Strong Interest in Bio-CCUS in Finland

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Bioenergy Association of Finland
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Who we are

- Business association with some 250 member organisations.
- We represent the entire bioenergy sector from land ownership to energy companies, as well as technology and research in the field.
- Advocacy areas: Bioenergy, Biofuels, Biochar, Peat and Growing Media

Bio-CO2 Use and Removal 2025, Helsinki

- Pictures from the 2024 event

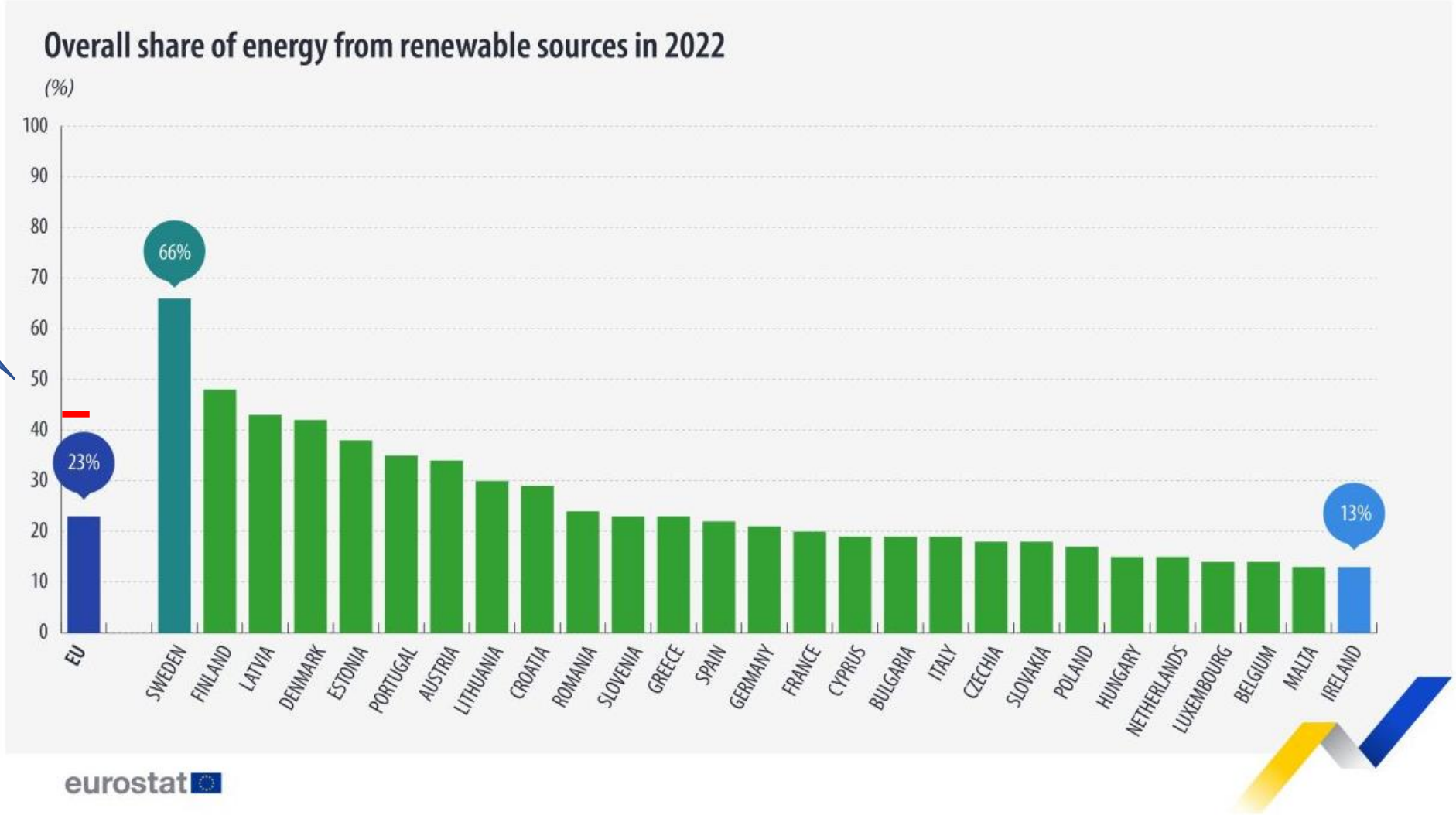
Our vision

- Excellent conditions for development of sustainable and even carbon-negative biomass-based products.
- Our goals include high added value from biomass, circular economy, and the export of industrial products and services. Bioenergy is produced from side streams.
- We strengthen energy self-sufficiency, energy security and employment and regional economy.
- We promote the improvement of production and utilisation of biomass, as well as biodiversity management in the sector.
- We promote the capture, utilisation, and storage of biogenic carbon dioxide.
- Through these actions, we improve the acceptance of bioenergy and utilisation of biomass.

