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Green Taxes and their Impact on Romanian's Economy compared to Investments for Air and Climate Protection

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Climate changes are more and more evident and their effect is increasingly extensive, and in the current context the environmental taxes may become a key factor in ensuring the sustainable development for the entire society. This article presents a medium-term analysis of the main categories of environmental taxes, their evolution compared to the investments for air and climate protection, as a percentage of GDP, made in Romania. Four main categories of environmental taxes: energy taxes (including transport fuels); transport taxes (excluding transport fuels); pollution taxes and resource taxes are collected in Romania, yearly. The data used in this study provides from the National Institute of Statistics. During 2006-2020, in Romania the highest percentage is represented by energy taxes 88%, in second place are taxes for transports 10% and in the third and fourth places with insignificant percentages (about 1%) are the taxes for resources and for pollution. From the four categories of environmental taxes, it can be seen that resource taxes have a decreasing trend from 51.6 million euros in 2006 to 3.84 million euros in 2020, while energy taxes, transport taxes and pollution taxes have an increasing trend.

Keywords: *climate changes, environmental taxes, sustainable development, air and climate protection*

Introduction

Climate change and the resulting impacts have become a priority and at the same time a widespread concern in the international society, being among the major challenges of the actual century (He et al. 2023). The damage cost of global warming will expand considerably quicker than global economic output, and carbon dioxide (CO_2) is the primary origin of climate crisis and greenhouses warming (Gunawardene et al. 2022). Carbon dioxide is connected to atmospheric warming within the phenomenon well-known as the climate change and the concentration of CO_2 in the environment is a fundamental impact on Earth's climate (Müller et al. 2018).

In accordance with the general average statistics of the Earth system model, the meteorological condition will obviously change in the 21st century and the temperature is estimated to increase by among 1.0 and 3.7 °C on the basis of forthcoming carbon dioxide footprint (Khandekar et al. 2005, Anderson et al. 2016). For fulfilment the Paris Agreement 2015 objectives that target of restricting the average greenhouses warming less than 2.0 °C referring to pre-industrial status, it is

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crucial to accomplish strict mitigation policies to minimize human-caused CO_2 emissions to substantially reduce the cost-effective effect of global warming (Qiang et al. 2020). The rise in the earth's atmospheric temperatures caused by climate warming impacts the entire planet, having also an essential influence on the durability and evolution of all species, and is furthermore a main challenge to the complete ecological system (Oktyabrskiy 2016). The issue of global warming generated by GHG (Greenhouse Gas) emissions has already exceeding nationwide frontiers. Therefore, it is not compulsory to reach the emission diminution goals of distinct states, but much more significantly to manage the complete worldwide CO_2 emissions. Global collaboration has an absolute function in encouraging emission decreasing (Koseoglu et al. 2022). It is essential to aim for an international partnership to manage climate variability (Youssef et al. 2023) and to establish a series of commonly approved rules of lead that can be applied between various countries. Considering the development of industrial sector, unsustainable energy usage and production prototypes linked with increase of population and socio-economic progress are some of the principal driving factors behind the raise in anthropogenic CO_2 emissions (Demiralet al. 2022).

This article has the next research motivations: to study the green taxes trend between 2006-2020 in Romania, depending on the type of taxes: energy taxes (including transport fuels), transport taxes (excluding transport fuels), pollution taxes, resource taxes. Concomitant at the same time, we will analyze the trend of investments and expenses in the field of air pollution and climate change. Beginning with the half of the nineteenth century, climate change has been the extreme obvious, resulting unusual global variation and these determine more frequent extreme weather incidents.

Literature Review

Environmental taxes have a fundamental function in impacting polluting economically activities throughout the cost mechanism, being an economic tool used complete for sustainable progress that stipulates innovative concepts for confronting global warming (Heine et al. 2019). From one perspective, states are able to establish norms for the management of carbon-dioxide emissions based on the principle of ”polluter pays” and considering their effective circumstances, hence that ecological taxes should turn into a globally relevant but individualized approach of greenhouse gas reduction and carbon neutrality. On the contrary, environmentally related taxes are a category of stimulative direction (Costantino et al. 2023), whereas the concept of specific resources provides particular economic capital for ecogovernmentality, environmental policy act and climate action, although several advantageous fiscal policy-making are contributory to heartening undertakings to take up pollution control technology and eco-friendly equipment. Mensah et al. (2019) mentioned that the insertion of ecological taxes is able to minimize emissions of greenhouse gas, particularly CO_2 emissions. Collecting environment related taxes has turn into an innovative plan for the worldwide society to manage with global warming and lessen the periodicity of extreme weather events.

