

More Value from Forestry based Bio Economy Through Collaboration



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WHY FINLAND?

FINLAND IS A
WORLD-CLASS
**INNOVATION
ENVIRONMENT**

IN FINLAND, BIO-
BASED PRODUCTS ARE
ALREADY IN
EVERYDAY USE

FINLAND IS A
BIOECONOMY
SUPERPOWER, WITH
**RICH NATURAL
RESOURCES**

FINLAND HOLDS THE
ENORMOUS
POTENTIAL OF
REDEFINING WOOD TO
REPLACE PLASTICS
AND TO **CREATE
SUSTAINABLE FIBRES**

A photograph of a forest landscape. In the foreground, there are several large, dark tree trunks. The ground is covered in green moss and low-lying vegetation. A dirt path leads from the foreground towards the background. In the distance, a person wearing a bright yellow jacket is walking away from the camera. The background is filled with tall, thin trees, and the sun is shining through the canopy, creating a warm, golden glow. The overall scene is peaceful and natural.

FINLAND

SMART FORESTRY

The industry is going through an extensive transformation, with inventory, harvesting and management all going digital and data-driven. This means demand for new solutions in which Finland is a world-class provider. The new optimized, demand-based inventory and harvesting methods enhance procurement and harvesting work and efficiency in both use of wood material and equipment usage. Precision forestry transforms the industry from highly manual and analog workflows with broad-brush management prescriptions to a system with digital data capture and planning, granular management prescriptions, and tight operational control.

Forest-based bioeconomy in the core of green transition

Prof. Johanna Buchert
Natural resources institute Finland (Luke)
Finland



Natural resources institute (Luke)



1334 employees

648 Scientists
639 Experts*
47 Research professors



*Employees in service groups and research infrastructure services as well as directors



Figures updated: 31 December 2023

Bioeconomy strategy for Finland 2022–2035

- Finnish bioeconomy strategy 2014 aimed at **increasing economic output** and number of jobs
- **2022 New strategy launched**
- **Sustainably towards higher added value**
 - BD and climate function
 - Holistic sustainability
 - Capacity building and **innovation of new products and processes**
 - Efficient use of resources
 - Growth of added value 4%/year = doubling as target

