

Development of Strategies to Reduce the Use of Gray Energy in Buildings

Master Thesis by Noorullah Nasery

Problem

The environment is greatly affected by the construction and functioning of buildings, particularly due to the energy consumed during their lifespan, known as **Gray Energy**. The buildings have negative effects on our environment in terms of GHG emissions, waste production, and energy consumption. With the growing need for sustainable buildings, it is crucial to develop approaches that decrease the use of gray energy.

The Building Certification Systems and LCA as the solution to the problem?

The thesis examines how the LCA tools can be used in construction projects and recommends a proposal for the cataloging of LCA data in the planning phase. In addition, various building certification systems have been compared to determine the best possible solution to solve the problem. Furthermore, strategies are suggested on how to minimize the use of Gray Energy in the building.

Life Cycle Stages		
PRODUCT	A1	Extraction, Production
	A2	Transport
	A3	Manufacturing
CONSTRUCTION	A4	Transport
	A5	Construction, Installation
USE	B1	Use
	B2	Maintenance
	B3	Repair
	B4	Replacement
	B5	Refurbishment
	B6	Energy Use
	B7	Water Use
END OF LIFE	C1	Demolition
	C2	Transport
	C3	Processing
	C4	Disposal
BEYOND	D	Reuse, Recycling, Recovery

LCA-Advantages

Provide insights into the environmental impacts of building material choices

Green building certifications, such as LEED, DGNB, and BREEAM, require LCA

LCA compares whether a building is more environmentally preferable than another.

LCA evaluates the environmental benefits of a new building product

The LCA and Building Certification Systems Characteristics

Life Cycle Assessment (LCA) is a method that has been scientifically based and standardized by the International Organization for Standardization (ISO). It is used to assess the environmental impacts and resource consumption of a product, system, or service throughout its entire life cycle

The certification systems are designed to lower the ecological impact of buildings and can function as a tool for management purposes to arrange and systematize environmental issues throughout the lifecycle evaluation of construction

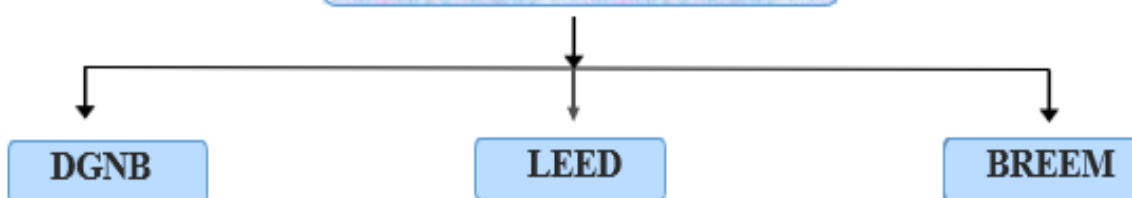
Results

There is the potential to make the buildings sustainable and environment-friendly through these processes. Furthermore, these tools can greatly help to achieve Sustainable Development Goals and pave the way to achieve Neutral Climate Building by 2050.

However, there are certain obstacles such complexity of the LCA and building certification systems and the cost which hinder the process which needs to be carefully taken into consideration.

Overview of building certification systems and their solutions for decreasing the negative effects of the building on the environment and reduction of gray energy.

Building Certification Systems



Lower the impact of buildings by recommending the use of sustainable materials, maximizing energy efficiency, and minimizing waste across the LCA

Support decision-making for sustainable development

Can be used for management purposes to arrange and systematize environmental issues throughout the LCA