NewWave

Result summary #1

New steps in the modification of wood, utilizing sustainable formulations

Project goal: The NewWave Project, funded by the European Union's Horizon Europe Programme, is actively working to build a sustainable and circular economy by introducing innovative and bio-based raw materials into production lines. The goal is to replace toxic chemicals and reduce the environmental footprint of products.

The formulation

One of the key areas of the project is the production of modified wood using formulations based on **fast pyrolysis-bio-oil (FPBO)**.
Recently, project partner **Foreco** conducted modified wood production on a pilot scale. This activity was carried out with the collaboration of **BTG**, which prepared and supplied the formulations, and **InnoRenew**, which will be responsible for subsequent analyses.

Testing wood

The work involved the modification of three different wood species: **Scots Pine, Beech, and Radiata Pine**. From initial laboratory-scale evaluations, the IS15 formulation from FPBO, prepared by BTG, proved to be the most promising and was selected for pilot-scale testing. The pilot impregnation plant is located at Foreco's premises.

Modification process

The wood modification process involves several stages. First, impregnation of the wood with the **IS15 formulation**. During the pilot phase, the impregnation solution was not heated, although heating could increase uptake by reducing viscosity. The objective was to maximize uptake, using a "refusal" process.



Figuere 1: pilot impregnation unit at Foreco

Typical conditions included pre-vacuum, pressure, and post-vacuum phases. This is followed by air and oven drying and curing to stabilise the impregnating agent within the wood cell wall. Pilot-scale curing took place in an atmospheric steam dryer with a maximum temperature of 140 °C. An ultrasonic device was used for non-destructive detection of any cracks caused by drying stress.



Figuere 2: crack detection device at Foreco

Testing results

In total, approximately 0.75 m³ of wood was treated with the IS15 formulation on a pilot scale. Foreco evaluated the formulation uptake and the density of the modified wood. Preliminary results indicate high variability in uptake for Beech and reduced uptake for Scots Pine, while the uptake in Radiata Pine heartwood was very good.

Based on current results, Radiata Pine is the preferred wood species for this application.
To gain a comprehensive understanding of the treatment's effectiveness, samples of the modified wood have been sent to InnoRenew. There, crucial tests such as durability and dimensional stability will be performed, providing further important insights.
This pilot-scale work represents a fundamental step in the development of bio-based building materials, which can contribute concretely to a more sustainable future.

Learn more on newwave-horizon.eu

Project partners

btg biomass technology group · InnoRenew CoE · rijksuniversiteit groningen · BLUE SYNERGY · etaflorence renewable energies · AEP polymers · FORECO · FORESA TECHNOLOGIES · TFC BIOMASS BASED CHEMICALS · n|w University of Applied Sciences and Arts Northwestern Switzer School of Engineering and Environment

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