The Improvement of the Environmental Taxation of Vehicle Emissions in Armenia

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Ավտոտրանսպորտային արտանետումների բնապահպանական հարկման կատարելագործումը Հայաստանում

Գասպարյան Գարրի Գ.
ՀՊՏՀ, տնտեսության կարգավորման և միջազգային տնտեսական հարաբերությունների ֆակուլտետ, բնօգտագործման տնտեսագիտության ամբիոն, ասպիրանտ (Երևան, ՀՀ)

Ամփոփագիր. Վերջին ժամանակներում կայուն զարգացման ապահովման անհրաժեշտության գիտակցմանը զուգահեռաբար հասարակության կողմից առավել մեծ ուշադրություն է դարձվում մթնոլորտային օդի աղտոտմանը: Վերջինիս հարցում էական մասնակցություն ունի ավտոտրանսպորտը, որի մասնաբաժինը մթնոլորտային արտանետումների ընդհանուր ծավալի մեջ Հայաստանում գերակշռող է: Ուստի սույն աշխատանքում նպատակ է դրվել բացահայտել Հայաստանում մթնոլորտային օդի պահպանությանն ուղղված գործիքներից մեկի՝ ավտոտրանսպորտից մթնոլորտային արտանետումների համար բնապահպանական հարկի կատարելագործման հնարավոր ուղիները: Առաջադրված նպատակի իրագործման համար իրականացվել է Հայաստանում ավտոտրանսպորտային արտանետումների բնապահպանական հարկի խորազննին վերլուծություն, ուսումնասիրության է ենթարկվել զարգացած և զարգացող երկրների համապատասխան փորձը, արդյունքում վեր են հանվել բնապահպանական հարկին առնչվող մեթոդական և համակարգային խնդիրներ, որոնց լուծման համար, հաշվի առնելով միջազգային փորձը, նախանշվել են համապատասխան ուղիներ:
Հանգուցաբառեր՝ մթնոլորտային օդ, արտանետումներ, ավտոտրանսպորտ, բնապահպանական հարկ, գնաճ, էքստերնալներ

Совершенствование экологического налогообложения автотранспортных выбросов в Армении

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Аннотация. В последнее время, параллельно с осознанием необходимости обеспечения устойчивого развития, все больше внимания общества уделяется загрязнению атмосферного воздуха. В этой проблеме значительную роль играет автотранспорт, доля которого в общем объеме выбросов в атмосферу в Армении является преобладающим. Следовательно в настоящей работе поставлена цель выявить возможные пути совершенствования одного из инструментов, направленных на сохранение атмосферного воздуха в Армении, в частности, речь касается экологического налога на выбросы в атмосферу от автотранспорта. Для достижения заявленной цели проведен углубленный анализ экологического налога автотранспортных выбросов в Армении, изучен соответствующий опыт развитых и развивающихся стран, в результате выявлены методологические и системные проблемы, связанные с экологическим налогом в Армении, для решения которых, с учетом международного опыта, намечены соответствующие пути.
Ключевые слова: атмосферный воздух, выбросы, автотранспорт, экологический налог, инфляция, экстерналии

Atmospheric air pollution is considered the most urgent and risky environmental problem. This leads to global climate change, deterioration of public health and well-being, and, in general, environmental degradation, which poses a serious threat to the sustainable development of society.

Road transport plays a significant role in atmospheric air pollution, whose share in global greenhouse gas emissions, according to recent studies, is about 12%, as a result, road transport is the second largest source of global emissions after coal-fired power plants, it is noteworthy that the main polluters in road transport are vehicles with low load capacity [**21**].

In contrast to the global picture, the share of road transport in atmospheric air pollution in Armenia reaches a fairly high level and fluctuates around 70% in recent years (Figure 1).

