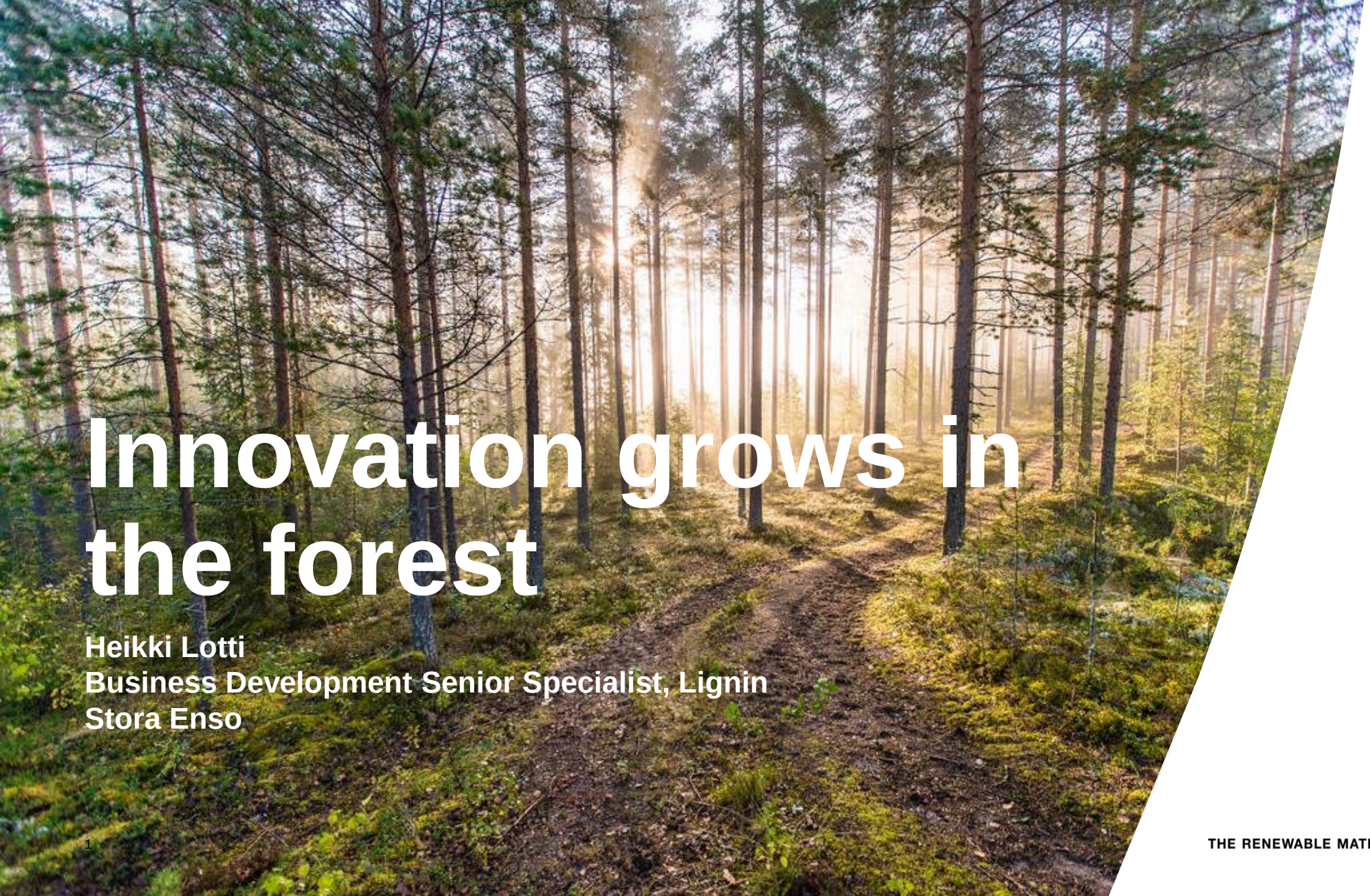
