



Sustainable coatings based on lignin resins and bio-additives with improved fire, corrosion and biological resistance

LIFE CYCLE ASSESSMENT OF LIGNIN-BASED COATINGS FOR SEVERAL APPLICATIONS

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Introduction

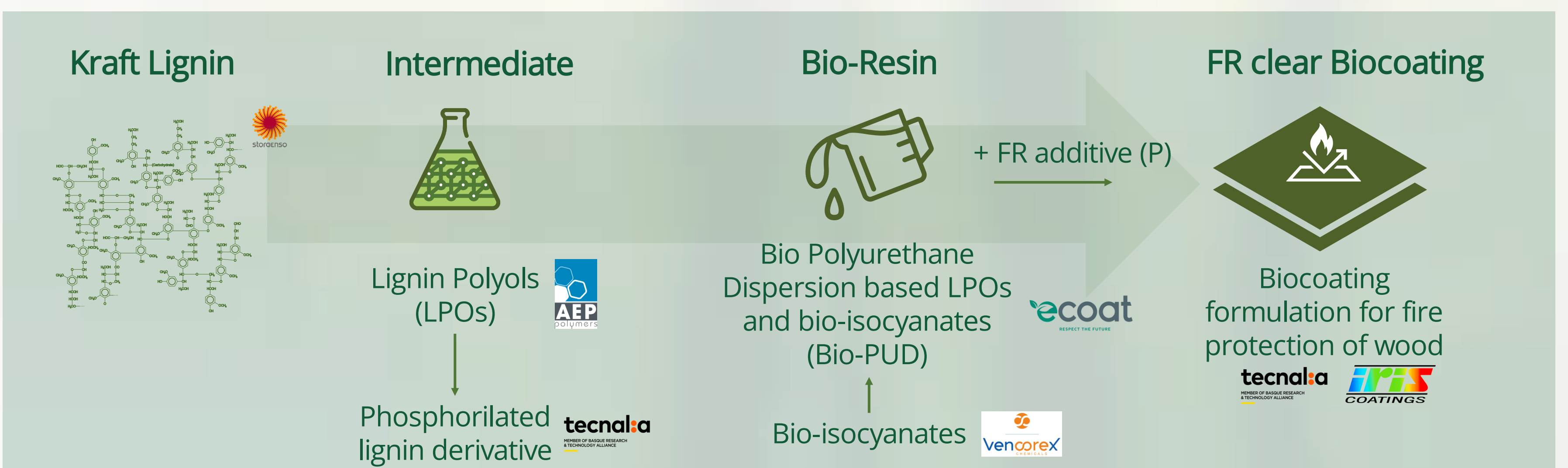
Lignin is an underused **by-product** with a strong potential to bring **economic returns** and **environmental advantages** if relevant applications are identified.

Within **LIGNICOAT** Project, ARDITEC assessed the **environmental impacts** of several **biocoatings** based on **lignin** for different applications.

The **Life Cycle Assessment (LCA)** results highlights some of the **water-borne formulations** developed by IRIS COATING and TECNALIA for **fire protection** of wood and **antimicrobial/antiviral** properties for metal surfaces by TECNALIA. The latter have been compared to their **fossil counterparts** to highlight the environmental benefits.

Other companies involved in the value chain are: VTT, AEP Polymers, Ecoat, Vencorex, and Barpimo.