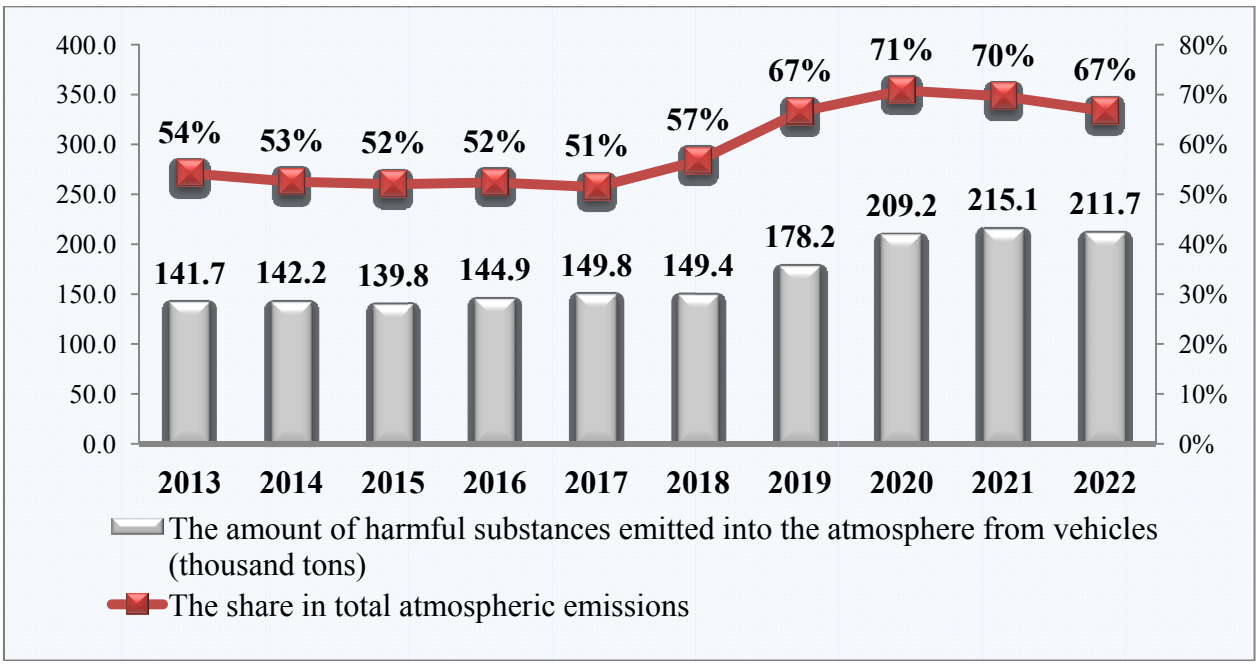

Figure 1. *The amount of harmful substances emitted by vehicles into the atmosphere and its share in the total emissions in Armenia in 2013-2022* [**22**; **23**; **24**]

As can be seen from Figure 1, during 2013-2022 vehicle emissions increased: in 2022, compared to 2013 increasing by almost 50%, their share in total emissions increased in parallel, a sharp increase was recorded especially in 2019-2020, which was due to both a significant increase in the absolute value of road transport emissions and a certain reduction in emissions from stationary sources in the given period.

In general, such a share and trend of emissions from vehicles are quite worrying and are an impetus for increasing the effectiveness of the toolkit aimed at the reduction of vehicle emissions.

In general, protection of the environment, including atmospheric air, is carried out by the application of two complex and multi-element environmental protection regulation mechanisms, namely, the administrative mechanism of environmental protection and the economic mechanism of environmental protection, the role of the latter one in a market economy takes on a key manifestation due to the need of internalizing externalities and the economic promotion of environmentally more acceptable activities [**7**].

Since the independence of RA, a certain economic mechanism of atmospheric air protection has been formed and operates, the toolkit of which mainly consists of environmental taxes and tax benefits, whose legal relations are regulated by the Tax Code of the RA, which provides two methodological approaches to the formation of an environmental tax depending on the distinction between stationary and mobile emission sources [**6**]. In accordance with the methodology developed for the latter, of course, the environmental tax on vehicle emissions is calculated. In particular, the calculation of the environmental tax for trucks registered in Armenia is carried out in accordance with three groups allocated by weight of vehicles (Table 1).

Table 1. *Environmental tax rates for the atmospheric emissions from trucks* [**28,** Article 168]

Truck group	Annual rate (AMD)
Vehicles intended for cargo transportation, the maximum mass of which does not exceed 3.5 tons	5000
Vehicles with a maximum mass of more than 3.5 tons, but not more than 12 tons, intended for cargo transportation	10000
Vehicles with a maximum weight of more than 12 tons intended for cargo transportation	15000

The calculation of environmental taxes for the atmospheric emissions from vehicles entering Armenia that are not registered in the RA is carried out in accordance with the type of vehicle and its compliance with emission standards, and in the case of the rest of vehicles, the main factor for the calculation of the environmental tax is the engine power in horsepower (Table 2).