**Higher value added
from the bioeconomy**

Strong
competence and
technology base

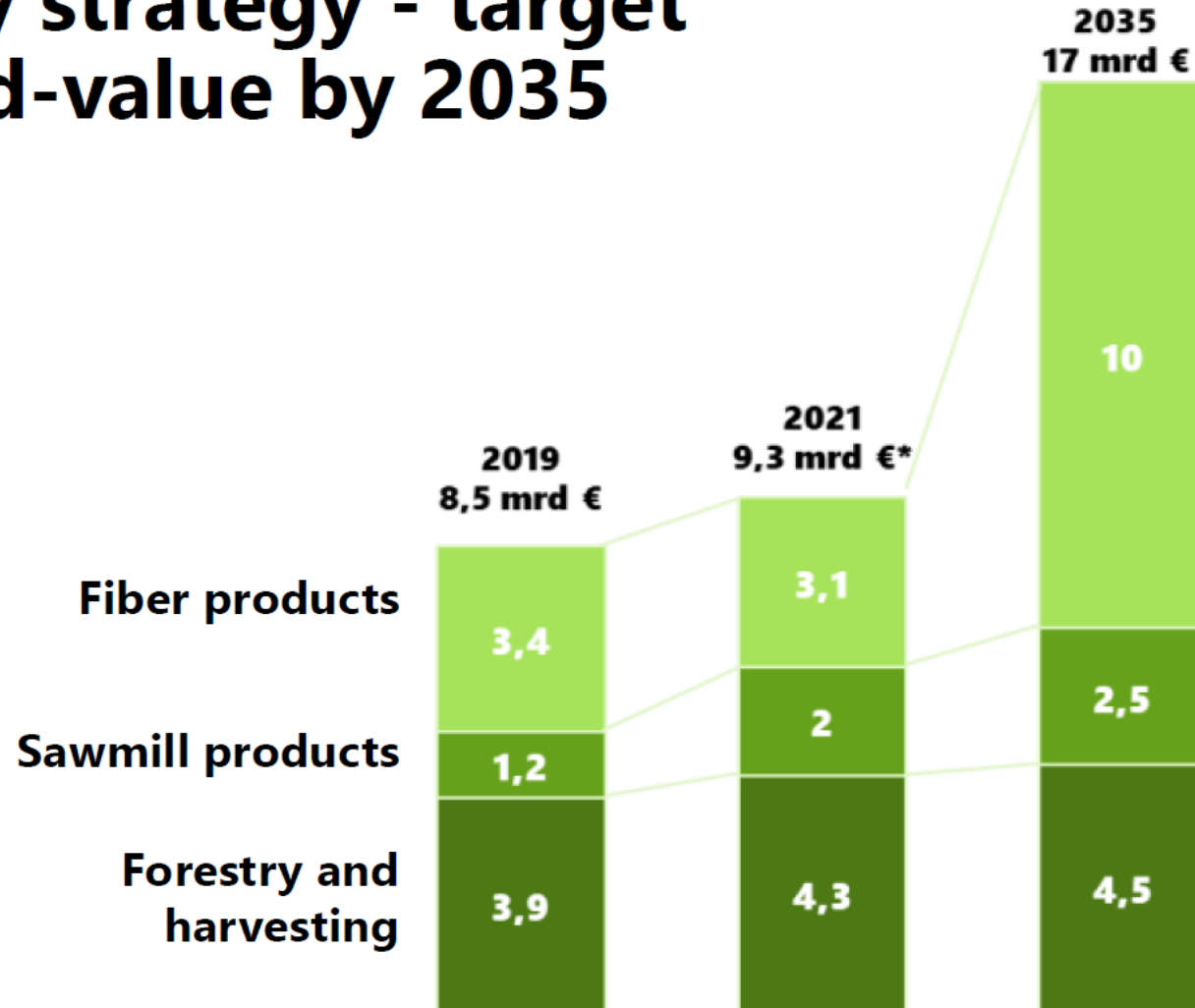
Competitive
operating
environment

Usability and sustainability of
bioresources and other ecosystems

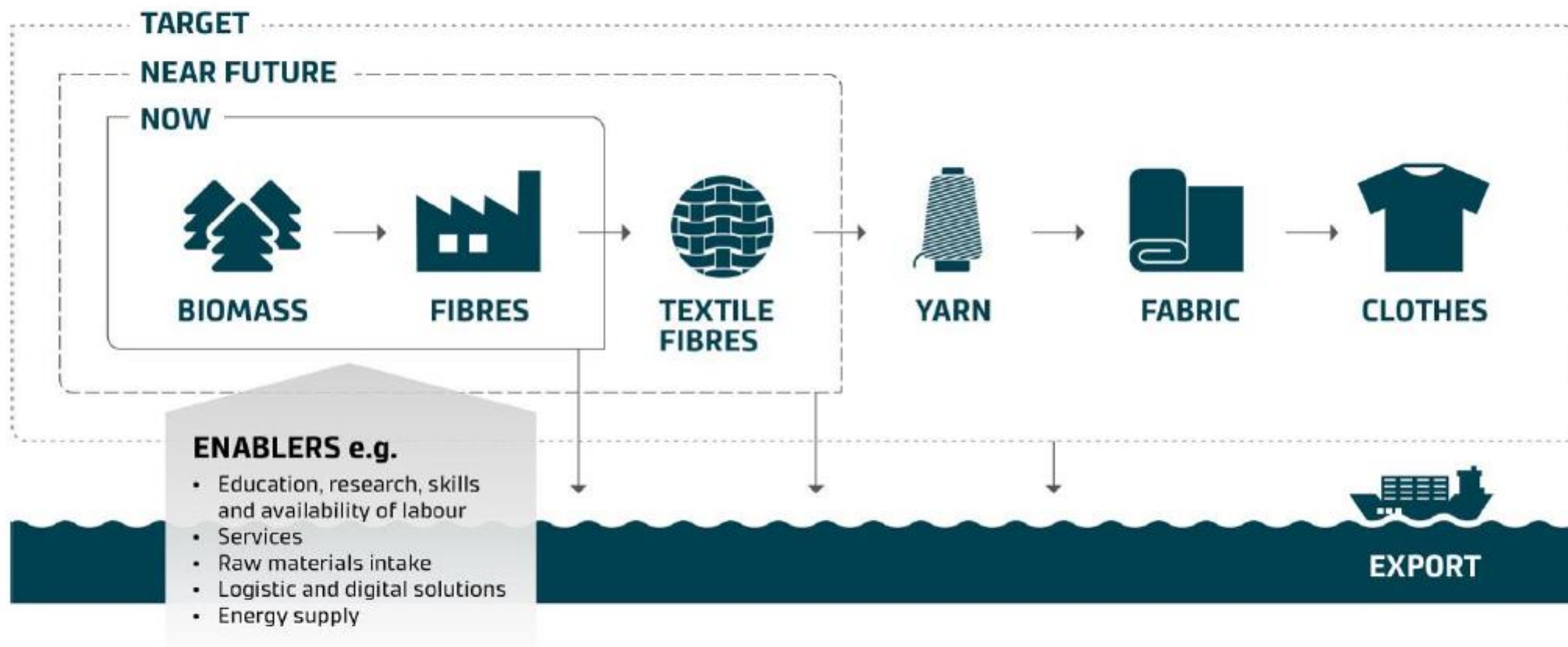
Finnish bioeconomy strategy - target to double the added-value by 2035

