



Norske Skog

Innovative solution to the global plastics challenge

28 April 2021 – Nordisk Bioplastförening



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Sustainable and innovative industry

- Global and **sustainability focused industrial company**
- **Best-in-class industrial assets** within fibre processing and sustainable energy
- **Leading process industry knowledge** and fibre refining competence
- Diversifying across **fibre-based materials, energy and chemicals**
- **Strong commitment to the green shift** and sustainable production

Chemicals & materials

**CIRCA**

Norske Skog holds ~26% of Circa Group AS

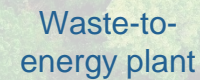
**CEBINA**

Current ~500 tonnes (pilot)

**CEBICO**

Introducing ~300 tonnes (pilot)

Sustainable energy

**Waste-to-energy plant**

Introducing +400 GWh(th) of energy production

**nature's flame**

Current ~425 GWh(th) of pellets production

Biogas

Current ~28 GWh(th) of energy production

Renewable packaging

**STRATO**

Introducing ~765k tonnes of Recycled Containerboard

Interliner

Current ~200k tonnes of interliner

Publication paper

**NOR|News**

Current ~1 350k tonnes of Newsprint

**NOR|Cote**

Current ~400k tonnes of LWC

**NOR|SC**

Current ~360k tonnes of SC

Solving plastic pollution requires more than one solution

- Plastics improve quality of life, but most plastics are fossil-based and **takes +500 years to degrade**
- Today, landfills contain over 6bn tonnes of plastics and **only 9% of all plastics have been recycled**
- Various plastic types and combinations, and different regulation makes recycling challenging
- Plastics have about **6 recycling cycles** implying that virgin plastics continuously must be added
- Tighter regulation, waste plastic import bans and public opinion demand change
- **Innovative solutions are needed**

