

УДК 504.03

ISSUES AND PROSPECTS OF THE SUSTAINABLE FUTURE WITH GROWING DEMAND FOR ELECTRIC VEHICLES

Afonina N.R. (ITMO University), Tlumach E.D. (ITMO University), Poluyanov A.M. (ITMO University)

Scientific supervisor – Sigaev A.S. (ITMO University)

Introduction. Nowadays the demand for electric transport has been growing due to the common belief that electric vehicles are environmentally-friendly mode of transportation. Sales of electric vehicles are breaking, with people increasingly buying them. However, despite the increasing popularity of electric vehicles, there are still several issues and challenges that need to be addressed in order to fully realize their potential as a sustainable replacement for traditional gasoline-powered vehicles. This research will explore the question of whether the future really is in electric vehicles, by examining the key issues and possibilities for solving them in the context of the growing demand. The future of the automotive industry is being reshaped by the rapid growth in demand for electric vehicles. With an increasing focus on reducing carbon emissions, many countries and companies are now investing in the development of electric vehicles to meet the needs of consumers who are looking for more environmentally-friendly and sustainable transportation options. At the same time, people are also following the trend of eco-friendliness by waste sorting, attempting to reduce consumption, eating less animal meat and, obviously, trying to find a better form of transportation. Many people see electric vehicles as an alternative to the internal combustion engine. However, there are numerous problems associated with the use of such vehicles, ranging from high production and operating costs to the short lifespan of equipment. We aim to investigate whether such investments are justified and how environmentally friendly this mode of transportation really is.

Main part. Sales of electric vehicles doubled in 2021 to a new record of 6.6 million. Only 120,000 electric cars were sold worldwide in 2012. Almost 10% of global car sales were electric in 2021, which is four times the market share in 2019. Global electric vehicle sales continued to grow strongly in 2022, with 2 million sold in the first quarter, a 75% increase compared to the same period in 2021. (IEA: Global EV Outlook 2022).

One of the main advantages of electric vehicles is that they produce zero tailpipe emissions, which means they do not emit pollutants such as nitrogen oxides, particulate matter, and greenhouse gases into the atmosphere. This can help to improve air quality, particularly in urban areas where air pollution is a major concern.

Moreover, consumer reports suggest electric vehicle batteries could last a lifespan of 17 years or 200,000 miles. The average lifespan of a conventional car is 12 years. This practice of measuring and comparing lifetime emissions is an important environmental comparison strategy called Life Cycle Analysis. In sum, about 10-15 years of an electric vehicle's lifespan would operate with a better carbon footprint than conventional cars with clean energy charging, assuming no change to manufacturing or battery technology.

While electric vehicles produce no tailpipe emissions, they do have a carbon footprint that depends on the source of electricity used to charge them. The production and disposal of electric vehicles also have an impact on the environment. For example, the manufacturing of electric vehicle batteries requires the extraction and processing of rare earth metals, which can have negative environmental and social impacts if not properly managed. Lithium-ion batteries – which are the most common battery types used in electric vehicles – are formed of certain elements including carbon or graphite, a metal oxide and lithium salt. It is also the same battery as in everyday technologies, such as mobile phones and laptops. Anyway, many electric vehicle batteries are made with 80% recyclable components, so when battery has come to the end of its lifecycle, it can be stripped down to separate the raw materials to reuse them. In addition, the generation of electricity used to charge electric vehicles can also have environmental implications depending on the source of the electricity. If the electricity comes from renewable sources, such as wind or solar power, then the environmental

benefits of electric vehicles are even greater. However, if the electricity comes from fossil fuels, such as coal or natural gas, then the environmental benefits are reduced.

One of the key challenges facing the widespread adoption of electric vehicles is the lack of charging infrastructure. In many parts of the world, there are simply not enough charging stations to support the growing number of electric vehicles on the road. This creates a range anxiety for electric vehicle drivers, as they may not be able to find a charging station when they need it. However, there are efforts underway to address this issue, including the development of fast-charging technologies and the expansion of charging networks. Anyway, the US currently has over 45,000 stations available, with more being installed daily. Currently there are more than 150 thousand charging stations in Europe. By the year 2030, at least 2,8 million more charging stations should be built. In Russia, there is a concept for the development of production and use of electric vehicles in the Russian Federation until 2030. The objectives of the concept include the development of production facilities for electric vehicles in the Russian Federation, the increase of technological competencies of national manufacturers of automotive equipment and components through the localization of the production of electric vehicles, the introduction of products with fundamentally new properties in the field of electric propulsion, stimulation of demand for them, as well as the organization of after-sales service, the creation of necessary engineering and transport infrastructure in the Russian Federation, and the lifting of existing regulatory barriers for the use of electric vehicles. In the first of the two stages of this concept, one of the priorities is the launch of at least 9.4 thousand charging stations, of which no less than 2.9 thousand are fast charging stations by 2024.

Conclusion. The question of whether the future really is in electric vehicles is a complex one that requires consideration of a range of factors. While there are certainly challenges and issues that need to be addressed, the growing demand for electric vehicles suggests that they will play an important role in the future of transportation. By addressing key issues such as charging infrastructure and environmental impact, it may be possible to accelerate the transition to a more sustainable and eco-friendly transportation system based on electric vehicles. Despite these challenges, the overall environmental impact of electric vehicles is generally considered to be lower than that of gasoline-powered vehicles, particularly as the electricity grid becomes cleaner and more renewable energy sources are used. However, it is important to note that electric vehicles are not complete solution to all environmental problems and that other modes of transportation, such as public transportation and active transportation, also have a role to play in reducing the environmental impact of transportation.

References:

1. EV battery guide – URL: <https://www.rac.co.uk/drive/electric-cars/running/ev-battery-guide-what-are-electric-car-batteries-made-of/#:~:text=EV%20batteries%20are%20made%20from,such%20as%20graphite%20and%20lithium>
2. Global EV Outlook 2022 – URL: <https://www.iea.org/reports/global-ev-outlook-2022>
3. Electric Cars: Are They Really Ecological? – URL: <https://greenly.earth/en-us/blog/ecology-news/electric-cars-are-they-really-ecological>
4. Концепция по развитию производства и использования электрического автомобильного транспорта в Российской Федерации на период до 2030 года – URL: http://www.consultant.ru/document/cons_doc_LAW_393496/2cc3e7a044fad83b4255225feb023d7c743e4a0/#dst100013