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RESEARCH OF DYNAMICS OF DEVELOPMENT OF ELECTRIC CAR IN THE WORLD AND ON THE UKRAINIAN MARKET

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Abstract

Purpose. Comprehensive research of current situation in the market of electric vehicles and problems to be addressed for the infrastructure development of the domestic electric car market, leading to the competition between electric cars and traditional internal combustion engine (ICE) cars in Ukraine.

Research methods. Analytical studies using domestic statistical indicators on the prospects for the development of electric vehicles have been undertaken. A comprehensive approach involving analysis and synthesis of relevant literature and research in road transport have been presented.

Scientific novelty. Of great academic value is analytical estimates of market dynamics for upgraded electric vehicles and the identification of the main segments and technical trends in further enhancement of rolling stock in the transport of Ukraine.

Practical significance. The undertaken research enables to identify the main factors ensuring environmental safety of transport by using electric vehicles in road traffic. The dependence of the distribution rate of electric transport and its development on the improvement of the technical and operational characteristics of electric vehicles has been established, which allows to drive the future of electro mobility, improve the environmental safety, and reduce the negative factors affecting the traffic.

Results. A comparative analysis of the effect of technical components of electric vehicles and traditional cars on the automobile market conditions is provided. The results of comparative review of components and technical capabilities of electric- and traditional cars are summarized. A comparative evaluation of the most common electric vehicles in a view of the environment protection is given. Constructive solutions for modern serial electric vehicles of the greatest threat to the road safety are noted. The possible directions of research are considered, the results of which would allow increasing environmental safety of electric cars.

Keywords: electric vehicle, eco-friendliness, electro mobile market, charging stations, charging rates.

The problem and its connection with scientific and practical tasks

Today, the history of electric vehicles has entered a new round of its development. People realized that eco-friendliness is what's needed in the 21st century. The oil resources in the world are not limitless, and many engineers and inventors are working on the issue of improving the electric motor. And this is not surprising, because there is a lot of reasons for this. Because of the economic crisis, the rise in price of gasoline and oil, many people began to think about whether it is worth buying a car for us, or it makes sense to save and buy an environmentally

hazardous car. Taking into account the current state of affairs with energy sources, our state is also interested in having more electric transport in Ukraine, which will create energy independence, environmental well-being and economic benefits. Electric cars are beneficial not only to consumers but also to the state as a whole

Analysis of research and publications

The countries of Europe, China and India are encouraging their citizens to buy electric vehicles by issuing grants and lowering taxes. France and the United Kingdom are planning to fully switch to electric cars by 2040. In the United Kingdom, up to 5% of all cars are electrically powered. In order to increase the number of "green" cars, the government gives the British a grant to buy an electric vehicle at 35% of the cost of the car and exempt from the property tax. In France, electric cars more than 100 thousand, or 1.2% of the total market. For purchasers of "green" cars the government compensates 10 thousand euros. The desire to switch to electric cars in India is explained by the high level of air pollution. According to Greenpeace, 2.3 million people die annually in the country due to emissions. India plans to ban the sale of new cars on gasoline and diesel engines by 2030. The government intends to subsidize the purchase of electric cars two to three years, until cars become available. The Netherlands will switch to electric cars until 2025. Instead of the government people are encouraged to buy electric vehicles local authorities. Buyer of electric car is exempt from registration tax and property tax. Germany, and at all suggests the EU to legalize a ban on the Union level since the 2030s. So far, the country has introduced incentives to purchase electric cars: a 10-year exemption from property tax, a green machine loan of 4,000 euros and low interest rates on a loan. The weight of electric cars in the world is leading Norway. Every third car in the country is electric. Ecological cars are not subject to the 25% VAT and tax on the car, and the owner of the electric vehicle pays a reduced toll. In 2025, Norway will maximize carbon emission limits by 0%, thus prohibiting the car from the ICE. Automakers have begun to focus on the production of hybrid and electric vehicles due to the constant increase of ecological requirements for cars with Domestic Vehicles. For example, Volvo announced that by 2019 all new cars will have an accumulator and an electric motor. Mercedes, Audi and Volkswagen are also lagging behind in the race to produce electric cars.

