



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

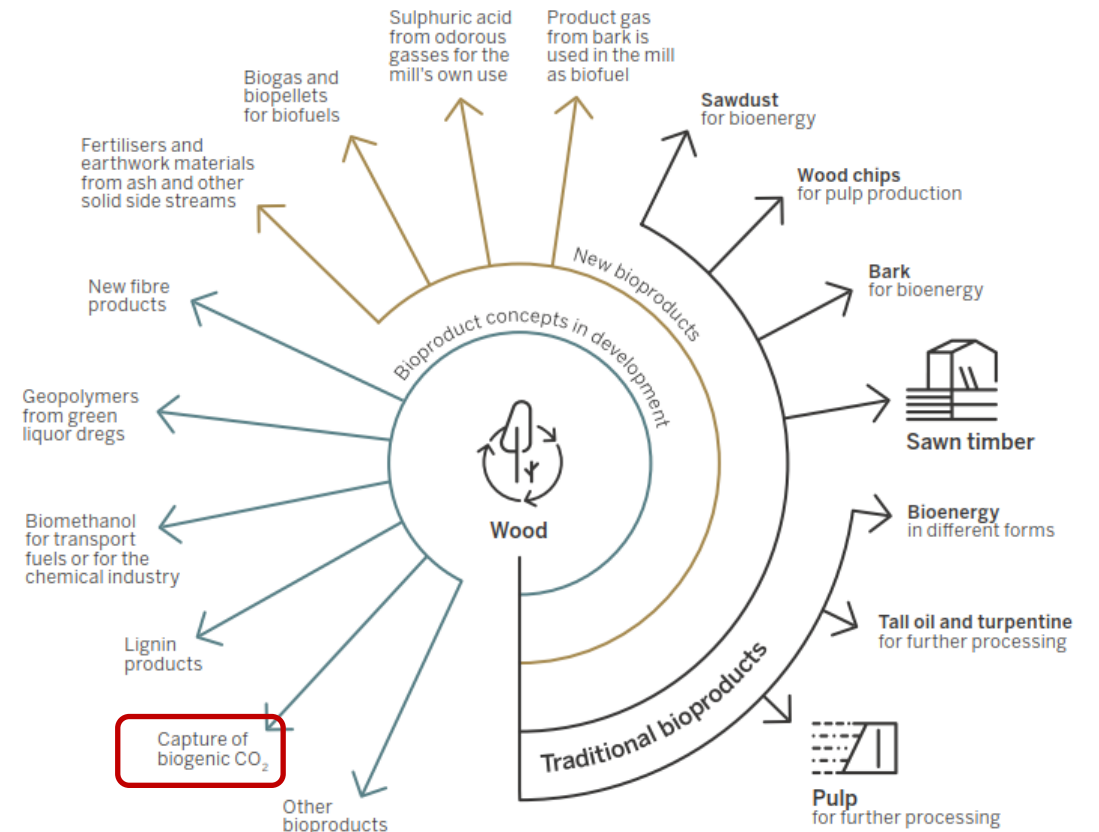
New bio-based chemical refined from lignin for construction products.

Production underway at the Äänekoski demo plant.

Wood-based CO₂ to replace fossil raw materials

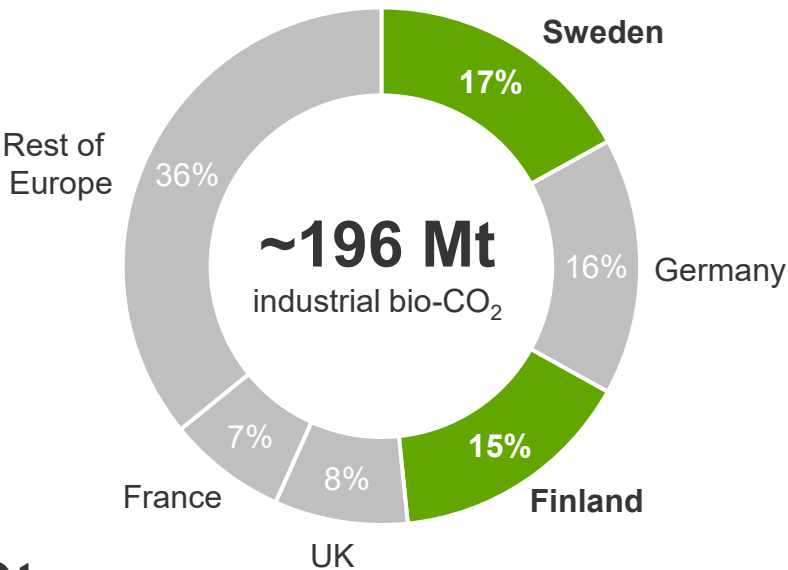
- Part of the bioproduct mill concept
→ Wood raw material is utilized according to the **cascading principle**
- Wood-based CO₂ is a side-stream which can be captured and utilized as raw material to **replace fossil alternatives**
- → Climate impact
→ Security of supply
→ Enables the development of a significant new industry
- 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