Table 2. *Environmental tax rates for the atmospheric emissions from vehicles (except trucks) registered in Armenia* [**28**, Article 168]

Engine power in horsepower (hp)	**Year of manufacture of vehicle**							
	1st year AMD per hp	**2nd year** AMD per hp	**3rd year** AMD per hp	**4th year** AMD per hp	**5th year** AMD per hp	**6th year** AMD per hp	**7th year** AMD per hp	**8th and every subsequent year** AMD per hp
up to 50 hp	2.5	2.5	2.5	3	3.5	4	4.5	5
51-80 hp	5	5	5	6	7	8	9	10
81-100 hp	7.5	7.5	7.5	9	10.5	12	13.5	15
101-150 hp	10	10	10	12	14	16	18	20
151-200 hp	12.5	12.5	12.5	15	17.5	20	22.5	25
201-250 hp	15	15	15	18	21	24	27	30
251-300 hp	17.5	17.5	17.5	21	24.5	28	31.5	35
301 or more hp	25	25	25	30	35	40	45	50

As can be seen from the table, the established rates increase in parallel with the increase in engine power and reach the maximum level at 301 horsepower and above, at the same time, the rates also increase depending on the age of the vehicle, reaching a maximum for vehicles that are 8 years old or more. It is also noteworthy that hybrid and electric vehicles are exempt from environmental tax [**28**, Article 172]. Such approaches are perhaps due to the logic of setting relatively low taxes for environmentally more friendly vehicles, thus promoting their use. However, the study of the statistical data of vehicle emissions indicates a significant proportion and growth trend of vehicle emissions in Armenia, which raises certain concerns about the environmental tax set for vehicles and the effectiveness of its methodological approaches.

In general, the study of international leading practices shows that in the developed countries of the world, periodic environmental taxation of motor vehicles is carried out through ownership or use taxes, which also include consideration of the environmental factor [**16**, pp. 200-201]. Usually, the basis for setting such taxes is mainly the levels of CO_2 emissions from vehicles, vehicle's mass, engine displacement, engine power, fuel type, as well as whether the engine is electric or hybrid [**16**, pp. 235-250].

The vehicle's mass usually serves as a taxe base in case of trucks, and rates increase as mass increases. Of note is the US Heavy Highway Vehicle Use Tax, according to which trucks weighing 55,000 (about 25 tons) or more pounds are taxed, while with a weight of up to 75,000 (about 34 tons) pounds, the tax amount is $100, plus $22 for every 1,000 pounds exceeding 55,000 pounds, and for trucks weighing more than 75,000 pounds the tax amount is $550 [**16**, pp. 235-250]. The experience of Iceland is also interesting, here only diesel-powered trucks exceeding 10 tons are taxed according to mass, and in some cantons of Switzerland, when taxing all vehicles, the engine displacement or the number of horsepower are also taken into account simultaneously with the mass [**4**]. As a result, it can be stated with satisfaction that the current methodology of environmental taxation of trucks in Armenia is, in essence, in line with the international leading experience.

As for taxation based on CO_2 emissions, this approach is mainly applied to passenger cars, for example, CO_2 emissions are the basis for taxation of passenger cars in Denmark, Finland, France, Greece, Iceland, Ireland, and Latvia, in Germany, the tax consists of a basic tax (depending on the engine displacement) and a tax on CO_2 [**16**, pp. 235-250], a similar approach applies in Austria, but in this case the engine power in kilowatts is taken into account [**2,** p. 4]. There are countries in which the basis for the tax is only engine power, for instance, Hungary and Italy [**16**, pp. 235-250], and in East Asian countries, in particular in Japan, South Korea [**16**, pp. 235-250] and still economically developing China [**11**], periodic taxation of passenger cars is carried out on the basis of engine displacement. With all of these approaches, rates increase in parallel with an increase in CO_2 emissions, engine power or engine displacement. In some countries, rate increases also occur depending on the type of fuel, for example, in Germany, the base tax rate is €2 per 100cc for a petrol engine and €9.50 for a diesel engine [**16**, pp. 235-250]. In addition to rate increases, rate reductions or even tax exemptions apply to hybrid or electric vehicles. As an example, we can highlight the experience of Germany, where electric vehicles are exempt from tax for 10 years from the date of first registration, after which they will be taxed by mass, in Latvia they are simply exempt from tax, while Slovakia provides 50% tax reduction for hybrid vehicles [**16**, pp. 235-250].