Formulation of the problem

Despite all the advantages of electric cars, they have two, but very significant problems that prevent them from nowadays competing with conventional cars. And this is the same battery, the stock of which in the warm season in the Leaf is only about 130-150 km. In winter, this figure drops to 80-90 km (in the fall the capacity of the battery), which makes it impossible to travel even on medium distances. It should be borne in mind that if traditional gas stations are literally at every step, even between settlements, then the filling stations for electric cars in Ukraine today are only about 900 for the whole country. The exact number of experts to determine is not taken because their equipment and quantity is constantly changing. So in Ukraine at the present time, before planning a trip on an electric car, you need to carefully plan your route through the refueling, because if the route ends the charge, only a tow

truck can help. In addition, another incentive has disappeared practically - free charge of electric cars. And at the hotel charging stations already announced such a tariff, which disappears in general economic sense in the operation of the electric car, compared with the ICE. For comparison, today in the EU there are about 100,000 charging points for electric vehicles. And by 2025, they will require at least two million, according to the most restrained estimates of the European Commission. This means that over the next seven years there should be, at least, a twenty-fold increase in the number of charging stations.

Material presentation and results

The dynamics of percentage content of electric cars in the world by years from 2013 to 2017 (fig. 1).

Ukraine is at high enough place in Europeat the pace of grow thof the marke to felectric cars. This is a very positive fact, given the fact that the average price of liquid palu-vain 2018 in the world canrise by 15-18%, which will also affect the domestic market. In the second itions, "survival" of many motorists, even very skeptical, began to lookin the direction of electric cars. More over, in our country recently was with drawn VAT and excise duty on customs clearance of electric cars. So, from January 1, 2018 to January 1, 2019, according to the Draft Law No. 6,776-d, theim port of electric cars to Ukraine is free of charge, paying only the costof the carit self - usedor new - in the salon a broad. For comparison, the VAT on any other caris 20% ofits valueand 109 euros. It should be noted that such privileges apply only to fully electric motors: hybrid saretaxed, as wellas cars with ICE. That is why about 4 thousand such cars are going on the roads of Ukraine, and Ukraine is among the 5 leading countries in the development of electric vehicles.