Doubling e.g. by

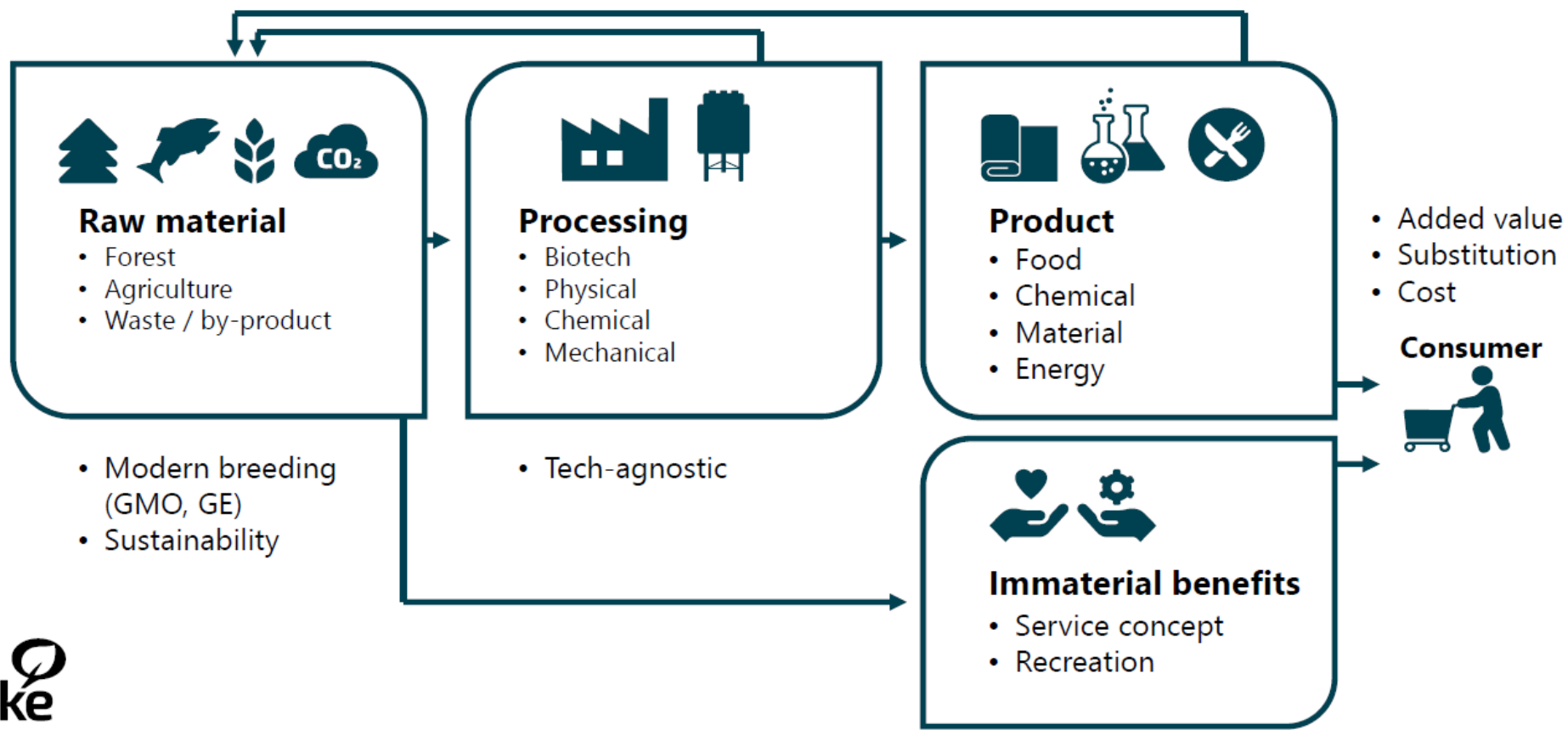
- Textile fibers
- Lignin products
- Advanced fiber based packaging
- CLT



The textile value chain of the future in Finland – What is needed?



