What is ExpandFibre?

ExpandFibre (2020-2024) is a 50 M€ R&D collaboration and an Ecosystem launched by Fortum and Metsä Group and co-funded by Business Finland. It focuses on upgrading pulp fibre, hemicellulose and lignin from renewable and sustainable sources of straw and northern wood into new bioproducts. Its ambition is to meet the growing demands for sustainable textile fibres and other added value biomaterials.

The research and development in ExpandFibre, aiming at producing new ground-breaking technologies and smart business concepts, is divided into seven research themes:

- Textiles
- Biocomposites
- Packaging
- Lignin products
- Hemicellulose products
- Sourcing & fractionation of straw
- Other fibre products

ExpandFibre invites actors in these value chains to join in building a world-leading innovation ecosystem to eventually commercialize new bioproducts and green businesses.

expandfibre.com
ExpandFibre Programmes & Ecosystem

ExpandFibre Ecosystem
Projects and organisations aligned with the ExpandFibre vision and themes and funded by Business Finland, EU or by other means

ExpandFibre Programmes
50 M€ R&D entity launched and implemented by Fortum & Metsä Group and co-funded by Business Finland + subcontracts

Other members

SMEs
Brands
Associations

Clusters
Industry
Universities
Research institutes
Ecosystem members by organization type

**Research & education**
- RTOs
  - VTT
  - Luke
- Universities
  - Aalto University
  - Åbo Akademi
  - LUT University
  - Tampere University
- Other
  - GLADIA
  - Centria
  - LAB University of Applied Sciences
- Other organisations
  - FINNISH TEXTILE & FASHION
  - innovestor

**Industry**
- SME
  - Pure Waste
  - Brightplus
  - APEF Polymer
  - SC GRAND Sustainable Textile
- Large
  - Valmet
  - Kemira
  - MIRKA
  - Lindström
  - KCL
  - LOUNAS-GUOMEN JÄTTEHUOLTO

**Companies**
- SME
  - GloCell
  - Semantum
  - NiMAR
  - Spinverse
  - Scitech Service
  - AEP Polyymers
  - NIMAR
  - TrueMed
  - TrueMed
  - MITEOFIN
  - FIBERX
  - INSTITUTE OF DESIGN

**Service / technology providers**
- SME
  - Semantum
  - NiMAR
  - Spinverse
  - Scitech Service
  - AEP Polyymers
  - NIMAR
  - TrueMed
  - TrueMed
  - MITEOFIN
  - FIBERX
  - INSTITUTE OF DESIGN

**Total members: 47**
- Research & Education: 14
- Companies: 30
- Other organisations: 3

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

<table>
<thead>
<tr>
<th>Textiles</th>
<th>Biocomposites</th>
<th>Packaging</th>
<th>Lignin products*</th>
<th>Hemicellulose products*</th>
<th>Sourcing &amp; fractionation of straw</th>
<th>Other fibre products</th>
</tr>
</thead>
<tbody>
<tr>
<td>• New, sustainable textile fibres for wearable textiles and nonwovens</td>
<td>• Raw material processing and converting</td>
<td>• New pulp-based plastic-replacing packaging solutions</td>
<td>• Lignin fractionation for material applications</td>
<td>• Hemicellulosic sugar refining and separation</td>
<td>• Sustainable agricultural residue supply chains</td>
<td>• New materials based on pulp fibres for high-volume applications</td>
</tr>
<tr>
<td>• Staple fibre analytics and performance testing</td>
<td>• Material properties</td>
<td>• Tools and processes for designing sustainable packaging</td>
<td>• Lignin as functional ingredient for thermosetting resins as well as for thermoplastics and bio-composites</td>
<td>• Xylose, pentoses and furfural as industrial ingredients and platform chemicals</td>
<td>• Concepts for low-emission straw supply networks</td>
<td>• Novel chemistry for pulp fibre modification</td>
</tr>
<tr>
<td>• New staple fibre applications and post-treatment technologies</td>
<td>• Recycling and end-of-life</td>
<td>• Barriers and binders based on natural polymers</td>
<td>• Lignin dispersants</td>
<td>• Polymeric hemicellulose as industrial ingredients and platform chemicals</td>
<td>• Novel biomass supply contract concepts</td>
<td>• Functional structures including hybrid materials</td>
</tr>
<tr>
<td>• Recycling and traceability</td>
<td>• Biocomposites containing fibres and lignin</td>
<td>• Additive chemistry</td>
<td>• Novel methods for lignin functionalization</td>
<td>• New fractionation technologies for processing of agro-residual raw materials</td>
<td>• Advanced 3D and 4D fibre processing methods</td>
<td>• Fibre and specialty cellulose products from straw pulp, including MFC, MCC and chemically modified cellulose</td>
</tr>
<tr>
<td>• Business models to speed up global market entries</td>
<td>• All-cellulose composites &amp; natural fibre polymer composites</td>
<td></td>
<td></td>
<td>• Side-stream utilization in animal feed and fertilizer applications</td>
<td></td>
<td>• Professionals trained for new bioproduct businesses</td>
</tr>
</tbody>
</table>

