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DEVELOPMENT TENDENCY OF NOISE AND EXHAUST GASES-FREE ELECTRIC BUSES IN CITY PUBLIC TRANSPORT

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ABSTRACT
In this article, the development trend and economic efficiency of environmentally friendly and low-noise electric buses as public transport are presented. Electric buses are one of the fastest growing types of public transport in the modern world.

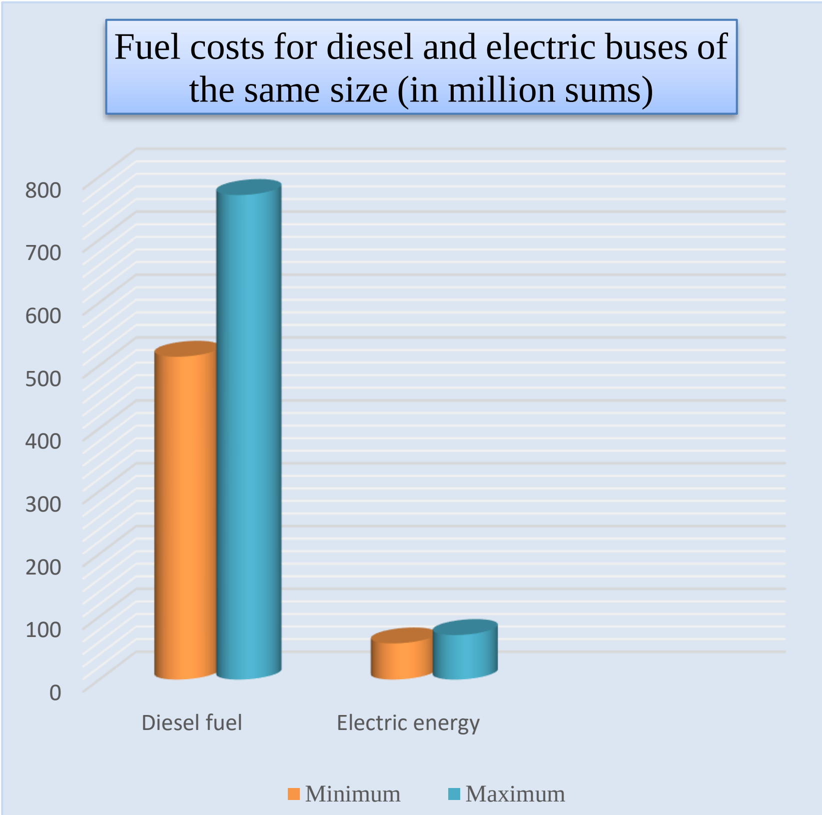
Keywords: Electric bus, ecology, environmental efficiency, economic efficiency, lithium iron phosphate accumulator, diesel.

INTRODUCTION
When it comes to public transport, the first thing that comes to mind is buses. Currently, buses with diesel engines are widely used in public transport. Their place in our life is very important. With the help of buses, we can easily get from one place to another. However, the demands of the modern world are also changing from year to year. This requires us to use environmentally and economically efficient electric buses as urban public transport. What exactly are the efficient aspects of the electric bus?

MAIN PART
Electric buses were first used in public transport in Great Britain in 1906. At that time, electric buses used batteries. These batteries are disposable and are replaced with new ones after a working day. With these batteries, the electric bus had a range of 64 km. Electric buses began to develop rapidly as soon as they showed their effectiveness. This idea caused other countries of the world to use and produce environmentally and economically efficient electric buses.

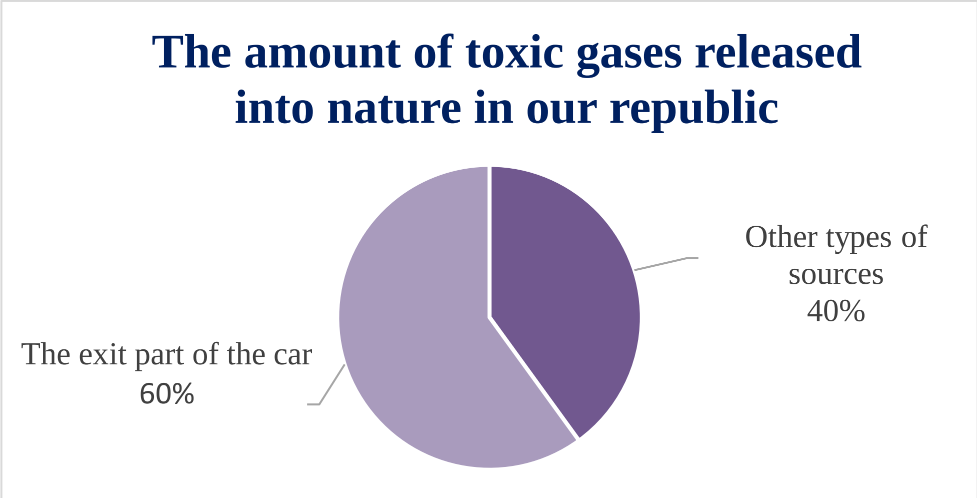
Energy Analysis
Mercedes Benz Connecto LF0345 buses used in public transport of Tashkent city consume 0.1-0.15 tons of fuel per day. If we take into account that the current price of diesel fuel is 14,079.77 soums (November 23, 2022), each bus consumes fuel from 1,407,977 soums to 2,111,965.5 soums per day. we can cross. So in one year, each bus is financed by the state up to 513,911,605 - 770,867,407.5 soums for fuel. If we consider the energy consumption of an electric bus of the same size and capacity, the energy capacity of the batteries for one day is 320-350 kw/h. If we take into account that the price of the state tariff for electricity for legal entities is 450 soums