The 38 member countries of the Organization for Economic Co-operation and Development (OECD) countries have developed the take of the advantage of environmental taxes, that are extensively considered as providing compensations for durable efficient progress, investment in eco-friendly technology and amendments in consuming models. Global warming taxes is having an essential task in the agri-environmental actions of the European community (Rafique et al. 2022). Starting with 1972 OECD states proposed the principle of ”polluter pays”, obliging all those who pollute needs to support the expenses of releasing contaminants in order to achieve internalization of external charges. Only after the 1990s, OECD states have started to accomplish environmental taxes reform, that intends to achieve the transition from taxes to green taxes whereas adjusting ecological externalities and diminishing distorting fiscal consequences regarding different markets (Eyraud et al. 2013).

Currently the green taxes charged by these states consist in emissions taxes, fuels taxes, auto traffic taxes, polluting taxes, production taxes and different taxes aimed to monitor pollution and their impact. Environmental management taxes have change into the principal instrument of green strategies in numerous OECD members. Overall, the evolution of environmental taxes in OECD states, the basic strategy orientation of green taxes is to limit and regulate emissions and subsequently achieve environmental preservation. Nevertheless, gradually, the effect of global warming on the economy sector is higher compared to atmospheric pollution. It is expected that by 2060, the financial damage attributable to global warming will be approximately 3% of gross domestic product, and the economic impact chargeable to pollution of the atmosphere will be for around 1% (OECD 2019). Decreasing of environmental pollution and reaction to global warming are the two target to accomplish economic sustainability of current society. Linking global warming reduction and atmospheric pollution monitor strategies may create substantial interactions hence the advantages of combined policy activities supposed to be additional targets in an exhaustive mode. Moreover, taking into account the fact that carbon dioxide (CO_2) is included in the category of the principal elements impacting the pollution of the air and climate variability, the basic source for ecological conservation and pollution control and of green taxes, particularly for CO_2 as the standard for an emission charges, to a major extent should be supposed to be the essential steps in connecting with global climate change.

By combining two important targets: global warming mitigation and adaptation and air pollution control may obtain considerable interactions and not simply supports to touch into the immense capabilities of current national environmental standard in reviewing climate variability and extreme weather phenomena, apart from extends study viewpoints and complete the actual publications. The link among global warning strategies and pollution of the air is extensively accepted. It is universally established that exhaustive study of climatic variations and atmospheric pollution is required, therefore a substantial percentage of papers have considered quantifiable the common advantages of climate strategy on atmospheric environment (Aminzadegan et al. 2022). It may be considered that there is a close connection among climate change and pollution of the environment, whereas the actual research barely studies the function of environmental pollution strategies in mitigating

climate change and diminishing severe weather incidents. Since an extensively used environmental pollution manage approach in OECD countries, the issue of green taxes has had a position in confronting climate variability in a prolonged interval of time may be determined by using the large-scale calculations and experimental test at this phase (Smith et al. 2017).

Emission decreasing stimulants cannot merely restrict the circumstances of energy production or consumption activities and at once lessen pollutant emissions, but also support the growth of environmental protection technologies settled on the emission diminution and high-tech progress in the domain of environmental protection. Parry (2012) suggested the idea of restricting greenhouse gas emissions in the group of taxes to mitigate pollution, and based upon Bouwer (2013), suggested the theory of absorption of the external cost of pollution of the environment.

Taxes transfer allows the green taxes is not only the target to bear environmental benefits green profit, but may lower the current taxes system to the constituents of production similar to capital, labor and additional promote assignments and support economic development and provide all the consequence (Dogan et al. 2023).

This article presents an analysis of the evolution of the collection of environmental taxes on the four categories: energy taxes, resource taxes, transport taxes and pollution taxes. All the data used in this study come from the National Institute of Statistics in Romania.

In order to analyze a comparison between the taxes collected in the period 2006-2020, we used the data on investments for air and climate protection, as a percentage of GDP and expenditures for air and climate protection as a percentage of GDP, having the same source, the National Institute of Statistics from Romania.

Materials and Methods

Green taxes originate from the tax system utilized in public accounting and consist in compulsory expenditures that are collected through public governments or European Union bodies. Environmental taxes represent an important instrument of environmental policy, which is included in the category of economic instruments for environmental protection, pollution control and natural resource management.

In compliance with the standards of economic sustainability and the target to accomplish an efficient utilization of natural resources and non-polluting economy, respecting the Europe policy and in multiple principal schemes, the elaboration of a data framework that consistently contains environmental elements in addition to economic ones it becomes altogether the more indispensable. In order to transpose European legislation, the legislative framework for collecting data on environmental accounts was created in Romania, namely Regulation (EU) no. 691/ 2011 of the European Parliament and of the Council of July 6, 2011 regarding European environmental economic accounts and Regulation no. 538/2014 amending Regulation (EU) no. 691/2011 on European environmental economic accounts.