Bioeconomy strategy should cover R&I in the whole value-chain





This is Valmet

- 220+ years of industrial history
- Over 19,000 professionals
- Orders received 2023 – \$7,300,000,000 CAD
- 140 service centers, 54 production units, 28 R&D centers
- Beyond Circularity Program
 - Focused on R&D and innovation to be carbon neutral by 2030



Industries served

- Pulp
- Energy
- Biomass
- Board
- Tissue
- Paper
- Services
- Automation
 - Automation Systems
 - Flow Control



Valmet Bio Industries

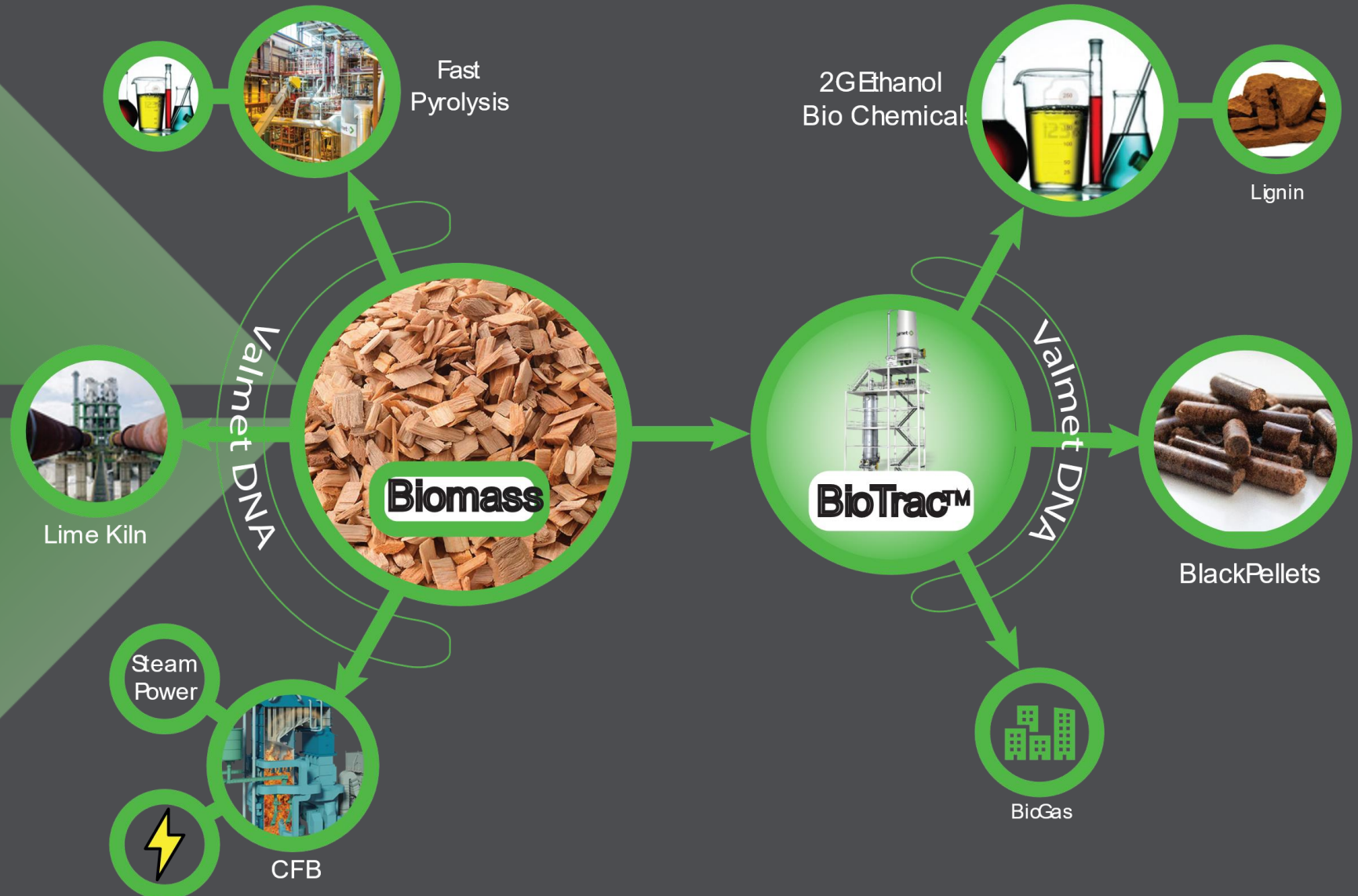
- Bioethanol
- Biochemicals
- Steam treated pellets
 - black pellets
- Biomass gasification
- Lignin extraction
- Fast pyrolysis
- Textile recycling
- 3D fiber



