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ENVIRONMENTAL TAX MECHANISM IN KAZAKHSTAN: THEORETICAL APPROACH

Rapid technological and economic development has posed serious environmental threats, with toxic emissions and waste accumulation affecting both developed and developing countries. The environment is greatly impacted by the release of toxic substances into the atmosphere and the accumulation of waste. To address these issues, the article explores the potential of using the tax system to implement environmental policy, focusing on Kazakhstan's transition to low-carbon development. The study aims to highlight the significance of environmental taxes and explore ways to reduce greenhouse gas emissions by analyzing Kazakhstan's existing environmental taxes and CO_2 emissions dynamics globally. To achieve this goal, the study employs a mixed approach, including a literature review and a statistical, comparative analysis of vehicle taxation policies in Kazakhstan, identified as one of the main sources of exhaust emissions. The significance of this work is underscored by the fact that, despite Kazakhstan's active participation in global climate initiatives, it remains the largest greenhouse gas emitter in Central Asia. Drawing on the experience of developed countries, which primarily address environmental issues through market mechanisms, Kazakhstan also needs to consider incentive mechanisms using tax instruments to ensure environmental safety and reduce the carbon footprint of its products. The study utilizes methods of comparison, analysis, synthesis, and summarization of scientific research and expert assessments. It is proposed to classify the transport tax as an environmental tax and improve its calculation by considering the vehicle's environmental class and year of manufacture. The practical significance of this work lies in isolating environmental taxes from other tax payments and clearly defining the directions for reforming Kazakhstan's tax system. Additionally, it is crucial to classify environmental taxes, develop usage methods, ensure proper distribution of revenues, and facilitate accurate international comparisons for sustainable development.

Key words: environmental pollution, environmental tax, Pigouvian tax, the «polluter pays» principle, transport tax.

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Қазақстандағы экологиялық салық салу механизмі: теориялық аспектілері

Қазіргі уақытта әлемдік экономиканың технологиялық және экономикалық даму ағынының жылдам өзгерістеріне байланысты қоршаған ортаға үлкен қауіп төніп тұр. Дамыған және дамушы елдердегі қоршаған орта атмосфераға улы заттардың шығарылуы мен тұрмыстық қалдықтар үйінділерінің пайда болуынан үлкен зардап шегуде. Мақалада осы аталған мәселелердің алдын-алу мақсатында Қазақстан өзінің даму бағыты ретінде төмен көміртекті дамуға көшуді анықтай отырып, экологиялық саясатын жүзеге асыру үшін салық жүйесін пайдалану мүмкіндіктері қарастырылған. Зерттеудің мақсаты – экологиялық салықтың мәнін ашу, сонымен қатар Қазақстандағы қолданыстағы экологиялық салықтарды, түрлі елдердегі CO2 шығарындыларының динамикасын талдау арқылы қоршаған ортаға парниктік газдар шығарындыларын азайту жолдарын қарастыру болып табылады. Осы мақсатқа жету үшін зерттеуде пайдаланылған газдар шығарындыларының негізгі көздерінің бірі ретінде Қазақстандағы көлік құралдарына салық салу саясатына әдебиеттерге шолу мен статистикалық, салыстырмалы талдауды қамтитын аралас тәсіл қолданылды. Жұмыстың маңыздылығы Қазақстан климаттың өзгеруімен күресу және парниктік газдар шығарындыларын азайту жөніндегі жаһандық үдеріске белсенді қатысушы болып отырғанына қарамастан Орталық Азиядағы парниктік газдардың ең көп эмитенті болып отыр. Дамыған елдердің тәжірибесіне сәйкес қоршаған ортаны қорғау мәселелерін бірінші

арқылы реттеуді жөн көреді, сондықтанда елімізде экологиялық қауіпсіздікті қамтамасыз етуге және өндірілетін өнімдердің көміртегі ізін азайтуға өз қызметі мен өндірісін бағыттауда салық құралдарын пайдалана отырып ынталандыру тетіктерін қарастыру қажет. Зерттеуде салыстыру, талдау, синтездеу, ғылыми зерттеулер нәтижелерін жалпылау, сараптамалық бағалау әдістері қолданылды. Зерттеудің негізгі нәтижесі ретінде көлік салығын еліміздегі экологиялық саясаттың құралы ретінде пайдалана отырып, оны экологиялық салықтар санатына қосу және оған салынатын салық сомасын көліктің классы мен шығарылған жылын ескере отырып есептеу механизмін жетілдіру ұсынылады. Жұмыстың практикалық маңыздылығы экологиялық салықтарды салық төлемдерінің жалпы жиынтығынан оқшаулау және Қазақстанның салық жүйесін одан әрі реформалау бағыттарын нақты белгілеу қажеттілігінде. Сондай-ақ, қандай салықтардың экологиялық санатына жатқызылу қажеттілігін анықтап, оларды пайдалану жолдарын әзірлеу қажет. Экологиялық салық түсімдерін дұрыс пайдалануды және халықаралық деңгейде салыстырулардың дұрыстығын қамтамасыз ету де елдің тұрақты дамуы үшін маңызды.

Түйін сөздер: қоршаған ортаның ластануы, экологиялық салық, Пигу салығы, «ластаушы төлейді» принципі, көлік салығы.

