



# Safety and Sustainability - Assessments and Methodologies used in PERFECOAT

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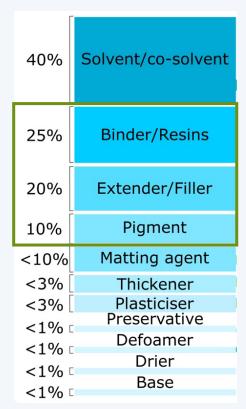




### **Objectives**

- The PERFECOAT goal is to develop and validate a new generation of industrial wood and decorative coatings with at least 25% bio-based components that meet and even surpass the current quality and sustainability of fossil fuel coatings.
- Starting with a very high initial bio-based content of close to 100% (lignocellulose and marine residues), the project applies biotechnology to produce various building blocks (e.g. microbial polymers, lipids, terpenes, pigments, and cell mass from biomass sugars, as well as biopolymers)
- Throughout the development, skin sensitization and leachate tests, and life cycle assessments (LCA, LCC and social LCA) have been used to evaluate the safety and sustainability of biobased ingredients and coating formulation. The aim is to guide and quantitatively demonstrate the sustainability improvements achieved with the bio-based coating compared to conventional fossil fuel-based coatings while minimizing risks.

#### General composition of coatings



The ambition of **PERFECOAT** is to identify alternatives to replace major components











**High Performance Bio-based Functional Coatings for Wood and Decorative Applications** 

Environmental impacts assessments in Perfecoat:
Methodology and preliminary results







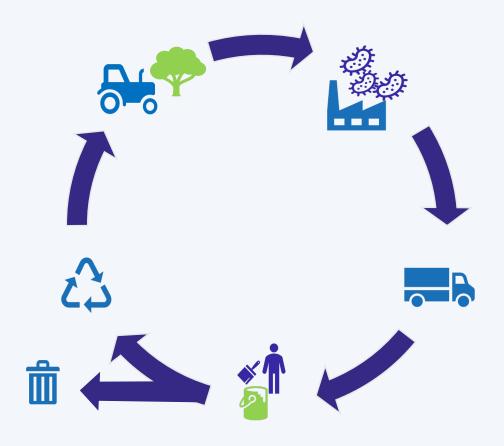
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# **Life cycle Assessment**

- Environmental Life Cycle Assessment (E-LCA), normally referred to as Life Cycle Assessment (LCA), is a technique that aims at addressing the environmental aspects of a product/service and their potential environmental impacts throughout that product/service's life cycle.
- ISO's standards on environmental management (ISO 14040 and ISO 14044)









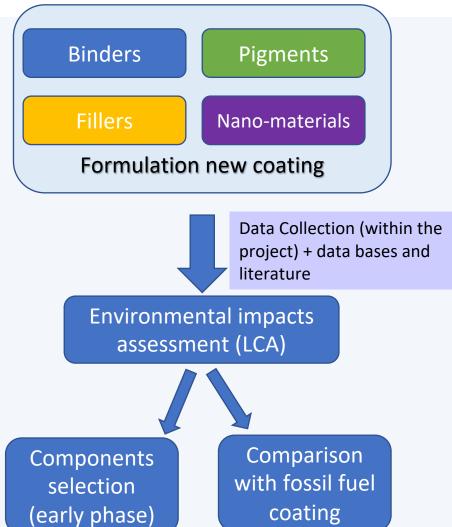




## **Environmental impact (LCA)**

# **Objectives**

- Life cycle assessment is used to assess the entire value chain (from feedstock to ingredients production and final coating formulations).
- Communicate results to work packages involved in the development to further optimise the proposed strategies with respect to environmental criteria.
- Select components entering the final formulation
- Compare new concepts (ingredients and coatings) with a standard fossil-based counterparts.













#### **Relevant standards**

### **Task 6.2: Life Cycle Assessment**

- Literature screening and the review of specific LCA requirements and guidance for bio-based products
  - Standards for bio-based products
    - EN16751:2016 to assess the sustainability of the biomass
    - EN 16760:2015 to assess impacts over the life cycle of bio-based products with focus on the biobased part of the product
    - CEN/TR 16957:2016 to guide the Life Cycle Inventory for the end-of-life phase
  - ISO 14067 for Carbon Footprint of a Product
  - Reports
  - Scientific papers

EN 16760 EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM November 2015

ICS 13.020.60

**English Version** 

Bio-based products - Life Cycle Assessment

Produits biosourcés - Analyse du cycle de vie

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### **Scope definition**

- Analyze environmental impacts of biobased ingredients and new coatings (UV curable and waterborne) and compare them with their fossil fuel counterparts.
- New coating formulations should have similar performance to the existing (fossil fuel) control paints.
- The functional unit of the study is set to 1 kg of product
- Only ingredients present in a quantity greater than or equal to 1% will be included according to UNEP/SETAC guidelines.



