

## ANALYSIS OF THE STATE OF MODERN GREEN TECHNOLOGIES IN LOGISTICS

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Particular attention has recently been paid to too large constant emissions of CO<sub>2</sub> into the atmosphere, which have a detrimental effect on the ozone layer, which in turn is becoming a major cause of climate change on the planet. Thus, humanity suffers from the negative effects of carbon dioxide, especially Ukraine suffers from this. Based on statistics, in 2018 in Ukraine CO<sub>2</sub> emissions amounted to more than 225 thousand tons, and Kyiv as of March 2021 ranks 12th in the ranking of cities in the world in terms of air pollution. Undoubtedly, the logistics sector is involved in increasing these emissions, which account for about 15% of total CO<sub>2</sub> emissions.

According to Our World in Data, in order to reduce the temperature on Earth, it is necessary to reduce the amount of carbon dioxide (CO<sub>2</sub>) emissions by approximately 410 million tons [1]. Large 3PL providers and multinationals understand the scale of the problem and are already trying to tackle it. Thus was born the concept of "Green Logistics", which is associated with the effective management of the flow of returned, damaged, expired and used goods, waste production and consumption, both forward and reverse direction. Which helps to improve environmental performance enterprises by saving material resources and reduction of harmful emissions by enterprises.

First of all, the fight against the harmful effects on the environment of man is progressing slowly, but logistics is beginning to make some progress. The development of green technologies in logistics is yielding its first results. A good example of the introduction of the first steps of green technologies in logistics was the company Raben, which has developed a calculator with which any company can calculate the amount of carbon dioxide emissions as a result of their activities. In addition, Raben's specialists are helping to develop a roadmap by which companies achieve a certain reduction in the negative environmental impact of logistics companies. In 2019, the company also tested tractors running on liquefied natural gas. Such transport is more environmentally friendly because it emits much less CO<sub>2</sub> and a minimum level of particulate matter. Compared to diesel cars, liquefied natural gas tractors are 10 decibels quieter, which is especially noticeable in populated areas.

I would like to note that green technologies also did not bypass warehousing logistics. A new warehouse has recently been built for the Real Digital online store. The

uniqueness of this project is that during its implementation more than 90% of recycled construction waste was used in the total amount of construction materials, which were taken from the remains of the previous building. This warehouse uses rainwater for domestic purposes, which is collected using special technology from the roof of the building. Thanks to this, the company managed to reduce water use by 84%. This saving is also achieved through electricity, because the windows of the distribution center are installed blinds that prevent the building from overheating, and the use of air conditioning is minimized. Intelligent LED lamps and energy optimization systems are installed throughout the distribution center, thanks to these innovations, Real Digital has reduced the carbon footprint by 58%, and the cost of electricity has decreased by 56% [1].

Another striking example of the use of green technology is the logistics center PVH Europe in the Netherlands, which began to use alternative energy sources, namely the roof of the center is completely covered with solar panels, so the roof of this logistics center is considered "the most efficient in the world." The electricity generated by it fully provides all the processes of the logistics center, and the key is that this center also provides electricity to other warehouses, offices and production facilities, which are located not far from the logistics center PVH Europe. Thanks to their ecological power plant, they reduce carbon monoxide emissions in their own technological process and supply chains by 30% [2].

The development of green technologies in logistics is also showing good results in the field of freight transport, an example of which is the cooperation between the logistics company DHL and the world's largest manufacturer of electric trucks Volvo. Their collaboration includes exclusive, the world's first pilot tests of a fully electric Volvo FH truck with a total road train weight of up to 60 tons. Starting in March this year, the truck will run between two logistics terminals DHL Freight in Sweden, the distance between which is about 150 km. But today Volvo FL Electric and Volvo FE Electric electric trucks are mass-produced for freight exclusively within the city [3].

So, the main problem for logistics companies that they are trying to solve is harmful emissions into the atmosphere. They seek to improve logistics processes in a way that makes them more environmentally friendly. The main obstacle is that the use of green technologies entails huge investments, which usually have a very long payback period. Despite this, all countries are trying to join the trend of "green logistics" as most companies. Directly, its use in Ukraine could improve both ecological and economic situation. Joining Ukrainian companies to the global environmental movement would attract grants and significant financial assets into Ukraine's economy, which are allocated by world leaders for states and companies trying to fix environmental problems on the planet.

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