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Экологический налоговый механизм в Казахстане: теоретические аспекты

В настоящее время в связи с быстрыми изменениями в технологическом и экономическом развитии мировой экономики, возникла серьезная угроза окружающей среде. На окружающую среду в развитых и развивающихся странах большое влияние оказывают выбросы токсичных веществ в атмосферу и образование массивов бытовых отходов. В целях предотвращения данных проблем в статье рассматриваются возможности использования налоговой системы для реализации экологической политики, определяя переход к низкоуглеродному развитию как направление развития Казахстана. Цель исследования – раскрыть значение экологического налога, а также рассмотреть пути снижения выбросов парниковых газов в окружающую среду путем анализа существующих экологических налогов в Казахстане и динамики выбросов CO_2 в разных странах. Для достижения поставленной цели в исследовании использовался смешанный подход, который включал обзор литературы и статистический, сравнительный анализ политики налогообложения транспортных средств в Казахстане как одного из основных источников выбросов выхлопных газов. Значимость работы определяется тем, что несмотря на то, что Казахстан является активным участником глобального процесса борьбы с изменением климата и сокращением выбросов парниковых газов, он остается крупнейшим эмитентом парниковых газов в Центральной Азии. По опыту развитых стран, которые предпочитают регулировать вопросы охраны окружающей среды прежде всего через рыночные механизмы, Казахстану также необходимо рассматривать механизмы стимулирования с использованием налоговых инструментов для обеспечения экологической безопасности и снижения углеродного следа выпускаемой продукции. В исследовании использовались методы сравнения, анализа, синтеза, обобщения результатов научных исследований и экспертной оценки. В качестве основного результата исследования, используя транспортный налог как инструмент экологической политики в стране, было предложено включить его в категорию экологических налогов и усовершенствовать механизм исчисления суммы налога, учитывая экологический класс и год выпуска автомобиля. Практическое значение работы заключается в необходимости выделить экологические налоги из общей совокупности налоговых платежей и четко разграничить направления дальнейшего реформирования налоговой системы Казахстана. Также следует определить какие налоги должны стать экологическими, и разработать способы их использования. Обеспечение правильного распределения поступлений от экологических налогов и корректного международного сравнения также является важным для устойчивого развития страны.

Ключевые слова: загрязнение окружающей среды, экологический налоги, налог Пигу, принцип «загрязнитель платит», транспортный налог.

Introduction

At the present, rapidly developing stage of the economy, due to the rapidly changing technological and economic landscape of the world economy, a serious threat to the environment has emerged. In both developed and developing nations, environmental degradation occurs extensively due to toxic emissions released into the atmosphere and the proliferation of domestic waste landfills. Consequently, this article explores strategies for environmental preservation, such as the implementation of environmental taxes and levies. These measures have garnered increasing traction globally over the past decade as means to safeguard the environment.

The objective of environmental regulations is to mitigate the detrimental effects inflicted upon the environment and the influence of human activities on climate change. Conversely, environmental taxes are a direct approach to enhancing environmental quality in developed economies. Over time, several tactics have been developed to persuade different social and economic groups to reduce their environmental pollution. Emission permit trading and pollution taxes are two highly pertinent techniques. These tools have various effects on the extent to which businesses and households contribute to the overall effort to decrease harmful atmospheric emissions and protect the environment. They also impact the extent to which national and international environmental policies are successfully put into action.

Presently, the regulation and scope of greenhouse gas emissions in Kazakhstan encompass the inclusion of several mechanisms, namely the formation of a carbon budget, the implementation of carbon quotas, and the supervision of industrial plant operators. However, the system of levying taxes on emissions remains more efficient within individual countries compared to alternative approaches like carbon quotas or emissions trading. This is the situation in contemporary situations. Moreover, in Kazakhstan, the full potential of the taxation mechanism for environmental regulation has not been fulfilled, and the utilisation of tools such as taxes is not at an optimal level. This poses a concern as Kazakhstan is leading the way in terms of environmental regulation (Poberezhskaya & Bychkova, 2022).

In accordance with Article 128 of the Environmental Code of the Republic of Kazakhstan, enacted on January 2, 2021, No. 400-VI, and subsequently amended as of February 28, 2024, the designated authority for environmental protection has implemented market-based mechanisms to mitigate emissions into the environment. These mechanisms include setting emission limits, allocating emission quotas, and endorsing procedures for trading emission quotas and obligations aimed at reducing environmental emissions (Government of the RK, 2021).

Furthermore, to ensure economic viability, a zero coefficient is implemented in the payment rates for adverse environmental effects when acquiring a comprehensive environmental permit. Guarantee of purchasing electric power generated by facilities utilizing industrial waste energy is facilitated by the settlement and financial center. In addition, among other measures, government support is provided to ease the adoption and shift to «green» technologies and to encourage the attraction of «green» investments (Government of the RK, 2021).

Literature review

The established definition of environmental taxes was developed by the Statistical Office of the European Union, also known as Eurostat. According to this definition, an environmental tax depends on the physical characteristics of an entity that have a negative impact on the environment. Additionally, an environmental tax may apply to entities that are connected to the primary entity, causing a negative impact (Eurostat, 2021). This definition helps identify and classify environmental taxes for international statistical reporting and analysis (Eurostat, 2021). Such a unified definition of environmental tax is necessary for a full understanding and application of environmental taxes.

This definition is widely used by international organizations such as the United Nations (UN), the World Bank (WB), the International Monetary Fund (IMF), the European Commission (EC) and the Organization for Economic Co-operation and Development (OECD).

The theoretical and methodological basis of environmental taxation was established in the works of A.Pigou , R.Coase , G.Tullock , LHGoulder , J.Stiglitz , LIJacobson , W.Baumol , and others. Their contributions to the development of taxation as a policy instrument, including environmental taxes, were further expanded upon by D.Helm and D.Pierce .

A. Pigou's 1920 «The Economics of Welfare» underpinned taxes' ecological purpose. Negative externalities render the economy's resource allocation ineffective, which he first shown. Businesses lack private motive to spend more to avoid negative externalities without government participation. They always try to maximise profit and output at the lowest cost. In this case,

society will pay more for the enterprise's products due to external expenditures to offset harm. Thus, the market for commodities with negative externalities will be inefficient without tax adjustments (Pigou, 2017). Pigou suggested internalising externalities using environmental taxes, or Pigouan taxes, to reduce inefficiencies.

