










**EXPANDFIBRE**



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# ExpandFibre Ecosystem R&D&I focus points on the road towards the Vision 2030

Straw and wood fibres as raw materials						
 Textiles	 Biocomposites	 Packaging	 Lignin products*	 Hemicellulose products*	 Sourcing & fractionation of straw	 Other fibre products
<ul style="list-style-type: none"> <li>• New, sustainable textile fibres for wearable textiles and nonwovens</li> <li>• Staple fibre analytics and performance testing</li> <li>• New staple fibre applications and post-treatment technologies</li> <li>• Recycling and traceability</li> <li>• Business models to speed up global market entries</li> </ul>	<ul style="list-style-type: none"> <li>• Raw material processing and converting</li> <li>• Material properties</li> <li>• Recycling and end-of-life</li> <li>• Biocomposites containing fibres and lignin</li> <li>• All-cellulose composites &amp; natural fibre polymer composites</li> <li>• Additive chemistry</li> </ul>	<ul style="list-style-type: none"> <li>• New pulp-based plastic-replacing packaging solutions</li> <li>• Tools and processes for designing sustainable packaging</li> <li>• Barriers and binders based on natural polymers</li> </ul>	<ul style="list-style-type: none"> <li>• Lignin fractionation for material applications</li> <li>• Lignin as functional ingredient for thermosetting resins as well as for thermoplastics and bio-composites</li> <li>• Lignin dispersants</li> <li>• Novel methods for lignin functionalization</li> </ul> <p>*) Especially for straw</p>	<ul style="list-style-type: none"> <li>• Hemicellulosic sugar refining and separation</li> <li>• Xylose, pentoses and furfural as industrial ingredients and platform chemicals</li> <li>• Polymeric hemicellulose as industrial ingredients and platform chemicals</li> </ul> <p>*) Especially for straw</p>	<ul style="list-style-type: none"> <li>• Sustainable agricultural residue supply chains</li> <li>• Concepts for low-emission straw supply networks</li> <li>• Novel biomass supply contract concepts</li> <li>• New fractionation technologies for processing of agro-residual raw materials</li> <li>• Side-stream utilization in animal feed and fertilizer applications</li> </ul>	<ul style="list-style-type: none"> <li>• New materials based on pulp fibres for high-volume applications</li> <li>• Novel chemistry for pulp fibre modification</li> <li>• Functional structures including hybrid materials</li> <li>• Advanced 3D and 4D fibre processing methods</li> <li>• Fibre and specialty cellulose products from straw pulp, including MFC, MCC and chemically modified cellulose</li> </ul>
<p><b>Cross-cutting topics</b></p> <ul style="list-style-type: none"> <li>• Replacing plastics and fossil-based materials</li> <li>• Digitalisation &amp; measuring</li> <li>• Emerging technologies</li> <li>• Sustainability assessment</li> <li>• Design for circularity</li> <li>• Piloting and test-beds for new applications</li> <li>• Following regulatory environment</li> </ul>						

## Vision for 2030

- Investments in commercial production of new bioproducts (textile fibres, biocomposites, other bioproducts, etc.)
- New bioproducts available to the markets with significantly **lower carbon footprint**
- Sales and/or out-licensing of **new technologies** related to new bioproducts
- **Professionals** trained for new bioproduct businesses
- **Sustainability awareness** increased throughout the value chains

# Specific topics for Research projects without parallel company projects

 <p><b>Textiles, Biocomposites, Packaging and Other fibre products</b></p>	 <p><b>Lignin products</b></p>	 <p><b>Hemicellulose products</b></p>	 <p><b>Sourcing &amp; fractionation of straw</b></p>
<ul style="list-style-type: none"> <li>• Advances in fibre-based material modelling</li> <li>• Digital tools for re-designing fibre properties</li> <li>• Understanding molecular level interactions between pulp fibres, water and novel chemistry</li> <li>• Development of solvent insensitive carbohydrate analysis methods</li> <li>• Flow rheology and behavior of natural polymer -containing solutions and dispersions</li> <li>• Novel material functionalities and advanced characterization of biomaterials</li> </ul>	<ul style="list-style-type: none"> <li>• Lignin based carbon-materials for high value applications, e.g. energy storage</li> <li>• Understanding of lignin chemical structure versus material properties and functions via analytical tools</li> <li>• Understanding of lignin particle size versus performance in various applications by using analytical tools</li> <li>• Potential technologies to influence lignin color</li> </ul>	<ul style="list-style-type: none"> <li>• Advancing currently low-TRL production and application options for C5+C6 sugars</li> <li>• Specialty sugar fine chemistry for e.g. food, pharma, cosmetics</li> <li>• Sugar polymer chemistry</li> <li>• Sustainable food production (e.g. proteins, prebiotics), end-of-life and recycling of nutrients</li> </ul>	<ul style="list-style-type: none"> <li>• Products from biorefinery side streams e.g. extractives, cellulosic fines, salts, silica, sugar-lignin reaction products, proteins</li> </ul>
<p><b>Cross-cutting topics</b></p>			
<ul style="list-style-type: none"> <li>• Tools and strategies for increasing sustainability awareness among consumers</li> <li>• Sustainability assessment of end-of-life alternatives for bio-based products (biodegradation, recycling, reuse)</li> <li>• Understanding biodegradation of new materials</li> <li>• Measuring and monitoring technologies for improved raw material quality and material recycling</li> <li>• Advanced microparticle measuring systems and separation technologies</li> </ul>			