Environmentally related taxes statistics register and provide data from the perspective of tax-paying entities in a method that is perfectly compatible with data stated in national accounts. In this case are registered the income related to the

environmental taxes of the state economies according on the economic sectors. Manufacture and consumption are included as economic activities. Environmental taxes deduce from the fiscal policy used in national accounting and are consist in mandatory payments, without consideration, in cash or in kind, which are collected by public administrations or European Union institutions.

The time series of revenues on each environmental tax and on the four main categories of environmental taxes: energy, transport, pollution and resource taxes are included in the standard forms, which meet the reporting requirements of Regulation (EU) no. 691/2011 of the European Parliament and of the Council of July 6, 2011 regarding European environmental economic accounts.

In accordance with the Environmental Taxes Account (RNIS 2021), the main purpose of environmental taxes is to aim to integrate the cost of the negative impact on the environment into prices. In this way, consumers and producers must use resources responsibly natural and limit or avoid pressure on the environment.

The principal potential advantages of taxes consist in the provision of income for local and central authorities. The revenue generated by environmental taxes can be used for other environmental conservation projects or to reduce other taxes.

As stated in the Eurostat methodological guide (2013) there are four main groups of environmental taxes: energy taxes (including transport fuels); transport taxes (excepting transport fuels); pollution taxes; resource taxes.

Energy taxes involve taxes on energy products used both for transport and for energy and industrial processes. The most significant products energy for transport consists in petrol and diesel. Included the category of energy products energy and industrial processes are take into account: fuel oil, natural gas, coal and electricity. Meanwhile, CO_2 and SO_2 taxes are included in this category because they are complicated to distinguish independently in fiscal statistics.

If we analyze in detail, this category includes: energy products for transport: unleaded petrol, leaded petrol, diesel, other energy products for transport purposes (for example LPG or natural gas); energy products for stations: light fuel oil, fuel oil, natural gas, coal, coke, biofuels, production and consumption of electricity, production and consumption of district heat, other energy products for stationary use; greenhouse gases: carbon content of fuel, greenhouse gas emissions (including revenues from emission permits recorded as taxes in the national accounts).

Transport taxes predominantly contain property and use taxes vehicles. Taxes on different transport equipment (e.g., aircraft) and connected services of transport, like tax on charter or scheduled flights, are additionally included in this category, if they conform to the general description of environmental taxes. Shipping charges may be taxes with reference to imports or sales of motor vehicles or constant outgoings such as tax on annual road. Taxes on the consumption of gasoline, diesel and other fuels used for shipping are not included in shipping charges. Transport taxes include: transport (excluding transport fuels), import or sale of motor vehicles, registration or use of motor vehicles, recurring (e.g., annual charges), road use (e.g., motorway charges), congestion charges and city taxes (if the taxes enter the national accounts), other means of transport (ships, planes, trains, etc.), air transport and plane tickets and vehicle insurance (excludes general insurance taxes).

Pollution taxes are applied to emissions from mobile and immovable sources, when some are sold goods (batteries, dangerous chemicals, tires, plastic bags, plastic packaging and cardboard). Therefore, they are the taxes that apply to air and water emissions, solid waste and noise. In this category does not include CO_2 taxes, as they were included in the tax category on energy.

Environmental taxes consist of the following air emissions - measured or estimated: NOx emissions - measured or estimated, SOx emissions - measured or estimated, other air emissions - measured or estimated (except CO_2), substances that diminish the ozone layer (e.g., CFCs and halons); effluents in water - measured or estimated, effluents of oxidizable matter - measured or estimated (BOD, COD), other effluents in water measured or estimated, treatment and collection of effluents, fixed annual fees; non-point sources of water pollution, pesticides (based for example on chemical content, price or volume); chemical fertilizers (e.g., based on phosphorus or nitrogen or nitrogen content), manure, waste management, collection, treatment or storage, individual products (e.g., packaging, beverage containers, batteries, tyres, lubricants); noise (e.g., airplanes taking off and landing).

Resource taxes are taxes that apply to the exploitation of natural resources (water, minerals, wood, etc.), other than those used as energy sources. However, there are differences of opinion whether the extraction of natural resources is, in itself, harmful or not, although there is an agreement generally that this can lead to environmental problems such as soil erosion and pollution. The main sources of resource taxes are: water abstraction, exploitation of biological resources (e.g., timber, game and fish species), extraction of raw materials (e.g., minerals, oil and natural gas) and landscape modification, tree cutting.

Expenditures for environmental protection are the basis of the concept of sustainable development, promote the continuity of economic and social development without causing damage to the environment and natural resources essential for human activity. According to the Romanian National Institute of Statistics, Expenditures for air and climate protection as a percentage of GDP, obtaining data on environmental protection expenses is an integrative activity of the requirements of statistical representation of environmental protection and the interests of enterprises in the evaluation of their own environmental performance. Although the evaluation of the environment and the effects of environmental policies is difficult, the use of data on environmental protection expenditures can guide the general management of the unit by providing some indications on the environmental benefits resulting from a combined economic-environmental policy. These categories of information are obtained from the public administration and from the productive sector "enterprises" (RNIS 2022a).

