

Comparative Life Cycle Assessment of an Extensive Green Roof with a Traditional Gravel-Asphalted Roof: An Application for the Lebanese Context

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Abstract : A vegetative roof, also called a garden roof, is a "roofing system that endorses the growth of plants on a rooftop". Garden roofs serve several purposes for a building, such as embellishing the roofing system, enhancing the water management, and reducing the energy consumption and heat island effects. Lebanon is a Middle East country that lacks the use of a sustainable energy system. It imports 98% of its non-renewable energy from neighboring countries and suffers flooding during heavy rains. The objective of this paper is to determine if the implementation of vegetative roofs is effectively better than the traditional roofs for the Lebanese context. A Life Cycle Assessment (LCA) is performed in order to compare an existing extensive green roof to a traditional gravel-asphalted roof. The life cycle inventory (LCI) was established and modeled using the SimaPro 8.0 software, while the environmental impacts were classified using the IMPACT 2002+ methodology. Results indicated that, for the existing extensive green roof, the waterproofing membrane and the growing medium were the highest contributors to the potential environmental impacts. When comparing the vegetative to the traditional roof, results showed that, for all impact categories, the extensive green roof had the less environmental impacts.

Keywords : life cycle assessment, green roofs, vegetative roof, environmental impact

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