Bioenergy in Finland

Finland is No 2 in the EU on Renewable Energy

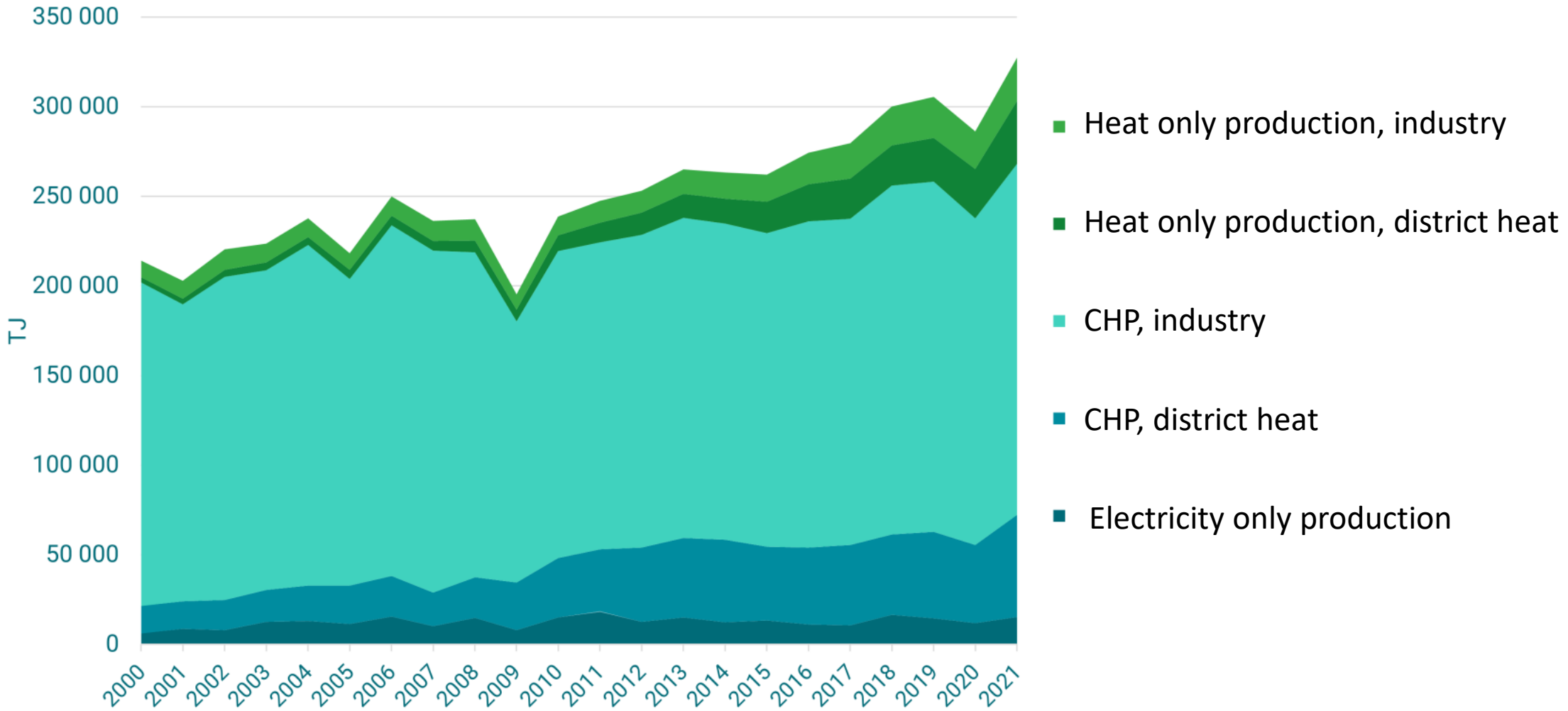
New Goal for 2030 agreed: 42.5 %



Key Numbers

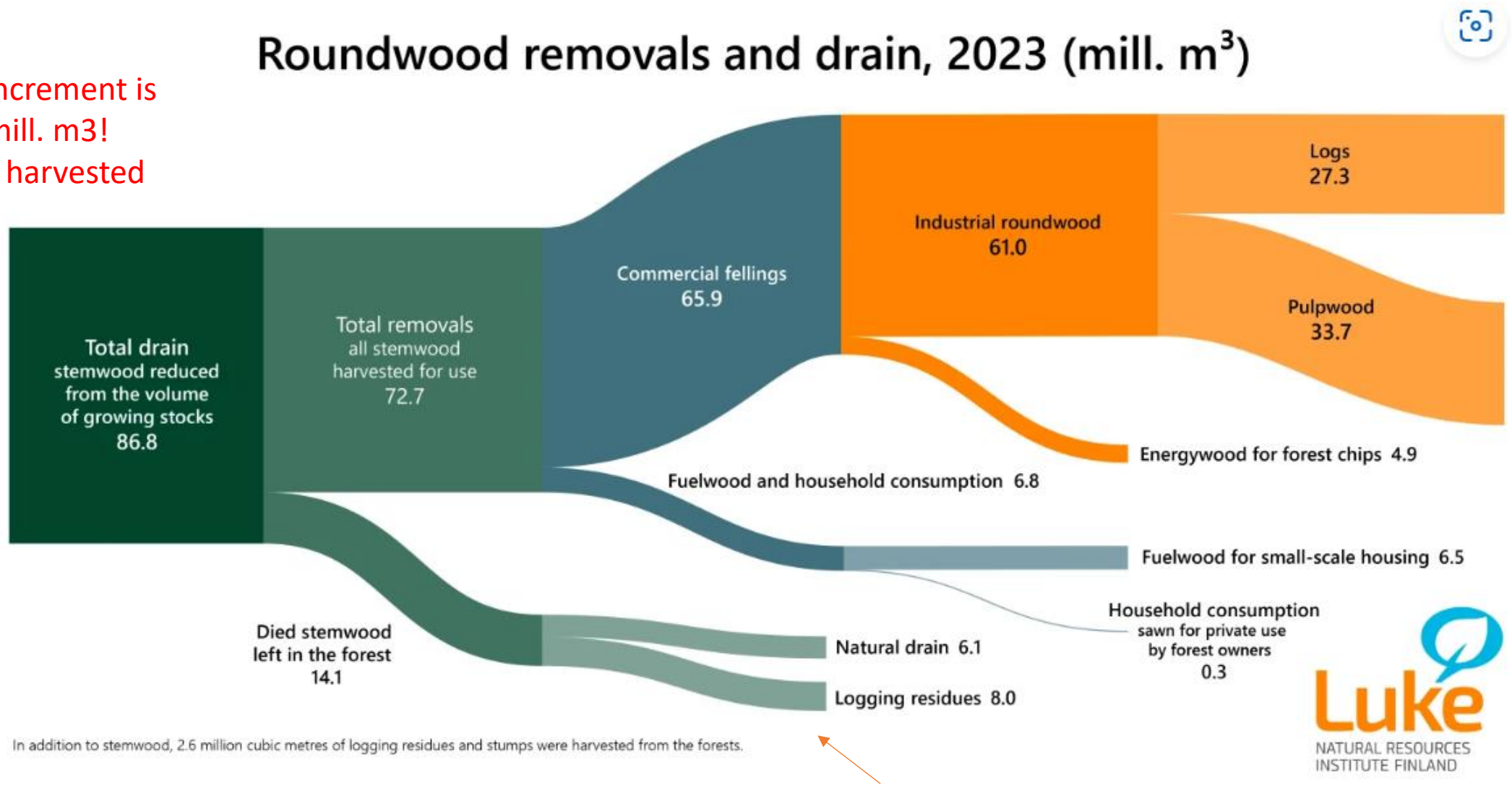
	1990	2022
Ranking of Energy Sources	1. Oil 2. Nuclear 3. Coal 4. Wood fuels	1. Wood fuels 2. Oil 3. Nuclear 4. Other RE
Bioenergy as % of Total Energy Consumption	14.7%	32 % (2022)
Bioenergy as % of All Renewable Energy	81 %	76 % (2022)
Wood-based bioenergy as % of All bioenergy		90 % (2022)