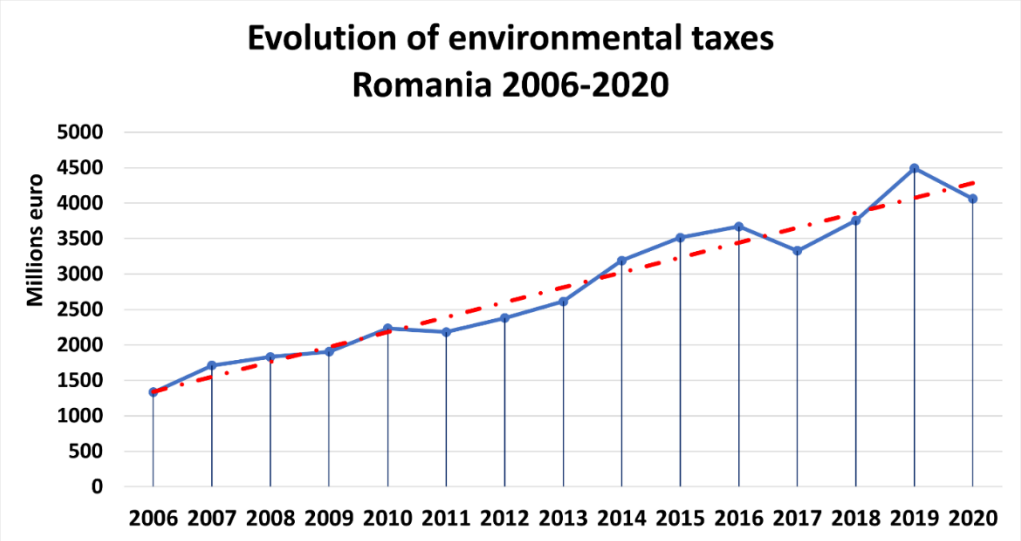
Based on Romanian National Institute of Statistics, Investments for air and climate protection, as a percentage of GDP, investments for environmental protection include all capital expenditures related to environmental protection (involving methods, processes, technologies, equipment or parts thereof) the primary purpose of which is to collect, treat, monitor and control, reduce, prevent or eliminate pollutants or pollution or other environmental degradations, resulting from the operative activity of the units. The total investment consists of the sum of the investments necessary to reduce the emissions of polluting substances resulting from the production process

and the treatment of pollution called environmental protection at the end of the production process and the prevention of pollution called environmental protection integrated in the production process (RNIS 2022b).

Results

For the purpose of observe the evolution of environmental taxes in Romania, between 2006 and 2020 we analyzed the dataset collected by National Institute of Statistics, collected according to the European legislation. The total value of these taxes in the analyzed period was 38,125 million euro.

Figure 1. *Evolution of Environmental Taxes in Romania 2006-2020*

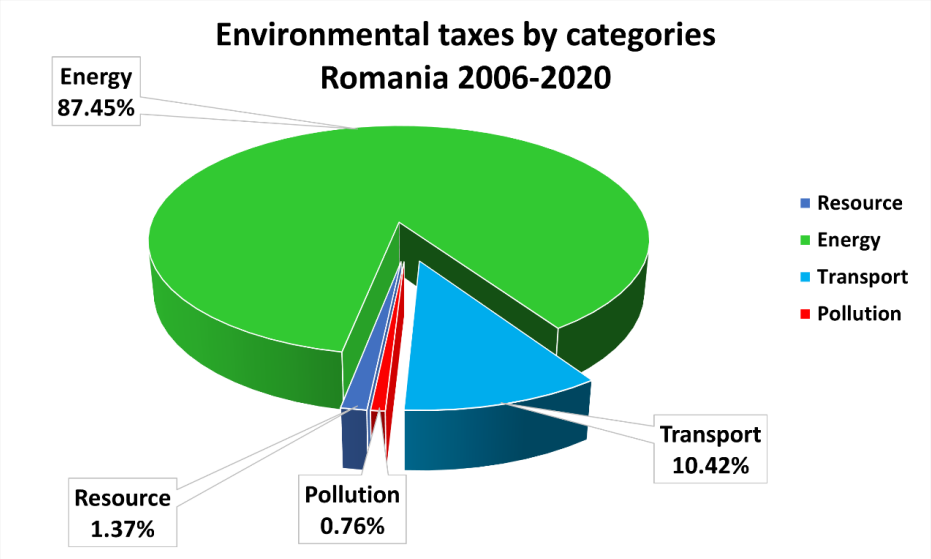


The upward trend is one that can be clearly seen from the data analysis. If in 2006 the value of environmental taxes, in total, was 1,331 million euro, this value almost tripled in 2020, reaching 4,059 million euro. The highest value is that of 2019 of 4,490 million euros, but overall, these values have constantly increased by 10-20% annually. It should be mentioned that even when Romania went through a period of economic crisis between 2009-2011, these taxes continued to increase.

