ROAD TRANSPORT IS THE MAIN SOURCE OF ENVIRONMENTAL POLLUTION IN THE CITY

Shukurov Nuritdin Rakhimovich
Candidate of Technical Sciences, Associate Professor Academy of the Ministry of Internal Affairs of the Republic of Uzbekistan

Abstract: *Air pollution from automobile transport, a crucial element of city functioning, has recently become one of the most pressing problems facing megacities. This article examines the causes of air pollution from automobile transport, as well as ways and measures to reduce the concentration of harmful substances in the atmosphere. An assessment is made of the impact of motor vehicles on the environmental condition of the Tashkent air basin. Comprehensive measures are proposed to reduce anthropogenic impacts, including tightening environmental standards for imports and promoting electric transport.*

Keywords: *air pollution, gross emissions, environmental standard, environmental protection, automobile transport, air pollution sources, vehicle fuel, dust, exhaust emissions.*

INTRODUCTION

At present, in the context of scientific and technological progress and the intensification of industrial production, the problems of environmental protection have become one of the most important national tasks, the solution of which is inextricably linked with the protection of human health. For many years, the processes of environmental degradation were reversible. affected only limited areas, individual areas and were not of a global nature, therefore, effective measures to protect the human environment were practically not taken.

In recent years, irreversible changes in the natural environment or dangerous phenomena have begun to appear in various regions of our planet. In connection with the massive pollution of the environment, the issues of its protection from regional, intrastate have grown into an international, global problem. All developed countries have identified environmental protection as one of the most important aspects of humanity's struggle for survival [1].

The advanced industrial countries have developed a number of key organizational, scientific and technical measures for environmental protection. They are as follows: identification and assessment of the main chemical, physical and biological factors that adversely affect the health and performance of the population, in order to develop the necessary strategy to reduce the negative role of these factors; assessment of the potential impact of toxic substances polluting the environment in order to establish the necessary risk criteria for public health; development of effective programs to prevent possible industrial accidents and measures to reduce the harmful effects of accidental emissions on the environment. In addition, of particular importance in environmental protection is the establishment of the degree of danger of environmental pollution for the gene pool, in terms of the carcinogenicity of some toxic substances contained in industrial emissions and

waste. Systematic epidemiological studies are needed to assess the risk of mass diseases caused by pathogens contained in the environment [2].

In recent years, air pollution in Uzbekistan has become a pressing problem. Air pollution occurs throughout the year, but especially becomes more acute in autumn. A long period of absence of precipitation, weak winds, temperature inversion contribute to the stagnation of atmospheric air, create conditions for the accumulation of pollutants.

Air pollution with dust in the Republic is associated not only with natural features (dry climate, sandy and loamy soils), but also with anthropogenic pollution (vehicle emissions, industry, construction, thermal power plants). Low ventilation of the atmospheric space in the city of Tashkent, congestion of roads with urban transport, large-scale construction, as well as cutting down trees, lack of widespread watering of lawns and highways - all this combination of meteorological conditions and anthropogenic load leads to high air pollution [3].

Road transport emits 200 pollutants into the air, including carbon monoxide, aldehydes, soot, nitrogen oxides. Accumulating in the surface layer (human breathing zone), these substances react under the action of ultraviolet rays, becoming the starting products for the formation of new, sometimes even more toxic compounds.

As of July 1, 2025, there were 4,612,700 registered vehicles owned by individuals in Uzbekistan. This is 441,500 more than the previous year. According to the National Statistics Committee, the vast majority of the vehicle fleet (93%) are passenger cars – 4,289,000 units. There are 302,600 trucks, 7,700 minibuses, 7,300 special vehicles, and 6,100 buses [4].

Furthermore, the daily influx of out-of-town and transit vehicles is estimated at an additional 150,000-200,000 vehicles.

Car imports into the country are also growing: from 30,000 in 2022 to 74,500 in 2024. In January-September 2025, Uzbekistan imported 56,300 passenger cars from 29 countries. This increase in imports, including low-emission vehicles, directly impacts air quality in the capital [5].

In recent years, there has been a rapid increase in interest in electric vehicles, with their share of deliveries reaching 7% in 2024, a positive factor supported by the exemption from customs duties. In the first nine months of 2025 (January-September), Uzbekistan imported 40,345 electric vehicles from 16 countries, almost 2.5 times more than in the same period last year. According to the results of the first 10 months (January-October 2025), 47,264 electric vehicles have already been imported, exceeding the total imports for the entire 2023-2024 [6].

According to the Tashkent City Department of Ecology and Environmental Protection, the volume of pollutant emissions into the atmosphere in Tashkent last year amounted to approximately 426,000 tons. Motor vehicles accounted for 395,000 tons, or more than 90% of these emissions [7].

Resuspension emissions, which are the airflow from moving vehicles that stir up road dust, sand, and other sediments from the road surface, also contribute to air pollution in the capital. In Tashkent, where soil and construction dust are abundant, this mechanism is critical (Tab. 1).

Table 1

Pollutant	Average Annual Concentration (Approximately)	Average annual MAC (Approximately)	WHO standard
PM2.5	30-45 мкг/м3	25 мкг/м3	5 мкг/м3
PM10	50-70 мкг/м3	50 мкг/м3	15 мкг/м3

Table 1 shows that actual average annual PM2.5 concentrations in Tashkent exceed WHO standards by 6-9 times, indicating a high risk to public health.

The highest PM2.5 peaks are observed in winter (due to temperature inversions and heating) and during periods of heavy traffic, confirming the significant impact of motor vehicles combined with adverse weather conditions..

