



Biogenic CO₂ capture in Metsä Group

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Metsä Group

Sales* **EUR 5.8 billion** | Personnel **8,800**

METSÄLIITTO COOPERATIVE | The Group's parent company | Owned by over 90,000 Finnish forest owners

METSÄ FIBRE



**Pulp and
sawn timber**

Sales
EUR 2.6 billion

Personnel
1,400

METSÄ BOARD**



Paperboard

Sales
EUR 1.8 billion

Personnel
2,000

METSÄ TISSUE



**Tissue and
Greaseproof
papers**

Sales
EUR 1.1 billion
Personnel
2,400

METSÄ WOOD



Wood products

Sales
EUR 0.5 billion
Personnel
1,600

METSÄ FOREST



**Wood supply and
forest services**

Sales
EUR 2.5 billion
Personnel
600

METSÄ SPRING | Innovation Company

We explore new wood-based products

Aiming to develop wood-based alternatives to fossil-based materials



Muoto

Fibre-based package designed to replace plastic in food packaging.

Demo plant operating in Äänekoski, with construction of the commercial mill underway.



Bio-CO₂

Wood-based CO₂ as a raw material for chemicals and fuels.

Commercial-scale plant planned in Rauma.



Metsä LigO

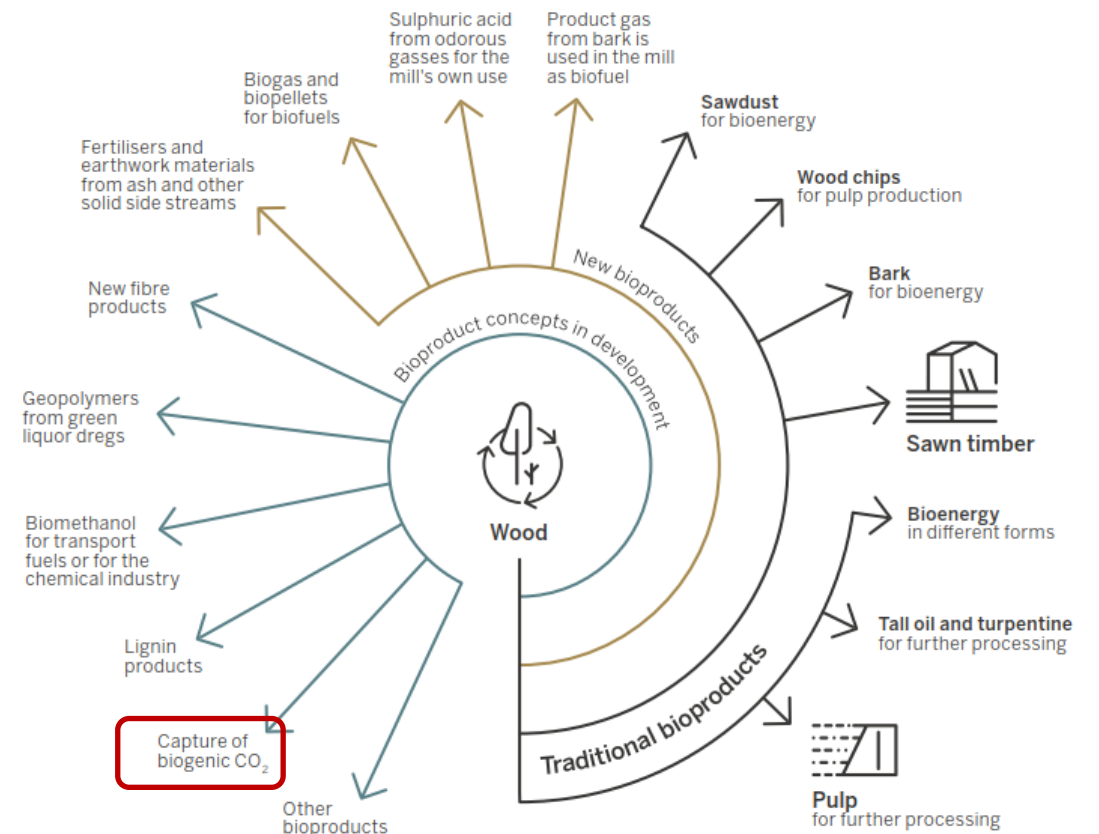
New bio-based chemical refined from lignin for construction products.

