To establish a practical subject to tax and simplify its collection, Sweden benefited from bond between the carbon content of fuels and CO₂ emissions from fuel and set the tax rate based on the average carbon content in the fuel.

Energy tax and CO₂ tax in Sweden work in combination as two parts of a single tax. One reason is the possibility to use each part to pursuit other objectives. The energy tax is intended primarily to earn incomes for the state budget, the CO₂ component is primarily intended to achieve the environmental objectives.

For comparison (Tables 4–6) were present 3 basic commodities of energy taxation and their tax rates in 3 compared states.

The price for Czech Republic is given after the conversion rate of 27,412 EUR according to the current daily exchange rate list of NBS dated on 4 March 2014.

In Czech Republic, if the combustion heat cannot be proved it is set at 33 GJ per tone of coal. From the above comparison, it is clear that Sweden is really a top representative of environmental policy and its implementation. It is not only due to the fact that it has come up the best environmental policy in term of established taxes, but also in terms of the rates level. The CO₂ tax rate for the commodities in Sweden is

given for comparison. Czech Republic has a similar tax rate for coal and natural gas to that in Slovak Republic, but Slovakia has the lowest electricity rate.

Table 4. Comparison of tax rates on electricity, own processing

EU state	Tax rate		
	Energy tax	CO ₂ tax	Total tax rate (EUR)
Slovak Republic	1.32 EUR/MWh	-	1.32 EUR/MWh
Czech Republic	28.3 CzC/MWh	-	1.03 EUR/MWh
Sweden	29.4 EUR/MWh	-	29.4 EUR/MWh

Table 5. Comparison of tax rates on natural gas, own processing

EU state	Tax rate		
	Energy tax	CO ₂ tax	Total tax rate
Slovak Republic	9.36 EUR/MWh	-	9.36 EUR/MWh
Czech Republic	264.8 CzC/MWh	-	9.66 EUR/MWh
Sweden	26.9 EUR/MWh	235 EUR/MWh	261.9 EUR/MWh

Table 6. Comparison of tax rates on coal, own processing

EU state	Tax rate		
	Energy tax	CO ₂ tax	Total tax rate (EUR)
Slovak Republic	10.62 EUR/t	-	10,62 EUR/t
Czech Republic	8.5 CzC/GJ	-	10,23 EUR/t
Sweden	35 EUR/t	273 EUR/t	308 EUR/t

Table 7 shows also the volume of collected energy taxes, road tax and Swedish taxes on pollution and resources, Czech and Slovak fees on pollution and resources.

Table 7. Volume of environmental taxes in mln EUR for the year 2011

EU state	Energy tax	Road tax	Taxes/fees on resources and pollution
Slovak Republic	1114	13	24
Czech Republic	3404	215	46
Sweden	7855	1741	144

Source: own processing according to the environmental taxes by countries and by type of tax, Eurostat, 2011.

As we can see Sweden has received the biggest volume of collected taxes. This indicator may not be as relevant as the tax rate, because Sweden has got much more area, population, number of businesses etc.

Conclusion. Environment protection is a global need and a commitment to all economies in the world. It is therefore very important to select appropriate policy instruments for its protection. One of the most effective tools is the group of economic instruments of environmental policy including environmental taxes. Ecological concepts accept the need for setting rates on commodities that have negative impacts on environment and vice versa on those commodities acting positively on environment. Appropriately selected tax rates may have impacts on polluters who would reduce the consumption of commodities harming the environment or seek substitutes that are more environmentally friendly.

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