MODULE 3: HYDROGEN LOGISTICS AND SUSTAINABILITY AND ECOLOGY

ARTICLE: LIFE CYCLE ANALYSIS (LCA) AND ITS APPLICATION IN GREEN LOGISTICS

Entry

Life Cycle Assessment (LCA) is a method for assessing the environmental aspects and potential impacts of products throughout their life cycle – from raw material extraction, through production, use, to recycling or disposal. In the context of growing environmental awareness, LCA is becoming an indispensable tool in green logistics, helping companies identify opportunities to reduce harmful emissions and optimize processes.

Definition and Purpose of LCA

Life Cycle Analysis is a standard methodology for assessing the environmental impact of products and services. The goal of LCA is to provide a complete picture of the environmental consequences of a product, enabling more informed decisions to be made at different stages of the supply chain. LCA examines energy use, greenhouse gas emissions, water use, air pollution, and other environmental aspects that can be optimized.

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Application of LCA in green logistics

1. **Product Design:** LCA allows designers and engineers to assess the environmental impact of different material and technology options at the product design stage, allowing them to select solutions that will have the least environmental impact throughout their life cycle.
2. **Supply Chain Optimization:** By analyzing the life cycle of individual components, companies can identify which parts of the supply chain generate the most emissions and look for ways to reduce them, for example by changing suppliers, manufacturing locations or transportation methods.
3. **Packaging Management:** LCA helps in selecting packaging materials that are not only cost-effective but also environmentally friendly. The analysis includes the recyclability of materials, potential pollution generated during production and the possibilities of reusing packaging.
4. **Waste Management:** LCA helps companies better manage waste by analyzing waste treatment options such as recycling, composting, and incineration. The assessment allows them to choose the method that minimizes negative impacts on the environment.

Application examples

For example, large corporations such as IKEA use LCA to assess the impact of their home products, from furniture to textiles. The company uses LCA results to inform customers about the carbon footprint of products, which in turn contributes to greater transparency and promotes responsible purchasing decisions.

Challenges and prospects

One of the challenges of LCA is that it is a complex and time-consuming process. It requires detailed input data and advanced modeling tools, which can be a barrier for smaller companies. However, the increasing availability of software and databases

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environmental issues makes LCA increasingly accessible and used not only by large corporations but also by SMEs.

Summary

Life Cycle Analysis (LCA) is a key tool in green logistics that allows companies to identify and manage their environmental impacts at every stage of a product's life cycle. By integrating LCA into decision-making processes, companies can not only minimize negative environmental impacts, but also build lasting value and reputation in the eyes of increasingly environmentally conscious consumers.

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