For What are the Finnish Wood Fuels Used?



Woody biomass flows

Annual increment is
104 mill. m3!
=> 70 % harvested



2/3 stays in the forest!

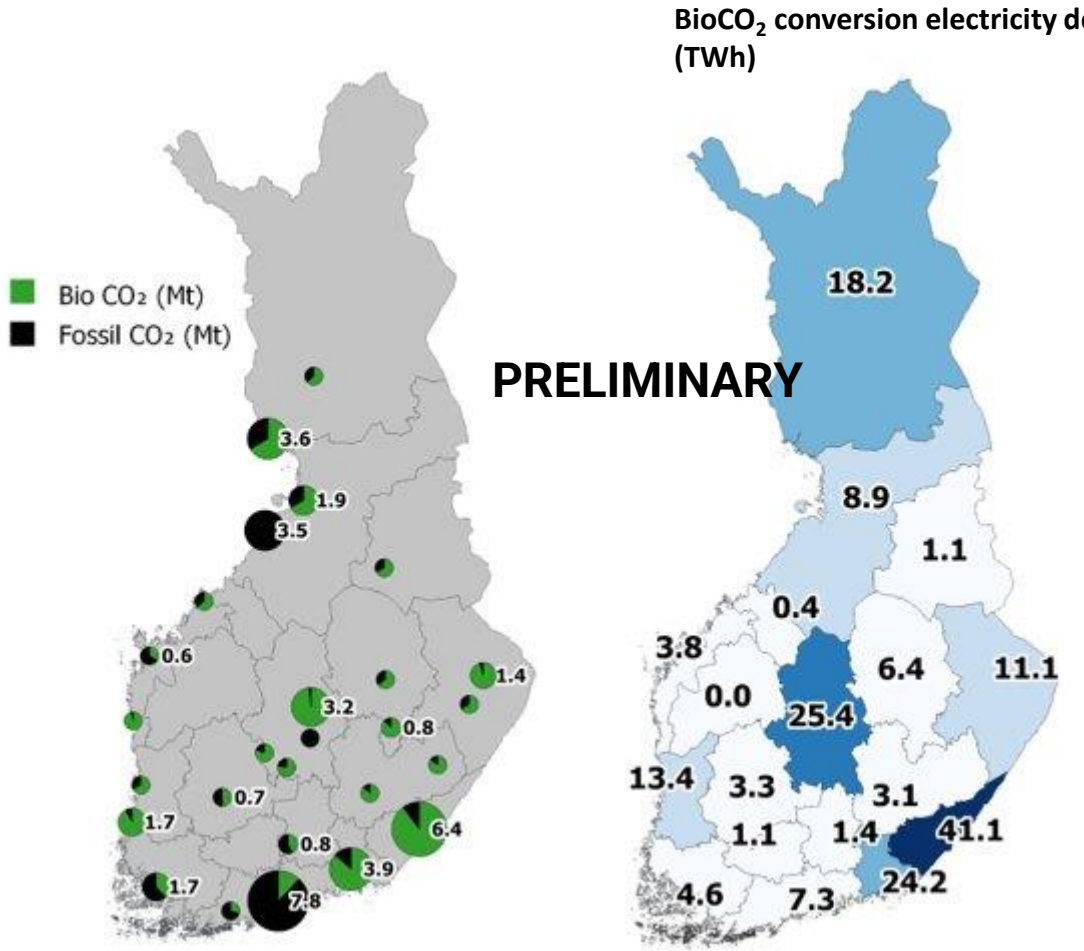
Prospects of Bio-CCUS

Government Programme of 2023

- New strategic opening in the Government's programme: CCUS solutions as one of the key priorities in the Finnish climate policy.
- BioCCU combined with increased hydrogen production a platform for fuels, chemicals and materials from a sustainable carbon source.
    - *"The Government will explore and introduce policy instruments to ensure that carbon dioxide emissions to atmosphere from large industrial sources are eliminated by the mid-2030s. The Government is preparing to introduce sufficient incentives to advance investments. After conducting a study on the matter, the Government will introduce a reverse auction of negative emissions or a similar mechanism to encourage the capture of carbon dioxide."*
- 140 M€ for Clean Energy Finland key projects (total amount for the 4 years).

Large point sources of CO2 in Finland

- Large point sources could provide about 24 Mt/a of biogenic CO2. Forest industry accounts 18,9 Mtn/a and energy industry 5,6 Mtn. → Huge potential for CCUS!
- About half of the point sources on the coast.
- Regional mismatch for CCU: renewable power vs CO2.
- 16 identified on-going projects
  - 15 Bio-CCU projects
  - 1 Bio-CCS project
  - CO2 volume still below 2 MtCO2/a
  - Significant investment volume for the Finnish context
- No geological storage sites have been identified in Finland. → Partners and international co-operation a must



Source: Hannu Karjunen, LUT, Hygcel-project