368m

tonnes of plastic¹
produced in 2019

12bn

tonnes of plastic in
landfills by 2050

350bn

euro plastics industry
in Europe alone

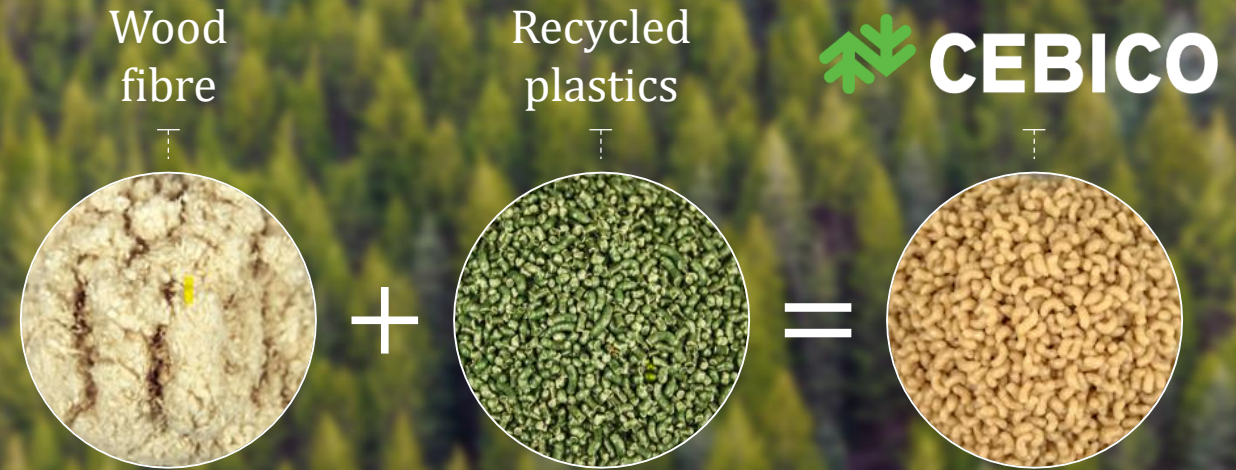
5m

tonnes recycled plastic
produced in Europe

Taking a supply chain perspective

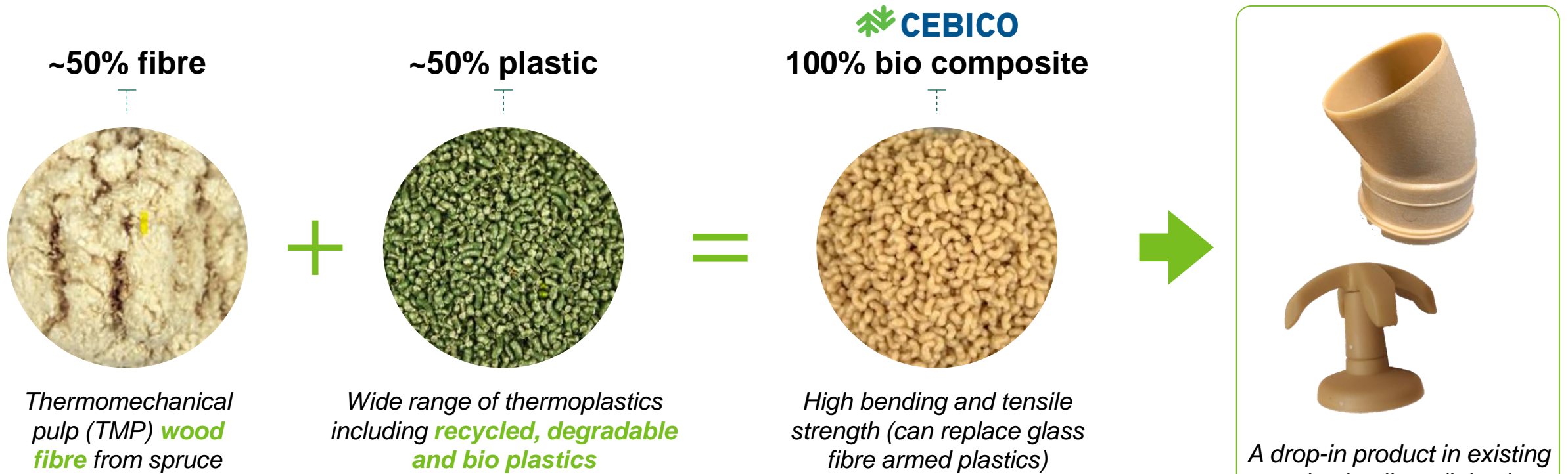
- 1** **Substitute plastics with fibre** in the recycling process to make it competitive with virgin plastics
- 2** **Invest in mechanical recycling technology** to enable closed loop recycling of fibre-based plastic composites
- 3** Develop fibre-based plastic products together with customers **designed for closed loop recycling**

Replacing one kilo of plastics with fibre *saves six kilos of CO₂ emissions*



- ✓ **Improves strength** in virgin and recycled plastics
- ✓ **Enables thinner materials** (i.e. less consumption)
- ✓ **Increases value and lifetime** of recycled plastics
- ✓ **Reduces product costs** by replacing plastic with fibre

