Consortium

12 partners

10 different European countries

Connect

BioPhenom

Multifunctional biophenols
for safe and recyclable materials

Funded by the European Union

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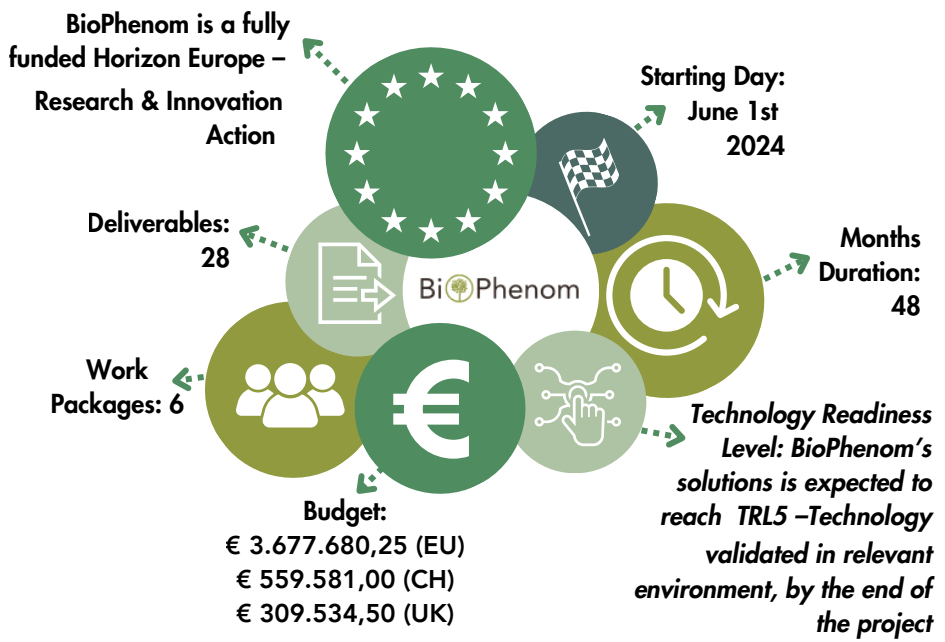

Project

The BioPhenom project aims to address the significant challenge posed by the widespread use of **unsustainable petrochemicals**, many of which are **substances of very high concern (SVHC)** due to their harmful effects on the environment and human health. Some industrial practices use SVHC to **formulate and improve the functionality of wooden, thermoset, and thermoplastic materials**. These materials are toxic, non-recyclable, and accumulate in our ecosystems, thus prompting an **urgent need for safer alternatives**.

To deal with the safety and environmental issues related to the manufacture and disposal of chemicals and materials, the European Green Deal and its ambition for zero pollution, has **introduced safe and sustainable by design bio-based solutions** that can accelerate the transition towards a **circular bioeconomy and reduce waste**.

Leveraging advanced technologies and processes (i.e. fast pyrolysis, liquid extraction), the BioPhenom project seeks to **exploit biophenols isolated from industrial biomass sidestreams to produce bio-based flame retardants** and **replace SVHC in the development of safe, sustainable, and recyclable materials** (i.e. wood products, CF thermosets, thermoplastic composites) for different applications. The selection of sidestreams and the most promising applications for the materials developed in the project will be determined by a scoping study, and the process of 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.

Technologies Developed

The technologies that will be developed in BioPhenom are:

1. Fast pyrolysis of biophenol-rich biomass sidestreams.
2. Liquid extraction of phenolic biomass sidestreams.
3. Synthesis of bio-IFRs from biophenols.
4. Wood impregnation with bio-IFRs.
5. Leach-resistant topcoat for wood impregnated with bio-IFRs.
6. Synthesis of bio-based and FR precursor for epoxy resins using the bio-IFRs.
7. Custom design of bio-based CF thermoset composites with FR properties.
8. Electro-spinning of bio-CFs from bio-IFRs and impregnation with bio- and FR resin.
9. Manufacturing PLA-based thermoplastic composites containing biochar and bio-IFRs.
10. Recycling of wood impregnated with bio-IFRs into wood-based particleboards.
11. Chemical recycling of CF thermoset composites to recover individual components.
12. Recycling of PLA-based thermoplastic composites containing biochar and bio-IFRs.