

SuperBark – Safe and sustainable adhesives and coatings from industrial softwood bark

Project presentation
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Project Description

SuperBark aims to develop safe, sustainable, and high-performance **>95% bio-based adhesives and coatings** from industrial softwood bark, that is a major side stream from the forest industry.

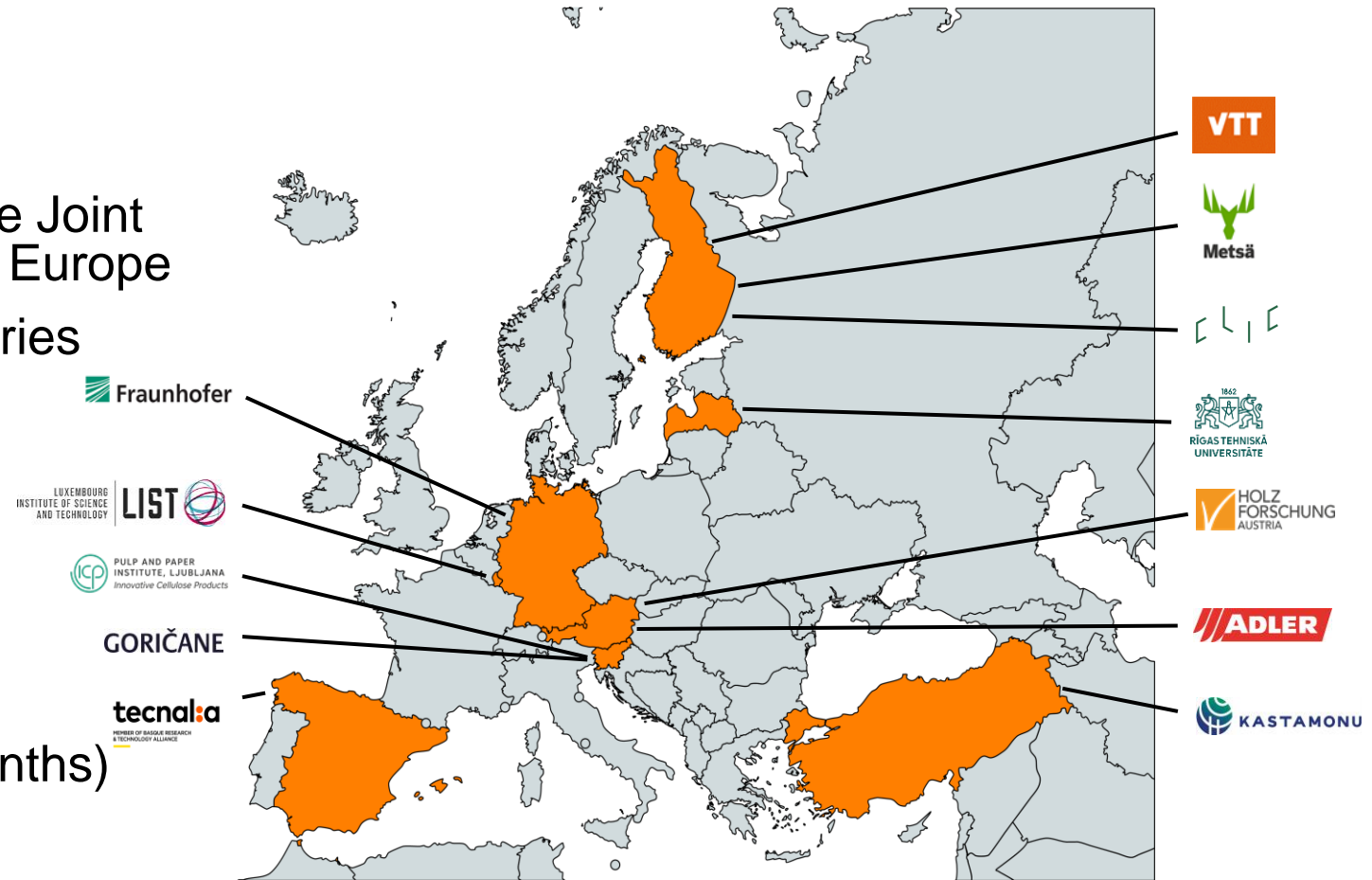
The four-year project (Sept 2023-Aug 2027) will improve the sustainability, health, and safety profiles of adhesive and coating products compared to fossil-based solutions.