As for the countries most comparable to RA, it should be noted that in post-Soviet and EAEU member Russia, environmental periodic tax of vehicles as such is not carried out, instead, there is simply a transport tax and the basis of taxation is engine power expressed in horsepower, which is absolutely not an environmentally friendly approach, since older cars with the lowest engine power pollute the atmosphere the most, while their owners pay less taxes [**9**]. However, it should be noted that vehicles with a power of up to 70 horsepower are exempt from tax, and in some regions there are tax benefits for electric vehicles and vehicles powered by natural gas [**3**]. A similar approach applies in Belarus, but here taxation is carried out depending on the mass of the vehicle, and electric vehicles are exempt from tax until 2026 [**15**]. The experience of Kazakhstan is quite interesting, here fuel is subject to taxation according to types: liquid or compressed gas and kerosene, unleaded gasoline, diesel, for which the rates set for each ton are 0.24, 0.33, and 0.45 of the monthly calculation index, respectively [**29**, Article 576]. It should be emphasized that this is not an excise tax, but an environmental tax for atmospheric air pollution from mobile sources. This approach is quite acceptable from the point of view of taking into account the environmental impact, since emissions are proportional to the burned fuel, however, in terms of content, it simply complements the excise tax levied on fuel. As for the transport tax, it should be noted that in Kazakhstan it is calculated based on the engine displacement [**29**, Article 492].

In general, it can be concluded that the best methodological approach to the establishment of an environmental tax on air pollution by vehicles is the formation of a tax based on vehicle emissions rate, which certainly can ensure more effective consideration of the environmental factor, therefore, such an approach should be considered as the best guideline for the reform of the methodology of the environmental tax on passenger cars in Armenia. Nevertheless, such a transition requires technical re-equipment of state monitoring and regulatory bodies, alignment of the legislative framework, and most importantly, ensuring the compliance of vehicles with the technical requirements of such a regulation. The latter is due to the fact that the emission catalytic neutralization systems of a significant part of the cars operated in Armenia have been removed [**13**], which, in the case of such regulation, can lead to severe public resistance or disruption of the transport system. The implementation of the mentioned steps definitely implies additional funding, which is not so realistic in the current socio-economic conditions of RA.

However, considering the formation of an environmental tax according to emissions rate as the best benchmark in Armenia, as an intermediate and more effective option than the current methodology may be the formation of an environmental tax according to the engine displacement. In general, the establishment of an environmental tax depending on the engine displacement is more appropriate from the point of view of effective consideration of the environmental impact, since the relationship between emissions and engine displacement is stronger unlike the relationship between emissions and engine power. This is due to the fact that engines built with innovative technologies and solutions with a relatively low fuel consumption are able to provide proportional power with a smaller engine displacement. In particular, studies have shown that for the same power turbocharging enables gasoline engine downsizing by about 30%, improves fuel economy by 8-10% while improving torque and acceleration performance, and data with experimental turbocharged, downsized gasoline engines shows that in the same vehicle, for the same power and performance, downsized turbocharged engines can give about 18% improvement in fuel economy [**20**]. Naturally, fuel economy also implies a reduction in emissions, since the level of emissions is proportional to fuel consumption [**1**]. Thus, it turns out, that according to the current methodology of the environmental tax established for passenger cars in Armenia, cars that pollute the atmospheric air less may pay more taxes. As a special case, we can mention the taxation of Shkoda Octavia and Lada Vesta produced in 2024, it is noteworthy that these cars belong to the same class. According to the official data, the Octavia's turbocharged 1.5-liter gasoline engine version develops 150 horsepower, and a combined fuel consumption is 5.53L/100km [**19**]. Therefore, the environmental tax in Armenia in accordance with the current methodology for the mentioned car is 1500 AMD (150 hp × 10 AMD). In the case of Vesta, according to the official data, the version with an atmospheric 1.6-liter gasoline engine develops 90 horsepower, and the combined consumption of gasoline is 7.3 l/100 km [**18**]. In this case, the environmental tax is 900 AMD (90 horsepower x 10 AMD). It turns out that due to the current methodology, a lower environmental tax is paid for the car that consumes more fuel and produces more emissions, which fundamentally contradicts the principle of introducing environmental taxes. However, if the engine displacement served as the basis for the establishment of an environmental tax, the picture would be different. To transform the curent methodology depending on the engine

displacement, we can consider the methodology for determining the transport tax in Kazakhstan, which is distinguished by high flexibility of the correlation between the engine displacement and the tax. The following engine displacement separation is used there (Table 3):