Comparable to the other member countries of the European Union, in Romania environmental taxes are composed of four categories of taxes, namely: resource taxes, energy taxes, transport taxes and pollution taxes.

The highest percentage of 87.45% is provided from energy taxes which includes any tax existing on fuels, energy generation, transmission, or consumption. At the same time, CO_2 and SO_2 taxes are also included in this category because they are difficult to identify separately in tax statistics. The main purpose of these taxes is to facilitate the clean energy transition towards a series of less polluting investments. On second place, but at a very long distance, are the taxes for transport, in a percentage of 10.42%. From this category, the most significant part results from motor vehicles import or sale, road use or other means of transport (naval, air and railroads transport, etc.).

Figure 2. *Environmental Taxes by Categories in Romania 2006-2020*



Taxes on resources are in third place in this analysis with a percentage of only 1.37%. These taxes consist of the extraction of raw materials: minerals, oil and gas, water abstraction, timber extraction, etc. Pollution taxes represent the lowest percentage of only 0.76%, and the activities that make up this type of taxes include measured or estimated emissions to air, measured or estimated effluents to water, waste management and noise pollution.

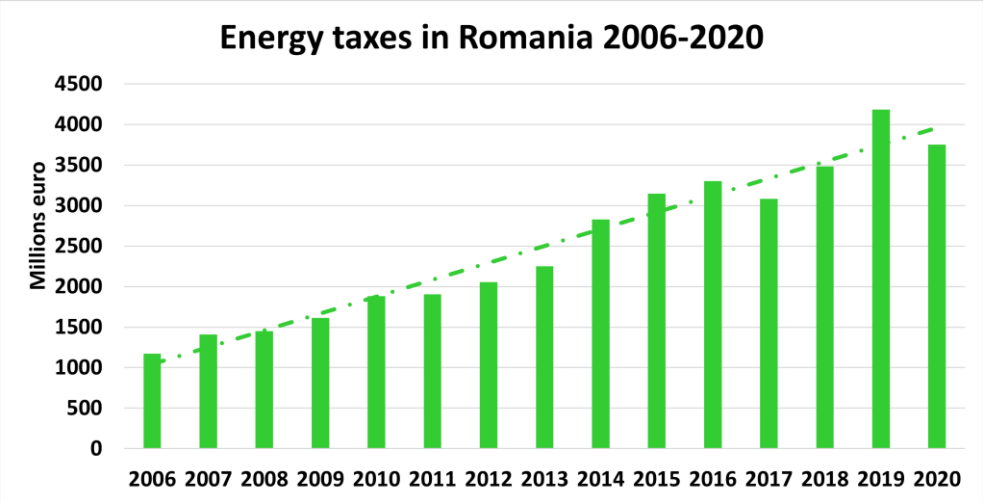
Energy taxes, containing fuel for transport, have evolved gradually, starting from 1,174.50 million euros in 2006 and reaching 3,753.24 million euros in 2020, which represents an increase of approximately 69%, in a period of 15 years.

In 2014 there is an increase to 2,829.69 million euro compared to 2,252.46 the previous year, 2013, and in 2019 a threshold of 4,184.34 million euro is reached, being the highest value recorded in the studied period.

The principal energy products for transport are equally petrol and diesel, including at the same time the energy products for stationary utilization consisting in petroleum distillates, gasoline, coal and electrical energy. Taxes on biogases and on different types of energy resulting from renewable sources are also contained in this category, but mostly are included taxes on storage of energy products.

