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## **Increasing environmental safety of urban buses**

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Ecology is a science that studies the relationship between animate and inanimate nature. It is an integral part of modern society, especially in the context of technological progress and development. Environmental safety is considered the determining factor, since environmental protection is a priority task of our society [1].

Road transport is causing enormous damage to our habitat. The main source of pollution is the internal combustion engine. However, not only the products of combustion of the fuel cause the damage during its operation, but also by liquids intended for the operation of the engine. Antifreezes are a good example. These fluids in their composition have ethylene glycol, which when ingested causes poisoning. However, the main hazardous source of pollution directly to humans is waste gas. They are the source of benzo[a]pyrene, tetraethyl lead and carbon dioxide. When ingested into a person with inhaled air, they cause immunodeficiency and lung cancer.

Modern researches of influence of cars on ecology and human body revealed that waste gases are a source of carcinogenic substances. These substances in turn lead to the development of cancer. In this regard, the "International Environmental Community" has tightened the requirements for car manufacturers and increased the permissible standards of emissions of harmful substances into the atmosphere, and called for the development of transport on alternative energy sources.

Currently, most types of vehicles, including cars and trucks, locomotives and tractors, regulate and control the following types of emissions: nitrogen oxides (NO<sub>x</sub>), total hydrocarbons (THC), non-methane hydrocarbons (NMHC), carbon monoxide (CO) and solid particles (PM). For each vehicle type, different standards apply. Compliance is determined by starting the engine with a standardized test cycle. Inadequate vehicles cannot be sold in the EU, but new standards do not apply to vehicles already on the road.

The Euro emission standard is a mandatory standard that is in force in the European Union. Currently, the latest Euro 6 standard is in place, which should help eliminate most of the undesirable substances that affect air quality. However, already this year a new, more stringent Euro 7 emission standard will be

introduced into the EU. For this reason, some alternative fuels have been used in this sector. A study was conducted in which the emissions of a diesel engine of a vehicle during the application of experimental fuels were investigated. The experimental engine was equipped with a turbocharger and direct fuel injection. At the testing stage, additional studies were carried out with partial combination of two types of fuel in different proportions, which also gave positive results [2].

In one study of CO<sub>2</sub> and NO<sub>x</sub> emissions, samples were taken from 149 diesel, gasoline and hybrid Euro cars 5 and 6 using a portable emission measurement system. The choice of models accounted for 56% of all cars sold in Europe in 2016. It was found that gasoline cars had CO<sub>2</sub> emissions of 13-66% higher than diesel. During urban driving, the average CO<sub>2</sub> emission factor was 210.5 g / km (-1) for gasoline and 170.2 g / km (-1) for diesel fuel. Direct injection of gasoline (GDI). The Euro 6 GDI <1.4 l engines were delivered in a similar manner to a 17% reduction in emissions compared to conventional fuel injection (PFI). Gasoline vehicles have reduced NO<sub>x</sub> emissions by 86-96% compared to diesel vehicles. The average value of urban diesel was 0.4 times (0.44) g / km (-1) 11 times higher than for gasoline 0.04 (0.04) g / km (-1). Also, two petrol-electric hybrids were analyzed for NO<sub>x</sub> and CO<sub>2</sub>, which were used both for gasoline and diesel fuel. Based on the results of the study, it was reported that replacing diesel with gasoline would lead to significant CO<sub>2</sub> emissions, but an increase in the fleet of hybrid vehicles would lead to a reduction in CO<sub>2</sub> and NO<sub>x</sub> emissions [3].

In the Republic of Kazakhstan, the first steps towards the adoption of international environmental standards are the adoption of a technical regulation on the requirements for emissions of harmful (polluting) substances of motor vehicles being released into circulation on the territory of the country under the number №1372 on December 29, 2007. This decree provides for the phased introduction of environmental standards. At the moment, an ecological standard of the Euro-4 class operates on the territory of the country, however, the ecological situation continues to be in a deplorable state, which in turn leads to the need for comprehensive measures aimed at improving the environmental component [4].

Based on this, first, it is necessary to introduce means and methods for reducing the amount of exhaust gas emissions in relation to public transport. One way is to use a reservoir for collection and subsequent filtration of exhaust gases, which will reduce the damage to the environment.

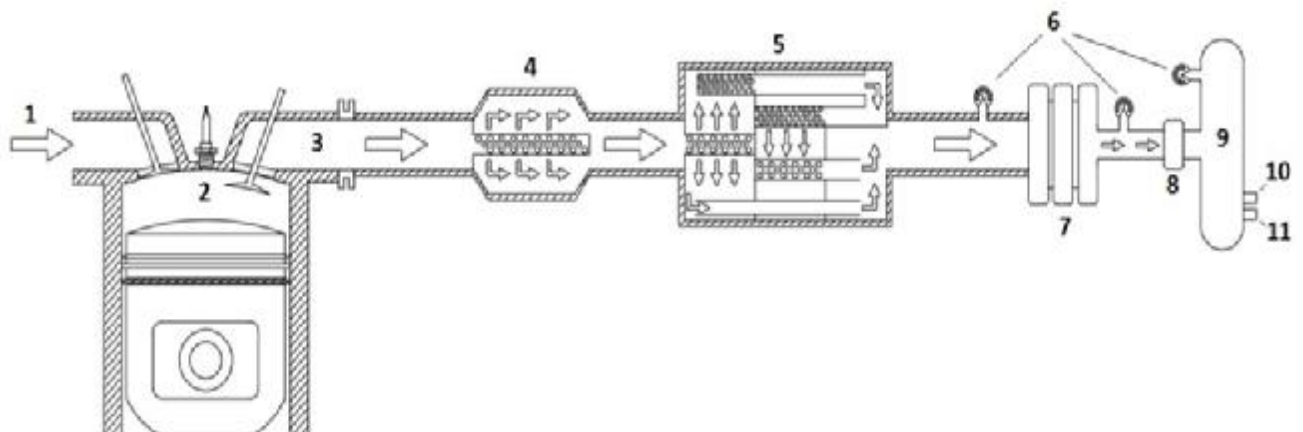


Figure 1 - Schematic diagram of the work:

inlet 1, combustion chamber 2, exhaust manifold 3, resonator 4, silencer 5, pressure sensors 6, compressor 7, single-acting valve 8, storage tank for exhaust gas 9, connection for pumping exhaust gas 10, emergency relief valve 11.

The operation of this device is carried out as follows: the exhaust gases from the combustion chamber 2 through the exhaust valve enter the exhaust manifold 3, then they pass through the resonator 4 and the silencer 5, then the exhaust gases enter the compressor 7, whose operation is regulated by the pressure sensors 6, the gases under pressure pass through the single-acting valve 8 and enter the reservoir 9 where they accumulate. The reservoir has a choke 10 for pumping waste gases at processing stations, and has an emergency pressure relief valve 11.

List of used literature

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