Transforming Bark into High-Value Bioproducts: Carbon-Smart Bark Biorefinery

Kuoresta korkean lisäarvon biotuotteita – Carbon-Smart Bark Biorefinery

Kyösti Ruuttunen, 8/10/2026

Luke



Erkki Oksanen / Luke

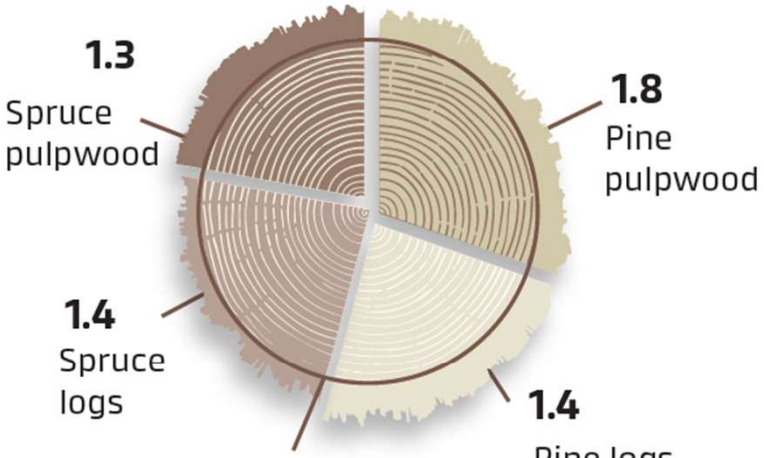


Background

Bark is usually combusted to supply energy, steam and electricity

Valuable compounds can be extracted and the bark residue used for materials or energy

AVAILABILITY OF SOFTWOOD BARK IN FINLAND

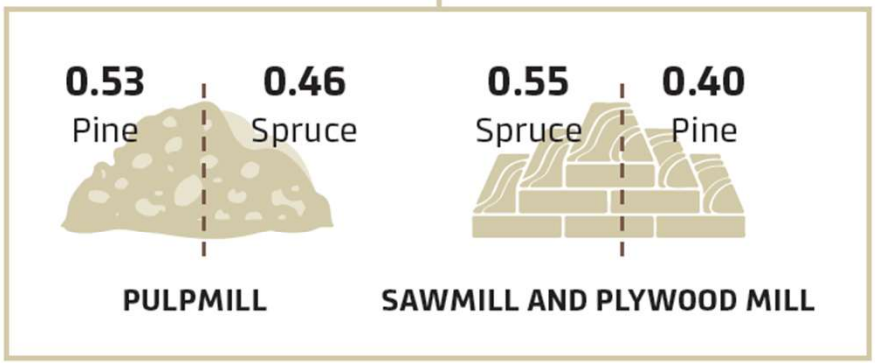


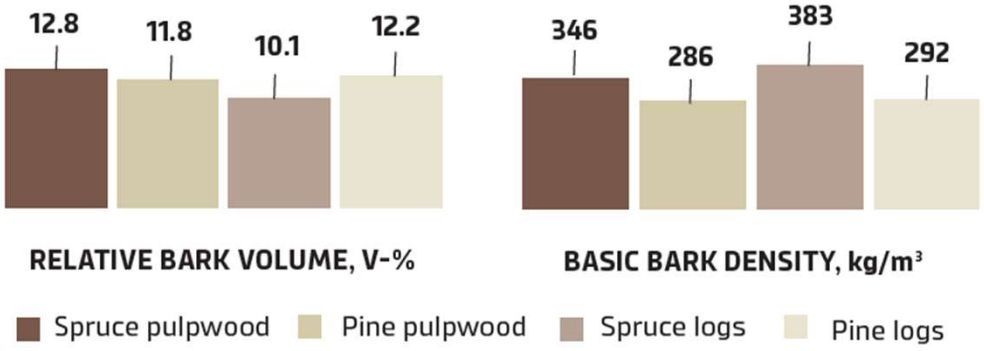
6.0
Mm³ /a

AMOUNT OF GENERATED SOFTWOOD BARK (average 2000–2023)

1.94
Mt /a

SOFTWOOD BARK AS DRY WEIGHT (average 2000–2023)





Interreg Baltic Sea Region
Co-funded by the European Union
CIRCULAR ECONOMY CEforestry

Literature: *stat.luke.fi, Heiskanen and Rikkonen 1976, Saikku and Rikkonen 1976, Alakangas et al. 2016*

The opportunity: Move from energy to higher value

- Current bark use: burned for energy, bark value 170 M€

Product streams from bark	Annual value potential (M€)
Cellulosic fibers/pulp	440
Tannins	80
Crude tall oil	47
Specialty chemicals (pectin, stilbenes): high value niche products	>10 000 €/t
Biocarbons	70-130

→ Annual value potential > 640-700 M€ through cascade approach

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Project Proposal

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CS Bark:
World-Class Experts' Joint Effort

- Proposal for Business Finland (Co-Innovation), under **Andritz**'s Veturi (BioCircleToZero)
  - Three years, starting latest June 2027 (proposal submission soon)
  - Research partners: **Luke, University of Eastern Finland, VTT, Aalto University, University of Oulu**
  - Seven companies with parallel projects, six other companies as co-funding partners
- CS Bark will bring together **experienced world-class researchers** and the research organizations' **excellent infrastructure**
  - Leading research organizations and companies in biorefining chemistry and technology, as well as life-cycle assessment (LCA) and techno-economic assessment (TEA)

Objective: creating technology and feasible value chains for complete utilization of bark

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CS Bark and Luke's Pilot Environment (LUPI)

- Pilot scale extraction experiments
  - 300 l reactor: hot water extraction of bark samples, varying T and pH
  - Hydrodynamic cavitation experiments
  - $ScCO_2$ extraction: lipophilic extractives isolation

- Separation and purification of water-soluble extractives (tannins, pectins, stilbenes, *etc*.)

- Refining extracted bark samples
  - Disk refiner → mechanical bark fibres → products



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Thank you for your attention!



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