Nitrogen oxides, primarily NO and NO_2, are a direct indicator of vehicle emissions, especially from diesel and gasoline engines:

– Distribution: NO2 concentrations reach their highest values along major city thoroughfares (e.g., Babur Street, Small Ring Road, Amir Temur Avenue).

– Hotspots: significantly elevated NO2 levels are observed at intersections and areas with long traffic jams, where engines are idling or accelerating.

– "Street canyon" problem: in densely built-up areas, tall buildings along roads impede NO2 dissipation, creating zones with chronically elevated pollution.

Carbon monoxide (CO) is formed during incomplete combustion of fuel. It is a key pollutant for older, unregulated vehicles:

● CO is the dominant mass emission from vehicles in Tashkent.

● CO levels in heavy traffic areas can exceed the maximum permissible limit by 1.5–3 times during peak hours.

● Correlation with vehicle condition: high CO concentrations directly indicate poor vehicle maintenance and missing or faulty catalytic converters.

To visualize and localize the problem, a transport-ecological zoning method was used:

➢ Zone A (Critical Pollution): Main thoroughfares and intersections (MKAD, central avenues). Characterized by peak concentrations of CO, NO_x, and PM.

➢ Zone B (Increased Pollution): Residential areas adjacent to Zone A, where pollutants are partially dispersed.

➢ Zone B (Conventional Background): Parklands and remote areas used to establish a baseline (background) pollution level.

This method allowed us to accurately determine that air pollution in Tashkent is a localized problem closely linked to traffic intensity and traffic flow management.

Effectively reducing the impact of motor vehicles requires a comprehensive approach that includes technological, infrastructural, and regulatory measures (Tab. 2).

Table 2

Regulatory and technological measures

Direction	Recommendation	Justification
Fleet Standards	Implementation of the Euro-4 (or higher) standard for entry/import. Establish a gradual ban on the import of vehicles below Euro-4, with subsequent tightening to Euro-5.	Low emission class vehicles are the main source of CO, NOx, and PM. This will reduce gross emissions.
Emission Control	Regular, impartial technical inspections using precise gas analyzers.	Preventing the use of vehicles with faulty catalytic converters.
Fuel	Improved fuel quality. Transition to low-sulfur Euro-5 fuel.	Sulfur impairs catalytic converter performance and increases PM emissions.
Promotion of Electric Vehicles	Tax incentives and free parking for electric vehicles; subsidies for the purchase of electric buses.	Direct replacement of internal combustion engines, reducing local pollution to zero.

For the rational development of transport infrastructure and traffic management, the following measures are recommended (Tab. 3).

Table 3 Development of Transport infrastructure and traffic management

Direction	Recommendation	Rationale
Public Transportation	Priority for public transport. Dedicated lanes for buses and minibuses; fleet upgrade to Euro-5 and electric buses.	Increasing the speed and attractiveness of public transport, which encourages people to move away from their personal cars.
Flow Management	Implementation of Intelligent Transport Systems (ITS). Use of adaptive traffic lights that manage traffic flow in real time.	Reducing the time spent in traffic jams, where emissions are highest.
Traffic Zoning	Introduction of a toll charge (TC) or restriction of transit traffic for freight transport in central areas during rush hours.	Reducing the concentration of pollutants in places with the highest concentration of people.

It should therefore be emphasized that the rapid growth of the vehicle fleet, fueled by both domestic production and increased imports, is the main catalyst for the air quality crisis, despite the encouraging, but still insufficient, growth rate of the share of electric vehicles.

Conclusion

To reduce the amount of harmful emissions, the country's authorities are taking the following measures: annually, under the program of the month “Clean Air”, at all points of the road patrol service of the republic on the central streets, special equipment will carry out environmental monitoring of the amount of harmful substances emitted into the atmosphere by motor vehicles running on gasoline, diesel fuel, compressed natural and

liquefied gas; increase the number of electric vehicles for personal use of citizens; increase the number of buses and electric buses, which will serve to reduce emissions of toxic substances into the air, since these types of public transport are considered environmentally friendly.

In addition, due to the long absence of precipitation and a large anthropogenic load in the city, it is necessary to pay more attention to watering and cleaning roads, measures to reduce the dust content of construction sites, and timely garbage collection. To improve air quality in Tashkent, it is necessary to take additional measures to green and beautify the city.

REFERENCES:

1. N.R. Shukurov. Road Transport is the Main Source of Environmental Pollution / International Journal on Orange Technologies (IJOT). – Indonesia. –Volume: 05, №5 (2023). – P.105-107.

2. Jekologicheskaja i tehnosfernaja bezopasnost'. URL. https://www.geol.vsu.ru/ecology/Science/Tutorials/2017/EcoTehnoSafety1.pdf (date of access: 06.11.2025).

3. Information on air pollution in Tashkent. URL. https://gov.uz/ru/eco/news/view/11891 (date of access: 06.11.2025).

4. Sh.A. Makhmudov, L.Z. Usmanova. Assessment of the contribution of various sources to air pollution in Tashkent / Problems of environmental protection and rational use of natural resources, 2019. –№24(1), – P.112-125.

5. The number of cars in Uzbekistan has grown by almost half a million in a year. URL.https://podrobno.uz/cat/obchestvo/chislo-avtomobiley-v-uzbekistane-vyroslo-pochti-na-polmilliona-za-god/ (date of access: 06.11.2025).

6. Car imports to Uzbekistan have increased. URL. https://zamin.uz/ru/auto/167160-import-avtomobiley-v-uzbekistan-vyros.html. (Date of access: 06.11.2025).

7. State Statistics Committee of the Republic of Uzbekistan (Goskomstat). Statistical Bulletin: Transport and Communications in the Republic of Uzbekistan, 2024. – Tashkent.