Pigou believes pollutants should be taxed to offset their environmental damage (Qiao & Chu, 2018). Governments can also align private and social marginal income for individuals with preferential tax policies (Feng, 2005). Environmental taxes reduces pollution and promotes tax reform and environmental industries. The majority of environmental levies in developed nations are energy taxes. Xu (2011) believes that an energy tax can affect the energy market, spur production technology, and raise energy conservation consciousness.

In his papers, Coase (2012) investigates negative external costs legally. He emphasises these costs. The study found that proprietors can handle external pressures without government intervention, reducing the need for low-cost taxes.

A taxable entity that harms the environment is the only criterion for an environmental tax, according to Eurostat.

Simply put, the introduction of a tax on any pollutant source qualifies as an environmental tax, irrespective of its calculation method or the designated allocation of its revenues. Consequently, this simplifies the nature of environmental taxation considerably. However, the practical implementation of these principles encounters significant obstacles. Baumol & Oates (1971) support the regulatory imposition of externally or ecologically focused taxes that are matched to society losses and adjusted in proportion to changes in those losses. Therefore, taxes are an adaptable tool for controlling environmental processes inside the framework of the economy.

The following simplified environmental (Piguan) tax categorization will help species understanding:

- Piguan direct taxes allow tax payments depending on the pollution source's calculated or measured emissions.

- Piguan approximation taxes add pollution estimates to indirect taxes. Tax payments depend on the expected pollution. Piguan approximation taxes are indirect.

Each sort of environmental tax helps implement an environmental function. Both sorts of taxation enhance the environment, but through different processes.

Approximation's main benefit is adding an environmental function to the tax system. As highlighted by McKay et al. (1990), this reduces state and enterprise administrative costs because each firm does not need a detailed emission control system. Thus, the government can use released monies for environmental conservation. Also, tax avoidance is much less likely.

Several reports by the OECD Centre for Tax Policy and Administration's Tax Policy and Statistics Department, the OECD Environment Directorate's Environmental Indicators and Information Department, the OECD Secretariat's Committee on Fiscal Affairs and the OECD Secretariat's Environmental Policy Committee (including a 2019 report) have praised emissions trading. However, the overall impression is that tax policy still plays a crucial role. Professors, experts and researchers in finance and economics argue that energy and carbon taxes can help prevent the climate problem from worsening, as economic and financial policies are global priorities. According to the eco-efficiency paradigm, such taxes are straightforward tools for influencing energy consumption habits and achieving sustainable development goals. Authors also note that «there remains significant potential for using taxation to improve the environment and mitigate climate change» (Kettner-Marx & Kletzan-Slamanig, 2018; He et al., 2019; Patuelli, et al., 2005; Carraro et al., 1996; Friedlingstein et al., 2020; Mazina et al., 2022).

The Intergovernmental Panel on Climate Change (IPCC) reports that 21% of global greenhouse gas emissions come from manufacturing, chemical processes, and industrial waste disposal.

It is important to highlight that a large number of international organisations support the practice of trading emissions. On the other hand, the academic community maintains that the only way to tackle climate change is through the implementation of environmental levies. According to the findings of scientists, environmental taxes are the most effective and straightforward measures that can be used to promote changes in the habits of individuals about their consumption of energy (Carraro et al., 1996; Patuelli, et al., 2005;Kettner-Marx & Kletzan-Slamanig, 2018; He et al., 2019; Friedlingstein et al., 2020; Li et al., 2023; Issayeva et al., 2023; Daniya & Tang, 2024). We are also of the opinion that the tools of taxes are effective in reducing the effects of climate change.

The Intergovernmental Panel on Climate Change (IPCC) reports that 21% of greenhouse gas emissions come from manufacturing, chemical reactions,

and industrial waste disposal (IPCC, 2015). These findings emphasise the necessity for aggressive environmental protection. Lin and Zhi (2019) propose that energy taxation can reduce carbon emissions, conserve energy, and enhance the environment. Tax measures that encourage better energy use and discourage carbon-intensive activities can help us move towards a sustainable future. However, only by taxing industry can emission reduction goals be achieved. Olson (1984) states that countries without energy taxes will suffer greater welfare losses than those with taxes. Kyle (2018) confirms this by referring to Pennsylvania, where the lack of a gas tax has had a strong negative impact on social well-being, especially in the electric sector. Wesseh & Boqiang (2019) agrees, saying that a carbon tax could bring economic benefits through investments in renewable energy technology. Djula (2019) researched EU countries and came to the conclusion that increasing energy taxes and energy prices could reduce final energy consumption, especially in countries with low consumption levels. This confirms the importance of implementing an energy tax on a practical level.

Given the actual consequences of these findings, they hold significant significance for countries that are significant emitters of greenhouse gases but have inadequate energy and carbon tax policies. In addition, despite advancements in eco-friendly technologies and sustainable energy sources, this pattern persists even in nations classified as «developed». For instance, the average American generates carbon dioxide emissions at a rate that is 3.5 times greater than the global average per person, which is 4.8 tonnes per person (Jackson, 2019).

Hence, it is crucial to carefully evaluate the advantages and disadvantages of implementing tariffs on environmentally hazardous emissions. Furthermore, it is crucial to pinpoint areas where the generated revenue can be used more efficiently to decrease emissions, tackle environmental harm, and combat climate change at both a global and domestic level.

Methodology

The study is grounded on the theoretical and methodological concepts put out by national and international scholars who have analysed the environmental policy and protection measures implemented in various countries. The writers employed essential scientific methodologies, including literature surveys, a systematic and logical approach, as well as economic and comparative study of tax policy.