References

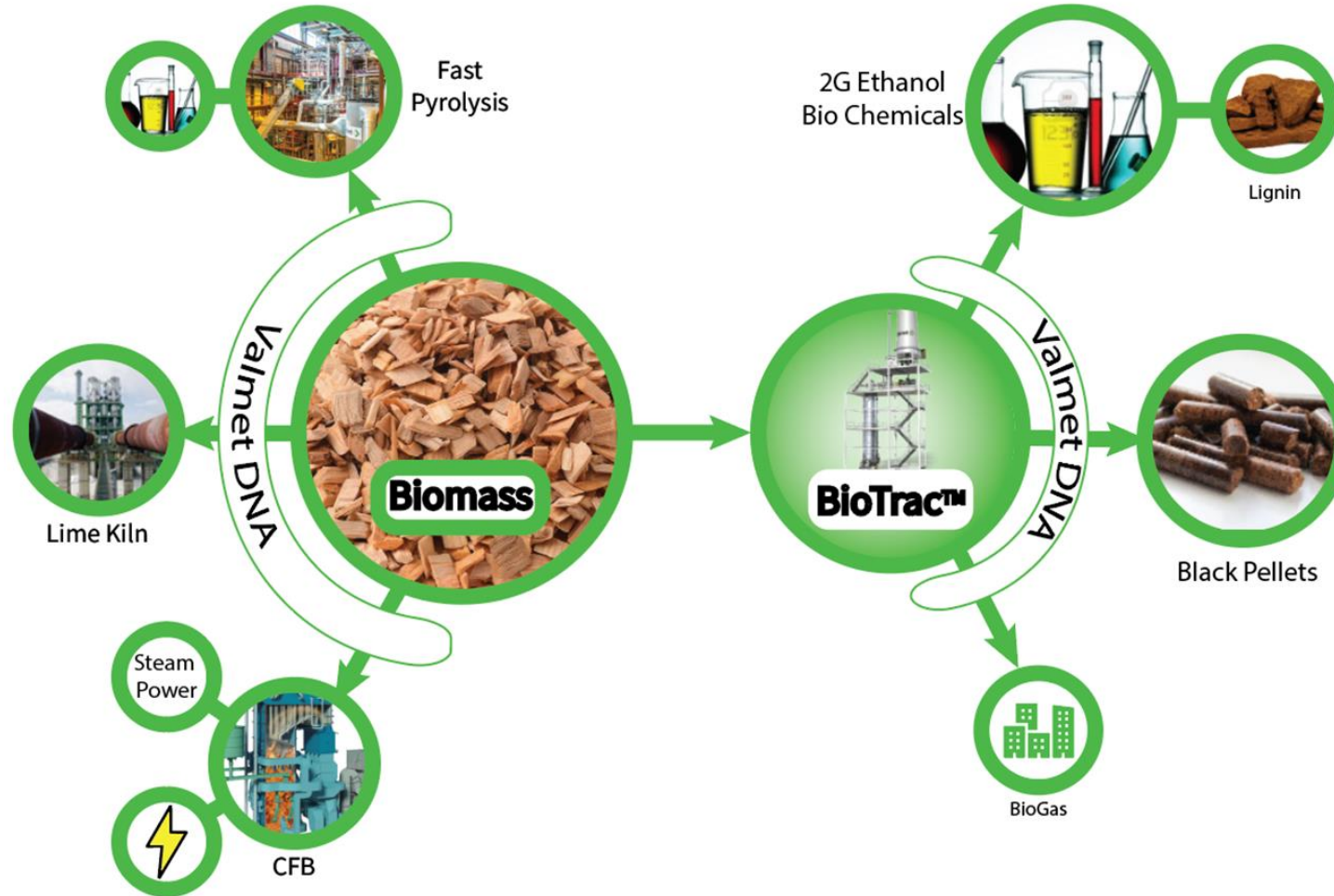
- >500 plant references on plug screw feeders
- >50 reference's on horizontal reactor systems
- >700 references on vertical reactor systems
- >45 references on batch digesters
- >20 references biomass pretreatment (bio)
- >60 references PREX impregnation


Sustainability – Biomass Conversion





Sustainability – Biomass Conversion





We are on a mission to transform the raw material base of the global textile ecosystem with our technology

Spinnova technology is a unique way to produce textile fibre with reduced impacts on climate and nature



1. Spinnova has won numerous awards over the years including e.g, Fast Company's World Changing Ideas Award, Impact Award on the Deloitte Technology Fast 50 listing, Engineer Invention of the Year (Finland), and Capterra Sustainability Tech Award 2022 (Finland). 2. As of end of 2023,.

