Life cycle analysis of a new self-healing bituminous membrane

Semester project (Fall 2023)

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Language for the project: French, English or Spanish.

Direction: Véronique Michaud

Description: Flat-roofed buildings are generally waterproofed with polymer bitumen membranes that are installed during construction. However, these are often damaged during or after building operations. Intervention of skilled workers is therefore essential to detect and repair the resulting leaks and maintain the static properties of the buildings. This is costly and disruptive.

![Figure 1 Double layer build-up (market share > 80%). Roof build-ups in Switzerland are typically insulated so they need a vapor barrier and waterproofing is a double-layer build-up, covered with ballast. The top membrane is fully torched onto the polyester (PES) fleece which is used as reinforcement. The surface coating are usually paving stones to prevent UV light damage the bitumen.](image)

Based on that, a novel self-healing bituminous membrane will be developed at LPAC, EPFL for the building industry according to an original concept whereby autonomous water-induced repair of damage prevents further penetration of water and improves health and sustainability.

Objectif: This project will focus on the Life Cycle Analysis (LCA) of this novel self-healing bituminous membrane in order to confirm the latter statement.

The specific objectives are:

1. Determine and compare the carbon footprint of the new self-healing composite versus the existing bituminous membrane.
2. Determine and compare the human health impact of the new self-healing composite versus the existing bituminous membrane.
3. If possible, economical and social impacts will be also investigated.

A basic knowledge of Eco-balance or Life Cycle Assessment is required for this project.