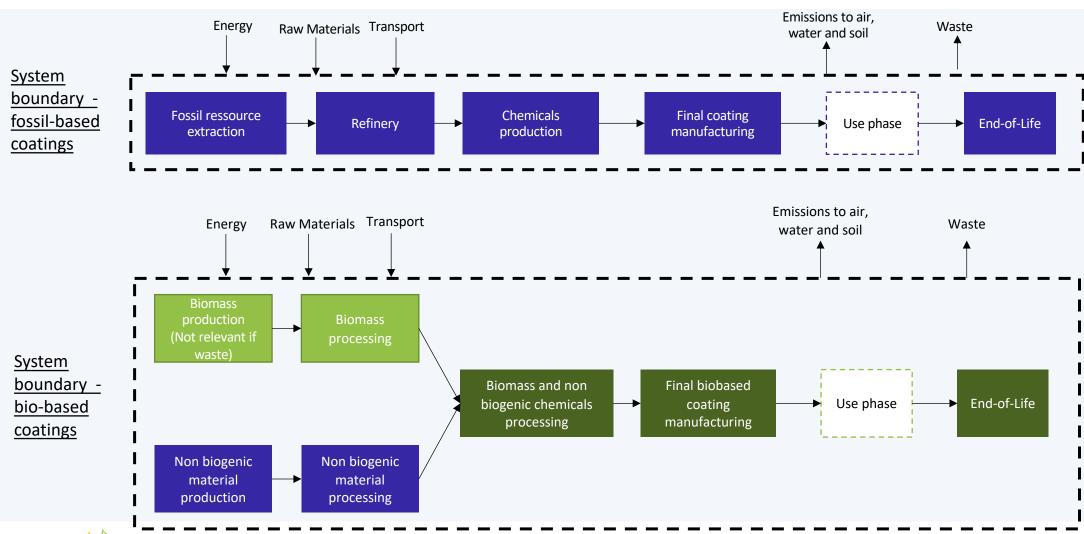






# **System boundaries**













# Life cycle inventory and impacts modellling

- Data was collected from industry partners, laboratory tests and relevant open sources (e.g., Ecoinvent databases, literature, etc.).
- Models have been used to estimate inputs for upscaled production.
- Life cycle impact assessment step was conducted using the software SimaPro and the impact assessment method EF3.0, ILCD 2011 and CML2.
- The greenhouse gases emissions have been the focus so far, but other impact categories are analysed and will be interpreted in a later stage once the final formulations are ready.



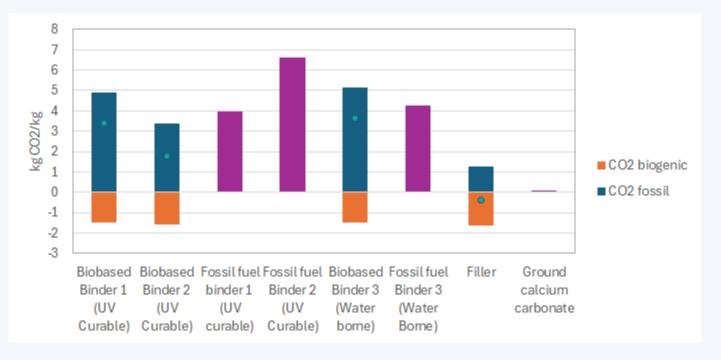








# **Preliminary LCA results on ingredients**



- These results are based on estimates from models for industrial production, taking into account possible energy and solvent recovery.
- Chemicals and energy inputs (e.g., compressed air, steam, mixing, and homogenization) are significant hotspots.
- The results are only indicative at this stage as we are still at TRL 5.
- These results are encouraging and indicate that with further optimizations, the new biobased ingredients can outcompete certain fossil fuel counterparts.
- These results will be used to select ingredients for the new biobased coating formulations. In turn, these formulations will be evaluated based on various environmental and economic criteria at a later stage.











#### Take home message

#### What can LCA do?

- Understanding your products' environmental impacts and identify hot spots
- Product improvement (eco-design)
- Comparison of products and production routes
- LCA is a powerful tool to ensure environmental sustainability but,
- Keep in mind the uncertainty in the data used especially at low TRL