Table 3. *The object of taxation of the transport tax on passenger cars in Kazakhstan* [**29**, Article 492]

Object of taxation	**Tax rate (monthly calculation index)**
Passenger cars with the following gradation by engine displacement (cubic centimeters)	
up to 1 100 inclusive	1
from 1,100 to 1,500 inclusive	2
From 1,500 to 2,000 inclusive	3
From 2,000 to 2,500 inclusive	6
From 2,500 to 3,000 inclusive	9
From 3,000 to 4,000 inclusive	15
more than 4000	117

It should be noted that the high flexibility of the correlation between the engine displacement and the tax is due to the fact that for cars with the working displacement of the engine of more than 1500 cc, the amount of tax is increased by 7 tenge for each unit exceeding the lower limit of the corresponding gradation of engine displacement [**29**, Article 492]. For example, if the engine displacement of a car is 1900 cc, the tax will be 3 × monthly calculation index + (1900-1500) × 7=11076+2800=13876 tenge (the monthly calculation index for 2024 amounts to 3692 tenge [**12**]).

Thus, taking into account the above observations, in the case of the improvement of the environmental tax on passenger cars in Armenia, it is possible to apply indicated approaches to the gradation of engine displacement and tax calculation, proportionally adjusting the current rates to the proposed methodology and at the same time maintaining the principle of increasing the rate due to the age of the car, which will ensure a more effective implementation of the "polluter pays" principle.

Nevertheless, in addition to methodological reforms, there is also a need to review tax rates, at least from the point of view of accounting for inflation. The current rates of the environmental tax on emissions from trucks in Armenia have not been adjusted since their application in 2007 on January 1 [**10**], meanwhile in 2024 as of January 1 inflation amounted to 92.33% [**27**], and the rates applied to passenger cars have not been adjusted since their application in 2018 on January 1 [**28**, Article 168], while in 2024 on January 1, inflation was 21.16% [**27**]. In general, leaving the tax rates unadjusted for inflation for long periods of time leads to further depreciation of the instrument, therefore it is recommended to automatically adjust the tax rates for inflation, to keep their monetary value relevant [**8**, p. 29]. As a possible solution, we can again rely on the experience of Kazakhstan. Here the tax rates are not set in absolute value, but the state defines a monthly calculation index (MCI), in relation to which rate coefficients are set (see Table 3). The size of the MCI is calculated when planning the state budget based on the expected inflation rate for the coming year [**5**]. For instance, in 2023 the MCI amounted to 3450 tenge, and in 2024 it already amounts to 3692 tenge [**12**].

Thus, a similar approach can be applied in Armenia, which will ensure a systematic solution to the issue of adjusting environmental tax rates in accordance with inflation.

After providing solutions to the fixed methodological and systemic issues, it is also necessary to revise the current tax rates, bringing them closer to the social costs of air pollution, thereby also strengthening the function of economic stimulation of the environmental tax. According to the latest OECD data, in Armenia in 2019 the welfare cost associated with premature death as a result of atmospheric air pollution with only $PM_{2.5}$ (particulate matter) was equivalent to approximately 12% of GDP (The EU average did not exceed 3.5%) [**17**], which amounts to more than 78 billion drams of RA [**26**], meanwhile in the same year, environmental taxes for air emissions from vehicles amounted to only 2.7 billion drams of RA [**14**], and in case of emissions from stationary sources, taxes were about 80 million drams of RA [**25**]. Therefore, it can be assumed that there is also a deep gap between the external costs of vehicle emissions and the collected environmental taxes, for the smoothing of which it is necessary, on the one hand, to ensure a reduction in emissions, and on the other hand, taking into account the socio-economic capabilities of the country, a gradual increase in tax rates.

Summing up, it may be noted that in the conditions of the rising trend of atmospheric air emissions from vehicles in Armenia and the huge external costs, the implementation of steps aimed at increasing the efficiency of the tools aimed at reducing emissions is the imperative of the time. As a set of such steps may be providing solutions to the identified methodological and systemic problems of the environmental tax on vehicle emissions, which can be ensured by the implementation of the relevant proposals made within the framework of the study, thus creating conditions for more effective

consideration of the environmental impact and ensuring the value stability of the established tax rates. Only after the implementation of the abovementioned steps, it is necessary to revise the current tax rates, gradually, according to the state's socio-economic capabilities, aligning them with the effective levels of the internalization of external costs and the economic stimulation provided by the environmental tax.

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