The literature review includes scientific and political publications that synthesize information and identify areas for further research. Using concepts from the theories of environmental taxes and political integration, a framework has been developed to clarify connections and provide a theoretical foundation.

Results and discussion

Kazakhstan, Central Asia's largest greenhouse gas emitter, is actively involved in the global climate change and greenhouse gas emission reduction effort. Kazakhstan has submitted an annual National Report on greenhouse gas emissions to the UN Secretariat since 2010, as required by the UNFCCC and Kyoto Protocol. It published its first Paris Climate Agreement report in 2021, committing to cut emissions by 55% below 1990 levels by 2030. Kazakhstan will reach this aim independent of international support.

The President of Kazakhstan issued Decree No. 577 on May 30, 2013, endorsing the "green economy" transition concept to promote sustainable economic development, environmental quality, population well-being, and Kazakhstan's overall well-being.

This concept offers a vision for shifting towards a «green economy» by delineating key objectives, detailing shared methodologies, and establishing fundamental principles for the transition.

It is worth noting that the governments of most developed countries of the world prefer to regulate environmental issues primarily through market mechanisms, which, in turn, encourage business representatives to direct their activities and production to ensure environmental safety and reduce the carbon footprint of their products.

Given the energy and carbon intensity of our economy, and the fact that coal generation remains Kazakhstan's primary energy source, it is not simple for the country to follow such a worldwide trend.

International organisations call for the elimination of hydrocarbon energy carriers at the same time because the gases they create during burning contribute to climate change and have a «greenhouse» effect.

The Government of Kazakhstan is taking action to lessen harmful emissions into the environment and the carbon footprint in manufacturing, as they are fully aware of the seriousness of the problem of the greenhouse effect's development and the detrimental effects it has on the ecosystem.

Statistics on CO_2 emissions by country

CO_2 generated by burning fossil fuels and deforestation is a major source of greenhouse gases and a key determinant of countries' ability to mitigate the effects of climate change. Greenhouse gas (GHG) emissions from human activities disrupt the radiative energy balance of the Earth-atmosphere system.

The majority of emissions originate from the utilisation of energy in the transportation, manufacturing, and residential sectors. The planet's carbon dioxide absorption is being impacted by notable transformations in agriculture and forests in recent times.

Therefore, carbon dioxide (CO_2) emissions play a significant role in contributing to the overall amount of greenhouse gases released into the atmosphere. Additionally, it is important to acknowledge that the combustion of fossil fuels and the process of deforestation both contribute to the emission of CO_2.

Worldwide carbon dioxide emissions resulting from the burning of fuel

We analysed the progression of carbon dioxide emissions resulting from the combustion of fuel by utilising data from the World Energy and Climate Yearbook (Fig. 1, Table 1).

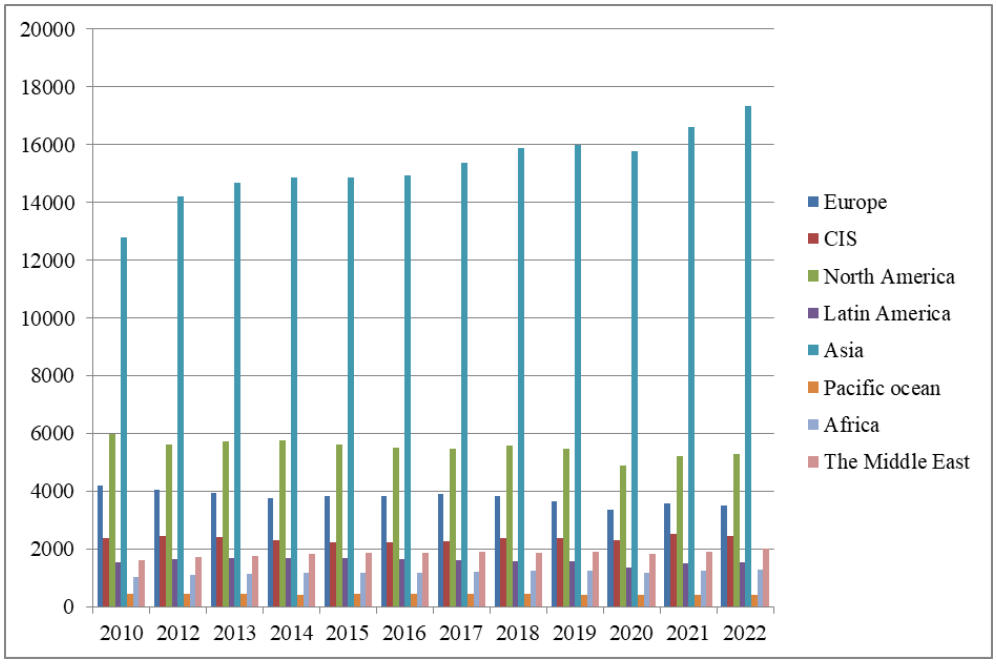

Figure 1 – The trend of $MtCO_2$ emissions from fuel combustion for the period 2010-2022
Note – compiled by the authors based on (International Energy Agency, 2023)

Table 1 – Trend of $MtCO_2$ emissions from fuel combustion for the period 2010 – 2022

	2010	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	+/-.%
Europe	4179	4046	3946	3777	3833	3850	3904	3827	3656	3349	3587	3514	-15,9
CIS	2391	2465	2413	2300	2234	2237	2283	2379	2390	2292	2518	2458	2,8
North America	5992	5609	5720	5764	5617	5521	5467	5590	5465	4899	5224	5298	-11,6
Latin America	1522	1641	1682	1689	1681	1649	1628	1571	1558	1370	1505	1548	1,7
Asia	12774	14195	14665	14869	14865	14931	15368	15878	16008	15772	16603	17336	35,7
Pacific ocean	437	435	432	423	429	439	439	437	428	410	398	394	-9,8
Africa	1027	1096	1134	1179	1172	1186	1216	1239	1258	1167	1246	1268	23,4
The Middle East	1604	1730	1766	1832	1855	1869	1896	1879	1900	1838	1892	1995	24,4
Note – compiled by the authors based on (International Energy Agency, 2023)													