Materials and Methods

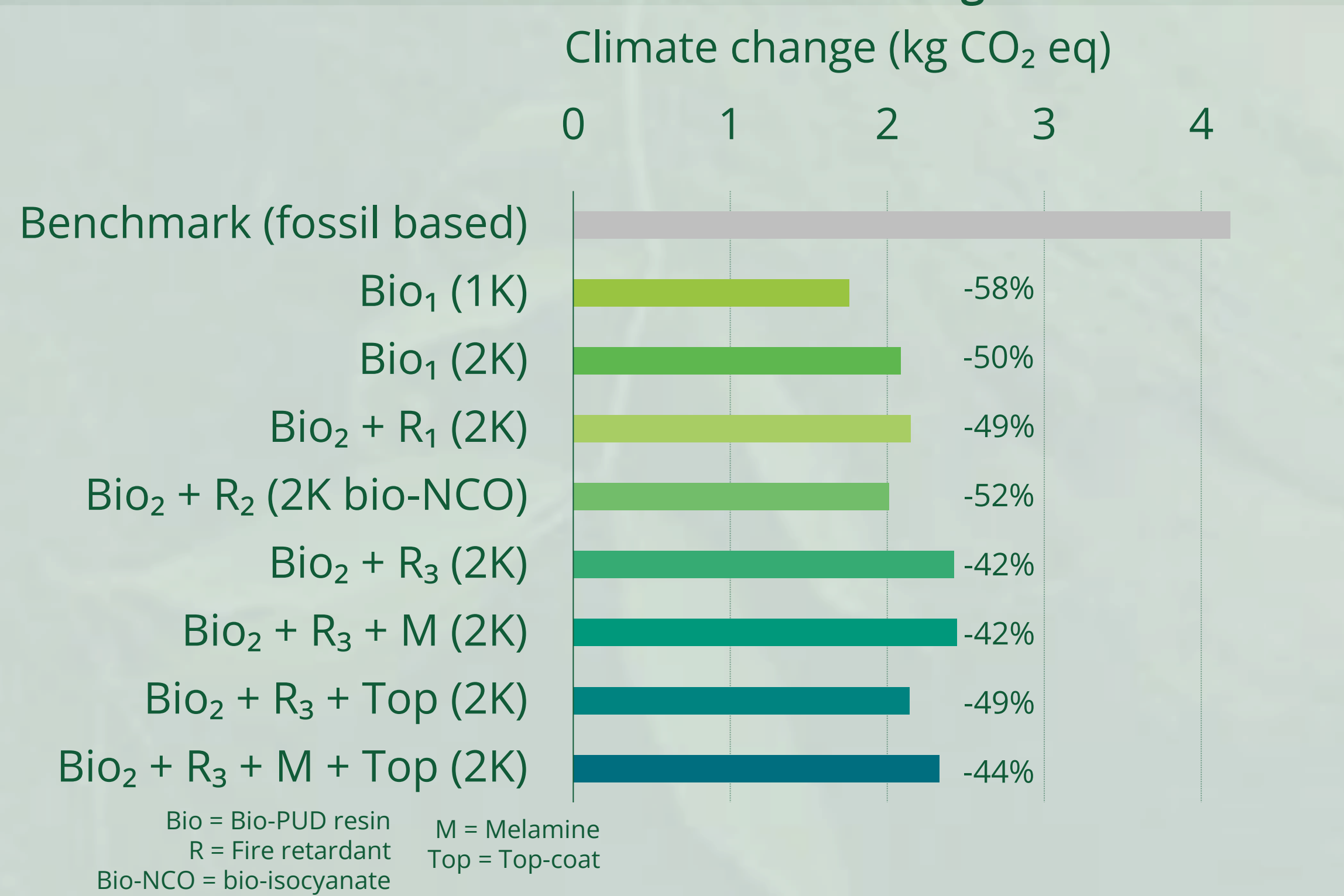


The model considers a **cradle-to-gate LCA**, starting from kraft lignin extraction until the biocoating formulation. Life Cycle Inventories were based on data retrieved from **scientific literature** and **experimental data**.

LCA model was implemented in SimaPro 9.3.0.3 software, and the environmental impacts were calculated applying the **Product Environmental Footprint method**. In this study, the chosen **functional unit (FU)** was **1 kg of coating** (lignin or petroleum-based). The FU will be updated by the end of the project to the quantity of coating necessary to comply with the relevant standards in the industry.