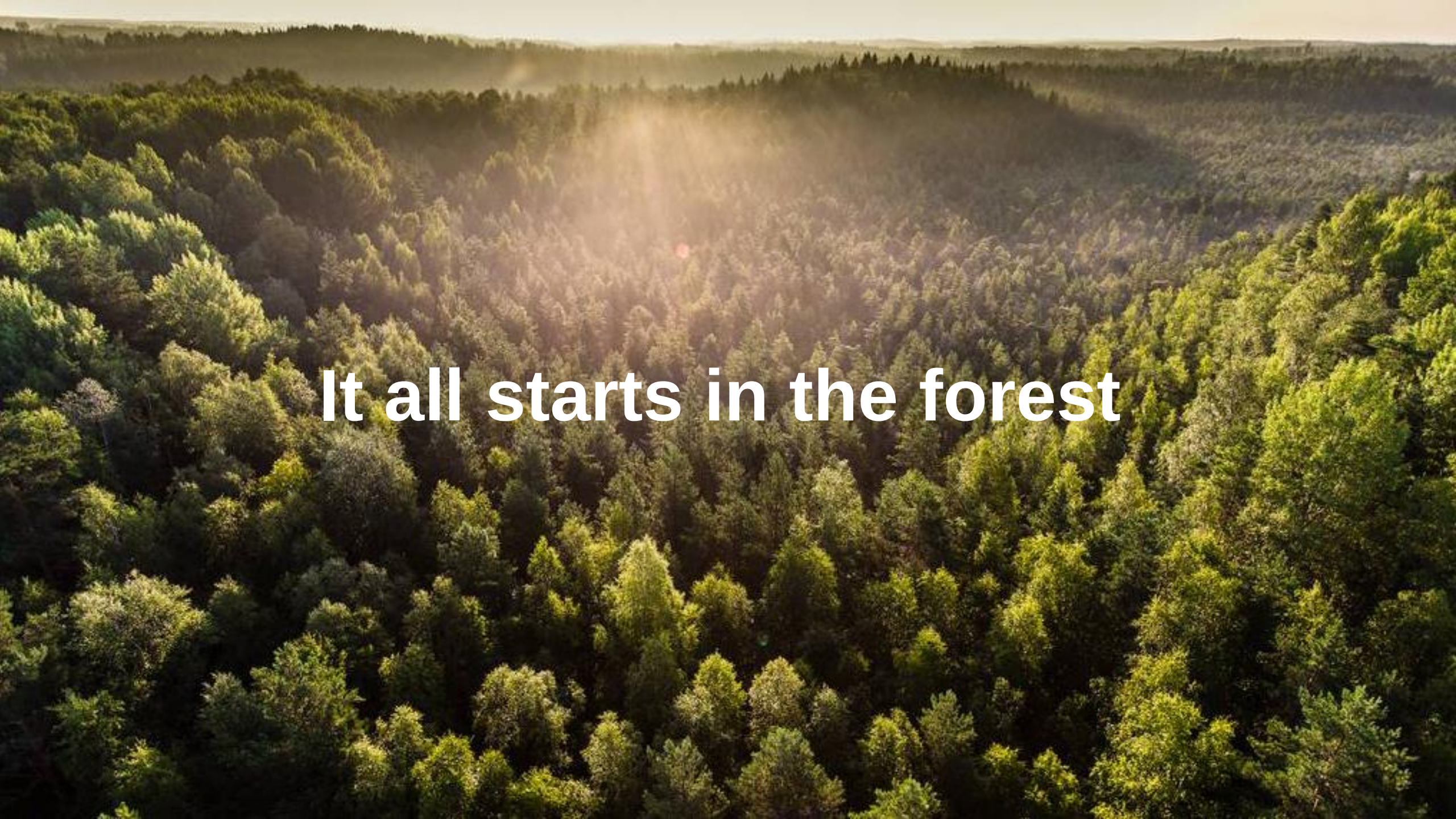


