

## **GREEN PUBLIC TRANSPORT AS A PART OF COUNTRY'S SOCIO-ECONOMIC DEVELOPMENT**

The implementation of programs, related to innovative environmental techniques in the field of public transport, is aimed at achieving such important goals as improving air quality and reducing the negative effects, which cause climate change. They also meet the goals of green economic growth, that are also, among other things, part of the Ukraine economic strategy. It can be expected, that the demand for green public transport will lead to an increase in production in this area.

Greening of public transport can significantly reduce CO<sub>2</sub> and NO<sub>x</sub> emissions. The negative impact of these emissions on human health is confirmed by many studies – they damage the cardiovascular and respiratory system. So, environmental innovations in public transport can directly contribute to improving people's health.

For now, Organization for Economic Co-operation and Development (OECD) offers 4 options for replacing old inner and intercity buses:

- 1) vehicles fuelled by compressed natural gas (CNG);
- 2) vehicles fuelled by liquefied petroleum gas (LPG);
- 3) vehicles fuelled by diesel that meets Euro 5 and Euro 6 emission standards;
- 4) electricity-powered vehicles (trolleybuses and battery trolleybuses) [1].

Obviously, not all of the proposed options can be called absolutely environmentally friendly, but even such modernization can be the beginning of the implementation of a full-fledged greening program for public transport. Usually, governments firstly invest in inner city transport, moving than to intercity or even international communications [1].

Today, China is the most relevant example of replacing standard city buses with green ones. By the end of 2018, there were about 425 thousand electric buses in the world, of which 421 thousand were in China [2]. In Europe, Amsterdam ranks first with amount of just 100 buses [3].

In China, the replacement of public transport with electric vehicles is made possible by significant government subsidies. Thus, according to new needs, the urban infrastructure is also changing (charging stations, maintenance, changes in the schedule and routes according to the capabilities of electric buses etc.). At the same time, the slow spread of ecological public transport in Europe and the United States is explained by the significant costs for the purchase and support of such transport systems, as well as a short-term orientation of investment programs.

Another option for green public transport, the importance of which is now widely discussed, is rail transport. According to UNIFE (the European Rail Industry) one small train can hold as many people as 133 cars. In addition, it is rail transport that remains the most economical and environmentally friendly today, when compared with standard cars, buses and airplanes [4]. Its main environmental benefits

are less harmful emissions, less energy use (compared to air transport), less impact on landscapes.

The widespread use of rail transport is a prerequisite for the implementation of the modern concept of a smart city. There is also interesting experience of Copenhagen, when thanks to the permission to transport bicycles on trains for free, the number of users of bicycles has tripled [5].

The Czech Republic's efforts to replace public transport with more environmentally friendly forms of transport have shown how the gradual, methodological modernization of the transport system leads to noticeable positive changes. So, from 2006 until the end of 2018, there were 21,900 vehicles fuelled by compressed natural gas (CNG) in the Czech Republic, of which 1,230 were used as public transport [1].

A similar program also operates in Poland, where the replacement of public transport with more ecological ones is planned until 2023. Still, the share of renewable energy used for transport in the EU rose from 7.4 % in 2017 to 8.1 % in 2018. This is well below the EU target of 10 % set for 2020 [6]. The main problems, that today affect the implementation of the green public transport, are: weak emission standards for diesel engines, low diesel standard, weak inspection standards, weak price signals, weak support for manufacturers of environmentally clean buses.

A modern city provides many opportunities for a comfortable life. At the same time, it causes a lot of problems that worsen living conditions. The transition to green public transport will significantly improve the ecological state of the city, and will become a necessary condition for implementing the concept of a smart city.

## References

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