УДК 502.35

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HOW TO MAKE LOGISTICS OPERATIONS EFFECTIVE: ENERGY AND RESOURCE SAVING APPROACH

In today's world, facing the challenges of climate change, depletion of natural resources and economic instability, the concepts of energy and resource saving have ceased to be just elements of a "green" image [1]. They have become powerful strategic tools for increasing the competitiveness and sustainability of business. These principles are particularly relevant in logistics, an industry that is the bloodstream of the global economy, but at the same time remains one of the largest consumers of fuel and other resources. Effective logistics today is not just about fast and cheap delivery, but about smart, optimized, and lean logistics.

From expenses to investments: why logistics has become a focus for cost savings

Logistics operations traditionally involve massive energy and material costs. Transportation (road, sea, air, rail) consumes vast amounts of fuel. Warehousing requires significant electricity expenses for heating, lighting, cooling, and material handling equipment. Packaging generates tons of waste.

Thus, the logistics chain is an ideal testing ground for implementing resource-saving principles. Every kilowatt-hour saved, every liter of unburned fuel, and every kilogram of unused packaging material directly translates into lower operating costs and a smaller environmental footprint. This creates a classic "win-win" synergy: the company increases its profits while also contributing to environmental conservation [2].

Key areas for integrating energy savings into logistics

1. "Green" transport and transportation optimization:

Fleet modernization: Replacing outdated vehicles with modern models with reduced fuel consumption that meet environmental standards (Euro-5, Euro-6); introducing electric vehicles and gas-powered vehicles for urban and regional transportation.

Route optimization: Using satellite monitoring systems and specialized software (TMS - Transportation Management System) to create routes that avoid traffic jams, left turns, idling, and inefficient driving. This reduces travel time and fuel consumption by 10-20%.

Cargo consolidation: Combining small shipments from different senders into a single full load of transport allows for maximum utilization of its capacity and avoids "air travel". This directly leads to a reduction in the number of flights and overall energy consumption.

Multimodal transportation: Combining different modes of transportation (such as long-distance shipping by rail or water, followed by final delivery by truck) allows for

the use of the most energy-efficient transportation method at each stage of the supply chain.

2. Energy-efficient warehouses:

“Smart” buildings: Construction and modernization of warehouse complexes using energy-saving technologies: insulation, LED lighting with motion and light sensors, heat recovery systems, and the use of solar panels for generating electricity.

Efficient equipment: Transition to electric forklifts, which not only produce no emissions on-site but are often more efficient than their diesel counterparts. The use of regenerative braking systems that return energy to the battery when the load is lowered.

Automation: The introduction of automated storage and retrieval systems (AS/RS) and autonomous guided vehicles (AGVs) allows for the optimization of cargo movement routes within the warehouse, reducing equipment operating time and energy consumption.

Resource-saving: Closing the logistics cycle

Resource-saving in logistics goes beyond energy savings and focuses on the efficient use of materials.

1. Eco-friendly packaging:

Reducing weight and volume: Developing and using lighter and more durable packaging materials that maintain their protective properties but require fewer resources for production and transportation [3].

Recyclable packaging (multi-pallets, containers): Implementing multi-reusable packaging systems eliminates the constant costs of disposable packaging (wooden pallets, cardboard) and significantly reduces waste generation.

Waste recycling: Establishing a system for collecting and sorting packaging waste (cardboard, film, plastic) in warehouses for subsequent recycling.

2. Reverse logistics:

This is a whole area focused on the return of goods, packaging, and waste. A well-structured reverse logistics system allows for the return of valuable raw materials, components, and materials into economic circulation, reducing the consumption of primary resources and the amount of waste disposed of in landfills.

Integrating energy and resource-saving principles into logistics processes is not a temporary trend, but a strategic necessity. Companies that see logistics not just as an expense, but as an area for strategic optimization, gain a significant competitive advantage. They reduce their operating costs, increase profitability, strengthen their image as a socially responsible business, and become more resilient to fluctuations in resource prices.

Modern logistics must be “smart”. It must not only move goods from point A to point B, but do so in the most efficient way possible, with minimal energy and resource consumption, and create a closed loop for material flows. Thus, logistics transforms from a “part of the problem” for the environment into a key “part of the solution,” proving that economic efficiency and environmental responsibility are two sides of the same coin.

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