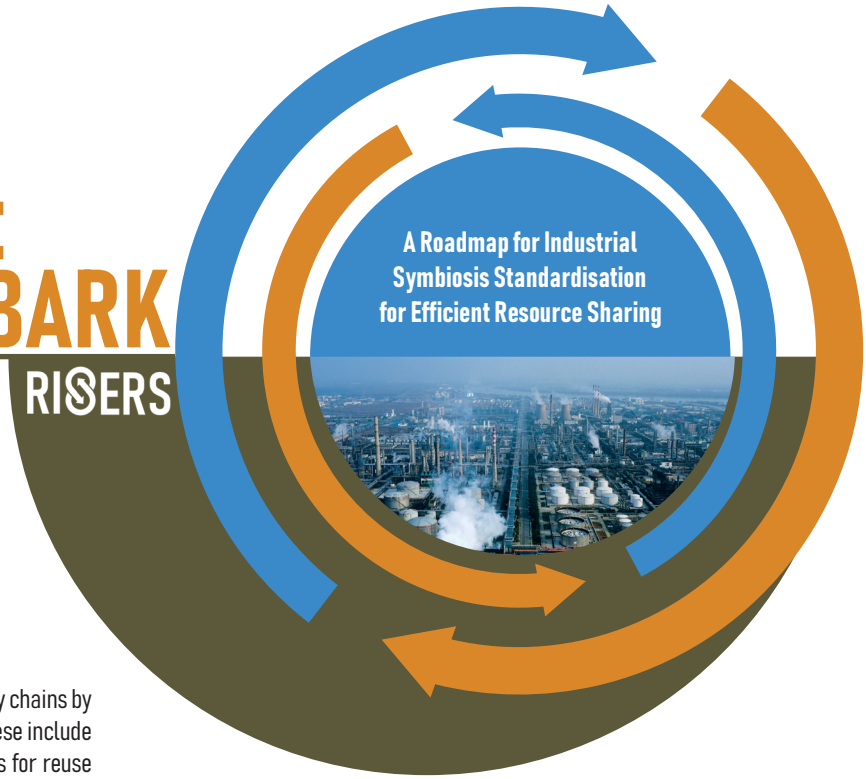
Synergy Fact Sheet

BIOMASS RESIDUES: WASTE WOOD AND BARK

Recover waste wood from pulp and paper sector, combustion plants



Introduction

The pulp and paper sector makes an important contribution to global supply chains by providing essential materials while generating a range of by-products. These include wood waste and associated residues, which offer significant opportunities for reuse beyond traditional disposal methods. This waste, which is mainly generated in kraft pulp mills, is produced during processes such as combustion in recovery boilers, biomass boilers and lime kilns. These processes produce biogenic CO_2, which provides an opportunity for carbon capture and utilisation. By using carbon capture and utilisation (CCU) or storage (CCS) technologies, the industry can reduce emissions and develop innovative bio-based materials, including precipitated calcium carbonate and lignin derivatives (Kuparinen et al., 2019). In addition, wood waste from the pulp and paper sector can serve as a renewable fuel source for combustion plants, contributing to energy generation while reducing reliance on fossil fuels.

In addition to biomass residues, large quantities of inorganic by-products such as green liquor, slaked sand, lime sludge and boiler fly ash are also produced. In the past, these materials were disposed of in landfill sites. However, advances in industrial processes and the increasing adoption of circular economy practises have created opportunities for their reuse. These by-products are now being utilised in diverse applications, including the development of alternative materials such as fillers and binders for construction, nutrient supplements for agriculture, and additives for environmental remediation. Furthermore, emerging research suggests potential applications of certain residues in the food industry, such as using lignin derivatives in packaging materials or as feed additives. These by-products are now being reused for applications in construction, agriculture and environmental remediation, contributing to sustainability goals and reducing reliance on landfills (Quina & Pinheiro, 2020).