Innovation grows in the forest

Heikki Lotti
Business Development Senior Specialist, Lignin
Stora Enso

THE RENEWABLE MATERIALS COMPANY


It all starts in the forest

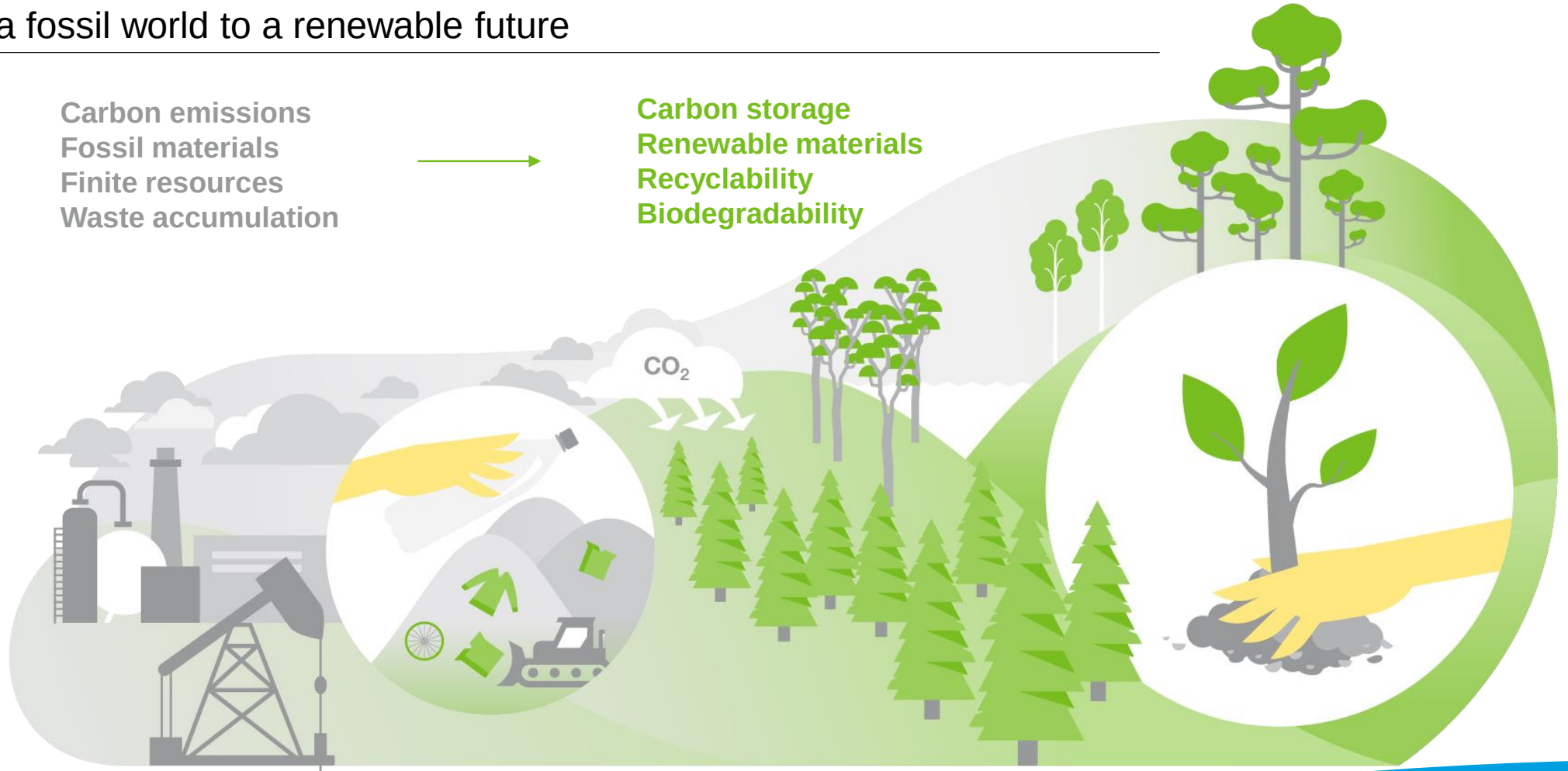
The world needs a new approach to materials