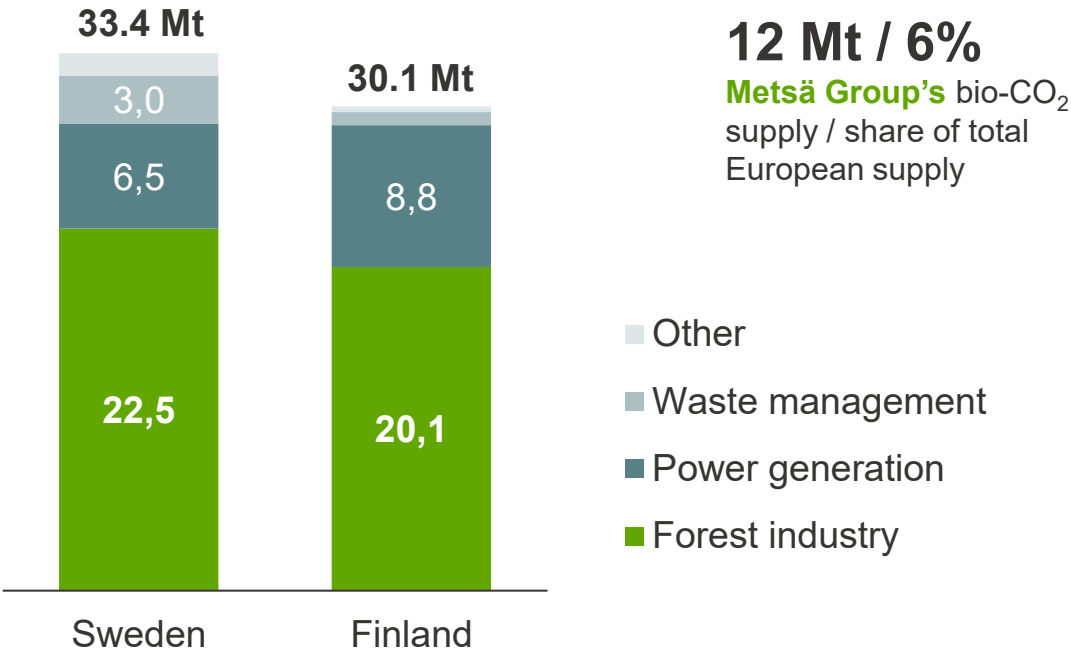
Finland and Sweden are major sources of biogenic CO₂ in Europe