As the analysis of Table 1 shows, in the period from 2010 to 2022, a decrease in CO_2 emissions was observed in Europe by -15.9%, in North America by -11.6%, in the Pacific region by -9.8%. In the rest of the world, there is an increase in CO_2 emissions from fuel combustion, for example, in the CIS, the growth was 2.8%, in Asia by 35.7%, in Africa by 23.4%, the Middle East by 24.4%.

After stagnation in 2021 (+0.1%), the global intensity of CO_2 emissions decreased by 0.7% in 2022, which is much less than the average for 2010-2019 (-2.3% per year). The largest decrease was recorded in Europe (-5.7%, including -5.3% in the EU, due to a 2% reduction in CO_2 emissions) and in the Pacific region (-4.4%, including -4.7% in Australia). CO_2 emission intensity has shown a decline in North America (-0.7%) and Latin America (-0.9%) in recent years. The implementation of hydroelectric power plants in Brazil has significantly contributed to positive transformations in Latin America.

Regarding Asia, it is noteworthy that the rate of rise in CO_2 emissions there rose by 0.6%. Although there was an improvement in the situation in China, Japan, and South Korea, there was an observed increase in emissions in India, Indonesia, and the countries of Central Asia. It is worth mentioning that in oil-dependent countries, there is a rise in the generation of power from coal and gas, resulting in a detrimental increase in greenhouse gas emissions. Therefore, Saudi Arabia experienced a 10% rise, Mexico saw a 10% increase, and Asian countries witnessed an 8% growth. Regarding European countries, their carbon dioxide (CO_2) emissions have declined. For instance, Turkey experienced a decline of 2.7%, while the United Kingdom saw a fall of 2.6%. In 2022, there was a 0.7% decrease in global CO_2 emissions.

Using analytical data from Energystats.enerdata.net, we conducted an analysis of carbon dioxide (CO_2) emissions resulting from the combustion of fuel in various countries. This analysis was based on information shown in Table 2 and Figure 2.

In the period from 2010 to 2022, a decrease in CO_2 emissions was observed in the USA by -16.0%, in Sweden by – 24.5%, in Japan by -11.0%. In several other nations, there has been a rise in the amount of carbon dioxide emissions that are caused by the combustion of fuel. Among these countries, India has had the most significant growth, going up by 58.0%, Turkey by 44.9%, Russia and China by 36% and 35%, respectively.

Energy-related carbon dioxide (CO_2) emissions experienced a 2.5% rise in 2022, which is significantly lower than the 6% increase observed in 2021. Despite the current decline in the worldwide economy, carbon dioxide emissions have reached unprecedented levels, surpassing 33.8 gigatons.

Next, we consider the volumes of CO_2 emissions in the context of all countries of the world (Table 3, Fig. 3).

Table 2 – Autumn for the period 2010-2022 – Million tons of CO_2

Countries	2010	2012	2014	2016	2018	2019	2020	2021	2022	-/+,%
Great Britain	1027	1096	1179	1186	1239	1258	1167	1246	1268	23,4
Germany	1522	1641	1689	1649	1571	1558	1370	1505	1548	1,7
Russia	12774	14195	14869	14931	15878	-	15772	16603	17336	36,0
China	7798	8752	9166	9090	9601	9721	9859	10397	10504	35,0
USA	4179	4046	3777	3850	3221	-	3349	3587	3514	-16,0
France	1604	1730	1832	1869	1879	-	1838	1892	1995	24,4
Malaysia	2391	2465	2300	2237	2379	-	2292	2518	2458	2,8
India	1570	1810	2024	2059	2303	2266	2068	2281	2481	58,0
Turkey	276	308	319	351	389	380	380	412	400	44,9
Sweden	49	42	39	39	36	36	34	37	37	-24,5
South Korea	594	631	624	655	667	653	609	615	597	0,5
Japan	1123	1214	1172	1123	1070	1033	981	1003	1001	-10,9
Note – compiled by the authors based on (International Energy Agency, 2023)										