First Bio-CCS Project announced on Sept 25th

Source: Vantaa Energy 2024

- **waste-to-energy site at Vantaa's Långmossebergen**
  - mixed waste incineration (after recycling)
  - overall CO2 emission reduction: 660,000 tCO2/a
  - compare: City of Vantaa's total emissions 900,000 tCO2/a
  - reduces costs caused by the EU ETS
  - 40-50 % biowaste => BECCS ca. 300,000 tCO2
- **capture plant ca. 350 M€, in addition:**
  - liquefied carbon dioxide logistics to the port
  - dedicated terminal in the port
- **investment decision 2027?**

Infrastructure is a key factor in CCUS project development

- CO2 transportation and logistics infrastructure are crucial factors in the development of CO2 usage and storage projects:
  - Regional hubs can be formed based on the proximity of CO2 sources and usage sites.
  - Common infrastructure can be shared to reduce costs for individual projects.
- The location of CO2 terminals is determined by CO2 sources and locations of other energy-related infrastructure (such as grid, district heating, and hydrogen networks).
- Domestic CO2 transport options include pipeline, road, and rail transport.
  - The optimal solution depends on terminal/hub location, distances, and quantities transported.
- In case of storage projects, the transportation of CO2 to permanent geological storage outside of Finland is assumed to be done by ship.
- A study made by VTT and commissioned by the Bioenergy Association of Finland with 9 companies to be published on Oct 4

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Thank You for Your Interest!

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