

Issues of environmental changes and transportation

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Abstract. Environmental changes, driven predominantly by anthropogenic activities, significantly impact air quality, with the transport sector contributing around 40% of emissions. This paper explores the integration of green logistics and green finance as pivotal strategies to mitigate environmental pollution associated with transportation. The methodology combines research, policy development, public awareness, infrastructure improvements, and stakeholder collaboration to promote sustainable transport solutions. Statistical data highlights the increasing production of vehicles and the harmful emissions they generate, emphasizing the urgent need for effective regulation. Analysis reveals that toxic substances from vehicle exhaust, such as nitrogen oxides and carbon monoxide, pose severe health risks. Recommendations for reducing emissions include enhancing vehicle standards, improving waste treatment technologies, and fostering the use of alternative fuels. The findings underscore the necessity for a comprehensive ecological regulation system in Uzbekistan to safeguard natural ecosystems and improve air quality, illustrating a commitment to sustainable development. This approach aims not only to reduce pollution but also to promote economic growth through green practices, ultimately contributing to a healthier environment for current and future generations.

1 Introduction

Atmospheric layers surrounding the globe are undergoing fundamental anthropogenic changes: the gas composition and properties of the air are changing; the erosion of the ozone layer in the ionosphere and stratosphere continues, the atmosphere is regularly saturated with dust and gas particles. The lower layer of the atmosphere close to the earth's surface is oversaturated with harmful gases released by industry, transport and other economic activities, which are dangerous for living organisms [1].

According to statistics, by the 21st century, humanity is emitting 170 times more harmful gases into the atmosphere than it naturally pollutes with harmful gases. Among the four main

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factors that cause this, the largest share falls on the transport sector - 40%, agriculture and household services - 24%, and the energy industry. -20%, production - 14% [2].

2 Literature review

According to foreign scholar Susan Wong, green logistics is the key to achieving sustainable economic growth by minimizing the environmental impact of supply chain operations. [1] This requires a holistic approach, integrating innovative technologies, renewable energy sources and effective resource management.

Finance represents a paradigm shift in the financial industry that aligns economic goals with environmental sustainability. Also, green finance offers investment opportunities that promote clean technologies, renewable energy and environmentally friendly practices, and pave the way for the transition to a low-carbon economy. [2]

In recent years, attention to the problems of interaction of society with the environment has increased sharply. At this point, the adoption of the new version of the Law of the Republic of Uzbekistan "On Road Traffic Safety" dated February 25, 2021 No. DUR-677 and the requirements of the law on the impact of vehicles on the environment A clear example of this is the fact that special attention is paid to it [1]. In addition, in the textbook "Safety and ecology of life activities" by M.S. Sapayev and F.M. Kadirov and "Traffic rules and safety" by J.R. Qulmuhamedov, K.M. Nazarov, R.S. Hikmatov, Sh.A. Shoislomov. in the training manuals, there is a detailed consideration of reducing the impact of vehicles on the environment [5-10].

3 Research methodology

The methodology for addressing issues of environmental changes and promoting green transport typically involves a multi-faceted approach that combines research, policy development, public awareness campaigns, and infrastructure improvements. Here are some key components of the methodology:

1. Research: Conducting comprehensive research on the environmental impacts of transportation and identifying key areas where improvements can be made to reduce emissions and promote sustainability.

2. Policy development: Developing and implementing policies at the local, regional, and national levels that incentivize the use of green transport options, such as public transportation, biking, walking, and electric vehicles.

3. Public awareness campaigns: Educating the public about the benefits of green transport options and encouraging behaviour change through targeted messaging and outreach efforts.

4. Infrastructure improvements: Investing in infrastructure projects that support green transport options, such as building bike lanes, improving public transportation networks, and installing charging stations for electric vehicles.

5. Collaboration: Working with stakeholders from government, industry, academia, and civil society to develop holistic solutions to environmental challenges related to transportation.

By employing these methodologies in a coordinated manner, it is possible to address issues of environmental changes and promote sustainable modes of transport that reduce emissions and protect our planet for future generations.