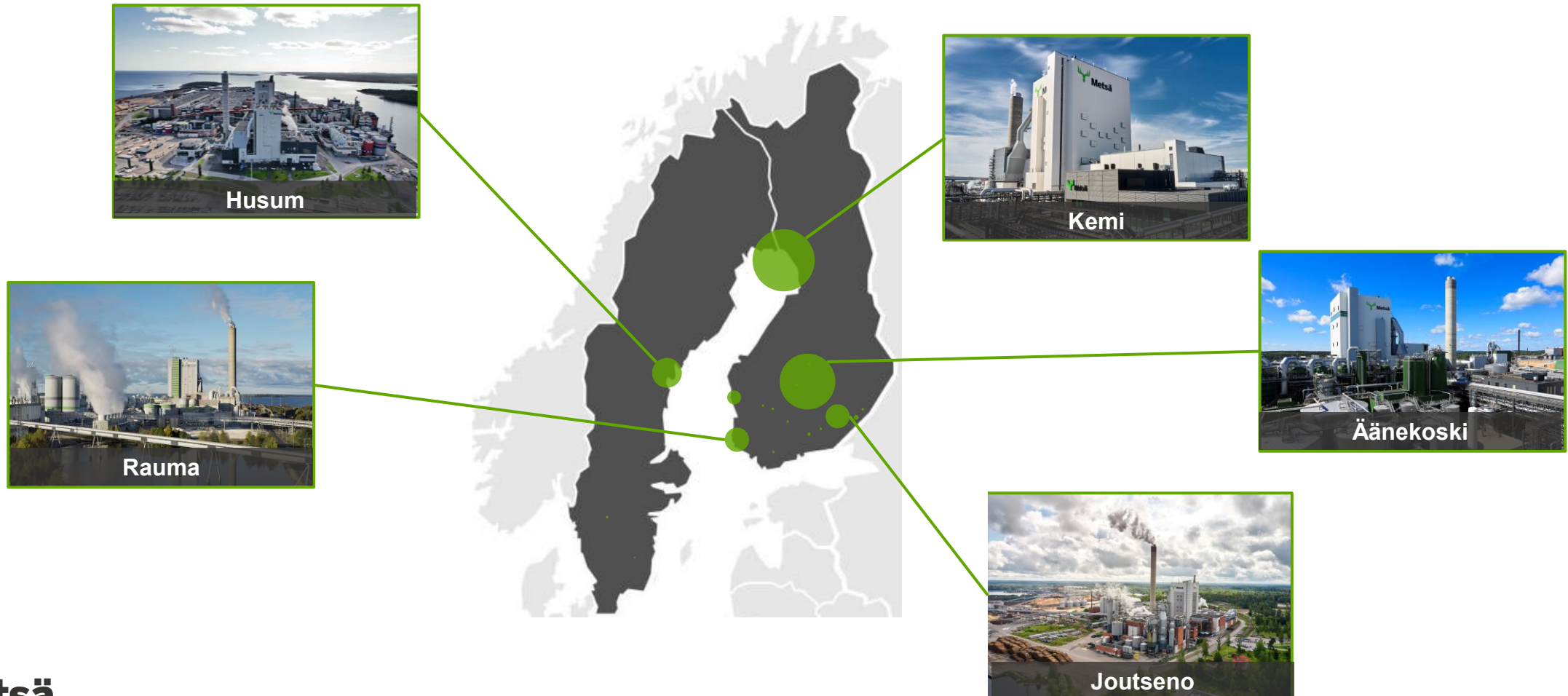
2.4 Gt

Industrial fossil-based CO₂ emissions in Europe 2022

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

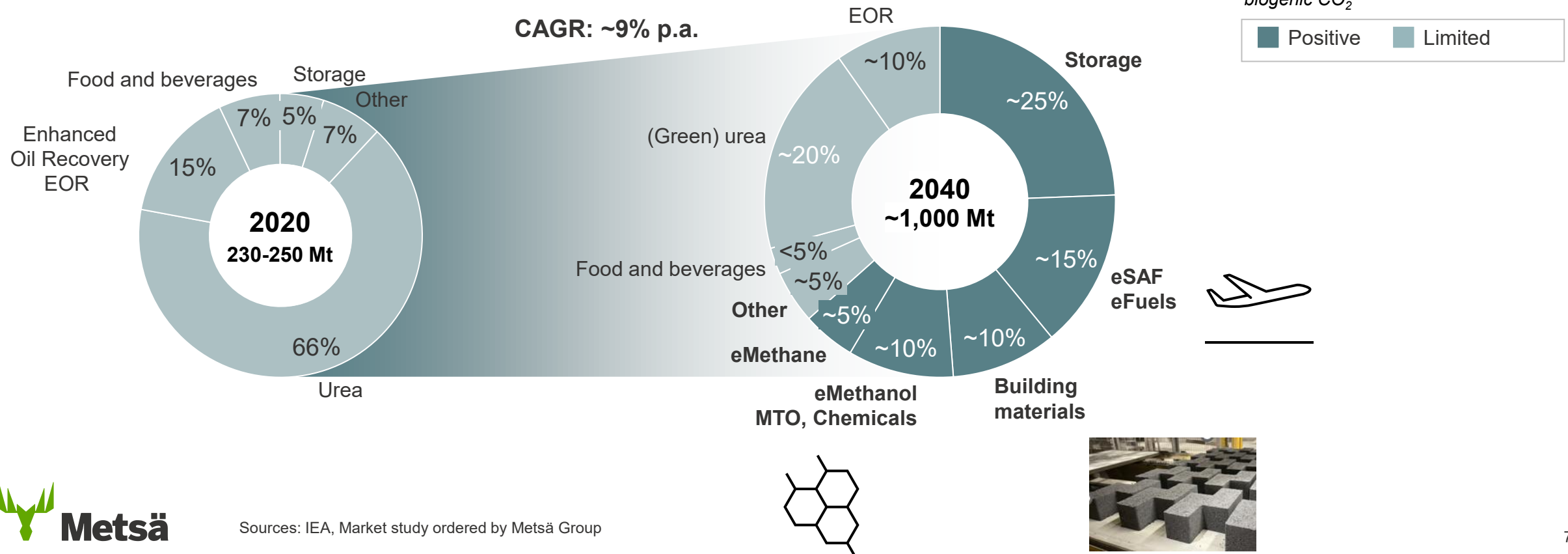


