

UNLOCKING THE POTENTIAL OF THE BIOECONOMY

Bio-based products – products wholly or partly derived from materials of biological origin – can make the economy more sustainable and lower its dependence on fossil fuels. For this reason, the EU has declared the bio-based products sector to be a priority area with high potential for future growth, reindustrialisation, and addressing societal challenges. However, making products from biomass is a complex business. Innovative projects, such as Bio4Products, are vital to develop the technologies that will enable industry to unlock the potential of the bioeconomy, paving the way for a whole range of bio-based product groups.

ENGINEERED WOOD AND NATURAL FIBRE REINFORCED PRODUCTS have great potential for use in the construction industry, for example as external cladding.

SAND MOULDING AND OTHER FURAN BASED RESINS have various applications for the manufacture of metal products in the foundry and refractory industry.

PHENOLIC RESINS are used extensively by many industries, and are particularly prevalent in car production. They can be found in brake pads, oil filters and any number of under-the-hood parts.

BIO-BASED WATER-PROOF MEMBRANES FOR ROOFING will create greener alternatives for the construction sector.



PROJECT PARTNERS

Bio4Products brings together a unique blend of organisations and expertise, led by BTG Biomass Technology Group from the Netherlands. The project, which began in September 2016 and will run for four years, is funded by the Sustainable Process Industry through Resource and Energy Efficiency (SPIRE) programme, a contractual public-private partnership under the EU framework programme Horizon 2020.



BTG BIOMASS TECHNOLOGY GROUP



DERBIGUM



HEXION



TRANSFURANS CHEMICALS



E4TECH



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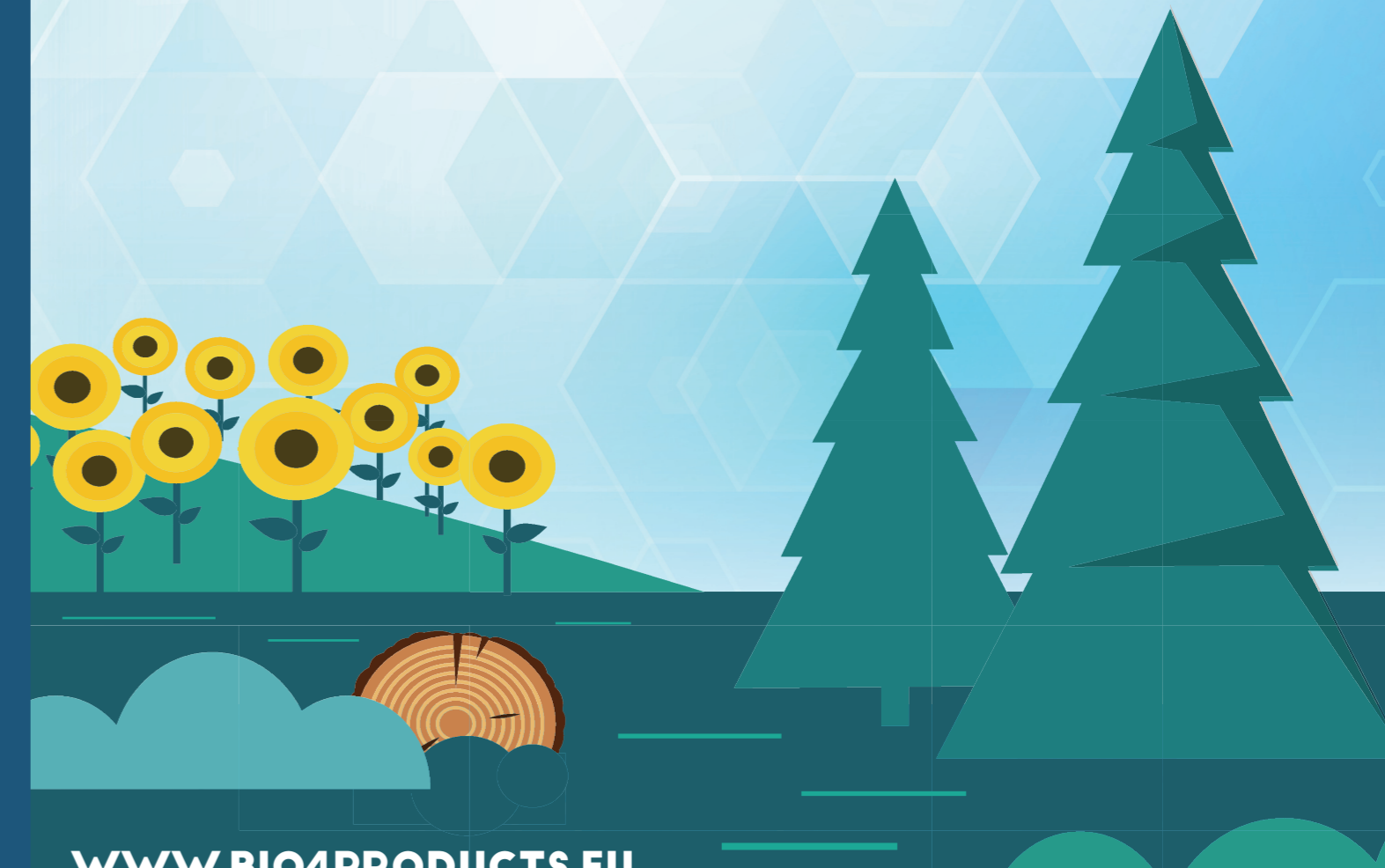