4 Analysis and results.

The share of the transport sector in environmental pollution has increased in recent years, because the car production index in the world is increasing year by year. In 2000-2005, the

average annual car production was around 60 million. After 2010, we can observe that the production increased sharply. in particular, 77.86 million cars were produced in 2010, 90.78 million in 2015, 95.7 million in 2020, 90.864 million in 2021, 77.62 million in 2022, and 79 million in 2023 [3].

If a car travels 15,000 km per year, it burns 1.5-2 tons of fuel and 25-30 tons of air. Indicators comparing the harmfulness of exhaust gases from gasoline and diesel engines are presented in Table 1 [4].

Table 1. Exhaust gases from gasoline and diesel engines [9].

Substances in waste gases	The composition of exhaust gases, %	
	Gasoline	Diesel
Nitrogen N ₂	74-77	76-78
Oxygen O ₂	0,3-8,0	5-18
Water is H ₂ O	3,0-5,5	0,5-4,0
Carbon dioxide CO ₂	5-12	1-10
Carbon monoxide CO	1-10	0,02-0,50
Nitric oxide N _x O _y	0-0,8	0,001-0,400
Hydrocarbons C _x H _y	0,20-0,30	0,1-0,10
Sulfur gas	0-,002	0-,03
Karakorum, g/m ³	0-0,04	0,1-1,5
Benzopyrine, g/m ³	0,0002	0,00001

Carbon monoxide is a colorless, odorless gas. After entering the respiratory tract, it is absorbed into the blood and combines with hemoglobin to form carboxyhemoglobin, which combines 210 times faster than oxygen in this reaction, resulting in oxygen deficiency.

Nitrogen oxides are a mixture of various oxides. The most dangerous of these is NO₂. Nitrogen oxides disrupt the work of the lungs and bronchi. Children and adults with cardiovascular disease are more affected.

Sulfuric anhydride is a colorless gas with a sharp smell, it dissolves well in water and forms sulfuric acid. Even if it is in a small amount for a long time, it increases cardiovascular disease and causes death, bronchitis, asthma and other respiratory diseases.

Hydrocarbons are a group of X_xNu type compounds, which smell when used, enter into a photochemical reaction with nitrogen oxides, and form smog. Benz(o)pyrene-polycyclic aromatic hydrocarbon is a crystalline product that is poorly soluble in water under normal atmospheric conditions. does.

Soot is a solid composition of waste gases, consisting mainly of carbon particles. There is no direct danger to humans, it only pollutes the air and makes it unpleasant.

Lead compounds are formed only when tetraethyllead (TEQ) is added to gasoline as an anti-knock additive. It enters the human body through the respiratory tract, skin and food, gradually accumulates, damages the nervous system, blood-forming organs [5].

According to scientists' calculations, the oxygen in the air is currently 21%, and if this amount decreases to 14%, almost most living organisms, including humanity, will fall into a critical state. To prevent this global problem, scientists and researchers for energy devices they recommend the economical use of spent oxygen or the use of other alternative and harmless types of energy [6, 7]

Negative processes related to the road transport complex are partially or completely eliminated by solving a number of engineering technical issues, including: introduction of zero-residue technologies;

improvement of waste treatment methods; finding the optimal mode of combustion of the fuel-air mixture; it can be solved by effectively using unconventional and alternative fuels [8-21].

It is necessary to carry out research on the environmental processes related to the vehicle transport complex, to scientifically substantiate the generalized criteria for ecologically evaluating the factors that have a harmful effect on the environment, and to perform the following tasks:

1. Development of a perfect ecological structure of the vehicle transport complex;
2. Based on the physical and chemical characteristics of the harmful wastes released into the environment by the organizers of the motor transport complex, development of their systematic and classification table;
3. Creating mathematical models of the matter and energy exchange process between the vehicle transport complex and the natural environment and finding solutions that satisfy the relevant conditions;
4. Improving the methods of accounting for the consumption of natural and energy resources consumed by the vehicle transport complex and the amount of waste emitted into the environment;
5. Development and implementation of a generalized comparative evaluation criterion that provides an opportunity to compare several independent objects within the vehicle transport complex.

When creating the algorithm of the ecological structure of the motor transport complex, it is taken into account that the natural environment consists of biogeocenosis and ecotope, the amount of natural and energy resources and operational materials consumed during the operational activity of the motor transport complex as input parameters, the amount of all types of waste discharged into the ecotop during the operation of the motor transport complex and are interpreted as output parameters. Wastes and negative events used in this are divided into five groups depending on chemical, physical and other influencing characteristics:

- 1) gaseous substances;
- 2) waste liquids;
- 3) solid powdery substances;
- 4) biogeological effects;
- 5) physical phenomena.