Metsä Group's main biogenic carbon dioxide sources are in Finland and in Sweden

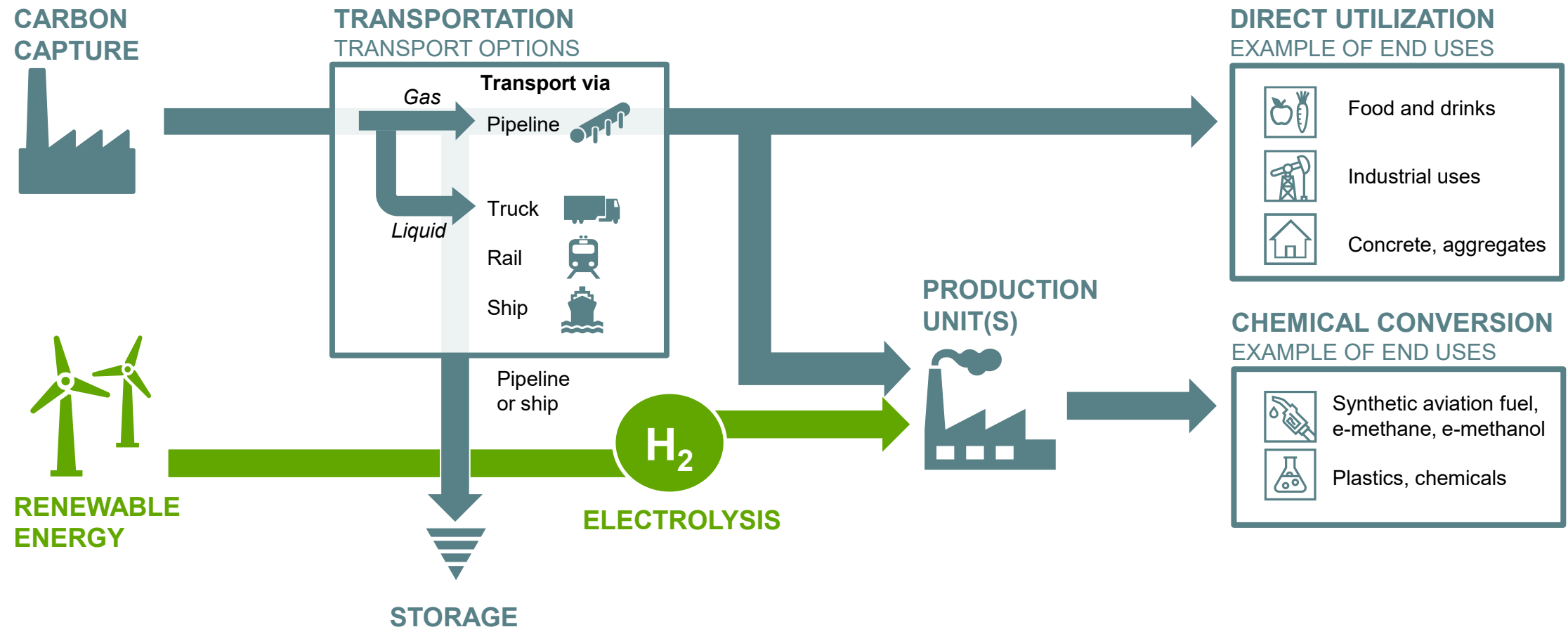


Global demand for CO₂ grows considerably by 2040 driven by various large-scale end uses