We have partnered with global companies to scale the Spinnova technology

Our customers producing SPINNOVA® fibre:



Planning a 20kt factory

WOODSPIN

50/50 JV of Spinnova & Suzano, 1kt factory

RESPIN

50/50 JV of Spinnova & Ecco, pilot line

Examples of raw material providers:



Eucalyptus wood pulp

ECCO

Leather waste



Textile waste pulp

Examples of delivery and development partners for Spinnova technology:



Exclusive partner for main equipment

SULZER

REJLERS

SIEMENS

KEMIRA

Nouryon

Textile partners supporting the industrial adoption of SPINNOVA® fibre :

RIETER

Tearfil Textile Yarns

Textechno
Textile Testing Technology

ARCHROMA
LIFE ENHANCED

Examples of fashion brand partners who have used SPINNOVA® fibre:



ECCO

BESTSELLER

H&M Group

marimekko

A person in a dark suit and light-colored trousers stands with their back to the camera on a black sand beach. They are looking out at the ocean under a cloudy sky. The waves are breaking on the shore.

Thank you

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A man with a beard, wearing a white hard hat with a 'PETZL' logo and safety glasses, is looking down at a document he is holding. The background is a blurred industrial setting with large cylindrical tanks. The entire image has a green tint and is overlaid with white geometric lines.

TAALERI
Bioindustry

Biocoal Projects in Finland and Canada

ScalingUp Conference, November 2024, Juha Hyvärinen

Joensuu Biocoal Ltd

The largest biocoal factory in Europe

- Taaleri Bioindustry is end-to-end responsible for the project
- Production capacity 60 000 metric tonnes annually
- Commissioning Q1/2025
- Commercial scale production, proof of concept



Taaleri Plc

Investments Powering the change

- Taaleri is a Nordic investment and asset manager that focuses on businesses with industrial-scale opportunities within bioindustry, renewable energy and real estate

AUM

€2.6

Billion
31 Dec 2023

Personel

111

31 Dec 2023

Turnover

€66.3

Million
31 Dec 2023

Market cap

€~280

Million
31 Dec 2023



Canada project overview

Key Insights

Taaleri's Biocoal Project in Canada

- Taaleri Biocoal Canada Development Ltd is planning to build several industrial-scale biocoal production facilities in Canada with the total target capacity of 1 million tonnes of biocoal annually
- The example facility has a production capacity of 120,000 tonnes of biocoal per year and utilises approximately 400,000 m³ of biomass annually

Patented scalable biomass torrefied technology

- Taaleri has an exclusive access to the innovative NextFuel Torrefaction Technology in Canada
- The technology was initially developed by Andritz in Austria, including one tonne per hour pilot facility, and subsequently spin off from Andritz, leading to the creation of the technology company NextFuel
- On a planned scale, the technology efficiently processes a variety of biomass raw materials, achieving a production capacity of 8 tonnes per hour per production line. The briquettes (the end-product) feature an energy density of 22-23 GJ per tonne, offering a carbon-neutral substitute for traditional fossil fuels



Why Canada?

Canada offers both raw materials and off-take opportunities for biocoal production



Forest resources

Excellent feedstocks available both from the forests and as by-products of sawmills and other industrial processes

Forest residues, recognised as “low graded wood” present a promising opportunity to be utilised as affordable raw material in biocoal production factories



Market opportunity

A solid investment environment, excellent ports for international deliveries, and potential Canadian off-takers in sectors like cement, steel, and energy, presents an attractive market opportunity



Climate impact

We aim to revolutionise industrial processes by providing a renewable, sustainable, and eco-friendly alternative for heavy process industries that reduces CO₂ emissions in hard to decarbonise sectors

In addition, the project's low-value biomass intake increases demand for wood from climate smart forest management which convert the used forests into more resilient ones considering the increasing risk of wildfires



Key applications for biocoal

Biocoal is a solution for achieving industrial carbon neutrality

Cement Industry

- High-Temperature Fuel: Biocoal is used as a fuel in the production of Portland cement, where limestone must be heated to 1450°C, requiring efficient, pulverized fuel