The project results will be applied in a range of industries, including furniture, construction, transport, and packaging.

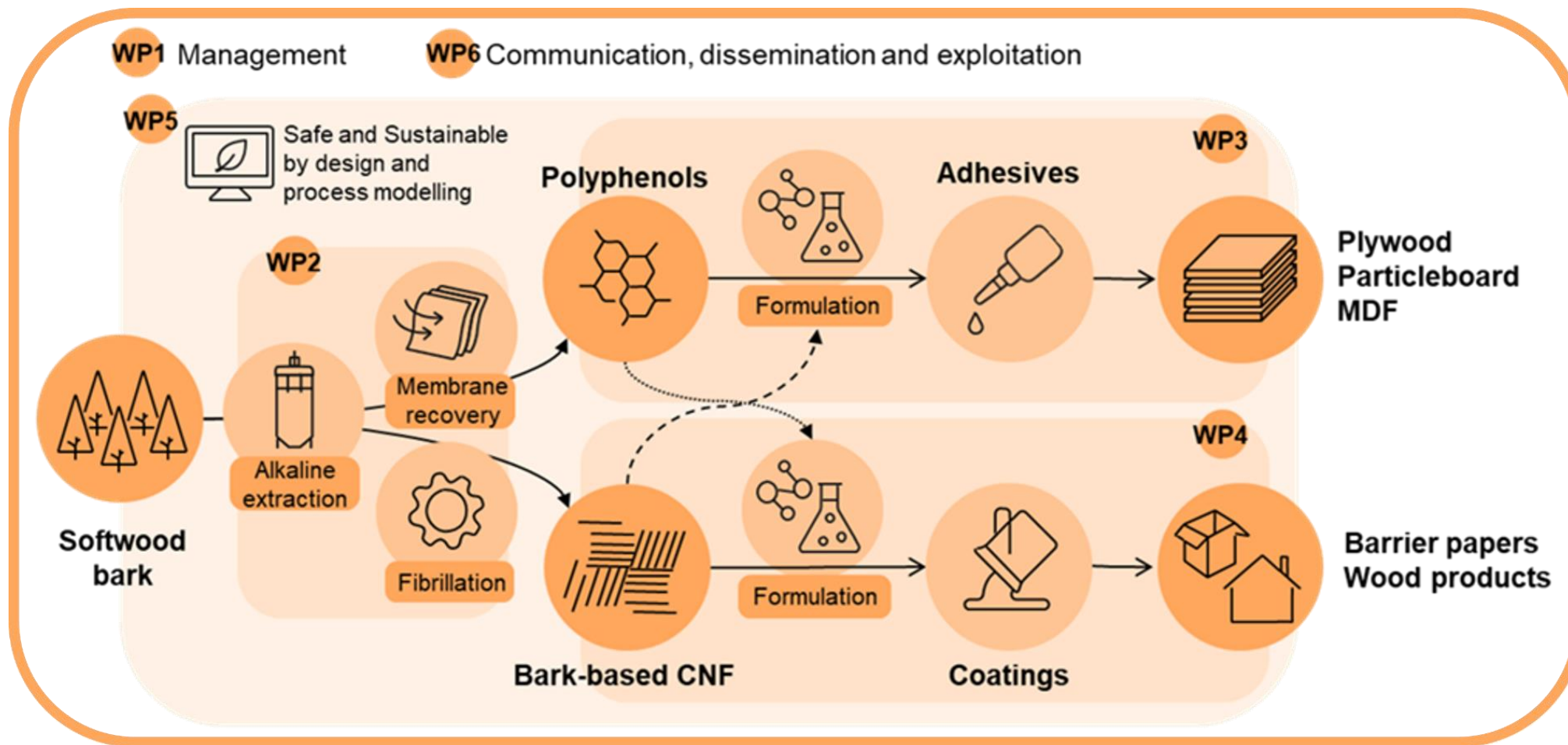


Consortium

- Funded by: Circular Bio-based Europe Joint Undertaking (CBE JU) under Horizon Europe
- Consortium: 12 partners from 8 countries
 - 6 RTOs
 - 1 University
 - 1 SME
 - 4 Large companies
- Coordinator: VTT
- Budget: 4.5 M€
- Time frame: 09/2023-08/2027 (48 months)