Production underway at the Äänekoski demo plant.

Wood-based CO₂ to replace fossil raw materials

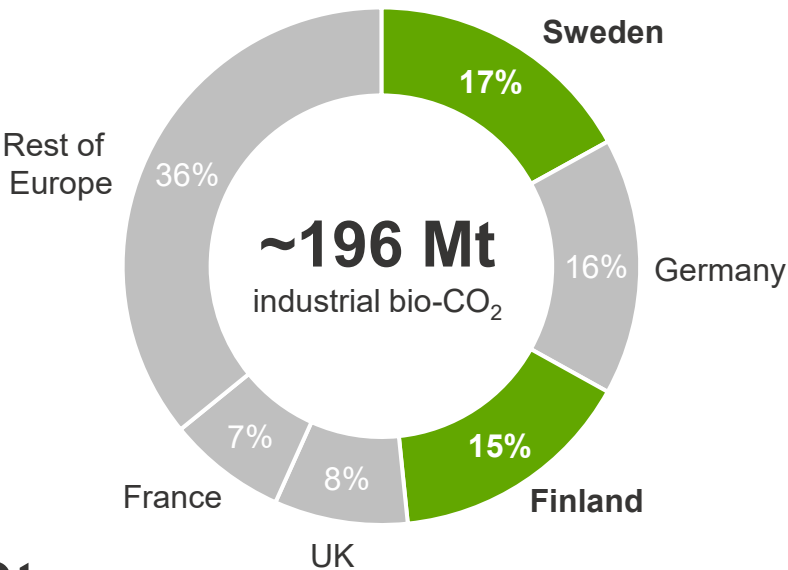
- Part of the bioproduct mill concept
→ Wood raw material is utilized according to the **cascading principle**
- Wood-based CO₂ is a side-stream which can be captured and utilized as raw material to **replace fossil alternatives or it can be stored permanently**
→ Climate impact
→ Security of supply
→ Enables the development of a significant new industry in Europe
- These benefits can be achieved **without** increasing the use of wood raw material

Utilisation of main and side streams in our bioproduct mill concept



Forest industry is a major source of biogenic carbon dioxide

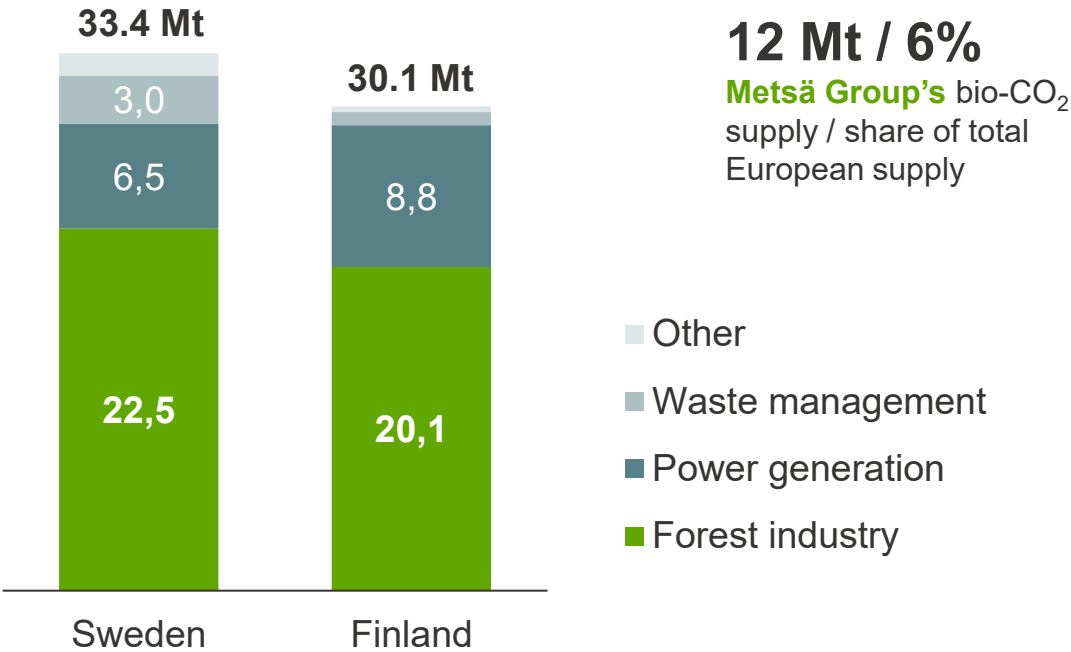
Finland and Sweden are major sources of biogenic CO₂ in Europe



