

УДК 656.025.2

Muzychka P., Valasiuk D., Ladutska N.
Alternative Energy Sources Used in Transportation

Belarusian National Technical University
Minsk, Belarus

Logistics is the management of the flow of things between the point of origin and the point of consumption to meet the requirements of customers or corporations. Today people use a lot of transportation ways: road transportation, marine transportation, air transportation, rail transportation.

All types of transport have both their pros and cons, but there is one drawback that unites them, it is air pollution. All transport releases harmful CO₂ into the atmosphere, which greatly harms humanity and our planet. However, there is already a solution, and this is transport on alternative energy sources.

Alternative energy sources are represented today by all sources of clean power that will successfully replace fossil fuels in the future for a cleaner environment. They are electric power, solar and wind energy, hydropower, biomass and geothermal energy, tidal power, etc.

Electric transport is a type of transport that uses electricity as a source of energy. Its main advantages over vehicles powered by external or internal combustion engines are higher performance and environmental friendliness.

Electric trucks have been around in niche application areas for over a hundred years, but the invention of lithium ion batteries has enabled the range of electric trucks to increase to several hundred miles. However, electric trucks are usually heavier than diesel trucks, the energy density of lithium ion batteries is far less, so very long-range trucking requires

recharging on the route, causing delays, or the swapping of trucks.

The diesel truck is using 3.37 times the amount of energy that the electric truck is using. Thus, the only variables that are stopping the commercial use of electric trucks are the original vehicle cost and the driving range, owing to the high battery pack cost and low specific energy. As mass production happens the cost might eventually be comparable to diesel vehicles and with improvement in batteries the limited range of the electric truck might be a non-issue.

Electric transport is represented not only by trucks but also by forklifts. Loaders can be attributed to one of the most demanded types of special equipment. This equipment is distinguished by its functionality and high speed of operation. That is why it is so often used in a wide variety of areas, including when organizing cargo transportation. In some cases, these forks are supplemented with the necessary additional devices: hooks, pallets [1].

Battery life is one of the biggest benefits of electric forklifts. Electric forklifts are very universal. They are also good for workers and the environment in many ways. Electric forklift trucks do not emit harmful emissions, making them ideal for indoor use. Workers breathe clean air and companies can cut ventilation costs. Electric forklifts are also quieter than gas ones. This makes them more secure. Warning signals and alarms can be heard more clearly. Workers do not suffer from ear fatigue. When your employees are not distracted by loud noises, the number of accidents can be significantly less. Other benefits of electric forklifts are stated as:

- the absence of a fuel tank which reduces the probability of a fire;
- better visibility (compared to trucks with rear-mounted liquid propane tanks);
- less maintenance;

- longer service life;
- fewer breakdowns due to fewer moving parts in the engine.

Like any equipment, electric forklift trucks have their drawbacks. Most of them have less power and load capacity than gas analogues. The batteries can be charged for up to eight hours, which can lead to downtime if a spare battery is not available. Charging stations take up space that can be used for other purposes. Electrics are easily damaged by weather such as rain or snow. Despite all the problems with electric forklifts, most users will say that the pros far outweigh the cons.

Opinions are divided over the prospects for electricity as a source of energy for trucks. Some say that the direction will not lead to any result, others bring to the market a lot of proposals on this issue. Here we are talking about cargo transportation over short distances. But what about long distances? You can answer this question if you think about it and look into the future. Most suitable for long distances is hydrogen. Here you can build on the intentions of Daimler, which plans to start producing trucks on liquid hydrogen in the second half of the 2020s. Also, Daimler, together with Volvo, signed an agreement on the development of hydrogen transport technology [2].

One of the main obstacles to the implementation of this technology is the cost of hydrogen production, which is high today. In addition, it is necessary to invest in the construction of hydrogen filling stations. For example, in Switzerland, hydrogen trucks are already in use and they have good prospects [3]. Biofuels (methane, ethanol, rapeseed oil, etc.) are, according to experts, the most promising alternative to gasoline today. Work on its implementation in full or in a mixture with gasoline is very actively carried out all over the world. Environmentally, it is not a panacea, but better than gasoline, it is a renewable source. In many countries of the world, biofuels are made from industrial waste: in Cuba

ethanol is obtained from waste from sugar cane processing, in Hong Kong methane is obtained directly from rotting waste in landfills by pumping this gas from the voids of garbage dumps. In addition, advances in biology and genetic engineering allow us to count on a significant breakthrough in this matter in the near future [2].

Nowadays, everyone makes a choice for themselves - a choice between electrocars and biofuels. Each has pros and cons. But, at the same time, an individual approach is needed here. It is necessary to evaluate routes, traffic frequency, etc.

From all of the above, we can conclude that in the near future transport on alternative energy sources will increasingly enter our lives, especially over short distances. Assessing the needs of carriers in various niches, we can say that just one solution will not be enough for everyone. The energy demand on the planet is still covered mostly from fossil resources, but renewable energy projects are increasing their presence in many countries, which shows that the clean future is closer than we thought.

References:

1. Using forklifts in the transport sector [Electronic resource]. – Mode of access: <https://perevozka24.ru/pages/ispolzovanie-pogruzchikov-sfere-perevozok>. – Date of access: 05.03.2021.
2. Prospects for alternative energy sources in transport [Electronic resource]. – Mode of access: https://studbooks.net/2378940/tehnika/perspektivy_iskpolzovaniya_alternativnyh_istochnikov_energii_transporte. – Date of access: 06.03.2021.
3. Transporting goods by electric truck. Is it possible? [Electronic resource]. – Mode of access: <https://news.transinfo.by/tehnologii/8053-perevozka-gruzov-elektricheskimi-gruzovikami-vozmozhno-li.html>. – Date of access: 05.03.2021.