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



Several partners needed in carbon capture value chain

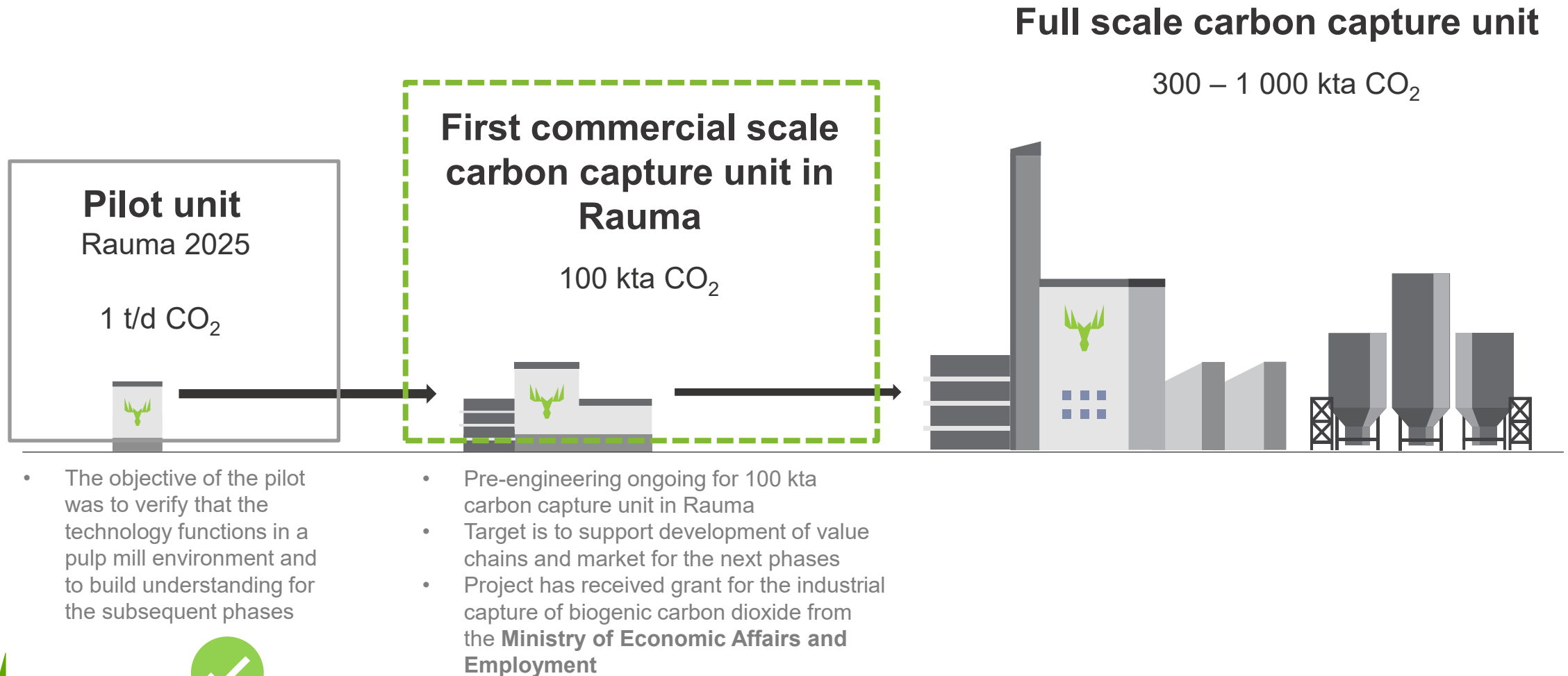


Experience from Rauma pilot plant

- 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**