Wood fibre and recycled plastics will enable a circular economy



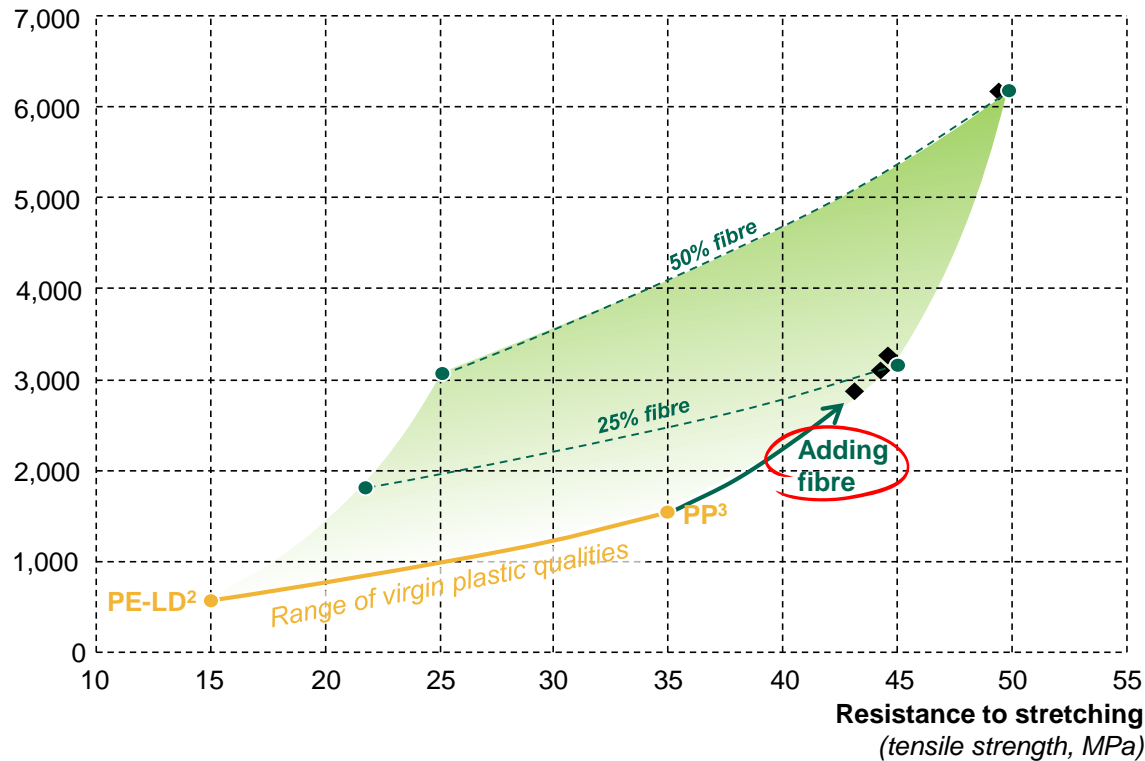
Replacing one kilo of plastics with one kilo of TMP saves six kilos of fossil CO₂ emissions, and increases recycling qualities compared to traditional plastics



Spruce fibre (TMP¹) sustainably increases length-of-life for plastics

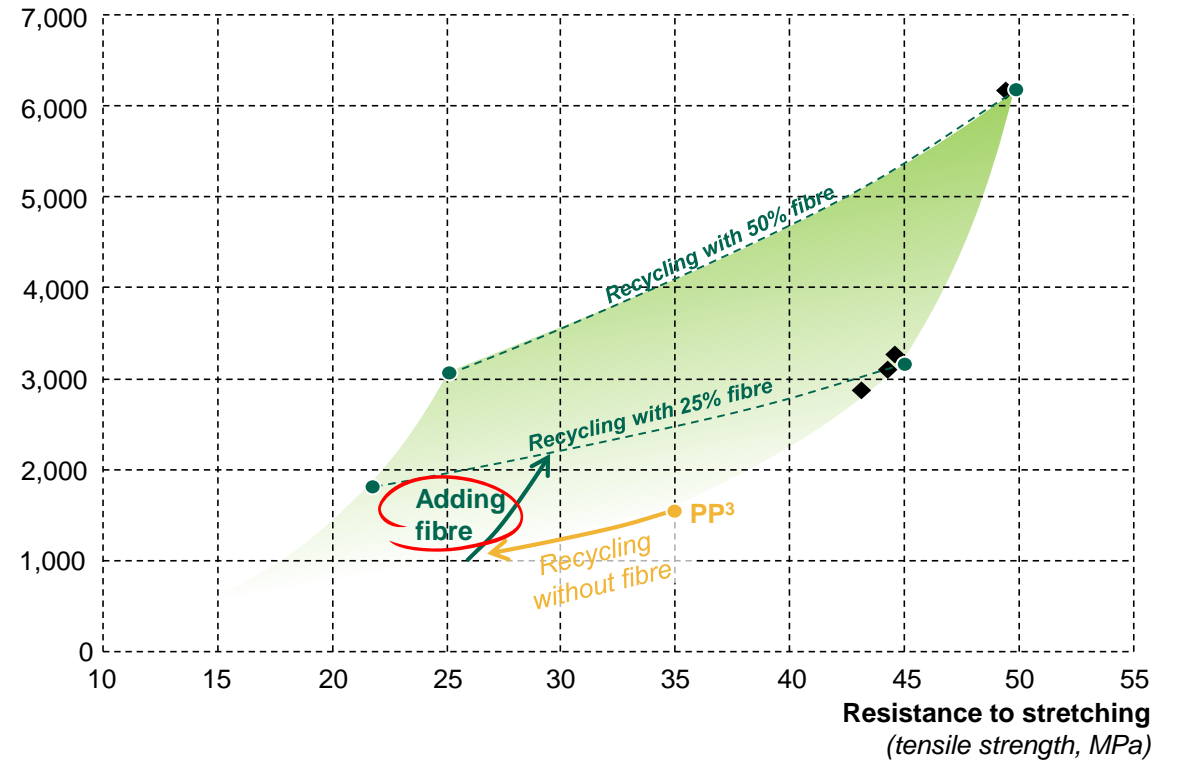
Adding fibre can improve a range of virgin plastic qualities