From a fossil world to a renewable future

Carbon emissions
Fossil materials
Finite resources
Waste accumulation

→

Carbon storage
Renewable materials
Recyclability
Biodegradability



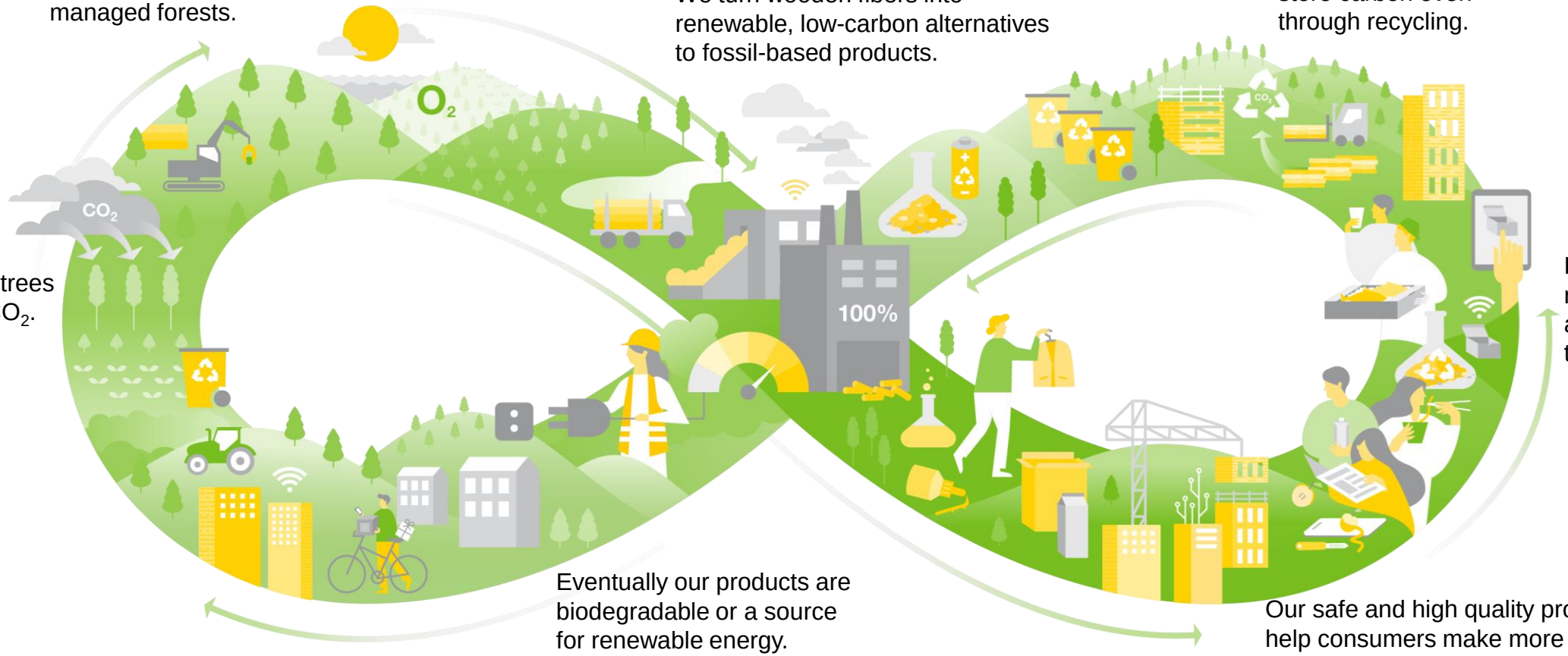
Materials, water, and energy

Renewable products make a circular bioeconomy

Renewable wood is harvested from sustainably managed forests.

We turn wooden fibers into renewable, low-carbon alternatives to fossil-based products.

Renewable products store carbon even through recycling.