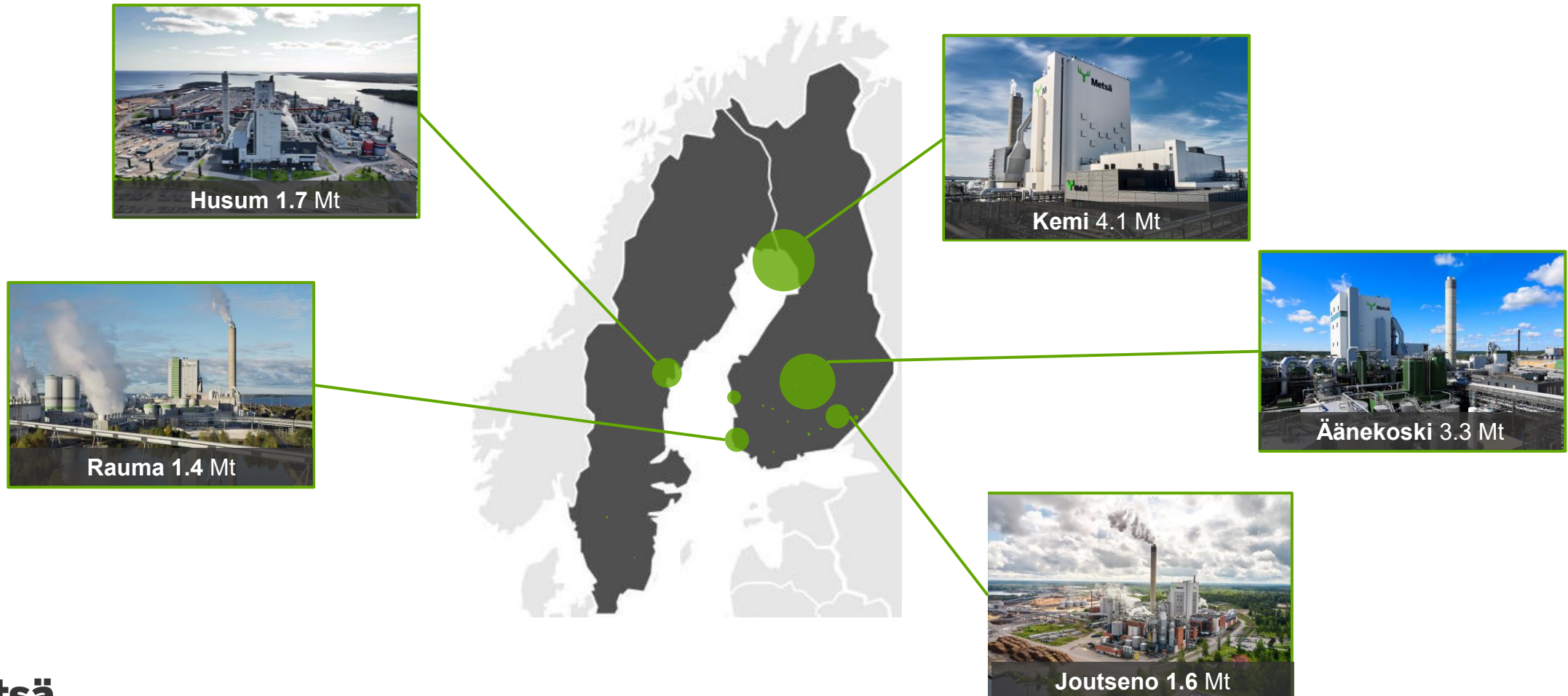
2.4 Gt

Industrial fossil-based CO₂ emissions in Europe 2022

In Sweden and Finland, the majority of biogenic carbon dioxide