per 1kw/hour, we can consider the energy consumption of each electric bus from 144,000 to 157,500 soums per day. So, each electric bus is financed by the state from 52,560,000 to 70,875,000 soums for electricity in one year. Diagram 1



1-diagram Energy analysis.

About 60% of the total emissions into the atmosphere in our republic (diagram 2) are accounted for by vehicles, and an average of 1.3 million tons of harmful gases are released into the air per year. In order to ensure state control over emissions of vehicles into the atmosphere, the "Clean Air" event is held every year in two stages throughout the republic. During the I and II stages of the 2021 "Clean Air" event, a total of about 280,000 motor vehicles were inspected. Within the framework of the environmental protection concept of the Republic of Uzbekistan in the period until 2030, the transfer of vehicles to gas cylinders, electricity and other alternative fuels in our country, in which by 2022, 50% of vehicles, 2030 and by the end of the year, priority tasks have been set to transfer 80% to work on gas-cylinder fuel and electricity. If we analyze the existing technical means, there are a total of 3.2 million motor vehicles belonging to individuals in the republic, of which 15.8 thousand are buses. Of these, there are 10,240 gas-powered buses. A total of 1181 buses operate in Tashkent city, of which 812 or 69% are designed for natural gas fuel. In 2023-2025, it is planned to purchase an additional 653 buses and electric buses.



2-diagramm

The developing electric buses can be divided into the following types depending on the energy reserve and auxiliary systems, as well as technologies:

- Outsourced during movement (trolleybuses)
- Rechargeable on the go.
- Charging during the session.
- Powered by fuel cells.
- Charging at depotsor stations.

In modern electric buses, we can see that the electric movement for power storage is as follows: the sequence of converting energy from the network in the bus is as follows: Electric network → substation → charging system → energy storage batteries. Direction of movement of energy stored in batteries during movement: energy storage batteries → electric motors → traction wheels. Unlike trolleybuses, ektrobuses have a separate power substation consisting of a transformer and a charger (Fig. 1) [2]. Despite these differences, the efficiency of these devices is approximately $\eta = 0.925\text{-}0.975$.

Figure 1. Yutong ZK6126BEVG electric bus structure.

In this type of bus, energy is stored in LiFePO4 (lithium iron phosphate) batteries by charging. Powering is done using an external high-voltage power supply. The LiFePO4 (lithium iron phosphate) accumulator battery consists of the following structures:

- Supercapacitor module (Supercapacitor charging and discharging system);
- Battery management system
- Cooling system pressure booster;

The efficiency of the batteries is determined by the ratio of the following parameters: by the ratio of the amount of charging to the amount of discharge of the batteries in the same period of time.

The efficiency of electrical storage devices is as follows: for lithium-ion batteries, it has an efficiency of KWE η=0.9-0.95 in relation to the types of batteries. For supercapacitors, the same KWE is equal to η=0.9.

The most promising areas for the use of environmentally friendly and noiseless electric buses are large megalopolises and cities with tourism centers.

In classic electric buses, we can see that high-capacity accumulator batteries are located under the upper roof and in the rear interior. Thanks to the temperature control system, regardless of the season and weather conditions, it is possible to maintain a constant temperature of electric bus batteries, which makes it one of the most reliable types of transport. The main advantage of using electric buses is environmental cleanliness, or in other words, the absence of harmful waste. The atmosphere in urban areas is becoming cleaner - this is the main reason why electric buses will soon conquer the whole world. Currently, the cost and maintenance costs of public transport are relatively high compared to other types of public transport, but they are gradually decreasing with the introduction of new technologies.

CONCLUSION

In conclusion, we can say that electric buses are one of the unique technical tools that have followed a complicated path of development. This type of transport is not only gaining popularity, Electrobuses are the transport of tomorrow, health transport. While studying this issue, we should emphasize that electric vehicles are highly economical.

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