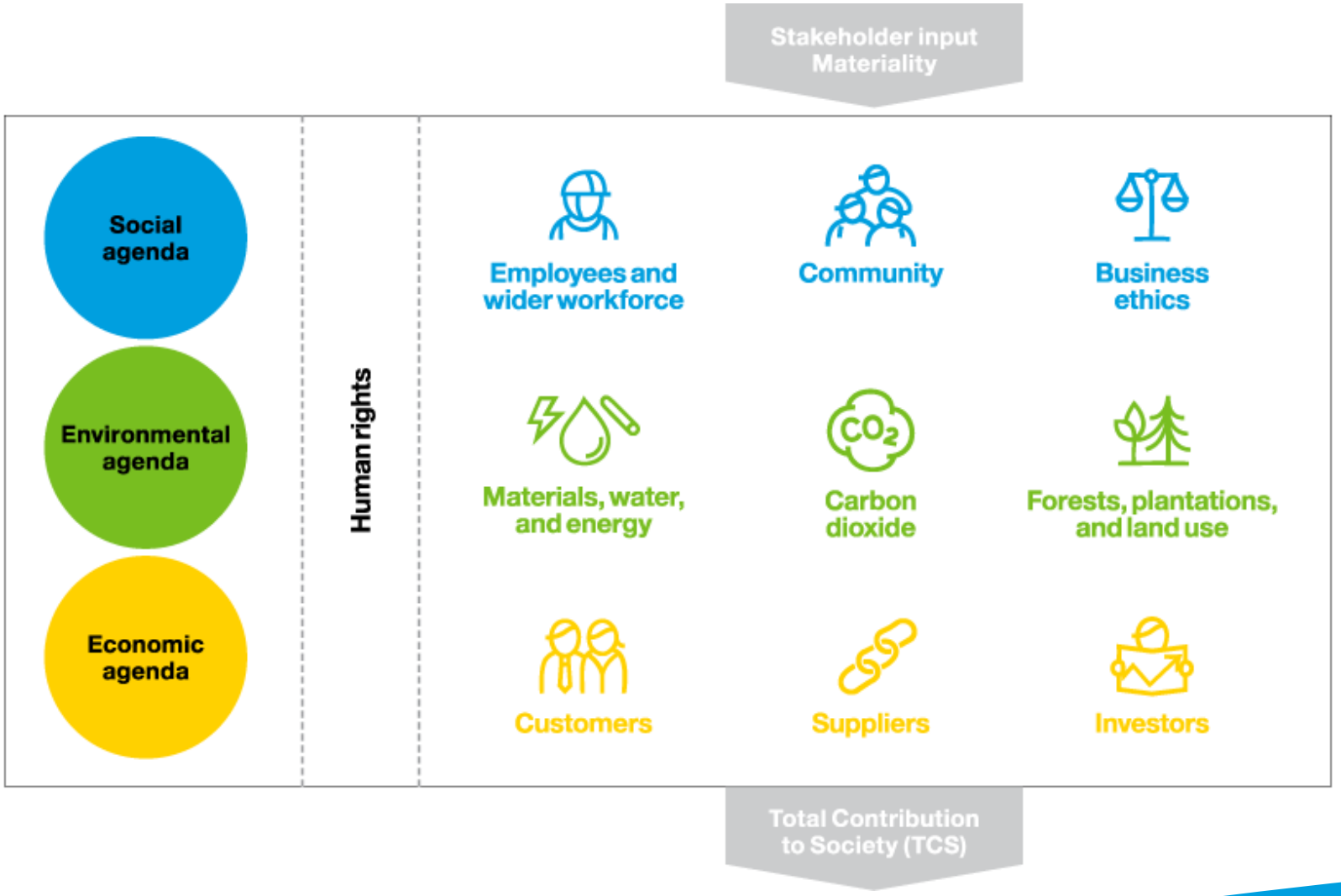
Growing trees absorb CO_2.

Fibres can be recycled for at least 5–7 times.

Eventually our products are biodegradable or a source for renewable energy.

Our safe and high quality products help consumers make more eco-friendly choices.

Our Sustainability Agenda



1. We care about all our people
2. We help communities be resilient
3. We play fair

4. We use natural resources with care
5. We combat global warming
6. We respect the local environment

7. We help customers be sustainable
8. We choose like-minded partners
9. We reward investors sustainably

Forests, plantations, and land use

We respect the local environment

Biodiversity management practices in Northern forests

Decaying wood
Decaying wood provides an important habitat for a wide variety of forest species.

High stumps
During harvesting, we make artificial snags to increase the amount of deadwood.

Retention trees
Provide continuum of decaying wood for forest species, such as birds who need it for nesting.

Protection of valuable sites
In forest management planning, we identify and protect ecologically and culturally valuable sites.

Forest structure
Variation in forest structure helps to maintain species and habitat diversity.

Controlled burning
Creates suitable habitats for many fire-dependent species and enhances forest regeneration.