Rotary lime kilns, which are an essential part of the Kraft process, play a key role in converting lime slurry into reusable lime within the production cycle. Modelling using computational fluid dynamics (CFD) has provided valuable insights into the mechanisms of heat transfer and calcination in these kilns. This knowledge enables the industry to optimise the efficiency of the kilns, reduce energy consumption and ensure consistent lime quality. Additionally, these kilns contribute to industrial symbiosis by utilising waste wood as an alternative fuel. By burning waste wood instead of conventional fossil fuels, the pulp and paper industry reduces its carbon footprint while transforming waste streams into valuable energy resources (AIDRES, 2023). This approach not only supports sustainability goals but also enhances economic efficiency by reducing reliance on non-renewable energy sources. By integrating cutting-edge technologies and prioritising sustainable practises, the pulp and paper industry is well positioned to transform waste streams into valuable assets and promote both environmental sustainability and economic growth (Ryan et al., 2022).

Supplying sector(s)			Receiving sector(s)	
Pulp & Paper	Various	Combustion plant, coal combustion	Energy	Energy

TECHNICAL FEASIBILITY

Industrial scale: The recovery and reuse of wood waste can be effectively scaled up and enables the efficient processing of large quantities to meet industrial energy needs.

Low technical requirements: Setting up waste wood recovery systems is simple and requires limited technical expertise and resources, making it viable for a wide range of facilities.

Collecting wood waste for incineration: Efficient collection and processing of wood waste ensures its consistent use as a fuel source in incineration plants, supporting reliable energy production.

PPP IMPACT – EU wide potential

Profit

Wins in industry

The utilisation of wood waste generates significant economic value, amounting to around EUR 130 million across the EU. For example, Case 82 in the Scaler project, demonstrates how industry sucessully recover wood wate transforming it into energy and reducing operational costs. This initiative not only increases industrial efficiency, but also strengthens the region's economic framework by promoting sustainable resource management.

Dissolved gas flotation (DGF): Advanced techniques such as DGF improve the separation of impurities from waste wood, improve fuel quality and reduce emissions during combustion.

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Planet

Environmental gains

The reuse of wood waste plays a crucial role in reducing environmental impact, saving approximately 840,000 tonnes of CO_2 annually. Case 87 in the SCALER project demonstrates how waste wood recovery significantly contributes to lowering CO_2 emissions while aligning with the EU's climate targets. This example supports the transition to greener industrial practices and highlights the environmental potential of wood waste utilisation.

People

Wins for society

Waste wood recovery initiatives create around 1,300 direct jobs, boost local economies, and foster skill development in sustainable industries. As illustrated by Case 82 in the SCALER project, such initiatives strengthen industrial symbiosis, enhance community resilience, and encourage a broader shift toward environmentally conscious practices.

RISERS

About this factsheet

This fact sheet is based on the findings of the RISERS project. Led by Ghent University with the support of project partners, the study involved a systematic assessment of 600+ industrial symbiosis (IS) cases across urban-industrial and cross-sectoral clusters in Europe. These cases formed the basis for the mapping of over 300 MES (Materials, Energies, Services) streams, categorised by output (source) and input (sink) sectors.

The fact sheet provides a detailed overview of a high-potential and high-impact IS synergy, evaluating its implementation feasibility and sustainability impact. Supported by data from public databases (MAESTRI, SCALER, EPOS, AIDRES, etc.) and literature, it offers a generalised insight into the economic, environmental, and social benefits per synergy.

Factsheets authors:

Lieven Demolder, Greet van Eetvelde (Ghent University)
Izabela Ratman-Kłosińska, Grzegorz Gałko, Mateusz Korcz (IETU)

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For more information and access to the full reports, please visit https://risers-project.eu

About the RISERS project

RISERS is a Horizon Europe project aimed at developing an Industrial Symbiosis Standardisation Roadmap supporting the uptake of high impact synergies and resources considering:

- identification of the needs, gaps and opportunities,
- revision of current standards and standardisation efforts relevant for CE and the priority synergies and resources,
- initiating the process of new standards development (especially for newer technologies and pilot-scale synergies).

The RISERS project was launched in January 2024 with a duration of 3 years.

For more information visit: https://risers-project.eu

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