originates from pulp mills

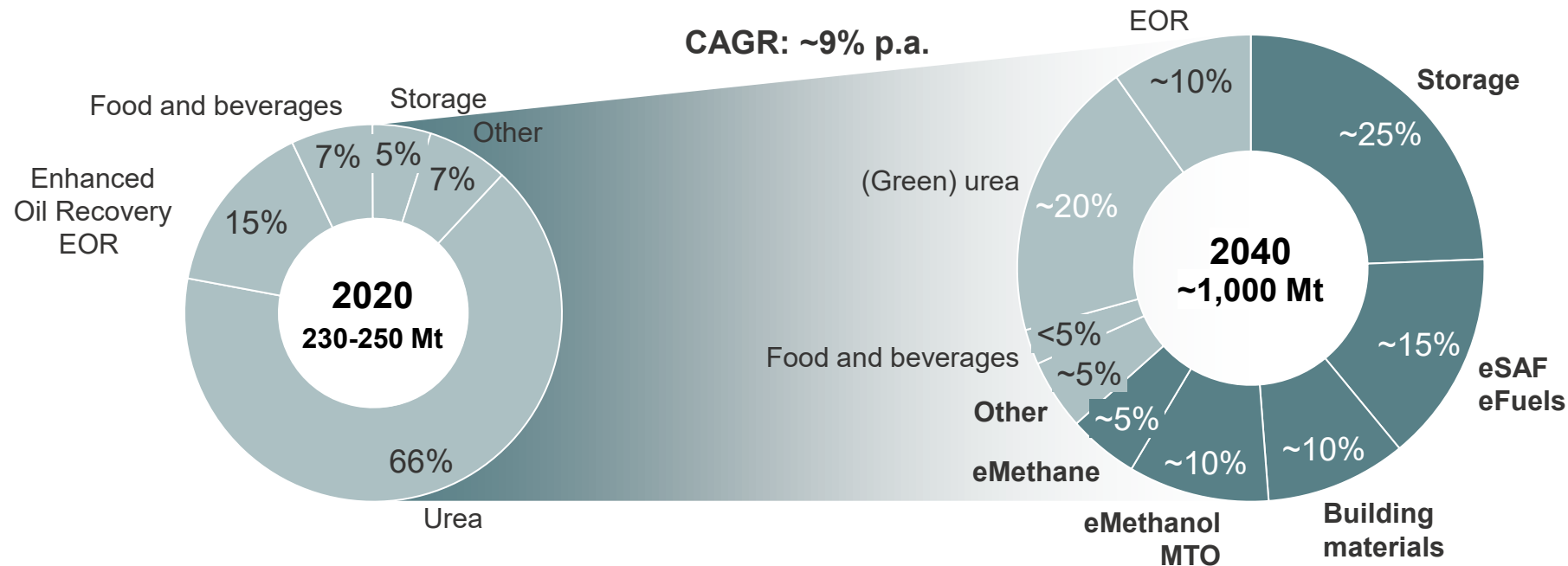


Metsä Group operations generate a total of 12 million tonnes of biogenic carbon dioxide annually