Soil and water protection
Harvesting, soil preparation and road building are planned to minimize adverse impacts to soil and water.

Buffer zones
Protect watercourses, connect and provide habitats for forest species and improve visual quality of the managed landscape.

Materials, water, and energy

We use natural resources with care

98%
Process residual utilization rate

96%
of water released back to the local environment

81%
Share of biomass in total fuel consumption

Efficient use of materials in circular bioeconomy

Wood
35.1 million m³

Fossil fuels
29.5 PJ

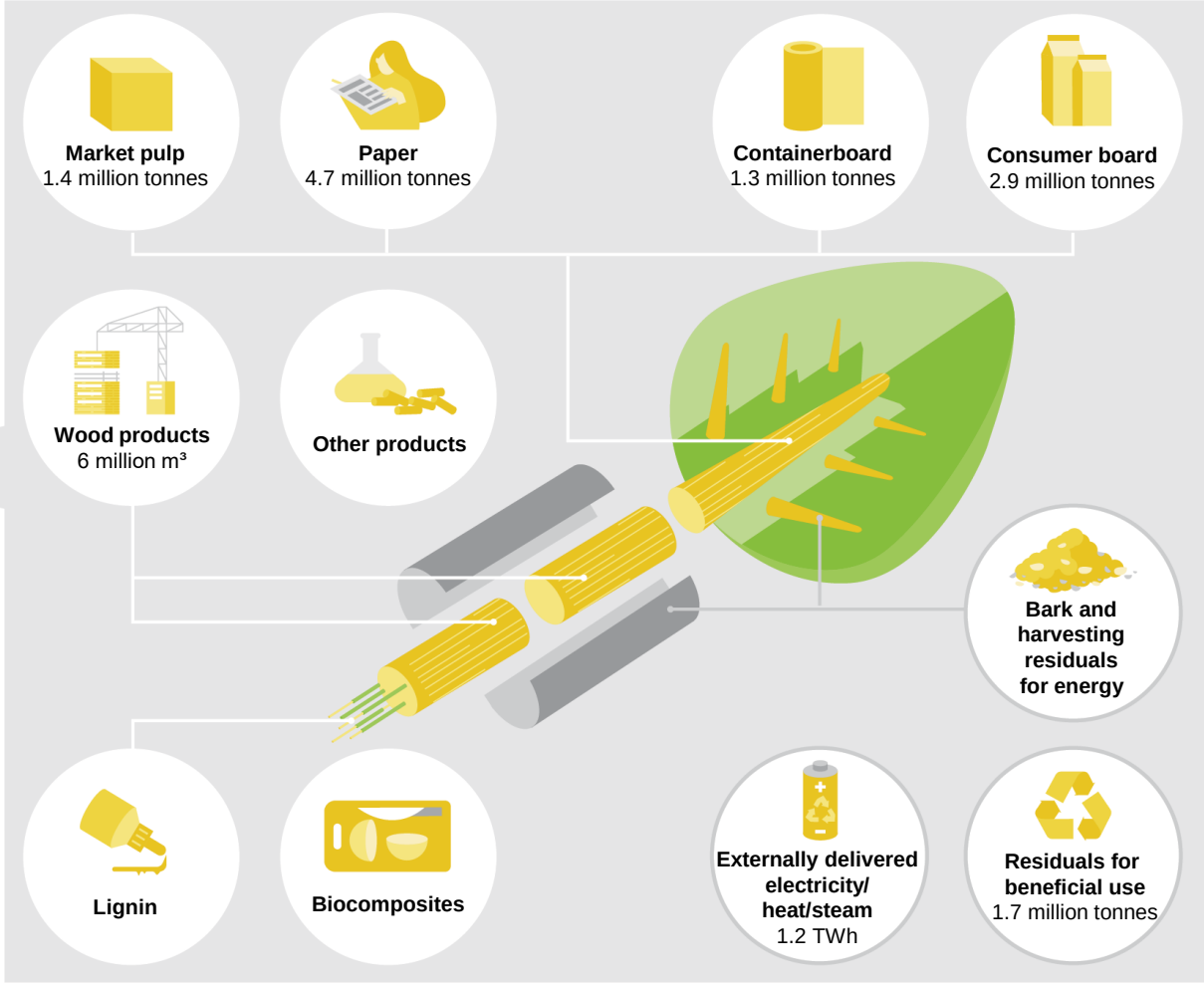
External biomass energy
20.4 PJ

Water
589 million m³, of which 96% is returned back to the local environment

Purchased electricity
7.7 TWh

Purchased pulp and paper for recycling
2.8 million tonnes

Pigments, fillers, starch, and other chemicals
2.5 million tonnes



From wood to renewable products - more value out of cellulose fibers

Extraction and separation technologies

Cellulose and hemicellulose

Sugars

Lignin

New materials, bio-based chemicals, bioplastics, regenerated cellulose, adhesives and much more.

Our innovation in action

TreeToTextile

- A partnership between H&M, Inter IKEA, Stora Enso and innovator Lars Stigsson.
- Aims at developing new textile fibers in a sustainable way at attractive cost levels.
- The process of TreeToTextile takes renewable cellulose raw material from responsibly managed forests and regenerates the cellulose into a textile fiber by spinning the wood pulp.
- A demonstration plant will be set up at one of Stora Enso's Nordic facilities.