Logistics refers to the integration of environmentally friendly practices and principles into the entire supply chain process, including transportation, storage, packaging, and distribution [3]. Green logistics aims to minimize the environmental impact of logistics activities by reducing carbon emissions, optimizing transport routes, promoting energy efficient practices and adopting sustainable packaging materials. Also, green logistics not only contributes to the mitigation of climate change and the conservation of natural resources, but also brings economic benefits by increasing operational efficiency, reducing costs, and increasing the reputation of enterprises as environmentally responsible entities.

On the other hand, green finance refers to financial instruments, mechanisms and practices that support environmentally sustainable projects and initiatives [4]. This includes channeling financial resources to investments that promote renewable energy, energy efficiency, waste management, clean technologies, and other environmentally beneficial activities. Financing can also take many forms, including green bonds, green loans, venture capital for green startups, and government incentives or subsidies for sustainable projects [5]. By channeling capital into sustainable activities, green finance plays a critical role in the transition to a low-carbon and resource-efficient economy.

The relevance of green logistics and green finance lies in their potential to address pressing environmental issues such as climate change, pollution and resource depletion. They provide practical solutions and financial support to businesses, organizations and governments to contribute to achieving global environmental goals while adopting sustainable practices.

In addition, green logistics and green financing have the ability to stimulate innovation, create green jobs, and stimulate economic growth in areas related to sustainability and environmental protection. They encourage businesses to adopt more sustainable and socially responsible practices, thereby increasing their competitiveness and market position in a world where consumers are increasingly concerned about the environment.

The relevance of green logistics and green financing is due to the urgent need to solve environmental problems, promote sustainable development and create a stable and sustainable future for current and future generations.

Various studies on green logistics and green financing have been conducted by foreign scholars to propose solutions to achieve sustainability in the logistics and finance sectors, and they have been systematized as follows.

Environmental Impact Assessments analyze the environmental impact of logistics activities and financial practices, assessing carbon emissions, energy consumption, waste generation and resource use. They identify the environmental impact of logistics operations and financial investments, identify areas for improvement, and propose mitigation strategies.

Sustainable supply chain management focuses on integrating green practices into supply chain management, including logistics and procurement [6]. Researchers are exploring ways to optimize transportation routes, reduce waste, improve energy efficiency, improve environmentally friendly packaging and recycling, and improve reverse logistics for waste management. They examine the impact of sustainable supply chain practices on cost savings, customer satisfaction, and environmental performance.

Green Technologies and Innovations explores the technological advances and innovations that support green logistics and finance. This includes research on electric and hybrid vehicles, alternative fuels, intelligent transportation systems, renewable energy solutions, green packaging materials, and digital platforms for efficient supply chain management and financial transactions.

Financial Instruments and Mechanisms Explore the various financial instruments and mechanisms that facilitate green financing, such as green bonds, sustainability-related loans, impact investing, and carbon markets. They assess the feasibility, scalability and effectiveness of these tools in attracting capital for sustainable projects and promoting green practices in logistics and other sectors.

Stakeholder collaboration and engagement is focused on collaboration to promote green logistics and financing. Researchers examine the role of governments, businesses, financial institutions and civil society in promoting sustainable practices. They analyze strategies for developing cooperation, knowledge sharing, and collective action to achieve shared sustainability goals.

It also contributes to the knowledge base of green logistics and green finance, providing insights and recommendations to policymakers, businesses and other stakeholders to adopt sustainable practices and move towards a low-carbon and environmentally responsible future.

The practice of state management of the motor transport complex and nature protection activities adopted in our republic currently has the main directions of solving the problems of ensuring the environmental safety of motor transport, the lack of a clear distribution of relevant powers between state bodies, enterprises and organizations, the absence of effective economic mechanisms, high environmental characteristics allows to stimulate the production and use of motor vehicles [6]. The low efficiency of the current system of ensuring the

environmental safety of road transport is primarily due to the fact that the current environmental protection legislation is focused on the problems of stationary pollution sources and does not take into account the specific characteristics of transport activity - the large and growing number of motor vehicles, their high mobility and continuous use in densely populated areas.