Methodology

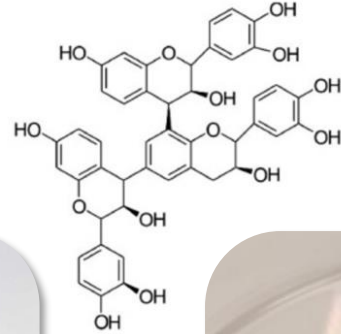


Production of bark-based components

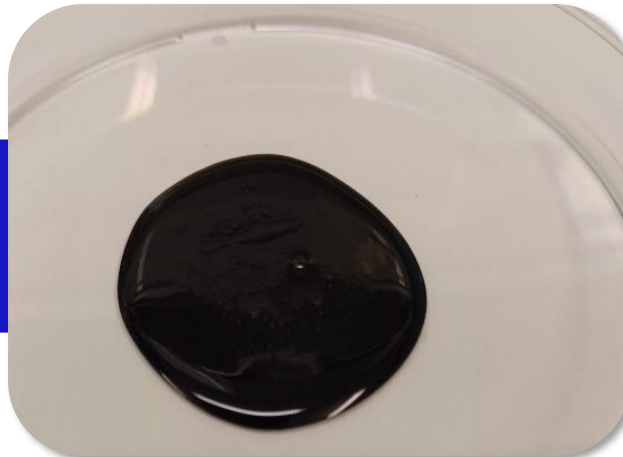


- About 25% of spruce bark can be extracted as polyphenols by alkaline extraction.
- Composition of polyphenols depends somewhat on extraction conditions, and also on the recovery method.
- Bark residue (30-50% of spruce bark) is enriched in cellulose, which allows its fibrillation to produce CNF.

Polyphenols in adhesives for wood products



Spray-dried polyphenols from spruce bark



Polyphenol-hexamine adhesive



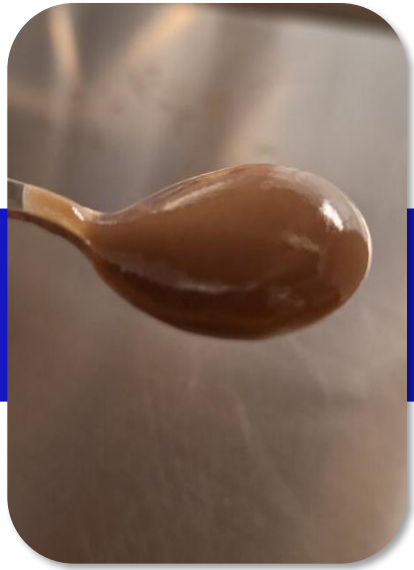
Birch veneer joints (lab)



Birch plywood

Superbark: 4 adhesive formulations with $\geq 95\%$ bio-based content to replace the fossil-based solutions

Bark CNF in coatings for barrier papers and wood products



Spruce bark CNF



Bleached bark CNF



Concentrated
bleached bark CNF

Superbark: 3 coating formulations with $\geq 95\%$ bio-based content to replace the fossil-based solutions



Coated wood samples (wet)

Prospects for market deployment and commercialisation

- 14 M tons of industrial softwood bark available in EU / a
 - with a potential > 3 M tons of polyphenols
 - with a potential 5-7 M tons of bark residue
- 4 M tons demand for adhesives for wood products in EU / a
 - SuperBark adhesives potential > 6 M tons
 - also potential to replace 2 M tons formaldehyde
- 2 M tons demand for coatings for wood products & barrier packaging in EU / a
 - SuperBark CNF for coatings >>> demand
 - potential end-uses of bark residue: sugar production → EtOH; kraft pulping with wood chips → fibres
- Industrial stakeholders in the Consortium or Advisory Board



Next steps

- Development of the adhesive and coating formulations will continue
- Polyphenols quality (molar mass and purity) is a key for their successful utilization in >95% bio-based adhesives
 - Membrane based recovery of the polyphenols needs further development
 - Separation of wood from the industrial bark seeks advanced practices
- TEA of integration of the bark extraction into existing mill sites continues (70 - 100 kt bark input / a)
- Safety and sustainability assessment guides the production of bark-based components and the adhesive and coatings formulations thereof



Conclusions

- Alkaline extraction of softwood bark has been demonstrated to provide polyphenols in high yield
- Bark residue from the extraction is a viable raw material for nanocellulose production
- Focus is now on the product demonstration – well functioning adhesives and coatings (>95% bio-based) from the bark-based components
- Full utilization of bark as well as smart process concepts allow an economic process and cost competitive products



Thank you!

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