Steel Industry

- Possibilities to replace pulverised and foaming coal in different furnaces

Non-Ferrous Metals (e.g., Copper, Nickel)

- Biocoal can serve as a reducing agent in slag treatment, enhancing process efficiency and minimizing metal loss to slag

Fossil Material Replacement

- Biocoal provides possibilities for applications such as activated carbon production and soil enhancement while it can directly replace fossil fuels in power plants without major investments

TAALERI

Bioindustry

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Our purpose:

Enabling sustainable societies through innovation in technology and services

We are shaping the green transition in marine and energy with our advanced technologies, expertise in sustainable fuels and lifecycle service offering.

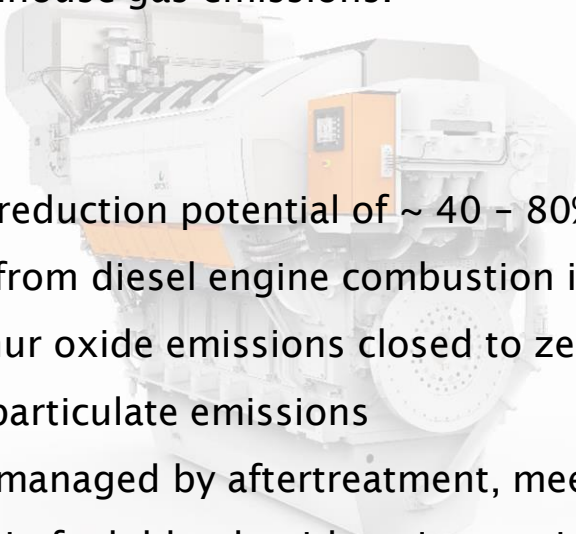
The path towards a decarbonised world relies on sustainable fuels

BioGas

- No particulate emissions, no sulphur oxide emissions, NOx managed by aftertreatment, meets IMO regulations, GHG from methane slip reduction technologies on-engine
- Biogas offers a low emissions and Circular Economy-oriented alternative, by recycling biogenic carbon and managing otherwise fugitive emissions from discarded or surplus organic waste.
- While combustion of biogas, like natural gas, produces carbon dioxide (CO₂), a greenhouse gas, the carbon in biogas comes from plant matter that fixed this carbon from atmospheric CO₂. Thus, biogas production is carbon-neutral and does not add to greenhouse gas emissions.

BioDiesel

- GHG reduction potential of ~ 40 – 80% (well to tank) depending on feed stock and production methods
- CO₂ from diesel engine combustion is not reduced but the cleaner CO₂ can be more easily recycled by photosynthesis
- Sulphur oxide emissions closed to zero
- Low particulate emissions
- NOx managed by aftertreatment, meets IMO regulations
- Drop-in fuel: blends with various ratios with fossil diesel possible.