Tree to Textile

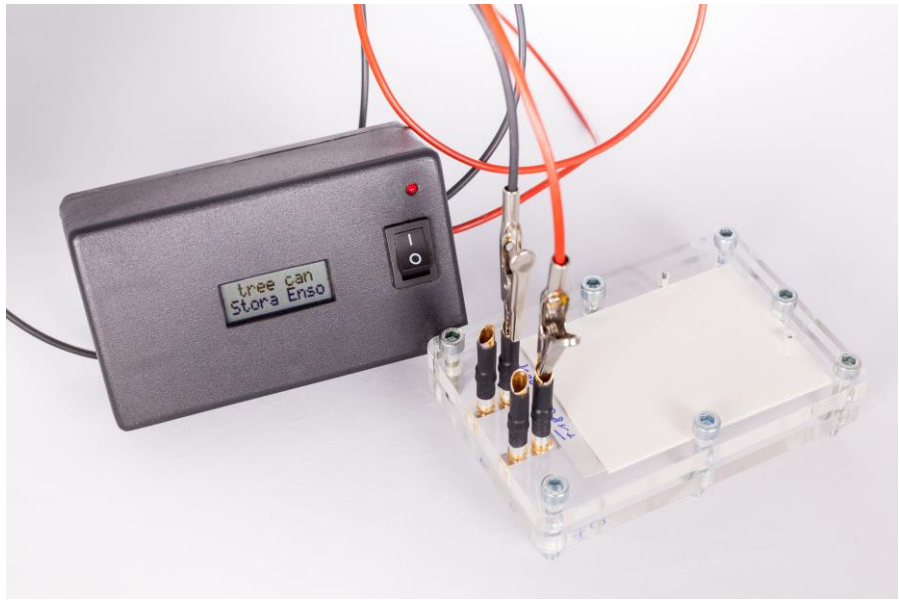
Lineo™ by Stora Enso

- After cellulose, lignin is the most abundant organic polymer on earth. It is a renewable, cost-efficient, non-toxic alternative to fossil-based raw materials, made from a traceable and natural material.

- Lignin benefits from a highly functional versatility, giving potential for creating new bio-based materials.

Bio-based carbon materials for energy storage investment at Sunila Mill

- Stora Enso is investing in a pilot facility for producing bio-based carbon materials based on lignin in Sunila Mill.
- Wood-based carbon can be utilised as a crucial component in batteries typically used in consumer electronics, the automotive industry and large-scale energy storage systems.
- There’s a growing demand for battery and we can meet it with a high-quality, attractively priced and sustainable alternatives.
- The construction is estimated to be complete by early 2021.



Biofoams

- Stora Enso acquired Cellutech in 2018 and the company's operation is now fully incorporated into Biomaterials Innovation organisation as the emerging business of biofoams.
- The acquisition of Cellutech supports Stora Enso's vision of replacing fossil-based materials with renewable ones originating from wood.
- The company works, among others, in the areas of foams for packaging and hydroponics where the markets are continuously growing.
- Cellufoam™ (cellulosic foams), which is versatile and biodegradable, can be used in packaging to replace polystyrene.