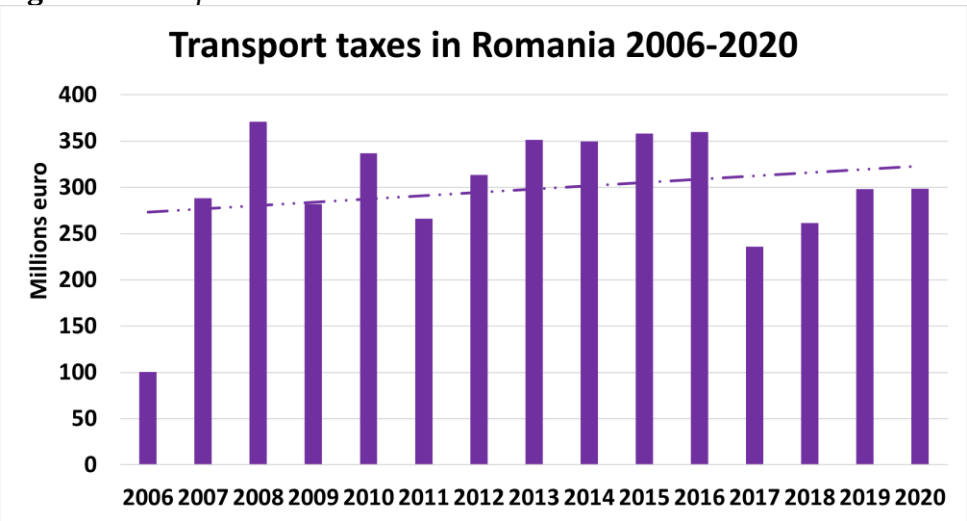
The most important aspect is the inclusion of CO_2 in the category of energy taxes due to the fact that this pollutant cannot be identified separately in the collection of energy taxes, it being integrated in the differentiation of mineral oil tax rates in accordance with the carbon content of the fuel.

Figure 3. *Energy taxes in Romania 2006-2020*



The second category of taxes, transport taxes, includes all types of taxes arising from the ownership and use of a motor vehicle. Environmental taxes resulting from related transport services regardless of the type of regular or charter flight are part of the category of transport taxes, containing at the same time taxes on other transport equipment, for example, planes, ships or railway wagons. Transport taxes also have an upward trend starting from 100.5 million euro in 2006 and reaching 298.42 million euro in 2020, the growth percentage being 66%.

Figure 4. *Transport Taxes in Romania 2006-2020*

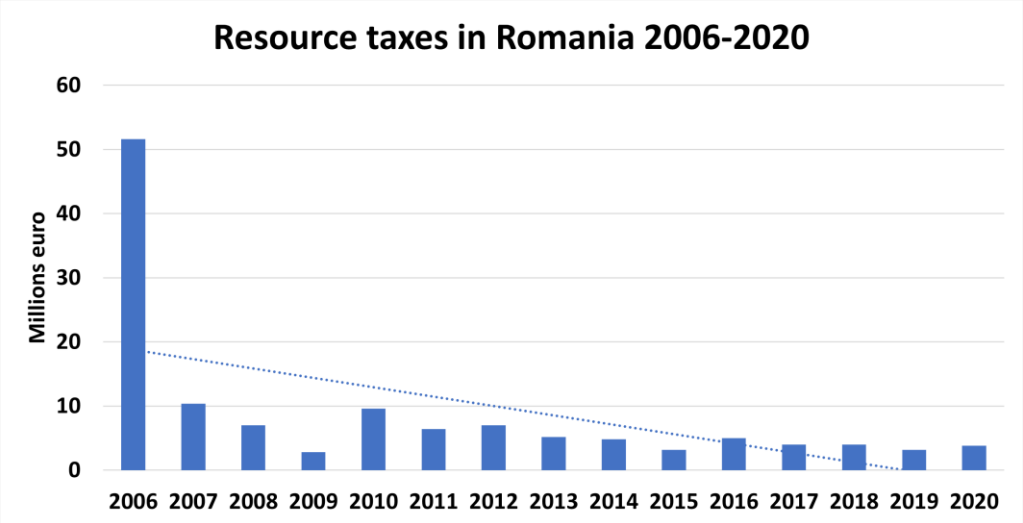


The most sudden increase in transport taxes is the one in 2006 compared to 2007 when it increased by 188 million euros, the rise continuing in 2008 with 82 million euros more. Between 2013 and 2016, transport taxes remained relatively constant at around 350 million euro.

All taxes on public transport should be included, regardless of whether we take into account the category of transport that are considered to be in some measure more nonpolluting similar to railways and trams or trolleybuses.

The only category of taxes that has a decreasing trend is that of taxes on resources, starting from 51.6 million euros in 2006 and reaching only 3.2 million euros in 2020. If we compare the taxes from 2006 and 2007, we can observe that the tax from 2007 is only 20% compared to the one from the previous year.

Figure 5. *Resource Taxes in Romania 2006-2020*



For the entire period 2006-2020, the entire amount collected as part of the resources category is 128 million euros, of which 40% were collected in the first year.

