

TECHNOLOGY, MACHINE-BUILDING, GEODESY

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**PROSPECTS AND POSSIBILITIES OF NATURAL GAS
AS THE UNIVERSAL ENERGY SOURCE OF THE FUTURE****OLGA ATROSHCHENKO**
Polotsk State University, Belarus

Natural gas plays one of the main role in global energy consumption, being relatively affordable, ecological and reliable source of energy. Prospects and possibilities of natural gas as the universal energy source of the future does not cause any doubt.

Environmental problems, shortages and high prices on gasoline forced many countries to actively transfer vehicles to alternative fuels. Very often the choice falls on natural gas, which is one of the most environmentally friendly and cheap sources of energy. Practice shows that the use of natural gas as a motor fuel leads to a more rational use of natural resources, small business development, improves budget efficiency and living standards of the population.

Judging by the high growth rates of the world gas market in the last decade, it can be argued that the transfer of the vehicles to gas fuel is a global trend, which in the near future will continue to skyrocket.

The main benefits of using natural gas as a motor fuel can be divided into environmental, resource, technical and economic.

Gasification of road transport is primarily caused by the need to improve the ecological situation in the major cities, whose inhabitants are choking with smog. Due to air pollution, which is estimated from 50 to 90% caused by the emission of harmful substances when operating vehicles, people often suffer from respiratory diseases, cancer and other serious diseases.

Natural gas is the purest among hydrocarbon fossil fuels. When burnt it forms only water and carbon dioxide, while combustion of petroleum products and coal forms more soot and ash. The research of Swedish ecologists has shown that natural gas is 75% better than diesel fuel and 50% than gasoline; at 60% less harmful to humans, contains practically no carcinogenic components; at 60-80% less destroys the ozone layer; at 50% less contributes to acid rain.

Cars on gas fuel reduces emissions of carbon dioxide (the main greenhouse gas) to 13%, nitrogen oxides – at 15–20%, at 8–10 times reduces the opacity of the exhaust gases and completely eliminates emissions of lead compounds. The use of natural gas in modern engines with minimal modifications allows to reach the emission standards, Euro-compliant 5.

The technical advantages of the use of natural gas include: oil change frequency (increases in 1.5–2 times); his performance (reduced consumption 15-20%); resource engine (increased by an average of 35%); service life of spark plugs is increased by 40%; service life of the engine and overhaul mileage increases; excludes detonation engine (due to its high octane rating of methane).

Economic benefits of gaseous motor fuel are determined by the costs of its production (production and transportation to service stations) and the prices of compressed natural gas (CNG). A peculiarity is that obtained from the bowels of the gas is used almost without further processing. This determines its relative low cost compared with other products of oil processing, such as petrol and diesel. According to the decision taken in the year 2016 in the Republic of Belarus ecological tax rates, by burning CNG as fuel payments drop twice, when using liquefied natural gas-and-a-half.

Table 1 presents data on an average fuel consumption by road transport, depending on the type of vehicle. When calculating the benefits when used CNG, for example, for a passenger car (taxi) have adopted the following assumptions: a daily mileage is 200 km, average cost per RB 1 l gasoline –11000 rub., and 1 m³ gas-6500 rub. Thus, operating costs when using gasoline as fuel, would amount to 101.981 million. USD/year, while using gas as fuel 63.583 million. USD/year. The annual savings on fuel would be approximately 38.398 million. USD/year.

From the table 1 it is possible to draw a conclusion about transfer of the car on gas fuel: even if there are some big expenses, there are profits, as well, because of the price of gas. This trend can be seen with other modes of transport.

When using gas as a motor fuel is reduced operating costs and cost of transport work. The amount of funds being released annually by switching to cheaper fuel is comparable with the cost of renovations to the vehicle. Transfer of vehicles with high lifetime and have, in view of the technical condition of the engines,

increased fuel consumption is most effective, since in this case the payback period decreases due to the effect on the fuel component.

Table 1 – Expenses motor fuel by motor vehicles

Type of vehicle	Fuel consumption per 100 km			
	gasoline, l	diesel, l	liquefied gas, l	compressed gas, m ³
trucks	25	34,1	39,7	30,3
buses	31	34,2	44,2	41,7
cars	12,7	12,3	16,8	13,4

One of the main issues in transition of road transport to gas fuel is a question of the feasibility of retrofitting for the use of compressed and liquefied petroleum gas. But about the fundamental criterion for calculating economic impact during operation cars on gas fuel is to reduce operating costs.

In the Decree of the Council of Ministers of the Republic of Belarus from 10.16.2003 No. 1331 "On the use of gas as a motor fuel for motor vehicles" on this day, is an example of the calculation of the economic impact of the use of gaseous motor fuel. The calculation results are presented in table 2.

Table 2 – Example of calculating the economic effects transfer of different types of vehicles to natural gas in the conditions prevailing in fuel prices and gas equipment

	Vaz-2106	GAS-31	Gaz-3302
Annual mileage, thousand km	25	25	30
Annual fuel consumption, l	2250	3250	5100
The annual savings on fuel, mln rub.	6.27	16.2	25.4
The cost of the CNG equipment, mln rub.	15	16.3	18
Payback, months	29.9	16.1	12.3

The use of natural gas is important in the commercial and public sectors. Reducing fuel costs gives a quick economic effect. In some regions of Russia all public transport has been translated into methane.

Translation of transport on gas fuel meets the following basic priorities of modern policy of the State in socio-economic sphere: reducing the inflation rate, one of the most important factors which is the increase in the prices of motor fuel; the rational use of natural resources, including hydrocarbons; gas is relatively cheap fuel available for low-income population; small business development (including transport); increasing efficiency in handling of funds budgets, reducing expenditure budgets.

Since environmental problems, gas and gas processing technology improved, and oil reserves are being depleted, interest in methane as an energy source and alternative motor fuel continues to grow. Methane as motor fuel is particularly valuable for countries which have large reserves of natural gas or biomethane opportunities to develop, as well as for those countries where there are issues of increasing budgetary efficiency, improving environmental conditions and ensuring energy security.

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