### Cross-cutting topics
- Replacing plastics and fossil-based materials
- Digitalisation & measuring
- Emerging technologies
- Sustainability assessment
- Design for circularity
- Piloting and test-beds for new applications
- Following regulatory environment

### 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

<table>
<thead>
<tr>
<th>Textiles, Biocomposites, Packaging and Other fibre products</th>
<th>Lignin products</th>
<th>Hemicellulose products</th>
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</tr>
</thead>
<tbody>
<tr>
<td>• Advances in fibre-based material modelling</td>
<td>• Lignin based carbon-materials for high value applications, e.g. energy storage</td>
<td>• Advancing currently low-TRL production and application options for C5+C6 sugars</td>
<td>• Products from biorefinery side streams e.g. extractives, cellulosic fines, salts, silica, sugar-lignin reaction products, proteins</td>
</tr>
<tr>
<td>• Digital tools for re-designing fibre properties</td>
<td>• Understanding of lignin chemical structure versus material properties and functions via analytical tools</td>
<td>• Specialty sugar fine chemistry for e.g. food, pharma, cosmetics</td>
<td></td>
</tr>
<tr>
<td>• Understanding molecular level interactions between pulp fibres, water and novel chemistry</td>
<td>• Understanding of lignin particle size versus performance in various applications by using analytical tools</td>
<td>• Sugar polymer chemistry</td>
<td></td>
</tr>
<tr>
<td>• Development of solvent insensitive carbohydrate analysis methods</td>
<td>• Potential technologies to influence lignin color</td>
<td>• Sustainable food production (e.g. proteins, prebiotics), end-of-life and recycling of nutrients</td>
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<tr>
<td>• Flow rheology and behavior of natural polymer-containing solutions and dispersions</td>
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<tr>
<td>• Novel material functionalities and advanced characterization of biomaterials</td>
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</tbody>
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Cross-cutting topics

• Tools and strategies for increasing sustainability awareness among consumers
• Sustainability assessment of end-of-life alternatives for bio-based products (biodegradation, recycling, reuse)
• Understanding biodegradation of new materials
• Measuring and monitoring technologies for improved raw material quality and material recycling
• Advanced microparticle measuring systems and separation technologies
Reaching targets through open co-operation

1. To communicate the ambitions and results of ExpandFibre
2. To attract new partners and competences to the ecosystem
3. To build joint visibility & informing the community at large that together Fortum and Metsä are aiming to take a leading role in the European bioeconomy
Communications

Webpages: www.expandfibre.com
• 2-3 news pieces published on the ExpandFibre website every month
• Updated ecosystem member list
• Contact form

Newsletters:
• Member newsletters to be sent towards the end of every month
• General newsletter to be sent every 2-3 months

Presentations & Material:
• One-pager and Powerpoint presentations for potential ecosystem members
• Value propositions for:
  Finnish organizations
  Non-Finnish organizations
  Projects

Additionally:
• Visibility in external industry events, seminars and workshops
• Frequent ecosystem events (workshops, seminars)
Join us to meet the growing demand for sustainable bioproducts – we need players from every part of the value-chain

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