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Development of Electric Transport in the Republic of Belarus

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The world trend in the sphere of social and economic development in our time is the transition to the principle of the «green» economy-model, aimed at achieving sustainable socio-economic development while reducing environmental threats. Such transit ensures the development of sustainable transport system. The purpose of the state's transport system is to satisfy the growing needs of the economy and the population in the transportation of people and goods through the creation of a high-quality and efficient infrastructure by modernizing the existing modes of movement and creating principally new. Today, the most important development trend is to convert engines to electricity, which will improve productivity, environmental friendliness and economic efficiency. The Republic of Belarus has a wide interest in the development of electric transport. Having a huge scientific and technical potential, Belarus aims to become a platform for successful implementation of the program of introduction of electric transport, both personal and public.

The urgency of switching to electric transport for the Republic of Belarus stems from the need to reduce the state's dependence on fossil hydrocarbon raw materials and emissions of carbon dioxide and other harmful greenhouse gases. The Republic of Belarus is among the top 20 most energy-dependent countries in the world. Energy dependence is 83.8 per cent [1].

The first electric vehicle in Belarus was registered in 2013. At the end of 2021 the number of electric vehicles in Belarus was 4000 units, in march 2022 about 6000 electric vehicles were registered in Belarus, the average monthly increase is 200 units [2].

The electric transport transition process consists of:

- 1) Ensure the availability of an electric vehicle. Giving owners, dealers and manufacturers of electric transport privileges and preferences;
- 2) Providing a wide range of electric vehicles on the state's market;
- 3) Development of an extensive charging infrastructure and service stations covering the whole republic;
- 4) Creation of own production of electric vehicles and their components.

The economic viability of using electric transport depends on public policy. The market for electric vehicles is constrained by their high cost. The average cost of imported electric cars in 2013-2016 was more than 50 thousand dollars, and in 2017-2018 it was at the level of 90-100 thousand \$. The increase in sales since 2020 has been due to the introduction of a stimulus package, which includes various tax preferences and incentives. Decree of the President of the Republic of Belarus from 12.03.2020 №92 «On stimulation of the use of electric vehicles» establishes a special preferential regime for owners, buyers (natural and legal persons) and manufacturers of electric transport, owners of service and charging infrastructure, which will increase the demand for this type of car. Special conditions for lending electric vehicles sold to individuals on the territory of the Republic of Belarus and the provision of vehicles for leasing also contribute to the economic attractiveness [3].

Creation of a network of power stations has been widely developed in the republic. The state authorities appointed the national operator for the creation and development of the

network - «Belorusneft». As of the beginning of 2022, the number of stations of the network «Malanka» counts more than 600 units, the average daily number of charging sessions - 1500. Today the network can serve up to 35 thousand electric vehicles. The operator installs two types of stations: slow (AC, 6-8 hours) and fast charging (DC, about 1 hour). At the moment, the network of charging stations allows unimpeded movement on the main roads of the country and major cities, charging stations are installed in parking lots near large commercial, sports and cultural facilities, shopping centers, hotels. The average distance between stations in the city is approximately 3-5 km, on highways-70-90 km. According to the state program, by 2030 the network should have 1304 stations with a distance of 50-70 km between them [2].

Due to the advanced mechanical engineering and huge scientific potential, Belarusian scientists and designers develop and create new mechanisms and design solutions for electric vehicles, giving a new impetus to the development of electric transport. Employees of the United Institute of Mechanical Engineering of the National Academy of Sciences of the Republic of Belarus are actively working on the creation of domestic components of electric vehicles: electric motors, power converters, high-speed reducers, creating technologies for the safe disposal of components of electric vehicles, etc. There are a lot of manufacturers that are interesting on starting the production of new components for EVs, electric charging stations for both industrial and individual applications. At the moment, scientists are faced with the task of developing a battery tank capable of providing a range of more than 300 km and solving the problem of safe disposal. Belarusian scientists in cooperation with industrialists create prototypes and serial models of passenger electric vehicles, electric trucks and public electric transport. One of the main directions of transport electrification in Belarus is development of public electric

transport. The transition to electric transport will lead to carbon neutrality and sustainable urban mobility. The development of passenger transport, which is predominantly public, will allow the formation of an effective policy in the field of passenger transport. The production of electric buses in the territory of the Republic of Belarus was mastered in 2017.

The rapid development of electric transport is an objective reality, contributing to the need to change the environment and the economy. There is a downward trend in the final cost of electric vehicles due to the lower cost of their components. However, due to changes in the political and economic situation in the world, it is expected that the price of energy will increase, which will lead to an increase in the price of electricity, increase transportation costs, increase the cost of raw materials for the production of automobile components (primarily batteries), the cost of owning an electric vehicle will increase. In this situation, the most promising market for electric cars is China.

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