In order to improve the ecological situation, attention should be paid to the following:

- permanent reduction of technical standards of vehicle emissions;
- introduction of environmental classification for use in organizing environmental control of motor vehicles and setting restrictions on the use of motor vehicles;
- environmental classification of motor vehicles and measures to increase their environmental class;
- taking measures to ensure the environmental safety of motor vehicles in the sale of motor fuel;
- measures for the organization of traffic, reconstruction of the street network, regulations for the maximum permissible concentration of pollutants in the atmosphere and the introduction of areas with limited use of motor vehicles if the maximum permissible noise levels caused by motor vehicle traffic are excessive in the area of residential buildings to see
- environmental control of motor vehicles taking into account the environmental class;
- quality control of motor fuel during their retail sale. In modern conditions, the number of vehicles and the number of passengers and cargo carried by them is increasing, maintaining the cleanliness of the environment is the most important task.

The study of various aspects of this problem is carried out in many areas, where the limitation of negative effects is usually distinguished and highly specialized.

Obviously, there is no single type of solution to the problem of pollution, and the optimal solution can only be made based on the study of the set of interrelated factors that determine the level of impact mentioned above.

Complete observations and analyzes of urban planning project practice show that in the development of residential planning projects, first of all, it is necessary to give a hygienic assessment to the projected aeration regime, as well as the expected level of atmospheric air pollution [6-7]. Since there is a functional connection between these factors, the quality of ventilation of the street space should be evaluated from the point of view of human heat sensation and the level of pollution of atmospheric air that meets the sanitary standards.

Due to the negative impact of transport, the reduction of population in the megalopolis is achieved as a result of wider implementation of transport and urban development activities. This includes: transfer of transit flows of vehicles to the network of high-speed highways located in the outskirts of the city and in the agglomeration area; development and construction of new routes of modern non-personal transport types (Monorail system, light metro, River trams, etc.); formation of a system of transport and transplant nodes equipped with park stops; creation of traffic-free areas in Central planning areas with intensive pedestrian traffic [8].

Studying the best practices in the field of transport policy allows to identify the main areas of improvement that will help the development of the city in the main aspects of the operation of the transport system.

Roads, like other technical structures, directly affect the environment by changing the parameters of natural systems. From the point of view of environmental safety, the most important structural traffic pollution, land removal and zoning are important for the design and operation of roads. Environmental safety is one of the main indicators of investments aimed at the development of highways.

Environmental safety of a highway (its ecologically safe state) means the ability to ensure minimal harmful effects and pollution of the natural environment of the areas around the roads formed by the engineering structures and structures of the highway and their impact on

the activity of motor transport. The ecologically favorable condition of the road is the following indicators:

1. Technical condition of roads and road structures.
2. The degree of pollution of the natural environment along the road.
3. The effect of the technical condition of the road on the release of harmful substances in road transport.

Environmental safety of highways is achieved by developing and applying design documents for construction, reconstruction, repair and maintenance of technical solutions that have a negative impact on the environment, which has a harmful effect on public health. does not show, irreversible changes in the natural environment, deterioration of people's socio-economic living conditions.

Conclusion

Currently, in the Republic of Uzbekistan, a scientifically-based ecological regulation system is being developed and put into practice in order to prevent ecological danger or ecological degradation caused by the organizers of the automobile transport complex. Standardization of harmful effects on the environment introduces requirements for the sources of environmentally hazardous waste used in the motor transport complex and ensures that they do not exceed certain threshold amounts. Environmental standardization takes into account permissible loads on natural ecosystems, that is, harmful sources of the motor vehicle complex should not significantly affect the way of life of living organisms and should not allow deterioration of the quality of the natural environment.

In conclusion, the Republic of Uzbekistan is taking proactive measures to develop and implement a scientifically-based ecological regulation system in order to prevent ecological dangers and degradation caused by the automobile transport complex. By standardizing harmful effects on the environment and setting thresholds for environmentally hazardous waste, the country aims to protect natural ecosystems and ensure the quality of the environment is not compromised. This approach demonstrates a commitment to sustainable development and environmental conservation in Uzbekistan.

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