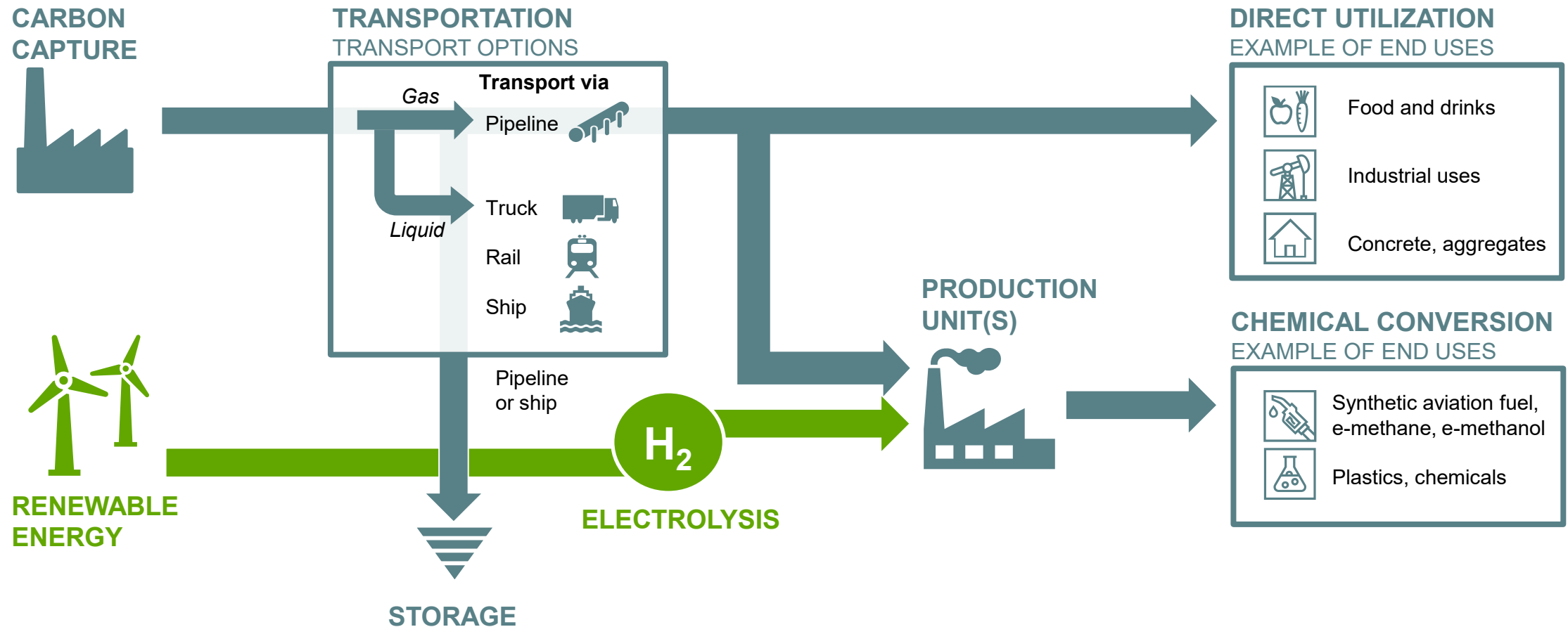


Global demand for CO₂ grows considerably by 2040 driven by various large-scale end uses

Global view on CO₂ consumption, MtCO₂ (including both fossil and biogenic CO₂)



