DISCOVER
Development of Innovative Sustainable COVEring materials for Roofs

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Background

Roofing materials are high quality products with a long life-time, but are made mainly from fossil raw materials and its derivatives; like bituminous roofing based on the oil derivative bitumen, or synthetic membranes that are based on polymers stemming from the petroleum chemistry (Figure 1). The uncertainty of petroleum exploitation, the by consequence high fluctuations in price, as well as the CO_2 footprint motivate us to look for alternative renewable raw materials. The target is to maintain the technical and functional characteristics.

Objective

- Develop a sustainable 100% bio-based roofing membrane
  - with at least the same technical and functional characteristics and performance as current roofing membranes
  - that fits in current production processes and application techniques
- Outdoor demonstration of this bio-based roofing membrane

Approach

Selection of suitable raw materials

Several possible bio-based substitutes for bitumen, such as residues from agriculture and the pulp&paper industry, are taken as a starting point in the project. The environmental impact as well as the impact of the various natural ingredients on key product requirements such as water resistance, compatibility, durability, workability and strength will be investigated.

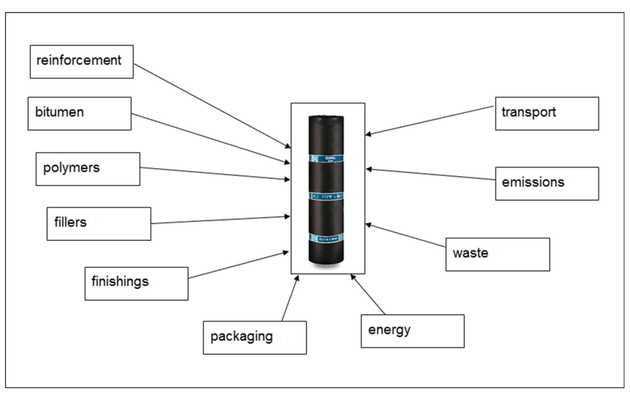

Figure 1. Roofing membrane constituents and key parameters

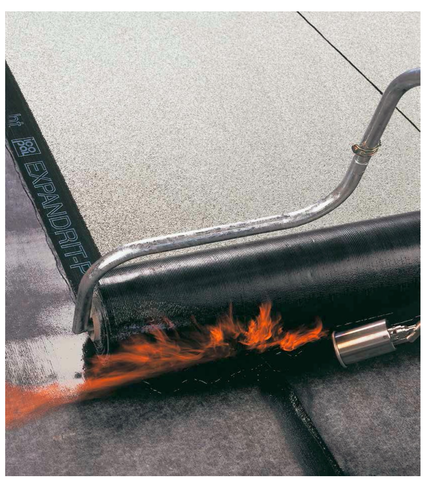

Figure 2. Installation of a bituminous roofing membrane

A comparison of different compositions should ultimately lead to a recipe that yields the best performance and can be produced at the lowest cost and without any negative environmental impact. For this last purpose, a LCA will be conducted. The challenge is to develop a roofing membrane material without having to change current production and application methods (Figure 2).

After selection of the most suitable bio-based raw materials, formulations will be tested by both Icopal and FBR on its basic characteristics (e.g. miscibility, compatibility, rheological and thermal behaviour), intermolecular level (e.g. dispersion, visco-elastic behaviour, reactivity), and performance according to roofing standards (e.g. flow-resistance, ageing, cold bending, walkability, windlift).

Figure 3. Flow behaviour of a bitumen alternative

Demonstration bio-based roofing membrane

During the last project year a prototype of a bio-based roofing membrane will be manufactured and extensively tested as a demo-roof under out-door conditions. The final product provides a sustainable alternative as well as advantage for roofers in projects where durability is required by building owners and architects.

Project partners

- **Icopal**
  Icopal is a leading manufacturer of a wide range of roofing materials. Icopal provides bituminous- and synthetic roofing tiles and steel for all types of roofs. Icopal Netherlands is part of the Icopal Group, which operates mainly in Europe. Recently the Group has been acquired by GAF. www.icopal.com
- **Stichting DAKlabel**
  DAKlabel is a branche organisation and innovation platform to stimulate innovative development for the roofing industry. www.daklabel.nl
- **Wageningen UR Food & Biobased Research**
  FBR is a contract research organisation who has extensive know-how on biobased raw materials, green conversion processes and develops biobased applications together with industrial partners.

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