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.

MODIFIED WOOD
has various outdoor applications. It is a sustainable alternative to creosote-treated wood, tropical hardwood or concrete.

INSULATION FOAMS
have a very high thermal performance and help to improve energy efficiency in buildings.

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, including for moulding compounds. They are particularly prevalent in car production, where they can be found in any number of under the hood parts.

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

FORECO

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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 environmentally-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**, **insulation foams**, **sand moulding resins** and **modified wood**.

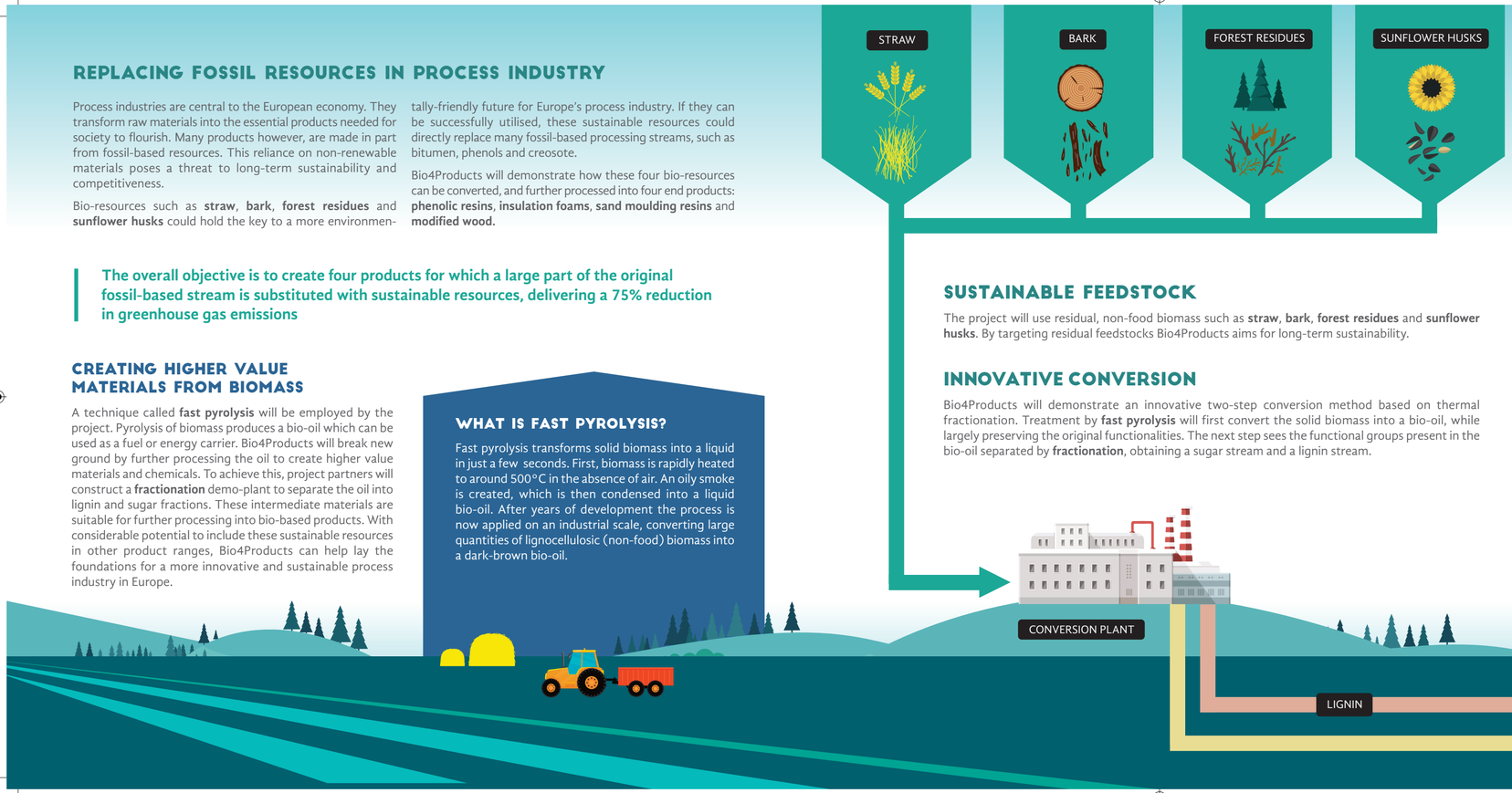
The overall objective is to create four products for which a large part of the original fossil-based stream is substituted with sustainable resources, delivering a 75% reduction in greenhouse gas emissions

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.



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.

BIO-BASED PRODUCTS

The intermediate lignin and sugar streams will be further processed, replacing fossil resources in the production of four products.

1 PHENOLIC RESINS

The lignin fraction will replace part of the fossil phenol in a number of existing resin formulations, which have applications in a variety of industries.

2 INSULATION FOAMS

The lignin stream will partially replace fossil phenol in the production of insulation foams for construction.

3 SAND MOULDING RESINS

The sugar fraction will replace petro based components in the production of sand moulding resins and other furan based resins.

4 MODIFIED WOOD

The sugar stream will be used as a formulation for wood modification, mainly for fencing applications.