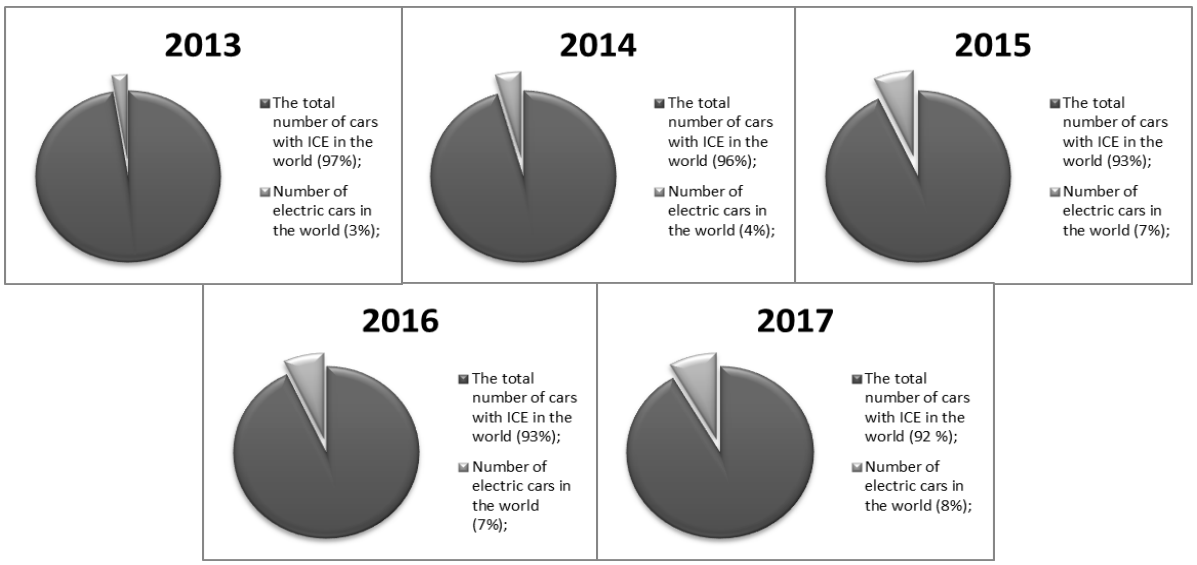

Figure 1 Percentage of electric cars in the world over the past 5 years

In the first half of 2018, a thousand seven hundred and eighty-eight electric-powered cars were registered in Ukraine, up 7% from the same period last year. After a decline in the first quarter, when the market showed a negative dynamics for the first time in a long period of time, the second quarter, on the contrary, showed a

record figure of 1173 cars (+ 91% in the first quarter and + 26% compared to last year's figures).

The advantages of modern brands of electric trains should include the following.

1. Driving an electric car is simple. There is only a start button here, instead of a gearbox - a gearbox, and an electric power steering is installed on almost all models.

2. The electric carbrake is much faster, which is connected with the function of recovery: the transformation of kinetic energy into electric. However, such braking allows you to save significantly on brake pads, which are much slower in electric cars.

3. The maximum speed in the most popular Nissan Leaf in the world and in Ukraine will be 140-150 km / h. The exception is the Tesla Model S, which accelerates to 250 km / h. The average speed recommended by the manufacturer - up to 100 km / h

According to the capacity and comfort of electric cars do not differ from the car with the internal combustion engine , but on the technical service can significantly save: annual maintenance with the replacement of coal filters will be 1200-1500 UAH. For equation, at the technical service for a vehicle with internal combustion engine - will pour at least 2400-3000 UAH. If we talk about maintenance, simple parts in the electric vehicle can replace the usual auto locksmith, but checking the battery (the main unit of an electric car) is better to carry out at a specialized service station, which is becoming more and more in our country. The remaining failures in electric cars are negligible and they occur less frequently than colleagues from the internal combustion engine

The results of a recent study by the European Automobile Manufacturers Association show that of all charging points existing in the EU today, 76% are concentrated in only four countries covering only 27% of the total area of the EU (the Netherlands, Germany, France and the United Kingdom) . And, for example, such a huge country as Romania only has 114 points of charge or 0.1% of the total EU. To stimulate the demand for electric vehicles with a significant run and at the same time solve the problem of lack of charging-these are originally intended in China. The government plans to cut subsidies to manufacturers of those electric cars running from one charge less than 300 km. The PRC is convinced that auto-makers should strive for innovation, and not rely on fiscal policies to stimulate demand for cars on alternative energies. Subsidized hybrids and electric vehicles have become more affordable for Chinese consumers thanks to subsidies. This allowed China to outrun the US and become the largest market for electric vehicles. According to the Ministry of Industry and Information of the People's Republic of China, the government spent 6.64 billion yuan ($ 1 billion) last year to stimulate the purchase of green cars by consumers. At the same time, within the framework of the new standards that came into force on February 12, 2018, China increased the subsidy rate for electric cars with a single charge of 400 km and up to 50,000 yuan ($ 7521). After all, the more mileage in the electric car, the less need charging stations.

Conclusions and direction of further research

Therefore, if our country does not solve the problem of insufficient number of refueling stations and does not set real tariffs for ordinary and high-speed charging of electric cars, this will create great obstacles to the development of this type of transport. And without this, a significant minus of trains - the speed of refueling. So, if the regular fueling takes 5 to 15 minutes, then the electric charge in the "high-speed" mode will have to spend about an hour (at least 30-50 minutes), and the correct, recommended by the manufacturers charging will take from 4 to 8 hours.

Anothe robstacleto the development of the market for electric cars in Ukraine, which is not yet emergin gin the EU, is un certainty about the disposal of batteries for electric cars. According to statistical in dicators, many of the minour country will soon end the life cycle.

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