Bio-based plastic packaging material investment at Langerbrugge Mill

- Stora Enso is investing in a pilot facility for enabling the production of bio-based plastics
- The pilot plant will focus on developing a cost-competitive process for manufacturing FDCA (furandicarboxylicacid) from sugars. FDCA is a key component of the bio-based barrier material PEF (polyethylene furanoate).
- In addition to its renewable nature, PEF's attractive barrier, mechanical and thermal properties open up new packaging opportunities, such as small liquid containers for soft drinks, juices and other beverages.
- The pilot is estimated to be ready during the first quarter of 2021.

EcoFishBox™ by Stora Enso – a renewable alternative for fish packaging

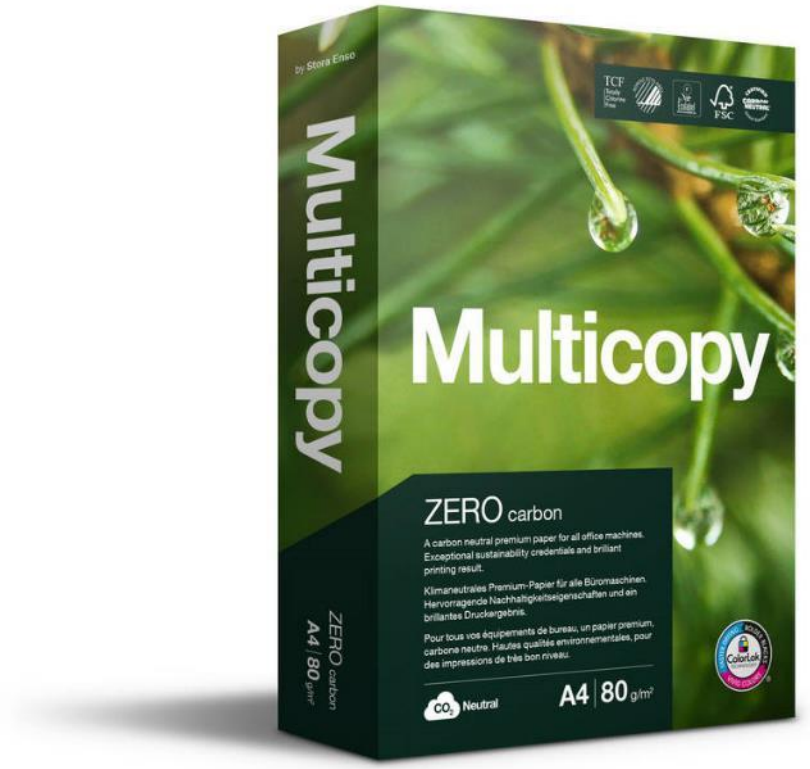
- Renewable, recyclable material.
- Alternative for traditional Expanded Poly Styrene (EPS) fish box.
- Convenient collection and recycling system which brings savings in packaging waste handling.
- Takes up to seven times less space in storage and transport than the traditional fish box.
- Waterproof and leak tight.
- Life Cycle Assessment critically reviewed by a third-party panel found that climate change impacts and fossil resource depletion of EcoFishBox™ are at least 40% lower than EPS boxes.

Biocomposites – every percent counts

- Stora Enso DuraSense™ combines wood with polymers reducing the need for non-renewable materials
- The polymers can be conventional, recycled or bio-based
- Lightweight and durable products for daily life
- Up to 80% smaller carbon footprint compared with conventional polymers
- Recyclable and re-processable 5-6 times
- Can be used for energy in the end of life

Multicopy Zero by Stora Enso – carbon neutral paper

- Multicopy Zero is a carbon neutral copy paper
- Emissions generated during manufacturing and distribution have been compensated
- Carbon is stored in the paper
- Some 95% of the energy for production is derived from bio-fuels and the rest from climate neutral sources
- Multicopy carries several environmental labels and the product, as well as the packaging material, are 100% recyclable



Stora Enso’s simple business idea

Renewable

Bio-based

Recyclable

Fossil-free

Biodegradable

storaenso

Thank you!

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