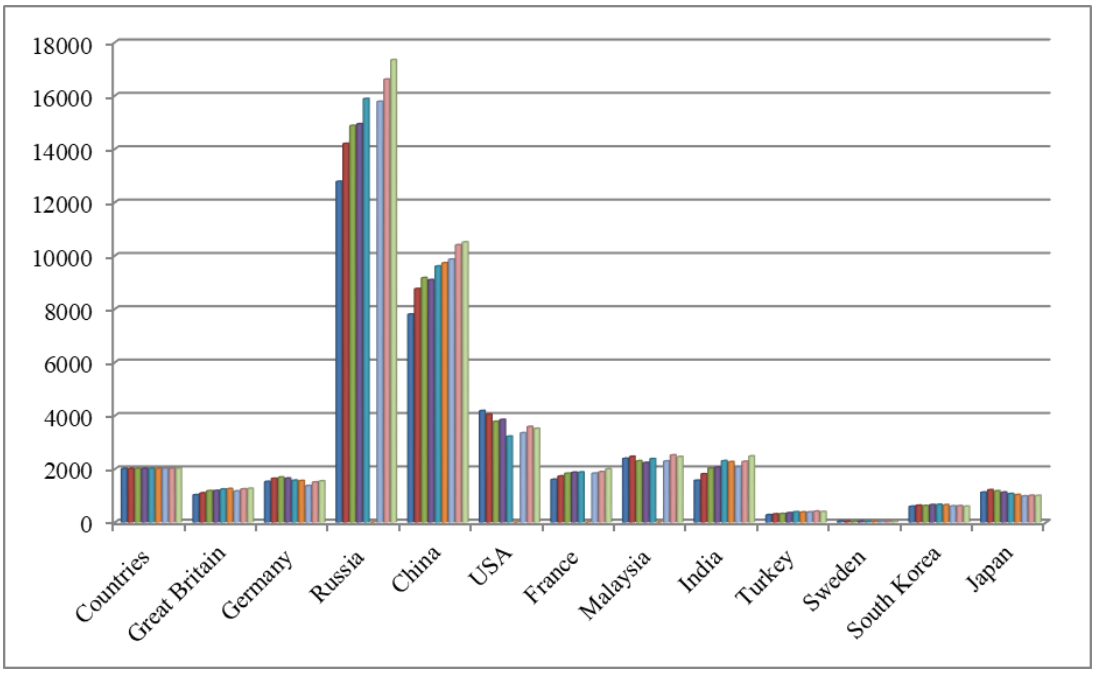

Figure 2 – Autumn for the period 2010-2022 – Million tons of CO_2
Note – compiled by the authors based on (International Energy Agency, 2023)

Table 3 – CO_2 emissions from all countries of the world (gigatons)

Years	1990	2000	2005	2015	2019	2020	2021	+/-2021/ 1990
CO_2 emissions (gigatonnes)	22,7	25,8	30,2	36,3	38,0	36,0	37,9	+67%
Note – compiled by the authors based on (International Energy Agency, 2023)								

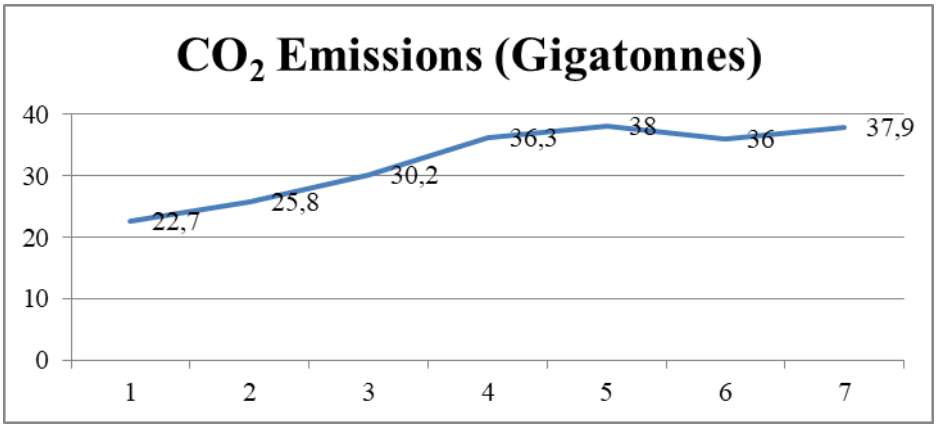

Figure 3 – CO_2 emissions from all countries of the world (gigatons)
Note – compiled by the authors based on (International Energy Agency, 2023)

China, the US, 27 EU members, India, Russia, and Japan continued to be the top emitters of CO_2 in the world in 2021.

Between the beginning of the twenty-first century and 2019, there was a progressive increase in the global emissions of greenhouse gases (GHG). This increase was mostly caused by an increase in CO_2 emissions, mainly in China and other industrialised and emerging economies. As a consequence of this, the natural greenhouse effect has a negative influence on life on Earth. This is because the amount of greenhouse gases in the atmosphere has significantly grown, which has led to the greenhouse effect.

Worldwide CO_2 emissions from fossil fuels fell 5.3% in 2020 compared to 2019, mostly as a result of the COVID-19 epidemic. Nevertheless, after a brief reprieve, the world's CO_2 emissions returned to their "pre-crisis" level in 2021, with the indicator hitting 37.9 gigatons, nearly 0.36% less than in 2019.

Taking into account the UN Framework Convention on Climate Change, countries are developing national emission inventories, proposing and implementing actions to reduce GHG emissions. CO_2 emissions, which are the main cause of global warming, are still rising globally, despite agreements to mitigate the effects of climate change (Table 4).

Table 4 – Dynamics of greenhouse gas emissions in Kazakhstan for 2010-2021

CO_2 emissions (million tons)	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
	315,8	302,5	303,4	306,9	355,8	361,2	366,8	385,8	401,6	364,6	351,2	340,8
Note – compiled by authors based on (National Bureau of Statistics of Kazakhstan, 2023)												

Kazakhstan's greenhouse gas emissions in 2021 declined by 0.37% compared to 2020, reaching a total of 340.8 million tonnes. A fall in total output, a decrease in passenger and freight traffic by all modes of transportation, and a decrease in total production are the primary causes of this decline. The COVID-19 pandemic is the primary cause of this decline. In addition, if we compare the emissions in 2021 to the base year of 1990, which is the year that serves as the baseline for Kazakhstan's responsibilities under the Paris Agreement, then we can see that the emissions in 2021 decreased by 10.35% more than the base year. There were 351.2 million tonnes in 2020, which is 3.7% less than in 2019, while the increase was 11.2% when compared to the amount that was produced in 2010. It is important to note, however, that the growth in greenhouse gas emissions from 2012 to 2018 was only for seven years.

In the volume of all greenhouse gas emissions in the Republic of Kazakhstan, the largest share is occupied by the category "Energy industry", which accounts for at least 75.7% (261.9 million tons of CO_2-eq) in 2021, which is 17.4% less than the base level of 1990, 50.7% higher than the level of 2000. The agriculture sector is in second place: 12.4%. Industrial processes are in third place: 7.8% (Table 5).