Several partners needed in carbon capture value chain

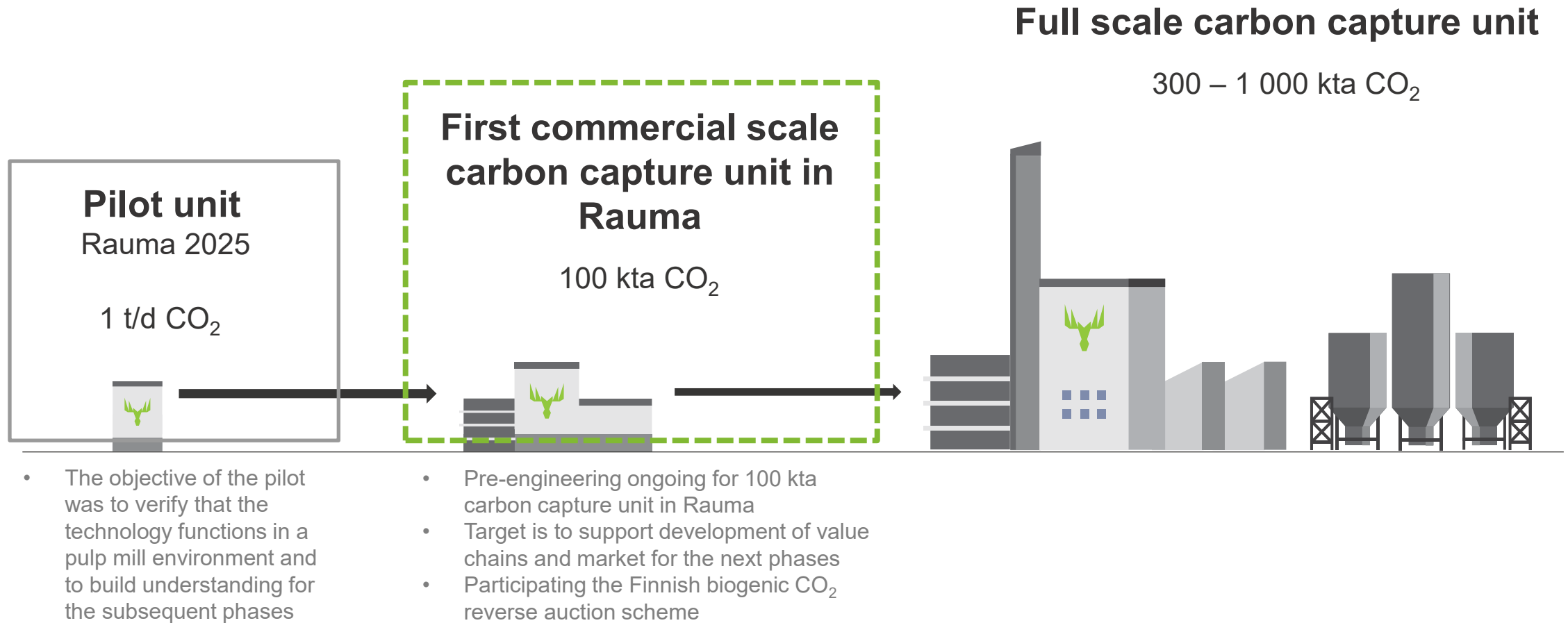


Experience from Rauma pilot plant

- Pilot unit (1 t/day) was installed to capture CO₂ from the mill's flue gases. Piloting was done together with technology provider Andritz (amine scrubbing technology).
- Pilot unit was running app. 6 months, and the capturing process was working well.
- During the piloting period, different processing parameters and conditions were tested to evaluate effect to e.g. energy consumption and yield.
- Several process samples were collected and analysed to gain further understanding of the process for designing the next phases.



Metsä Group proceeds in stages



Summary

- The capture of wood-based carbon dioxide is part of the circular economy and the resource-efficient bioproduct mill concept
- Biogenic carbon dioxide is valuable raw material for replacing fossil-based materials and fuels (CCU)
 - Together with hydrogen economy can enable development of a significant new industry
- Storing biogenic CO₂ permanently can create a net reduction in atmospheric carbon dioxide (CCS).
- Value chains and markets are still undeveloped and complex in both CCU and CCS route
 - Development requires collaboration
 - Step by step approach - Metsä is currently performing pre-engineering phase for 100 kta plant.





**Better everyday life
through Nordic wood**