Resistance to bending
(flexural modulus, MPa)



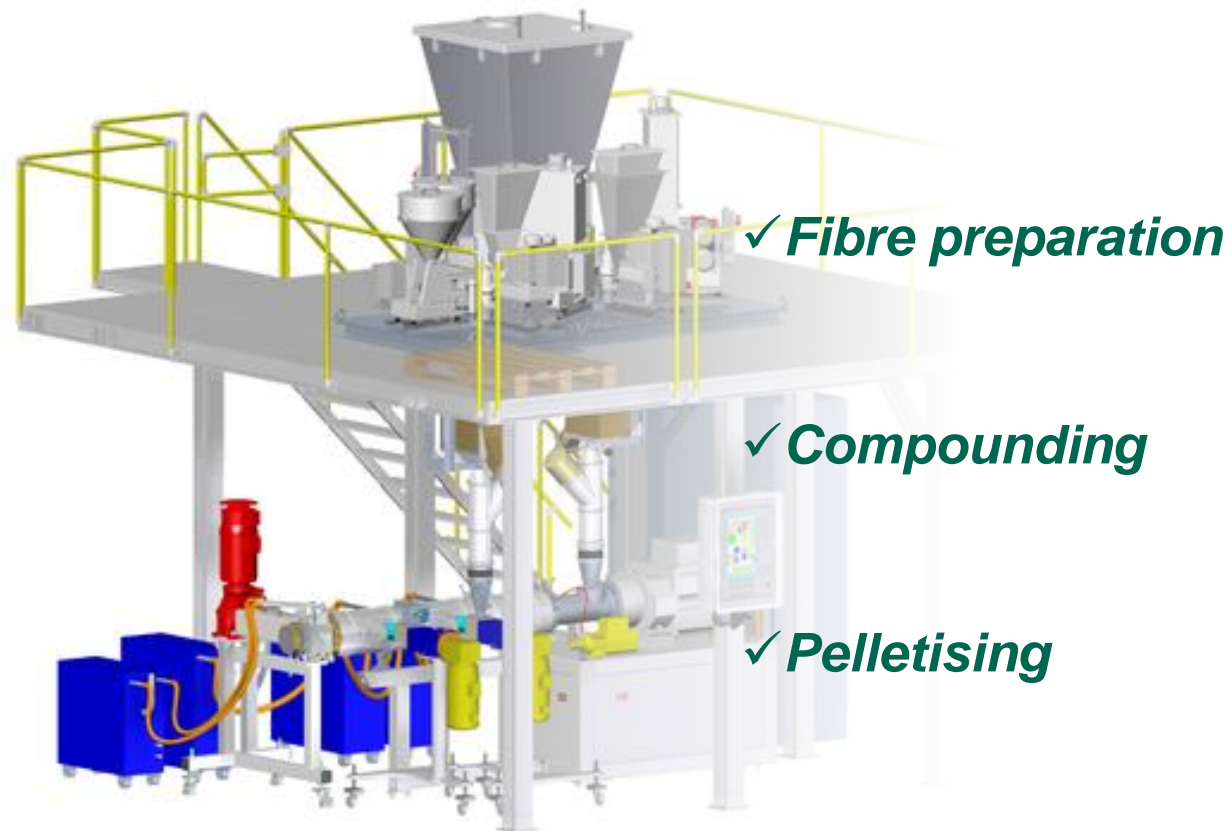
Adding fibre can improve a range of recycled plastic qualities

Resistance to bending
(flexural modulus, MPa)



● Plastic qualities ◆ CEBICO strength data points

CEBICO pilot enables further commercial development



- Annual capacity of ~300 tonnes at Saugbrugs
- Pilot expected operational from H2 2021
- Qualification commercial development 2021/22
- Supported by Innovation Norway with NOK ~15m



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