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BIO4 PRODUCTS

Creating sustainable resources for process industry



WWW.BIO4PRODUCTS.EU

REPLACING FOSSIL RESOURCES IN PROCESS INDUSTRY

Process industries are central to the European economy. They transform raw materials into the essential products needed for society to flourish. Many products however, are made in part from fossil-based resources. This reliance on non-renewable materials poses a threat to long-term sustainability and competitiveness.

Bio-resources such as **straw**, **bark**, **forest residues** and **sunflower husks** could hold the key to a more environmen-

tally-friendly future for Europe's process industry. If they can be successfully utilised, these sustainable resources could directly replace many fossil-based processing streams, such as bitumen, phenols and creosote.

Bio4Products will demonstrate how these four bio-resources can be converted, and further processed into four end products: **phenolic resins**, **roofing material**, **sand moulding resins**, and **engineered wood and natural fibre reinforced products**.

The overall objective is to create four products for which at least 30% of the original fossil-based stream is substituted with sustainable resources, and which deliver a 75% reduction in greenhouse gas emissions

CREATING HIGHER VALUE MATERIALS FROM BIOMASS

A technique called **fast pyrolysis** will be employed by the project. Pyrolysis of biomass produces a bio-oil which can be used as a fuel or energy carrier. Bio4Products will break new ground by further processing the oil to create higher value materials and chemicals. To achieve this, project partners will construct a **fractionation** demo-plant to separate the oil into lignin and sugar fractions. These intermediate materials are suitable for further processing into bio-based products. With considerable potential to include these sustainable resources in other product ranges, Bio4Products can help lay the foundations for a more innovative and sustainable process industry in Europe.

WHAT IS FAST PYROLYSIS?

Fast pyrolysis transforms solid biomass into a liquid in just a few seconds. First, biomass is rapidly heated to around 500°C in the absence of air. An oily smoke is created, which is then condensed into a liquid bio-oil. After years of development the process is now applied on an industrial scale, converting large quantities of lignocellulosic (non-food) biomass into a dark-brown bio-oil.

STRAW



BARK



FOREST RESIDUES



SUNFLOWER HUSKS



SUSTAINABLE FEEDSTOCK

The project will use residual, non-food biomass such as **straw**, **bark**, **forest residues** and **sunflower husks**. By targeting residual feedstocks Bio4Products aims for long-term sustainability.

INNOVATIVE CONVERSION

Bio4Products will demonstrate an innovative two-step conversion method based on thermal fractionation. Treatment by **fast pyrolysis** will first convert the solid biomass into a bio-oil, while largely preserving the original functionalities. The next step sees the functional groups present in the bio-oil separated by **fractionation**, obtaining a sugar stream and a lignin stream.

CONVERSION PLANT

LIGNIN

SUGAR

BIO-BASED PRODUCTS

The intermediate lignin and sugar streams will be further processed, replacing fossil resources in the production of four products: **phenolic resins**, **roofing material**, **sand moulding resins** and **engineered wood and natural fibre reinforced products**.



1
PHENOLIC RESINS

The lignin fraction will replace up to **65%** of the fossil phenol in a number of existing resin formulations, which have applications in a variety of industries.



2
ROOFING MATERIAL

The lignin fraction will replace up to **30%** of the fossil bitumen used in the production of water-proofing membranes.



3
SAND MOULDING RESINS

The sugar fraction will replace up to **75%** of the furfuryl alcohol used in sand moulding resins and other furan based resins.



4
ENGINEERED WOOD AND NATURAL FIBRE REINFORCED PRODUCTS

The sugar fraction will replace up to **100%** of the fossil creosote used in the production of engineered wood and natural fibre reinforced products.

PROCESSING PLANTS