Biogas upgrading

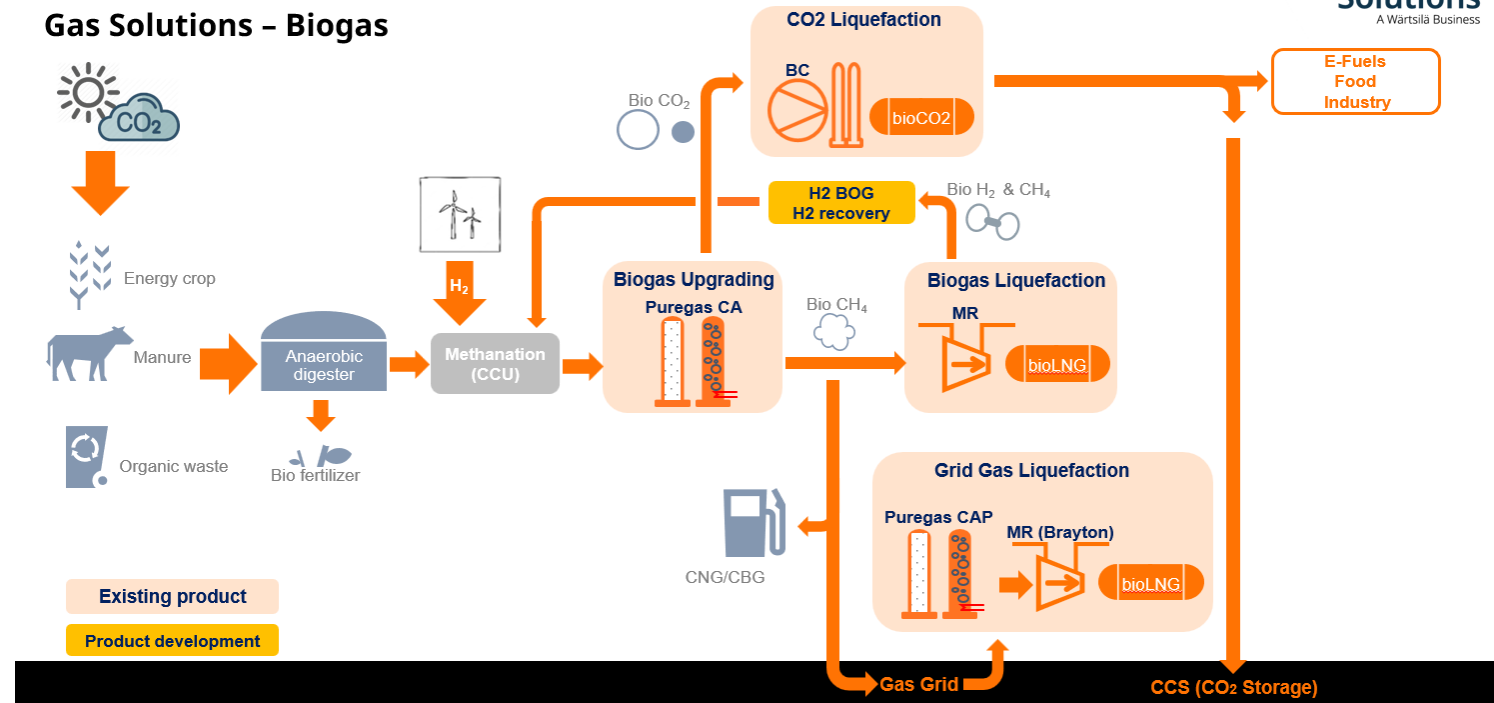
Biomethane is produced by separating and cleaning the raw biogas.

TYPICAL COMPOSITION:

- 99,9% Methane
- 0.1% Carbon dioxide
- < 0.1% Oxygen
- < 0.2% Nitrogen
- < 5mg/m³ Hydrogen sulphide

- Methane slip during manufacturing process is < 0.1%
- Activated carbon removes H₂S, also other impurities like siloxanes are removed.
- Good gas quality for the engines!**

Gas Solutions – Biogas



Raw biogas is typically comprised of 60% methane and 40% carbon dioxide (CO₂). When upgraded to Biogas, contains greater than 97% methane and is termed biomethane

BIOECONOMY TRADE AND STUDY MISSION FROM NORTH AMERICA TO FINLAND

May 11-16 2025

Contact: ulla.lainio@businessfinland.fi

PROGRAM 11 – 16 MAY 2025

- Preparatory workshop and dinner May 11 for all in Helsinki
- Site visits 12-16 May
- The delegation will be split into two groups:
 - Wood Building & CLT Group
 - Forestry Group
 - The two groups will have own buses and site visit programming.
- The Wood Building Group will participate Wood Building Conference 15-16 May in Helsinki
- Program starts and ends in Helsinki



WOOD BUILDING & CLT TOUR SITE VISITS

1. Meetings with the leading bioeconomy industries
2. Sustainable Finnish forest management, use of forests, forest nature and bioproducts
3. Sawing machines and sawmill lines for profitable sawmill business
4. CLT production lines, Gluelam, Cross cutting saw lines, Finger jointing lines
5. Modern Sawn timber and further processed goods
6. Meetings with wood building architect companies and research universities
7. Lines, machinery for LVL, veneer and plywood production
8. Wooden log house manufacturing
9. Site visits to residential and public wooden mass timber buildings
10. Speciality door and window manufactures for wooden buildings
11. May 15-16 Wood Construction Conference Helsinki



FORESTRY TOUR SITE VISITS

1. Meetings with the leading bioeconomy industries
2. Sustainable forest management, use of forests, forest nature, bioproducts
3. Finland's largest producers of sawn timber and further processed goods
4. Bioproduct mill integrate
5. Harvesters, forwarders, harvester heads. Visit to active forest harvesting
6. Forest machine operator training college
7. Truck and stationary cranes, logging equipment, tractor equipment
8. Sustainable forest management, use of forests, forest nature, bioproducts
9. Meetings with forest ind. companies and research universities
10. Sawing machines and sawmill lines for profitable sawmill business





Thank you!

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