Table 5 – Key indicators of greenhouse gas emissions by sector for 1990-2021

Name of the industry/ years	1990	2000	2010	2015	2019	2020	2021	+-2021/ 1990
Total national emissions	381,6	272,7	315,8	361,2	365,2	351,3	345,8	-9,4
Energy activities	316,9	173,8	247,1	296,3	294	272,5	261,9	-17,4
IPP (Industry and Products Processing)	19,3	12,3	15,8	20,8	20,9	22,3	27,1	40,4
Agriculture	44,7	26,1	32,7	32,8	38,5	40,7	42,8	-4,3
LULUCF (Land Use, Land-Use Change, and Forestry)	-	56,6	14,9	5,3	5,1	8,4	7,7	13,6
Wastes	4,6	3,9	5,3	5,8	6,7	7,4	6,3	37,0
Note – compiled by authors based on (National Bureau of Statistics of Kazakhstan, 2023)								

The Energy Activities encompass the sectors of manufacturing and construction, transportation, and various other industries. Analyzing the situation based on digital statistics, we can say that Kazakhstan is making rapid strides towards meeting the stated goal of reducing greenhouse gas emissions by 15% by 2030, although there are some problems here.

Our study looks specifically at the issue of the introduction of CO_2 taxes in Kazakhstan.

Author's Definition and Analysis of Environmental Taxes in Kazakhstan

Drawing from the preceding research, it appears that by the 1990s, there existed a relatively comprehensive comprehension of the nature of environmental taxes and the primary aspects of the environmental role of taxation. According to our point of view, an environmental tax is a levy that fluctuates in accordance with the degree of environmental damage that is generated by the utilisation or consumption of the taxable company. The structure of this tax system is determined by distinguishable tax components or the combination of such components.

This description offers a full grasp of the qualities that are associated with environmental taxes. The characteristics of this tax system are as follows: the tax base is chosen based on the physical attributes of the thing being taxed, and the tax should be collected directly from the source of pollution. If levying taxes directly at the source of pollution is deemed unsuitable, an alternative approach could be to target the enterprise that is linked to the source of pollution for taxation.

This viewpoint highlights the significance of creating a clear connection between environmental taxation and the environmental impact of activities or products. This emphasises the importance of aligning tax regulations with environmental objectives, in order to ensure that those who cause pollution bear the financial burden of the resulting consequences. Furthermore, it prioritises the practical aspects of implementing environmental taxes, acknowledging the challenges associated with directly identifying and taxing sources of pollution.

Assessing the magnitude of pollutants emitted by individual vehicles might be a difficult task. Automobile gasoline may be subject to taxation.

An environmental tax must serve the purpose of advancing environmental protection goals to be classified as such. To fulfill this requirement, the tax should possess both regulatory and fiscal functions, incentivizing taxpayers to favor organizations subject to taxation that exhibit superior environmental attributes.

This objective can be accomplished by modifying the tax burden in accordance with the level of pollution. This is only feasible when the tax burden is proportional to the level of environmental harm that the taxpayer is responsible for.

An environmental tax should serve the purpose of environmental protection. To achieve this, it must encompass both fiscal and regulatory functions. Through its regulatory function, an environmental tax encourages taxpayers to favor enterprises that demonstrate higher environmental performance. This is accomplished by adjusting the tax burden based on the level of pollution. For instance, tax incentives for environmentally friendly transportation motivate owners of other vehicles to opt for such cars.

Upon inquiry, it was shown that the transport tax in Kazakhstan has no regulatory effect. Since the tax is determined by engine power rather than its environmental impact, there is no way to establish a direct relationship between the tax amount and pollution levels. Therefore, the authors of this essay propose recommendations for altering the tax distribution system.

In order to underscore the lack of motivation for taxpayers to mitigate their detrimental impact on the environment, it is crucial to highlight that the magnitude of their tax payment is not contingent upon the extent of this influence. In the European Union (EU), the majority of environmental taxes, specifically 78%, are attributed to energy taxes, while transport taxes make up 19%. According to the International Energy Agency (2019), barely 3% of the overall budget is allocated specifically for levies that target the reduction of environmental pollutants.

Take advantage of the statistical data to gain insightful knowledge. Based on the information presented in Table 6, Kazakhstan has just four distinct types of environmental levies. The proportion of «energy taxes» accounts for around 67 percent of the total in 2021.

Tax collection from energy taxes has experienced a rise from 2017 to 2021. A number of factors, including energy consumption patterns, growing energy prices, and the implementation of energy-efficiency programmes, are among the factors that have contributed to this progression.

Among environmental taxes, «Taxes on environmental pollution» in terms of tax revenues account for about 4.9% of the total environmental taxes. In 2021, the increase in tax revenues from them amounted to 53% compared to 2017.

Table 6 – Environmental taxation in Kazakhstan, million tenge

Type of environmental tax*	2017	2018	2019	2020	2021	+/-. 2021 /2017, %
Energy taxes	1 213, 0	1 654, 2	1 706, 4	881,7	1 529, 1	26
Transportation taxes	64, 3	72,1	78, 3	63, 4	77, 6	21
Taxes on environmental pollution	72, 5	87, 1	100, 8	85, 6	111, 0	53
Taxes on the use of resources	284, 6	335, 1	394, 4	359, 2	488,0	71
Total environmental taxes	1 634, 5	2 148,6	2 280,0	1 390,0	2 268,6	35
Share of environmental taxes to total tax revenues, %	23,9	31,5	24,7	16,2	17,4	-
Share of environmental taxes in GDP, as a percentage	3,0	3,5	3,3	2,0	2,2	-
Note – compiled by authors based on (National Bureau of Statistics of Kazakhstan, 2023)						

The category "taxes on the use of resources" yields 21.5% of the total amount collected through environmental taxes. The revenue generated by these taxes in 2021 was 488.0 million tenge, a 71% increase over 2017. Over the previous five years, there has been a 53% increase in taxes on the utilisation of resources.