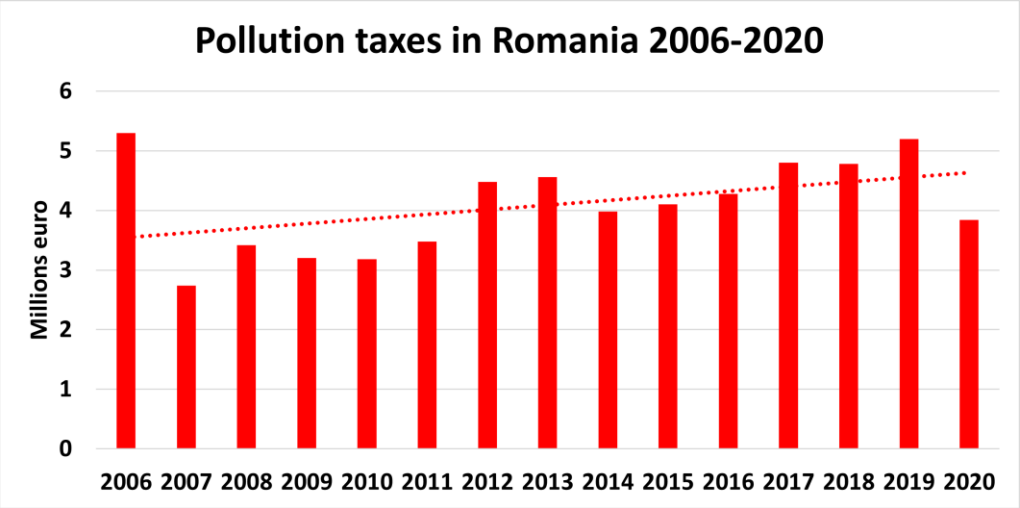
From the category of resource taxes are included several taxes connected to the extraction or to the utilization of natural resources, like as water, woodlands, biodiversity and aquatic and terrestrial ecosystems, etc., all types of activities consuming natural resources.

The fourth category of taxes is that of pollution taxes, which as an amount, in the 15 years analyzed, represents only 61.34 million euro. The trend is an increasing one, although the tax from 2006 had a value of 5.3 million euro compared to 2020 when the tax was 3.84 million euro.

From the point of view of the types of taxes included in this category, we must mention taxes on measured or estimated emissions of environmental factors: air water and soil, noise simultaneously with management of solid waste.

All four categories of taxes are based on the "polluter pays" principle, which must have as its final goal shifting tax out of activities as regards pollution, throughout decreasing no sustainable contributions.

Figure 6. *Pollution Taxes in Romania 2006-2020*

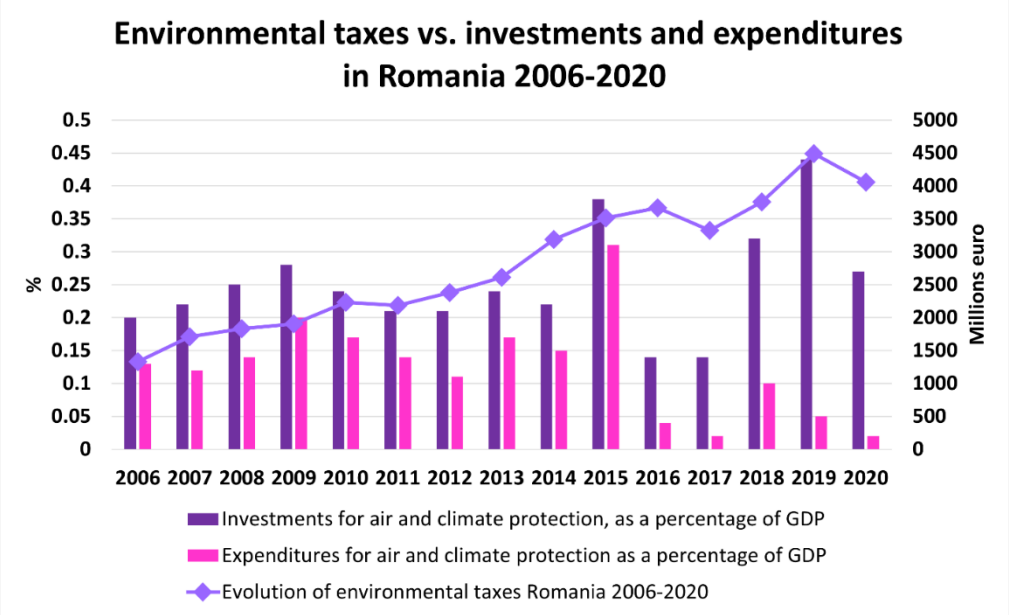


The fundamental target of any carbon pricing strategy is to mitigate carbon emissions, indicating that, if efficacious, the usage of fossil energy will lessen over the years. Although this furthermore means that profits from current or newly introduced fuel taxes and carbon costing policies will diminish as a consequences of the depreciation of the tax base as the guidelines perform successfully. It is thus the general net impact that is appropriate for any consequential research.

In Romania, during 2006-2020 average taxes were collected in the amount of 39.143 million euro. Unfortunately, at the level of official statistical data, we could not find the amounts used for investments and expenses for environmental protection except in the form of a percentage of GDP, which makes it very difficult to compare the amounts received with those spent to reduce pollution and climate change. Figure 7 shows investments and expenditures for air and climate protection, as a percentage of GDP in comparison with taxes collected in the same period. On the right axis are represented in the form of a line the taxes in millions of euros and on the left axis in percentage of GDP, in the form of columns are the investments and expenses.

