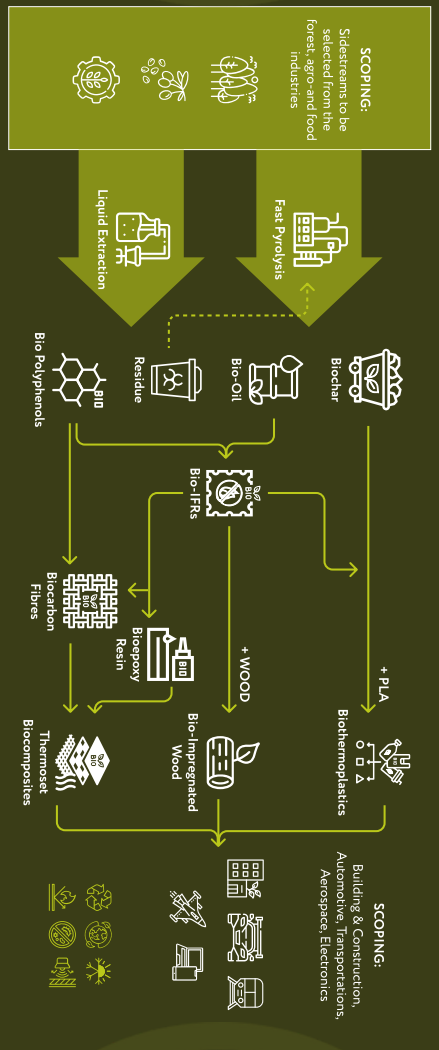
Methodology



WP 1 - MANAGEMENT & COORDINATION

WP 2 - ISOLATION & FUNCTIONALISATION OF BIOPHENOLS

WP 3 - WOODEN, THERMOSET, & THERMOPLASTIC MATERIALS

WP 4 - FUNCTIONALITY & RECYCLABILITY

WP 5 - SAFE & SUSTAINABLE BY DESIGN

WP 6 - COMMUNICATION, DISSEMINATION & EXPLOITATION

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CONNECT

BioPhenom

Multifunctional biophenols for safe and recyclable materials

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Challenge

Common materials found in a wide range of end products and applications are often formulated with **unsustainable petrochemicals**, many of which are **substances of very high concern (SVHC)** due to their harmful effects on the environment and human health. Examples of materials containing SVHC include **bisphenol-based thermoset epoxy resins, PAN-based carbon fibres, and wood** or any other material treated with **synthetic preservatives and flame retardants**.

Therefore, there is an **urgent need to replace materials containing unsustainable and hazardous petrochemicals** by **safe and sustainable bio-based materials** that align with current EU strategies and policy frameworks such as the European Green Deal.

Solution

BioPhenom will **produce biophenols from industrial biomass sidestreams** using advanced technologies and processes such as **fast pyrolysis** and **liquid extraction**. The biophenols will be used to produce **bio-based intumescent flame retardants** (bio-IFRs) and **replace SVHC** in wood products, bio-CF thermoset composites, and PLA-based thermoplastic composites for specified applications.

A scoping study will determine the selection of sidestreams and the most promising applications for the materials developed in the project. The process design, testing, and benchmarking against material functionality and application will follow the **Safe and Sustainable by Design (SSbD)** principles established by the EU Joint Research Centre.

Specific Objectives

The overall objective of BioPhenom will be attained by a set of 6 complementary-specific objectives (OBJs):

OBJ-1. Scope opportunities and challenges for the development of safe and sustainable bio-based solutions from biophenol-rich biomass sidestreams.

OBJ-2. Select and design the isolation and functionalisation of biophenols from selected sidestreams.

OBJ-3. Test and develop safe and sustainable by design wooden, thermoset, and thermoplastic materials.

OBJ-4. Assess and benchmark the functionality and recyclability of product demonstrators.

OBJ-5. Integrate and develop the SSbD framework for assessing the safety and sustainability of biomaterials.

OBJ-6. Contribute high-quality data generated along targeted value chains through effective and efficient dissemination, communication, and exploitation activities.

Expected Outcomes

The BioPhenom Project is poised to have a significant impact across various dimensions:

1 Reduce Dependency on Harmful Substances

BioPhenom's ambition is to replace fossil-based feedstocks with bio-based alternatives and reduce the use of harmful substances in materials and formulations. This approach aims to develop final bio-based products that are safer, exhibiting low human and ecotoxicity, while still meeting overall environmental sustainability requirements.

2 Enable Circularity by Design

BioPhenom products are designed for circularity, especially in areas where recyclability is currently challenging due to safety concerns. This ensures that products can be reused and recycled, enhancing resource efficiency and reducing pollution.

3 Build a Portfolio of Bio-based Solutions

BioPhenom focuses on developing a portfolio of promising bio-based solutions that have the potential for scale-up production and future market uptake. These solutions will be safe, circular, and sustainable, promoting environmental sustainability and economic growth.