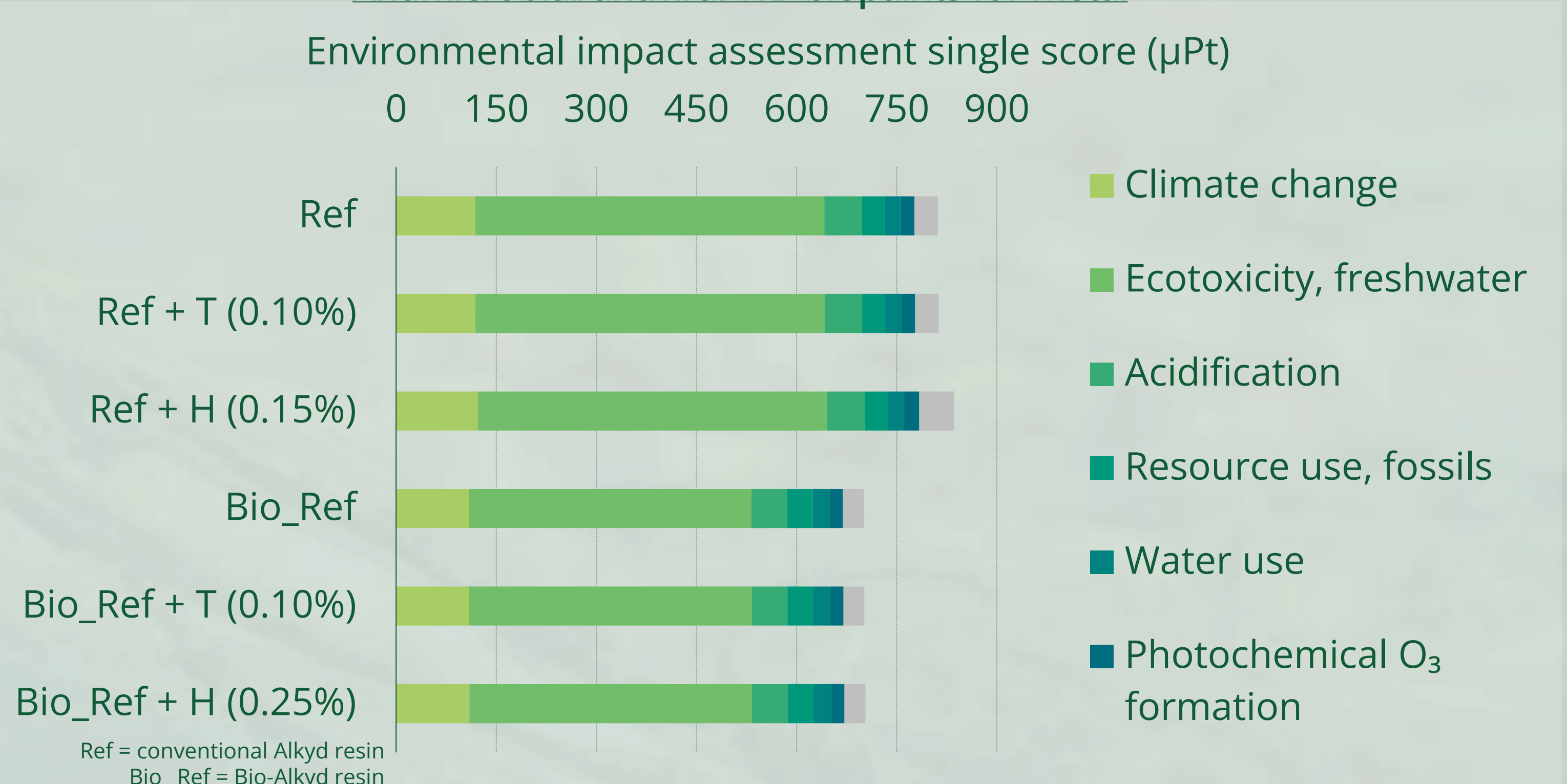
Results and Discussion

FR clear WB fire retardant biocoatings for wood



- For the global warming potential impact category, Bio₁ (1K) coating presents the best environmental performances. However, it has the lowest fire performance (data not showed).
- The reduction in kg CO₂ eq emissions ranges between 40 and 60% according to the developed bioformulations.

Antimicrobial/antiviral WB biopaints for metal



- Biocoatings (Bio) present better general environmental performances for the single score.
- Thymol (T) and hop soft resin (H) additions do not affect the results significantly.
- Titanium dioxide is responsible for the high score of freshwater ecotoxicity in the case of antimicrobial/antiviral paints.



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