

# WOOD ZYMES

## WOOD TRANSFORMING ENZYMES

www.woodzymes.eu

## Extremozymes for wood based building blocks: from pulp mill to board and insulation products



### PROJECT CONCEPT

The WoodZymes project aims to provide the wood industries with «wood transforming enzymes» able to work in the extreme operation conditions (including high temperature and pH) required to remove or modify hemicelluloses and recalcitrant lignin protecting cellulose in the plant cell wall. This will enable selective valorisation of currently underutilised biomass fractions to provide high-value bio-equivalents of petroleum-derived chemical building blocks.

WoodZymes illustrates the potential of extremozymes in the global bio-based economy, contributing to the sustainability and competitiveness of cellulose and board/polyurethane manufacture and establishing a direct link between the pulp and wood industrial sectors.



### PROJECT WORKFLOW

WoodZymes partners already have available extremozymes resisting very high temperature and pH that will be further optimized to be used as biocatalysts in wood industries.

Enzyme application will include the recovery of phenolic compounds from enzymatic breakdown of technical lignin, and of lignin and hemicellulose compounds from enzymatic delignification and bleaching of kraft pulp (also resulting in more sustainable final cellulosic pulp).



Extremophilic enzymes will also be used to valorise the latter compounds as bio-based precursors for adhesives in the manufacture of medium-density fibreboards (MDF), and as components of insulation polyurethane (PU) foams (substituting fossil building blocks), as well as for obtaining renewable sugar-based papermaking additives.

Finally, technical, environmental and socio-economic analyses of the newly developed materials and processes will be carried out to be compared with currently available ones.

### OBJECTIVES

- 1 To develop extremozymes adapted to industrial operation conditions by screening and protein engineering, to be applied as biocatalysts in the wood conversion sector.
- 2 To use the developed extremozymes for the production of lignin-derived phenols and hemicellulose-derived sugars from underutilised side streams of kraft pulp mills, followed by chemical characterization.
- 3 To obtain new MDF and PU materials by using lignin-based resin precursors and phenols, respectively, and to use hemicelluloses-derived sugars as papermaking additives.
- 4 Evaluation of the technical, environmental and socio-economic feasibility of the previous objectives, including life-cycle assessment/life-cycle costing and other analyses.



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