During the entire analyzed period, 15 years, the investments were higher than the expenses, which indicates that the new investments focus on the use of non-polluting and environmentally friendly equipment. The highest differences between investments and expenses are those of 2019 and 2020 with variations of 0.39% of GDP and 0.25% of GDP, respectively. Between 2010-2015, the difference of 0.7% of GDP between investments and expenditures was maintained almost constantly. From the visual analysis, it can be seen that the trend of taxes and expenses and investments are similar and obviously follow the same directions. The most obvious similarities are those of the years 2015 and 2019, when both expenses and investments for air and climate protection, as a percentage of GDP, as well as the four tax categories had similar increases, but also the years 2017 and 2020, when there were the same decreases.

Figure 7. *Environmental Taxes vs. Investments and Expenditures in Romania 2006-2020*



For a more accurate analysis of the similarities between the two categories of analyzed factors, we calculated the Pearson correlation coefficient, just to clearly see if there is a degree of interdependence or not. SPSS IBM 27 software was used to calculate the Pearson correlation coefficient, using the three variables: investments for air and climate protection, as a percentage of GDP, expenditures for air and climate protection as a percentage of GDP and evolution of environmental taxes Romania 2006-2020. Table 1 shows the Pearson correlation coefficients for the three variables, for a period of 15 years.

Table 1. *The Pearson Correlation Coefficients for the Three Variables, for a Period of 15 Years, 2006-2020*

		Investments for air and climate protection, as a percentage of GDP	**Expenditures for air and climate protection as a percentage of GDP**	**Environmental taxes Romania 2006-2020**
Environmental taxes Romania 2006-2020	Pearson Correlation	**0.430**	**-0.381**	1
	Sig. (2-tailed)	0.109	0.162	
	N	15	15	15
Investments for air and climate protection, as a percentage of GDP	Pearson Correlation	1	0.319	0.430
	Sig. (2-tailed)		0.247	0.109
	N	15	15	15
Expenditures for air and climate protection as a percentage of GDP	Pearson Correlation	0.319	1	-0.381
	Sig. (2-tailed)	0.247		0.162
	N	15	15	15

From the statistical analysis, it is obvious that there is an average positive correlation between environmental taxes Romania 2006-2020 and investments for

air and climate protection, as a percentage of GDP, with a coefficient of 0.430. An average negative correlation between environmental taxes Romania 2006-2020 and expenditures for air and climate protection, as a percentage of GDP, with a coefficient of -0.381.

Discussion

It is indubitably time for environment-related taxes and carbon pricing strategies to come to the fore, and their significance and consequence may be anticipated to obtain larger distinction in the course of the switch to a climate-neutral economy. Moreover, they are partially included as an alternative for different energy taxes and the income from these taxes may be very significant compared to the revenue from eco-taxes.

This indicates that combining carbon emissions taxes with pollution taxes as opposed to energy taxes would distort equally the time series at national rank and international similarities. If carbon emissions taxes are distinguishable, these taxes supposed to be stated as a distinct category adjacent to the total energy taxes. Taxes on greenhouse gases emissions other than carbon dioxide ought also to be inserted here.

Conclusions

Energy taxes vary from 1174.5 million euros to 3753.2 million euros, transport taxes almost tripled in the analyzed period from 100.5 million euros to 298.42 million euros and pollution taxes had a value of 5.3 million euros in 2006, 5.2 million euros in 2019 and only in 2020 this tax was 3.84 million euros.

In accordance with the impositions of the European Union, in Romania, in the period 2006-2020, the following categories of taxes were collected: resource taxes worth around 124.2 million euro, energy taxes in the amount of 33770.43 million euro, transport taxes in the amount of 4173.4 million euro and pollution taxes of approx. 57.5 million euro. As the highest collected fees are observed are the ones energy taxes and the lowest fees collected are the ones are pollution taxes.

From the statistical analysis of the Pearson correlation coefficient, it emerged that during the 15 years there is an average interdependence between investments for air and climate protection, as a percentage of GDP, expenditures for air and climate protection as a percentage of GDP and environmental taxes from Romania 2006-2020.

The impact system of environmental taxes may be explained as follows: first of all, the tax on environmental protection promoted the control of pollution by modifying the outward costs of pollution within the internal costs for companies. Secondly, by promoting green design, the regulatory agencies should monitor their air pollutants emissions in a certain area. As the third statement, the tax policy encouraged the progress of environmental protection capabilities in the urban zone, which in turn restrained the pollutant emissions in the metropolitan areas. Generally,

this study provides a conceptual basis for the common efforts of local authorities to reduce pollution besides the suggestions to facilitate the transfer from individual to multi-stakeholder partnership.

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