Transportation taxes include fees related to the use and ownership of vehicles. It is important to remember that energy taxes are different from transportation taxes in that they apply to petrol, diesel fuel, and other transportation fuels.

Although the percentage of revenue from transportation taxes in total environmental tax revenue is approximately 3,4% of the total budget revenue, this doesn't imply that vehicles have a diminished impact on environmental pollution. Statistical data indicates a rising trend in Kazakhstan in the collection of transportation taxes, attributed to the annual growth in the number of vehicles in the country.

As of November 1, 2023, the number of registered vehicles in Kazakhstan amounted to 5 million 216 thousand, of which 88 percent were passenger cars, 9.9 percent were trucks and 2.1 percent were buses.Наибольшее число автомобилей в Казахстане имеют солидный возраст.

As of March 1 of this year, more than 1 million 980 thousand passenger cars older than 20 years were registered in the country. And then in descending order:

- 20 years and older – 1,980,000 cars;
- from 10 to 20 years old – 867,378 cars;
- from 7 to 10 years old – 574,014 cars;
- from 3 to 7 years old – 356,223 cars;
- up to 3 years old – 250,590 cars.

Almaty region is among the leaders in age-related cars, 318,432 passenger cars older than 20 years are registered there. There are many such cars on the roads of Almaty (179,882 units), Karaganda region (157,646) and East Kazakhstan Region (154,179). There are much fewer old cars in Astana, 74,519 units. The largest young car fleet is registered in Almaty – 41,030 cars no older than three years. Next are Astana (33,635 units) and Karaganda and Almaty regions (15,643 and 15,428 cars, respectively).

In Kazakhstan, there are an average of 18.5 personal cars per 100 people. The lion's share of cars in the country is in private hands. Among passenger cars, this is 3 million 820 thousand 624 units (for legal entities – 213,823 cars), trucks – 279,927 (174,569), buses – 44,200 (51,383).

According to the Bureau of National Statistics, in Kazakhstan, the provision of a private car per 100 people is on average 18.5. The areas of East Kazakhstan (37.4), Almaty (31.1), and Karaganda (23.6) have the highest rates of personal car ownership among their residents. Furthermore, the individuals residing in the Turkestan (7.8), Kyzylorda (11.8) areas, and the city of Shymkent (10.8) are the most economically disadvantaged in the nation, omitting the population from newly established regions. The current value of this specific indicator is 20.3 in Almaty and 19.5 in Astana.

The transport tax, which is collected from car owners, goes to repair and maintain roads in the country. In Kazakhstan, currently, as everyone knows, the transport tax is calculated based on the volume of an automobile engine (Government of the RK, 2021). That is, it doesn't matter how often you drive on these very roads, wearing them out. Even if your car is parked in the garage for weeks, you have to pay the same as a neighbor who drives all day long if the engine capacity of your cars matches.

The authors propose a revision to this computation approach that takes into account the age, environmental classification, and volume of the vehicle. In addition to improving the method of calculating payments, this plan would classify it as an environmental tax, making it an instrument of environmental policy. In addition, these are examples of significant changes that have been made to the tax system and laws in order to protect the environment and ensure that it will continue to exist in the long run.

In neighboring Russia, there has been ongoing discourse regarding the fairness of the current format of the transportation tax. According to some opinions, a fairer approach would involve drivers paying based on the usage intensity of their vehicles. However, this payment wouldn't be in the form of taxes but rather through fuel excise taxes, where approximately 20% of the price per liter of gasoline constitutes the excise tax.

However, Kazakhstan has yet to establish a framework for an environmental tax, and there is no provision for it in the Tax Code of the Republic of Kazakhstan. Given the current state of the tax system in Kazakhstan, addressing this gap is imperative.

When it comes to human health and the ability to maintain human life, it is of the utmost importance to acknowledge that environmental degradation is generally associated with negative consequences. It is not the loss of nature itself that is the root cause of environmental problems; rather, it is the adverse effects that environmental degradation has on the well-being of humans.

The expanding proliferation of automobiles is a significant component in the worsening of the greenhouse effect, eventually leading to severe implications for the environment and further degrading living circumstances for the general public. Because of this, the primary goal of introducing an environmental tax is to reduce the losses that are paid by the general population. This entails:

- quantifying the monetary valuation of the environmental degradation engendered by the taxpayer;

- compensate these people or groups for their losses, serving as a form of monetary compensation for harms endured.

Conclusion

The shift towards environmental-focused taxation represents the integration of ecological concerns into the tax framework, where existing taxes acquire a supplementary role as instruments for environmental governance. This transformation enhances the socio-economic role of taxes within the national economy. Taxes start to affect manufacturing practices that society finds objectionable and encourage people to consume fewer products that hurt the environment. Revisions to Kazakhstan's transport tax computation methodology that would recast it as an environmental tax are consistent with the movement worldwide in taxes towards environmental sustainability.

Kazakhstan needs to define its own definition of environmental tax in this particular scenario. This is crucial from a theoretical and practical standpoint. Understanding the distinct categorization of environmental taxes among all tax contributions is crucial for grasping the avenues toward further reform of the Kazakh tax system. It assists in determining which taxes are appropriate for environmental designation, addressing the need to add new taxes and amend current ones, carrying out the nation's environmental policy more thoroughly, coming up with plans for using tax revenues, and guaranteeing the accuracy of comparisons with other countries.

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